EXPLORING FACTORS ASSOCIATED WITH AGGRESSIVE BEHAVIOUR IN ADOLESCENTS

by

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Abstract

This thesis examines the factors associated with aggressive behaviour in adolescents. It contains an introduction to the thesis. Chapter one contains a systematic literature review investigating the relationship between video game violence and aggressive behaviours in adolescents. The results of the review indicate that there is some evidence to suggest a link exists between exposure to violent video games and aggressive behaviour. However, this review also indicated that there were inconsistencies between studies and several methodological limitations of these, thereby, identifying gaps in the literature. Chapter two contains a piece of empirical research examining the relationship between exposure to violence in video games and aggressive behaviours in a sample of adolescents. Further, it explored possible mediators and moderators of this relationship; namely hostile attribution bias, empathy and exposure to violence in real life. The results of this research found a relationship between exposure to violence in video games and aggressive behaviour. In addition, this study found that hostile attribution bias, empathy and exposure to real life violence moderated this relationship. Chapter three is a case study describing the psychological assessment, formulation and planned intervention with a young person presenting with aggressive behaviours. A number of treatment considerations and potential obstacles to treatment with this population are discussed. Chapter four consists of a critical review of the Psychological Inventory of Criminal Thinking Styles (Version 3.0) which was used in the case study presented in chapter three. This review examines reported reliability and validity data for the measure as well as its limitations. Finally, implications of this thesis are discussed in chapter five.

Dedication

This thesis is dedicated to my parents, John and Suzanne Goddard; without their continued support and enthusiasm, the production of this thesis would not have been possible.

Acknowledgements

This thesis took a considerable amount of time, energy and team work. As a result, I would like to recognise those who helped with this endeavour. First, I would like to thank Dr. Louise Dixon and Dr. Jessica Woodhams, my academic supervisors, who helped immensely with suggestions, constructive criticism and support at every stage of the project. I would also like to thank the Forensic Psychology department administrative staff members, Sue Hanson and Stella Briggs, who go above and beyond the call of duty and have helped me in countless ways. I must also acknowledge my family for their continued support. Finally, I am grateful to the institutions for allowing me access to their services and the adolescents whose participation made this project possible.

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Introduction

1.1 Definition of the problem

Aggressive behaviour displayed by adolescents is a growing and common problem of concern. Whilst definitions differ widely, 'aggressive behaviour' or 'aggression' is defined here as behaviour intended to harm another individual who is motivated to avoid that harm (Bushman & Anderson, 2001a). It is not an affect, emotion or aggressive thought, plan or wish. This definition excludes accidental acts that lead to harm, such as losing control of a motor vehicle and killing a pedestrian, but includes behaviours intended to harm even if the attempt fails such as when a person attempts to shoot but misses a human target. It is differentiated from 'violence' which refers to extreme forms of aggression such as physical assault and murder. All violence is aggression but not all aggression is violence. Some researchers argue there are different types of aggression and make a distinction between instrumental and reactive aggression (e.g., Fontaine, 2007). Instrumental aggression is typified by deliberation and instrumental motives whereas reactive aggression results from an interpretation of a provocative, threatening or unjust stimulus, anger, impulsivity and an interest in hurting the perceived provocateur (Fontaine, 2007).

The social and political focus on adolescent aggression has increased dramatically in recent years. In the United Kingdom (UK), society appears to be in a state of confusion and disbelief as the number of lives lost as a result of the series of aggressive attacks perpetrated by young people increases. In 2009, many were horrified as they learnt that young brothers, aged 10 and 11, had lured two boys, aged 9 and 11, to a South Yorkshire ravine before carrying out a brutal attack (British Broadcasting Corporation (BBC), 2009a). In January 2008 alone, there were two fatal stabbings and several other knife attacks on teenagers, committed by other teenagers, in England (BBC, 2009b). Official statistics on the behaviour of adolescents only serve to increase this level of concern (e.g., Joseph Rowntree Foundation, 2002; Youth Justice Board, 2004). For example, in a survey of over 30,000 young people in England and Wales in 2005, 14 per cent of the sample reported attacking someone with the intention of hurting them in the previous 12 months (Armstrong et al., 2005). Further, according to the sentencing statistics, in 2007

45% of all crimes committed by young people were violent crimes against people (www.justice.gov.uk/publications/docs/sentencing-statistics-2007-revised.pdf).

Aggression in moderation appears to be a vital adaptive behaviour in humans. For example, it can be viewed as a positive response when one is threatened. Aggression is a prominent feature in childhood, often labelled as tantrums in some cases. Even very young children show features of aggressive behaviour; by eighteen months, children can be observed being physically aggressive toward siblings, peers and adults (Hay, Castle, & Davies, 2000; Keenan & Shaw, 1994; Keenan & Wakschlag, 2000; Tremblay et al., 1999, 2004). However, the vast majority of children will unlearn this behaviour based on the cues they receive from their environment. As they mature, they evolve better responses by observing and learning from others, their environment and their experiences. This fact is important because it places the nature and quality of interactions with others and the environment in which a child grows up in at the heart of aggressive behaviour.

The continuation of aggressive behaviour into adolescence is of particular concern as the prospects for these individuals are bleak. Not only does adolescent aggression have both a physical and mental impact upon the victims and their families, it also has a negative impact on the aggressive adolescent themselves including placing them at a higher risk of alcohol and drug abuse, involvement with the criminal justice system, depression and suicide attempts (Farrington, 1994; Fergusson & Horwood, 1998; Kokko & Pulkkinen, 2000; Nagin & Tremblay, 1999; Serbin et al., 1998). Further, aggressive behaviour during adolescence can continue into adulthood and even escalate in severity which increases their risk of spousal abuse and neglectful and abusive parenting as well as decreasing their employment prospects (Broidy et al., 2003; Fergusson & Horwood, 1998; Kokko & Pulkkinen, 2000). Indeed, research has shown that aggressive children are at high risk of later serious and chronic violent behavior and suggests that there is stability in aggression from adolescence to middle age (Kokko & Pulkkinen, 2005; Loeber & Stouthamer-Loeber, 1998; Nagin & Tremblay, 1999). For example, correlational findings from research have shown that, in men, physical aggression at age

8 was moderately stable to physical aggression at age 30 (r = .25) (Huesmann, Eron, Lefkowitz, & Walder, 1984) and weakly stable from age 8 to severe physical aggression at age 48 (r = .15) (Dubow et al., 2006).

Although there appears to be stability in aggressive behavior over the course of development, desistance from aggression also is common (Loeber & Stouthamer-Loeber, 1998). Many children who are aggressive at a young age modify their behavior before, or soon after, they enter adolescence (Loeber & Stouthamer-Loeber, 1998; Nagin & Tremblay, 1999). For example, whilst Nagin and Tremblay (1999) found that aggressive behavior at age six predicted self-reports of violence and serious delinquency during adolescence among boys, nearly one-half of all children who exhibited moderate levels of aggression at age six showed notably lower levels of aggression by ages 10 to 12. Twenty percent to 30 percent of those who received the highest teacher ratings of aggression at age six desisted from violence by age 15. The authors noted that as children grow older and acquire skills for problem solving, aggressive behaviors are replaced with behaviors that are more socially appropriate. Research has also shown that desistance from aggression occurs when youths develop strong bonds to pro-social peers and adults who reinforce positive behavior (Battin, Hill, Abbott, Catalano, & Hawkins, 1998; Catalano & Hawkins, 1996; O'Donnell, Hawkins, & Abbott, 1995). Other studies have shown that a child's potential for aggressive behaviour can be reduced when strong bonds are formed to school or religious institutions and when adolescents have higher academic achievement and refrain from substance misuse (Catalano & Hawkins, 1996; O'Donnell et al., 1995).

1.2 Previous research on factors associated with adolescent aggression

Research has strived to identify factors associated with adolescents' aggressive behaviour to better understand and clarify the factors underlying this and to guide preventative interventions and allocate limited resources most effectively. The vast array of literature on precursors to adolescent aggression has identified numerous factors associated with aggressive behaviours among adolescents. The Nested Ecological Theory (Belsky, 1980;

Bronfenbrenner, 1979; Dutton, 1985) implies that, in order to understand adolescent aggression, researchers must examine factors at four levels: the culture (macrosystemic), the environment (exosystemic), the family (microsystemic) and the individual (ontogenic). This model allows for the integration of multiple levels and contexts and examination of the multiple effects and interrelatedness of factors to establish the wider picture on adolescent aggression; research that focuses on any one level underestimates the effects of other contexts. This model recognises the complex and multifaceted nature of the aetiology of adolescent aggression and provides a scheme for systematically ordering the large body of data and integrating various theoretical viewpoints (Belsky, 1980). Therefore, using the Nested Ecological Theory (Belsky, 1980; Bronfenbrenner, 1979; Dutton, 1985), the factors identified as being associated with aggression in adolescents can be divided into four levels: macrosystemic, exosystemic, microsystemic and ontogenic, with bi-directional influences within and between the levels. This model indicates that no one factor can answer the question as to why aggression results but rather we must consider the interplay of several factors at several levels of our environment and at the individual level.

The macrosystemic level is related to broad, cultural values and beliefs that influence ontogenic and micro and exosystem development. Factors at this level might include the general, societal attitude towards adolescents and their aggressive behaviour, the legal response to aggressive acts by this demographic and its portrayal by the media. Research on factors associated with adolescent aggression at this level is limited. However, research on, for example, the effects of media on adolescents (e.g., Colwell & Kato, 2005) are at this level. This is an area for possible research.

The exosystem level refers to formal and informal social structures that impinge upon the immediate setting in which that person is found and which influences them. Factors associated with adolescent aggression at this level include: living in an area where there is a high crime rate (Tarolla, Wagner, Rabinowitz, & Tubman, 2002), high levels of poverty (Farrington & Painter, 2004; Felner, 2005; Hubbard & Pratt, 2002; Obeidallah, Brennan, Brooks-Gunn, & Earls, 2004; Smith & McAra, 2004; Smith & McVie, 2003), a

lack of social support (Siegel & Senna, 2000) and a lack of available activities for adolescents (Scales, Benson, & Leffert, 2000).

At the microsystemic level, which refers to the family unit or the immediate context in which aggression occurs, factors include: poor emotional attachment between parents or primary caregiver and child (Acoca, 1999; Barnow, Schuckit, Lucht, Ulrich, & Freyberger, 2002; Farrington & Painter, 2004), witnessing domestic violence and conflicts in families (Arnull et al., 2005; Barnow et al., 2002; Batchelor, 2005; Farrington & Painter, 2004; Hubbard & Pratt, 2002; Katz, 2000), parental criminality, incarceration and substance abuse (Acoca, 1999; Arnull et al., 2005; Barnow et al., 2002), poor parenting practices (Farrington & Painter, 2004; Smith & McAra, 2004; Smith & McVie, 2003), family structure and functioning (Rantakallio, Myhrman, & Koiranen, 1995; Smith & McVie, 2003), physical and sexual abuse (Acoca, 1999; Arnull et al., 2005; Austin, 2003; Batchelor, 2005; Chesney-Lind, 2001; DiNapoli, 2003; Hubbard & Pratt, 2002; Smith, Leve, & Chamberlain, 2006; Smith & McAra, 2004; Smith & McVie, 2003) and a history of accommodation in care (Arnull et al., 2005; Batchelor, 2005; Smith & McVie, 2003). Furthermore, associations with deviant peers (DiNapoli, 2003; Farrington, 1995; Fergusson & Horwood, 1996; Fergusson, Swain-Campbell, & Horwood, 2002; Hoge, Andrews, & Leschied, 1994; Piquero, Gover, MacDonald, & Piquero, 2005; Smith & McVie, 2003; Woodward, Fergusson, & Horwood, 2002) and gang participation (Esbensen, Deschenes, & Winfree, 1999) have also been identified as factors associated with aggressive behaviours in adolescents at this level.

Finally, factors associated with adolescent aggression at the ontogenic level, which refers to individual development and an individual's unique, developmental history, include: the age of onset of aggression (Arnull et al., 2005; Cottle, Lee, & Heilbrun, 2001; Hubbard & Pratt, 2002), substance abuse (Batchelor, 2005; Blum, Ireland, & Blum, 2003; DiNapoli, 2003; Flood-Page, Campbell, Harrington, & Miller, 2000; Lenssen, Doreleijers, & Dijk, 2000; Lipsey & Derzon, 1998; Smith & McVie, 2003), mental health problems (Acoca, 1999; Batchelor, 2005), low self-esteem (Chesney-Lind & Shelden, 1998; Smith & McAra, 2004; Smith & McVie, 2003), low academic achievement (Batchelor, 2005;

Siegel & Senna, 2000), expulsion from school and high levels of truanting (Acoca, 1999; Batchelor, 2005; Rumberger & Larson, 1998; Smith & McAra, 2004) and limited involvement in extracurricular activities (Eccles & Barber, 1999; Smith & McAra, 2004).

1.3 Thesis aims

This thesis aims to investigate multiple factors associated with aggressive behaviour in adolescents. It consists of five chapters, all of which contribute to an examination of this aim in order to further knowledge and understanding by which to guide effective preventive interventions. The first two chapters of the thesis place a particular emphasis upon the contribution that video games[1] make to aggressive behaviours in adolescents as they spent the majority of their free time playing these games (Funk, in press). Chapters three and four provide a focus on interventions with aggressive adolescents.

Specifically, chapter one contains a review of the literature which aims to assess the links between exposure to violent video games and aggressive behaviours in children under the age of 18 years. Chapter two presents a research study which aims to explore the effects of exposure to video game violence on aggressive behaviours in a sample of adolescents. Further, it aims to explore factors which may mediate and/or moderate this relationship; namely hostile attribution bias, empathy and exposure to violence in real life. Chapter three describes a case study of an adolescent who has been identified as displaying aggressive behaviours. This chapter aims to describe the assessment and formulation of an adolescent who presents with aggressive behaviours and an intervention plan for addressing this behaviour. Further, it aims to discuss treatment considerations and potential obstacles to treatment with this population. Chapter four is a critique examining the Psychological Inventory of Criminal Thinking Styles (Version 3.0) (Walters, 1995),

[1] The term ‘video games’ covers a broad spectrum of products, played on different platforms, with varying content. The term includes games on mobile phones and the internet, games for educational or training purposes and those played on computers and consoles. Some contain violent material whereas others are more family orientated.

an assessment tool designed to measure the thinking styles evident in offending populations which are thought to facilitate and maintain a criminal lifestyle. This chapter aims to provide an overview of the instrument in addition to a discussion of the scientific properties of the tool, its applicability to different types of offenders and its potential value as a research tool. Finally, a discussion is presented in chapter five regarding the findings of this thesis, its contribution to the literature and implications for future research.

Chapter One:
Violent Video Game Exposure and Aggressive Behaviours: A Systematic Literature Review.

1. Abstract

1.1 Aim: This systematic review aimed to assess the links between exposure to violent video games and aggressive behaviours in children under the age of 18 years.

1.2 Methods: Scoping methods were employed to assess the need for the current review. A literature review was then carried out following a systematic approach. Inclusion/exclusion criteria and quality assessment methods were employed. Data was extracted and synthesised from the included studies using a qualitative approach.

1.3 Results: Seven studies were included in the review. Six studies found evidence to support the existence of a positive association between violent video game exposure and aggressive behaviour. However, the findings from five of these studies suggest that this association is not significant when other variables are controlled for. Furthermore, despite some studies finding a positive association, these associations were small and the findings appear somewhat contradictory as there was also some evidence from the studies that exposure to violent video games may be associated with less aggressive behaviours. The other study found no evidence for a positive association and, conversely, found some evidence to support a negative association and, therefore, the idea that playing violent video games may be associated with less aggressive behaviours.

1.4 Conclusions: The findings of this review suggest that the research into the effects of violent video games on children and adolescents is inconsistent and requires further investigation. The complexity of research in this area is discussed with reference to methodological considerations. Future research recommendations are also discussed.

2. Background

2.1 Overview

Video games are, currently, in a period of rapid development. From a design point of view, video games are becoming more complex, realistic and interactive and they are spreading to new platforms such as mobile phones, websites and pocket computers. From an economic point of view, the video games industry is showing rapid rates of growth. Worldwide, the turnover in this industry in 2007 was about $41.9 billion (http://www.gamasutra.com/php-bin/news_index.php?story=21763). This number is expected to grow 9.1% annually to $68 billion in 2012 (http://www.businessweek.com/innovate/content/aug2007/id20070813_120384.htm?chan=search) making it the fastest-growing component of the media sector worldwide. By 2015, analysts predict the global video game industry will reach $91 billion (http://www.lsa.fr/exclusif-lsa-nintendo-france-a-vendu-38-millions-de-consoles-en-2008,102674?xtor=RSS-7). From a cultural point of view, however, video games have come under great criticism. In particular, there is a large controversy surrounding the relationship between playing violent video games and the behaviour of adolescents (e.g., Bensley & van Eenwyk, 2001; Dill & Dill, 1998).

This chapter will give a brief background of the video game industry and video game play. It will then describe some of the research investigating the effects of playing violent video games and theories that have been put forward to account for these effects. This chapter will then conduct a review of the literature on the effects of violent video games on the behaviour of children and adolescents.

2.1.1 Development and advances in the video game industry

The first video games emerged in the late 1970s and the number of people playing video games is now greater than ever before. Within Europe, UK consumers buy the largest

numbers of video games (Entertainment & Leisure Software Publishers Association, 2004). Fifty-nine percent of people aged 6 to 65 years (26.5 million people) in the UK play video games and 21.6 million play at least once a week (Byron, 2008). The average gamer is in their late twenties. However, virtually all children and young people play video games (Byron, 2008). Most video games are accessed through games consoles. However, a significant minority of children and young people play video games online and a small number access video games on mobile phones (Byron, 2008). Around two thirds of 5 to 16 year olds have their own games consoles whilst 87% have a console at home (Childwise, 2008).

Violent video games are those that depict intentional attempts by individuals to inflict harm on others. An 'individual' is not necessarily a person, it can be a non-human, cartoon character. This genre of video game came of age in the 1990s with the release of video games such as Mortal Kombat, Street Fighter and Wolfenstein 3D. The main task of these video games is to maim, wound or kill opponents. While the graphics (e.g., blood) and sound effects (e.g., screams) of these video games were cutting-edge at that time, technological advances have made video games even more graphically violent and realistic.

2.1.2 Video games, violent content and preference for violent video games

There are a variety of types of video games currently available. Funk (in press) describes six categories of video games (see Table 1). The majority of video games sold (44%) are classified as for ages 3 and older whilst only a small percentage (6%) are certificate 18+ (Byron, 2008). However, even video games involving cartoon-like characters, which are aimed at and classified by the industry as appropriate for general audiences, including children and adolescents, contain violent content. It has been reported that as many as 79% to 85% of video games contain violence (Dill, Gentile, Richter, & Dill, 2005). Whilst educational and 'brain training' video games exist, approximately 50% of young people's favourite video games feature violent content and many children and adolescents report having played 18+-rated titles (Buchman & Funk, 1996).

Table 1: Video game categories with descriptions

Category	Description
General Entertainment	Story or game with no fighting or destruction
Educational	Learning new information or figuring out new ways to use information
Fantasy Violence	Cartoon character must fight or destroy things and avoid being killed or destroyed while trying to reach a goal, rescue someone or escape from something
Human Violence	Human character must fight or destroy things and avoid being killed or destroyed while trying to reach a goal, rescue someone or escape from something
Non-violent Sports	Sports without fighting or destruction
Sports Violence	Sports with fighting or destruction

Taken from Funk (in press) pp. 57.

Research from focus groups to determine the reasons for playing video games reveal that, at the most basic level, video games are purely entertaining. They also suggest other reasons such as arousal, challenge, competition, diversion (avoidance of boredom, problems and stress), mood management, enhancement and attainment of developmental tasks, involvement in fantasy activities and social interaction (Funk, Chan, Brouwer, & Curtiss, 2006; Raney, Smith, & Baker, 2006; Salisch, Oppl, & Kristen, 2006; Sherry, Lucas, Greenberg, & Lachlan, 2006).

There has been minimal research directed specifically at understanding the attraction of violent video games. However, why violent video games are so appealing has been the focus of professional research and debate (Goldstein, 1998, 1999). The catharsis theory posits that video games are attractive because they serve as a release for aggression and that playing them would have a relaxing effect and, thus, also reduce aggressive behaviours (Kestenbaum & Weinstein, 1985). There is some evidence to support this theory (e.g., Colwell & Kato, 2005). Some researchers suggest an element of the

'forbidden fruit' where the appeal of games is enhanced by ratings that indicate violence (Kirsh, 2006). However, there is only mixed support for this explanation which is most likely to apply to boys (Kirsh, 2006). Other researchers suggest that children and adolescents seek out violent video games because of the need for new experiences and for physiological arousal (Aluja-Fabregat, 2000; Hind, 1995; Raney et al., 2006; Slater, 2003). McCauley (1998) suggests that the entertainment context modifies the anxiety which would normally be associated with violent images into a general state of arousal or excitement which some find enjoyable. Indeed, in focus groups, participants reported enjoying engaging in antisocial activity during game-playing such as extreme defiance of authority and rule-breaking (Funk et al., 2006). Further, Jansz (2005) suggests that violent video games are so appealing to adolescents, in particular males, because they provide them with the opportunity to choose to experience different emotions such as anger and fear.

For children and adolescents, it is most likely that video games with violent content are appealing to different individuals for varying reasons. However, personal history seems to be a key variable. Cantor (1998) found callous children who have been over-exposed to violence tend to be seeking continued arousal whereas anxious and emotionally reactive children are trying to master anxiety-provoking experiences. This would suggest that individuals who are exposed to greater levels of real life violence may play violent games as a result of this exposure. Evidently more work is needed to understand the appeal of violent video games.

2.1.3 Time spent playing video games and parental control

Playing video games is one of the most popular choices from available leisure activities across childhood and adolescence (Funk, in press). The time spent playing video games by children and adolescents has increased dramatically since they were first introduced. In the mid 1980s children spent an average of 4 hours a week playing (Harris & Williams, 1985). By the mid 1990s this had increased to over 7 hours per week (Buchman & Funk, 1996) and, in the 21st century, children are reporting spending 9 hours

per week playing video games (Gentile, Lynch, Linder, & Walsh, 2004) with children as young as ages 2 to 7 averaging 3 to 5 hours of play a week (Gentile & Walsh, 2002). Although, in most cases, video game playing occupies a relatively small percentage of total leisure time, there does appear to be a small group of children and adolescents whose excessive time commitment to and feelings about video game playing may interfere with other activities and suggest addiction (Chiu, Lee, & Huang, 2004; Griffiths, 2007; Yang, 2005).

Current research suggests that playing time peaks for many in middle childhood to early adolescence (Rideout & Hamel, 2006; Rideout, Roberts, & Foehr, 2005) with the exception of individuals who are particularly interested in video games (gaming 'enthusiasts') and, it is consistently reported, that boys play more than girls at all ages (Buchman & Funk, 1996; Gentile et al., 2004; Rideout et al., 2005). Whilst most of these studies have been on American samples, studies in other countries, such as Japan, Australia and the UK, report similar findings (Colwell & Kato, 2005; Pratchett, 2005; Wake, Hesketh, & Waters, 2003).

It is interesting to note that the pattern of video game play across adolescence mirrors the development of aggressive behaviours with both video game play and aggression increasing from ages 11 to 14 and decreasing in later adolescence (Kirsh, 2003). In some cases, pre-existing, aggressive tendencies may lead youth to actively seek out violent media and the resulting exposure may reinforce and exacerbate aggressive tendencies (Slater, Henry, Swaim, & Anderson, 2003).

As video games became a common leisure choice and their realism and graphic violence increased, researchers, policy makers and the general public became concerned about their effects on individuals. As a result, classification systems for video games were introduced. In the UK there are currently two classification systems: the British Board of Film Classification (BBFC) and the Pan European Game Information System (PEGI). Despite these systems, as is the case with films, few children and adolescents and, indeed, parents adhere to them. Parents often do not restrict their child's access to, or the amount

of time spent playing, video games. Furthermore, it is reported that, many parents never check what their children are playing or are unaware of the content (Byron, 2008). Many violent video games are marketed to youths and are easily obtained regardless of age (Federal Trade Commission, 2000).

2.1.4 Effects of violent video games

With this growing concern, researchers began to investigate the effects of playing violent video games on individuals. Several studies, both correlational and experimental, have demonstrated that playing violent video games can have a wide variety of negative effects on players including increasing aggression. These studies have demonstrated that exposure to violent video games increases aggressive behaviour (e.g., Anderson & Dill, 2000; Anderson, Gentile, & Buckley, 2007a,b,c; Cooper & Mackie, 1986; Wallenius, Punamäki, & Rimpelä, 2007), cognitions (e.g., Anderson & Dill, 2000; Bushman & Anderson, 2002; Calvert & Tan, 1994; Kirsh, 1998), affect (e.g., Anderson & Ford, 1986; Ballard & Wiest, 1996; Calvert & Tan, 1994; Fleming & Rickwood, 2001; Scott, 1995) and physiological arousal (e.g., Ballard & Wiest, 1996; Calvet & Tan, 1994; Fleming & Rickwood, 2001; Lynch, 1999) and decreases helping behaviour (e.g., Ballard & Lineberger, 1999; Silvern & Williamson, 1987).

Several theories and mechanisms are relevant as to how violent video games can lead to an increase in aggression and violence (see Tables 2 and 3). The current, dominant theory in this field is the General Aggression Model (GAM) proposed by Craig Anderson and his colleges (Anderson & Bushman, 2002; Anderson & Huesmann, 2003; Carnagey & Anderson, 2003) which integrates most of the earlier models of aggression (e.g., Anderson, Deuser, & DeNeve, 1995; Anderson & Dill, 2000; Bandura, 1983; Berkowitz, 1990; Crick & Dodge, 1994; Geen, 2001; Huesmann, 1986, 1998; Lindsay & Anderson,

Table 2: Theories to explain the effects of violent video games

Theory	**Description**
Social Learning Theory (Bandura, 2001; Calvert & Tan, 1994)	Aggression is learnt through observing the aggressive behaviours of video game characters. These behaviours are integrated into the individual's behavioural repertoire and then taken from the repertoire and exhibited. Furthermore, gaining higher scores and beating peers could provide motivation for increased aggression by reinforcing the behaviours.
Arousal Theory (Ballard & Wiest, 1996; Tannenbaum & Zillmann, 1975)	Playing an arousing video game might cause increased aggression in players who have an aggressive disposition or who are angry due to a generalised increase in energy and intensity. According to this theory, violent video games would only be expected to increase aggression in the presence of anger from another source.
Cognitive 'Priming' Theory and Social Information-Processing Model (Berkowitz, 1984; Dodge & Crick, 1990; Kirsh, 1998)	Violent video games activate related cognitive structures making it more likely that incoming information will be processed in an 'aggression' framework, possibly increasing aggressive behaviour. For example, someone whose thoughts of aggression have been provoked might be more likely to interpret ambiguous behaviour as aggressive and react accordingly.

Catharsis Theory (Kestenbaum & Weinstein, 1985)	Violent video games can provide a safe outlet for aggressive thoughts and feelings.
Drive-reduction Theory (Rubin, 1994)	Drive theory suggests that humans are born with certain physiological needs and that a negative state of tension is created when these needs are not satisfied. When a need is satisfied, drive is reduced and the organism returns to a state of equilibrium and relaxation. Therefore, violent video games might be useful in management of aggressive drives in that individuals may play violent video games to re-establish emotional equilibrium through arousal or relaxation.
General Aggression Model (Anderson & Dill, 2000)	This theory integrates social learning, arousal and cognitive processing theories and includes individual and situational variables. It suggests exposure to violent video games can prime aggressive thoughts, increase hostile feelings or increase arousal resulting in short-term increases in aggressive behaviours. Long-term increases in aggression result when video game play results in changes in aggression related knowledge structures or ‘scripts’ for events which guide behavioural reactions.

Table 3: Mechanisms to explain the impact of violent video games

Mechanism	Description
Observational Learning	After observing the behaviour of others, these behaviours are integrated into the individual's behavioural repertoire
Imitation	Learned behaviours are taken from the repertoire and exhibited
Schema Development	Knowledge structures about the typical organization of daily experience develop as a way to manage information efficiently
Script Development	Specific types of schemas for events develop to guide behavioural reactions
Priming	Violent media activate aggressive schemas
Automatisation of Aggressive Schemas	Repetitive priming of aggressive schemas makes them chronically accessible
Arousal	Physiological arousal occurs in response to particular stimuli; aggressive stimuli cause aggressive arousal

Excitation Transfer	Misattribution of the source of aggressive arousal could lead to aggression
Cognitive Desensitization	Beliefs that violence is common and mundane decreases the likelihood that moral evaluation will inhibit aggression
Emotional Desensitization	Numbing of emotional response to violent actions or experiences decreases likelihood that moral evaluation will inhibit aggression

Taken from Funk (in press) pp. 63.

2000; Zillmann, 1983). It provides a useful framework for understanding the effects of violent video games and there is some evidence to support this model (e.g., Bushman & Anderson, 2002).

According to the GAM, aggressive behaviour is largely based on the learning, activation and application of aggression related knowledge structures, stored in memory, known as cognitive scripts or schema. The psychological processes that link exposure to violence with subsequent increases in aggressive behaviour can be divided into those that produce immediate but transient changes and those that produce delayed but enduring changes.

The GAM model asserts that input variables, routes and outcomes interact in a cyclical manner to affect aggressive behaviour (see Figure 1). Input variables consist of personal variables, for example an individual's genetic predisposition, personality characteristics and attitude, and situation variables, such as exposure to violence in video games. Situational input variables influence aggressive behaviour by impacting on the person's present, internal state including their cognitions, affect and arousal which may be positive or negative, pleasant or hostile.

Exposure to violence in video games may, therefore, have an immediate impact in increasing aggressive behaviour by priming aggressive cognitions (including aggressive thoughts, expectations and hostile attribution bias and previously learnt behavioural scripts), by increasing arousal, by creating an aggressive affective state or by teaching players how to aggress (imitation of actions). All of these could lead to impulsive action and, possibly, to aggressive behaviour during a given social encounter.

Long-term effects also involve learning processes. From birth, humans learn how to perceive, interpret, judge and respond to events in their physical and social environment (Bandura, 1973). Various knowledge structures for these tasks develop over time and are based on experiences including real observations and interactions with others (i.e., in the family or community) and imagined ones (i.e., in video games) (Bandura, 1973). According to the GAM, repeated exposure to violence leads to learning, rehearsal and

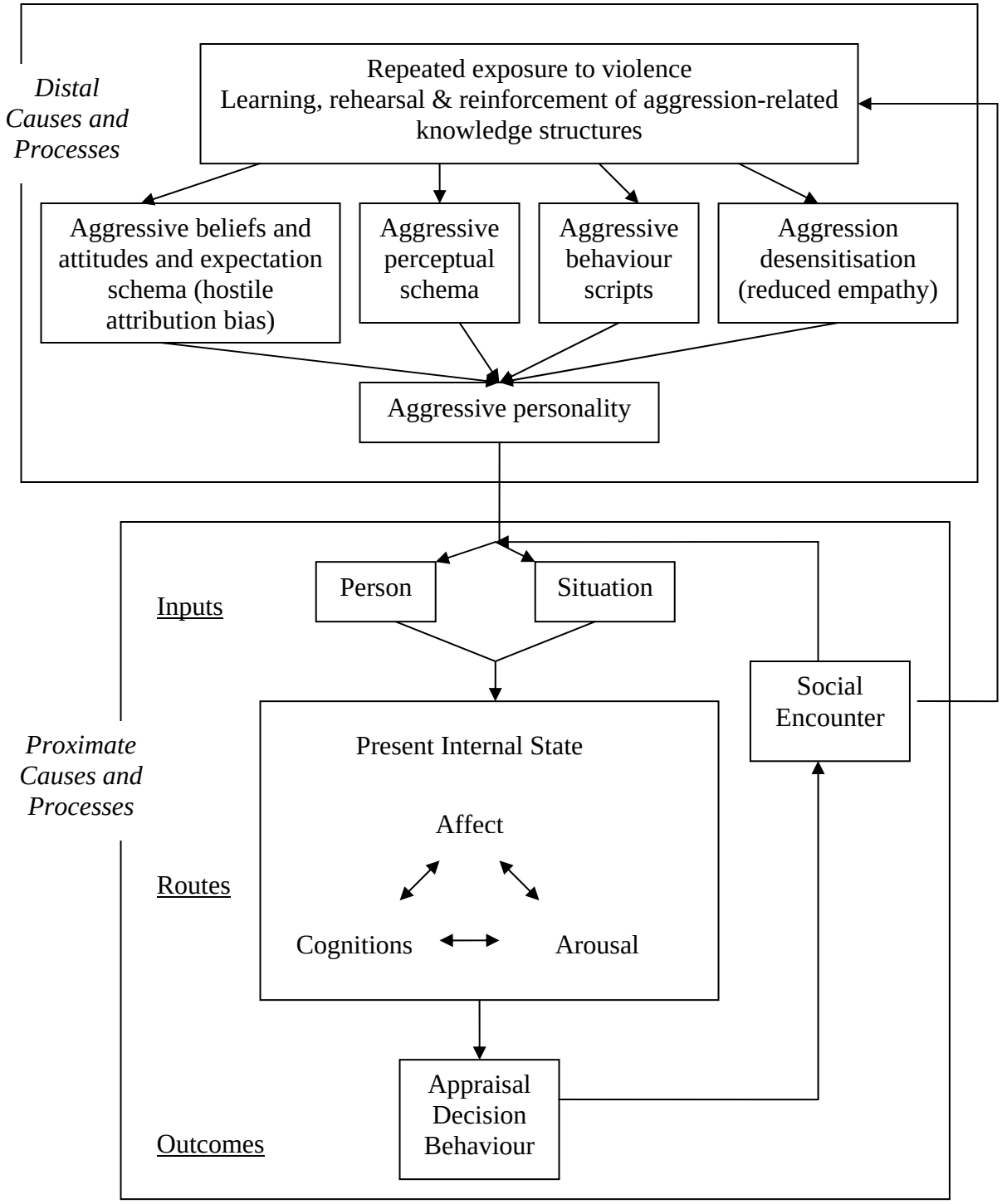

Figure 1: The General Aggression Model: Overall view. Adapted from Anderson et al. (2007d) pp. 45-46. Reprinted by permission.

reinforcement of aggression-related knowledge structures. Thus, the person develops aggressive beliefs and attitudes, perceptual schema, expectations and behaviour scripts and becomes desensitised to aggression. Exposure to violence changes the person's knowledge structures and, as these are rehearsed, they become more complex, differentiated and difficult to change. As a result, according to this model, there is a long-term change in the person's aggressive personality as a result of exposure to violence in video games which makes them more likely to behave aggressively.

Using this model it could be argued that violence in video games can increase both instrumental and reactionary aggression depending on the nature of the video game. For example, playing a game such as Grand Theft Auto, where characters use aggressive behaviours to steal items, could increase the likelihood of instrumental aggression through several mechanisms including: modelling behaviours and the development or priming of behavioural scripts. Similarly, playing a wrestling game (e.g., WWE Smackdown vs. RAW 2010) could increase the likelihood of reactionary aggression through increasing aggressive arousal.

2.2 Previous research and reviews

Preliminary searches for existing systematic reviews and meta-analyses were conducted using the Cochrane Library, PsycINFO, ASSIA, MEDLINE, ERIC, EMBASE, JSTOR and Web of Science electronic databases. In addition, the author's own collection of materials was used.

Many reviews on media violence were located (e.g., Anderson et al., 2003; Browne & Hamilton-Giachritsis, 2005; Bushman & Huesmann, 2006). However, seven meta-analyses (Anderson, 2003, 2004; Anderson & Bushman, 2001; Anderson et al., 2010; Ferguson, 2007a; Sherry, 2001, 2007) and four systematic reviews (Bensley & van Eenwyk, 2001; Dill & Dill, 1998; Emes, 1997; Griffiths, 1999) specifically related to violence in video games were located. The search also identified many reviews in conference papers and government and industry reports (e.g., Boyle & Hibbard, 2005;

Byron, 2008; Cumberbatch, 2004; Durkin, 1995; Egenfeldt-Nielsen & Heide Smith, 2003; Freedman, 2001; Goldstien, 2000, 2001; Harris, 2001; Ivory, 2001). However, due to the lack of peer review and potential for biases, these will not be discussed in this review.

Meta-analyses of violent video games and aggression have produced mixed findings. Four meta-analyses have found a positive relationship between violent video games and aggression and conclude there is a causal relationship between exposure to violence in video games and aggression (Anderson, 2003, 2004; Anderson & Bushman, 2001; Anderson et al., 2010) whereas three others (Ferguson, 2007a; Sherry, 2001, 2007) report having found no evidence for the causal link between violent video games and aggression.

It is interesting to note that the same author is involved in all the meta-analyses that have found a positive relationship between violent video games and aggression and conclude there is a causal relationship between exposure to violence in video games and aggression. Closer examination of the meta-analyses reveals that all the authors agree that the uncorrelated estimate for the effects of violent video games is quite small. However, the meta-analyses differ in their inclusion or exclusion of unpublished studies, how they analyse and correct for publication bias, the type of correlations used, the authors' perception of what constitutes a standardised and valid measure of aggression and how effect size estimates should be interpreted (Ferguson & Kilburn, 2010).

Systematic reviews have also produced mixed findings. Reviews by Dill and Dill (1998), Emes (1997) and Griffiths (1999) conclude that the evidence suggests that exposure to video game violence increases aggression. However, other reviews refute this (Bensley & van Eenwyk, 2001). Whilst many of these reviews conclude that the evidence is supportive of exposure to violent video games resulting in increases in aggression, they are cautious about their findings reporting that the data is inconsistent and has methodological problems (Dill & Dill, 1998; Emes, 1997; Griffiths, 1999).

Most of the research included in these reviews has been carried out on young adults (over 18 years) despite the concerns surrounding video game violence being directed towards their effects on children and adolescents. The effects of video game violence on children and adolescents are of particular concern as research on media violence suggests that there are sensitive periods when exposure to media violence can have a significant impact on the development of a behavioural predisposition to aggression (Eron, Huesmann, Brice, Fischer, & Mermelstein, 1983). Early experiences affect the development of neural connections and there are dramatic anatomical changes in the brain during adolescence (Dorn et al., 2003: Thompson et al., 2000), therefore, exposure to violent video games at these times could have a significant impact on a child. There may also be a cumulative effect of long-term exposure to violent media affecting adolescents (Johnson, Cohen, Smailes, Kasen, & Brook, 2002). In addition, research suggests adolescents may be the age group most vulnerable to the negative effects of exposure to violence due, in part, to the developmental changes, both biological and psychosocial, occurring during adolescence and their high levels of violent video game play (Kirsh, 2003). For example, during early adolescence, people experience rapid growth and maturation and increasing sexual feelings. Further, they face cognitive and socio-emotional challenges at school and changes in the emotional, social and psychological relationships with their parents and peers (Steinberg, 2001). Whilst most adolescents cope well with these changes, early adolescence is also a time of increased negative emotions and depression (Steinberg, 2001), making them more vulnerable to the effects of playing violent video games.

These previous reviews, with the exception of Anderson's (2003) meta-analytic review which analysed results for adults and children both combined and separately, have included studies on both adults and children and adolescents but have not, specifically, analysed the effects of violent video games on children under the age of 18. This current review differs in that it focuses on the effects of playing violent video games on children under the age of 18.

Most previous reviews have included a wide range of measures related to aggression including behavioural, cognitive, affective, physiological and pro-social measures. This

can lead to difficulties when interpreting the findings as there is confusion over what exactly is being measured. For example, Ferguson (2007a) reported that violent video games may increase aggressive thoughts but that these do not appear to lead to aggressive behaviours. This review differs in that it only includes studies that look specifically at aggressive behaviours. Furthermore, many of the studies included in these reviews have not, specifically, measured exposure to violent video games; some have merely looked at total video game play (e.g., Dominick, 1984; Lin & Lepper, 1987). This review differs in that it only includes studies that use a measure of exposure to violent video games.

Taking previous reviews into consideration, as well as the scoping searches employed prior to initiating this review, it was found that there was a need to further investigate the specific links between playing violent video games and aggressive behaviour in children under the age of 18 through a systematic approach. The present review is, therefore, deemed to be a valuable addition to literature in this area.

2.3 Aims and objectives

This systematic review aims to assess the links between exposure to violent video games and aggressive behaviours in children under the age of 18 years. Its objective is to determine whether there is an association between exposure to violent video games and aggressive behaviour in children under the age of 18 years.

3. Method

3.1 Sources of literature

A search was conducted on electronic databases including: the Cochrane Library (1800 to present, completed on May 9th 2010), PsycINFO (1985 to present, completed on May 9th 2010), EMBASE (1980 to present, completed on May 9th 2010), ASSIA (1985 to present, completed on May 9th 2010), ERIC (1985 to present, completed on May 9th 2010), Web of Science (1985 to present, completed on May 9th 2010) and MEDLINE (1950 to present, completed on May 9th 2010).

In order to source further material, the reference lists of reviews on the effects of violent video games were hand searched for studies matching the current search criteria as were references from the obtained articles. The bibliographies of books and online bibliographies (Parker & Becker, 1999, 2000, 2001, 2002, 2003, 2004, 2005, 2006, 2007) were also searched. Attempts were made, via email, to contact five experts interested in this area, Craig Anderson, Jeanne Funk, Patrick Kierkegaard, Douglas Gentile and Patricia Hind. This was done in order to gain additional resources and to ascertain whether they knew of any very recent studies. Only two did not reply.

3.2 Search strategy

The databases were electronically accessed, thus, limits were placed on searches. Searches were restricted to articles written in the English language due to both financial and time constraints of translating studies. The same searches were applied to all electronic databases. However, due to the differing search tools available from each database, slight variations did occur. Relevant searches and references were saved (see Appendix A for syntax).

Ideally hand searching would have been employed on all books and specific journals, such as Aggression and Violent Behaviour, due to the high volume of studies on this

topic published in these journals. However, availability and time constraints did not allow for this.

3.3 Search terms

The following terms were entered into the search. Although mapping to subject headings is a more efficient way to search for studies, keywords, abstracts and titles were searched in order to minimise the amount of studies that might be lost due to incorrect coding. Whilst this greatly increased the number of hits and duplicates, it also allowed for consistency across electronic resources as some databases did not have the mapping option. The wildcard option was used in the databases as, although this too increased the number of hits, it allowed for a more efficient search and minimised the amount of studies that might have been lost. It also allowed the search to accommodate for studies in different countries, using different spellings of the terms and accommodated for the wide variation in terms that researchers may use.

(Gam*) OR (Comput*) OR (Video gam*) OR (Videogam*)

AND

(Violen*) OR (Aggress*) OR (Antisocial) OR (Behav*) OR (Offen*) OR (Delinqu*)

AND

(Adolescen*) OR (Teen*) OR (Child*) OR (You*)

3.4 Study selection

Initially, scoping searches and a review of previous literature on the databases mentioned above led to the formation of inclusion/exclusion criteria (see Table 4) as follows.

Table 4: Inclusion/exclusion criteria

	Inclusion	Exclusion
Population	Individuals under the age of 18 (children, adolescents, youths)	People over the age of 18 (adults, university students)
Intervention	Risk Factor: Playing violent video games	Only observation of violent video games, online video games
Comparator	Exposure to non-violent video games (experimental studies)	N/A
Outcomes	Aggressive behaviour	Aggressive cognitions, aggressive affect, physiological arousal, other behaviours (e.g. pro-social behaviours)
Study Type	Any	
Other Exclusions:	Opinion papers, commentaries, editorials, unpublished papers and dissertations. Non-English papers. Papers published or data collection occurred before 1995.	

Studies were included if they met the following criteria:

(a) The study used participants under the age of 18 years.

(b) The study examined the effect of playing violent video games on some measure of aggressive behaviour.

(c) The study was published between the years of 1995–2010 and the data was collected after 1995. There were two reasons for this; the first was to examine 'recent' research given the number of reviews that have been done. Secondly, and perhaps more importantly, researchers (e.g., Carnagey & Anderson, 2004; Gentile & Anderson, 2003) have identified this period (1995 to present) as the 'third era' in which video game technology, graphics and sound effects improved markedly over previous eras making them more realistic and interactive which could mean more powerful experiences for, and effects on, the player. Many also include the option of personalizing the images of the video game characters. Video games within this 'third era' feature more violent content and first-person shooter-type games have increasingly dominated the market. Therefore, it was felt important that this review reflect research on the most current gaming technology as earlier research may not be as valid having been carried out on older forms of games. Furthermore, it is this 'third era' period in gaming technology which has caused the most controversy and concern regarding the effects of violence in video games.

(d) The study was published in a peer-reviewed journal. Book chapters, conference papers, dissertations and unpublished manuscripts were not included in the analysis. Although this may lead to some publication bias, it was deemed practical due to time and financial constraints of attaining articles as well as a lack of peer review. There was also no effective method for assuring that all relevant unpublished manuscripts could be obtained (including those from unknown authors or those intentionally or unintentionally suppressed by the authors).

Studies were excluded if they met the following criteria:

(a) The study only examined the possible effects on behaviours other than aggression (e.g., pro-social behaviour).

(b) The study only examined the possible effects on aggressive cognition, aggressive affect or physiological arousal or if the study examined other moods or psychological states such as depression, anxiety, self-concept, extroversion or neuroticism. Although the author recognises that aggression may be a factor in some of the studies excluded (for example, thoughts that involve aggression may lead to aggressive behaviour), the focus was on the most direct measure of aggression possible.

(c) The participants in the study merely observed someone else playing a video game.

(d) The study examined the use of online video games such as World of Warcraft. Despite these types of video games becoming increasingly popular, they were excluded because research on this genre is limited and filled with difficulties (Wood, Griffiths, & Eatough, 2004).

The inclusion/exclusion criterion was applied by the author to all studies. Those abstracts which did not reveal enough information to apply to the criteria were assessed using the full text article. All articles meeting the criteria, those about which the author was unsure and any of potential relevance were downloaded as full text. Those which were not available were ordered at a local library.

A flow diagram to illustrate the study selection process can be seen in Figure 2. It shows the number of hits, how many were duplicates or not relevant, how many were included and how many were excluded and reasons for exclusions. A total of eight studies were found that met the above inclusion/exclusion criteria and, thus, carried through to the quality assessment stage.

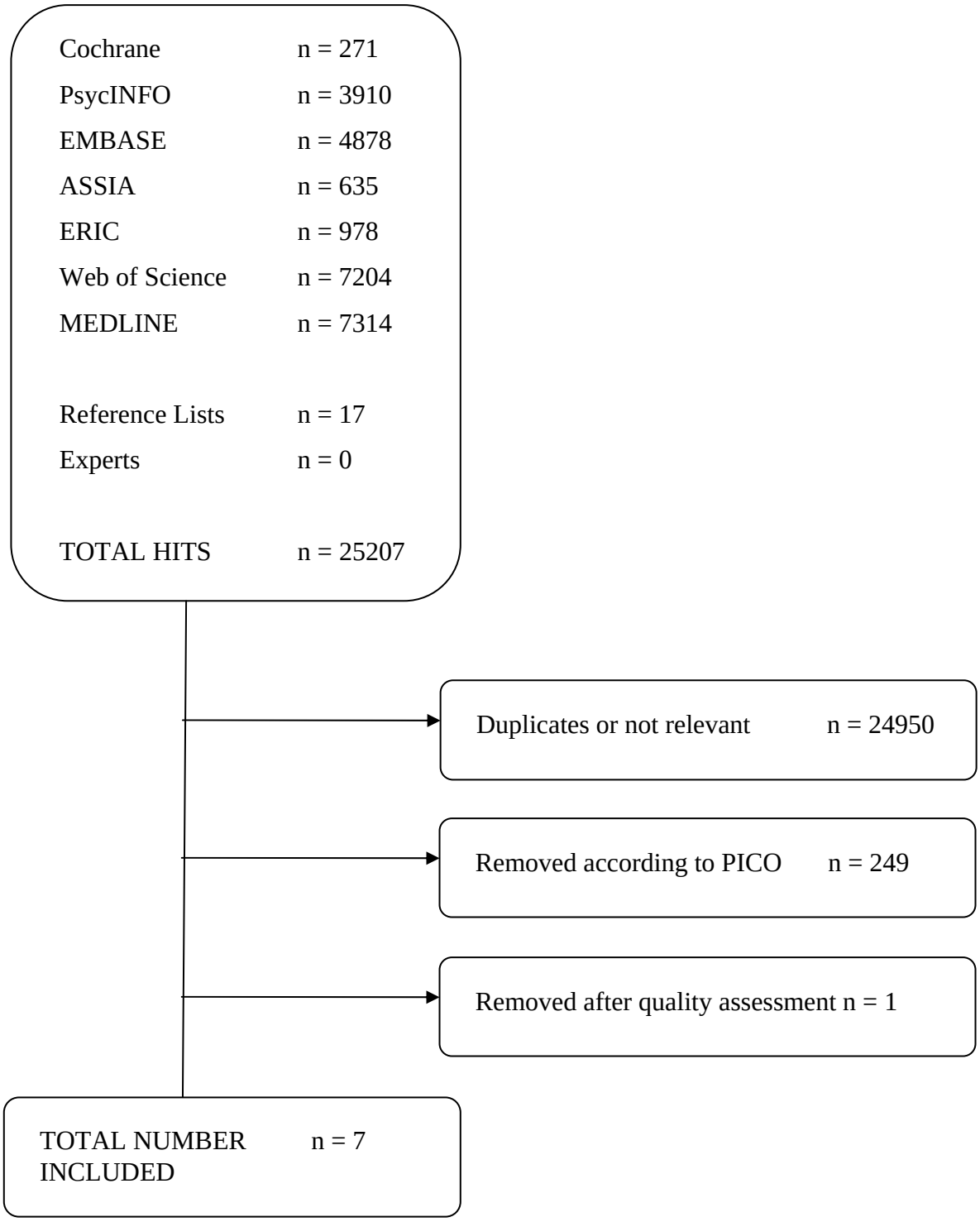

Figure 2: Flowchart of selection process

3.5 Quality assessment

Following the inclusion/exclusion stage, the methodological quality of included studies was assessed. The experimental, correlational and longitudinal studies were each assessed using different criteria in order to accurately assess their validity. The quality assessment criteria for all the types of studies were based on the Critical Appraisal Skills Programme (CASP, 2004) and included assessment of potential methodological problems (see Appendix B) that have been identified in previous research in the field of violent media (Anderson et al., 2007d).

The key variables of the quality assessment were: aims of the study, study design, sample selection, performance and measurement of outcomes, attrition rates, statistical analysis, clarity of outcome, applicability of findings and appraisal of limitations. Each item on the scoring sheet (see Appendix C, D and E) was assessed on a three-point scale (0 = '*No'*, 1 = '*Partly*', 2 = '*Yes'*), with an option of '*Unknown*' which was not included in the scoring but given extra attention in a qualitative manner. The total score was obtained by adding the scores of each item. The total score for the experimental study was out of a possible 98 whereas the total scores for the correlational and longitudinal studies were out of a possible 92. One study (Anderson et al., 2008) was excluded due to a quality assessment score of less than 50%. Therefore, a total of seven studies were carried through to the final analyses. The quality assessment scores for each study can be found in Table 5. Some of the strengths and limitations of each study are also commented on in Table 5.

3.6 Data extraction

To summarise the research findings for each of the studies, relevant features from each study were identified using a predefined pro-forma. The form (see Appendix F) allowed for the extraction of both general and more specific details required to make conclusions in this review. The data extracted from each study included: verification of study eligibility, study design, sample information including age and gender of participants, measurement of aggressive behaviour, measurement of exposure to video game violence,

statistical analysis, clarity of study and strengths and limitations. Information which was indecipherable from the studies was recorded as '*Unknown*'. Had the time constraint allowed, attempts would have been made to contact the authors of the studies in order to establish this information. However, this was not possible.

Table 5: Strengths, limitations and quality assessment scores of included studies

Authors (Year)	Study Strengths	Study Limitations	Quality Assessment Score (number of unknown)
Experimental Studies			
Irwin & Gross (1995)	• Controlled for arousal differences of video games and impulsive/reflective personality • Observers and participants blind to the research • High inter-rater reliability coefficient for observations	• Aggressive content of video games not rated independently • Video games not pre-tested for differences • Difficulty, frustration or enjoyment of video games not controlled for • No details of the method of random assignment to groups • Laboratory setting maybe unrealistic and can only assess short-term effects • Failure to distinguish between aggressive play and aggressive behaviour	72.4% (0/48)

		• Small sample size	
Correlational Studies			
Colwell & Payne (2000)	• Anonymity of responses • Attempts to control for some confounding variables such as gender	• No details given as to how the levels of violence in the video games were rated • Self-report problems • Cannot establish causality • No details of validity of questionnaire used • Did not specifically measure exposure to violent video games	65.2% (6/46)
Gentile et al. (2004)	• Anonymity of responses • Participating classes were mandatory classes and not electives, therefore, reduced likelihood of self-selection bias • Pre-tested survey • Measures amount of video game	• Participants rated the level of violence in video games themselves • Self-report problems • Cannot establish causality • Used only two questions to measure aggressive behaviour	79.3% (3/46)

	play and amount of violent video game play separately • Attempted to control for confounding variables such as gender and trait hostility		
Colwell & Kato (2005)	• Anonymity of responses • Attempted to control for confounding variables such as gender	• No details given as to how the levels of violence in the video games were rated • Self-report problems • Cannot establish causality • No details of validity of questionnaire used • Did not specifically measure exposure to violent video games	66.3% (6/46)
Wallenius et al. (2007)	• Attempted to control for some confounding variables including: social intelligence, parent child communication and age	• No details about anonymity of data or recruitment process • Lack of information about demographic characteristics of	57.6% (8/46)

	• Internal consistency of the physical and indirect aggression scores were high	participants • Self-report problems • Participants rated the level of violence in video games themselves. However, the reliability and validity of this was considered • Cannot establish causality • No details are given as to how the video game violence or aggression scores were calculated • No attrition analysis to compare characteristics of participants and dropouts	
Longitudinal Studies			
Wallenius & Punamäki (2008)	• Attrition rates provided • Attempted to control for some confounding variables such as parent-child communication, gender and age • Internal consistency of exposure to	• Self-report problems • No details about anonymity of data • Participants rated violence in video games • No details are provided as to how the video game violence score was	57.6% (8/46)

	violence and direct aggression scores at baseline and follow up were high	computed • Some differences between participants who dropped out verses those who participated in the follow-up, some of which were controlled for in the analysis	
Möller & Krahé (2009)	• No differences between participants who dropped out verses those who participated in the follow-up and reasons for dropping out specified • Level of violence rated by experts • High levels of agreement between raters • Pilot study to establish list of video games • Attempted to control for some confounding variables such as normative beliefs about violence	• Different measures of exposure to video game violence at baseline and follow-up, this was not controlled for in the analysis • Different lists of video games used at baseline and follow-up • Different experts rated violent content at baseline and follow-up • Self-report problems • Used some items from a standardised measure and developed items specifically for the study to assess aggressive behaviour	60.9% (9/46)

and hostile attribution bias • Controlled for possible order effects of presentation of measures through counterbalancing	• Used translation of an aggression measure

4. Results

The results of the included studies were not statistically combined for quantitative data synthesis due to the heterogeneity between the methodologies and analyses used. It is argued that meta-analyses of studies of this kind can produce invalid and, thus, misleading summary statistics (Egger, Schneider, & Smith, 1998). Indeed, this has been evident in the conflicts between previous meta-analytic reviews (e.g., Anderson, 2004; Ferguson, 2007a). Therefore, in reaching conclusions, studies were examined in a qualitative manner. Collation of data from included studies can be viewed in Tables 6 and 7.

4.1 Description of studies

The study designs included: (a) experimental, where participants were randomly assigned to play a violent or non-violent video game and then an outcome related to aggression was measured (Irwin & Gross, 1995), (b) correlational, where participants were asked about their video game playing habits and about aggressive behaviours (Colwell & Kato, 2005; Colwell & Payne, 2000; Gentile et al., 2004; Wallenius et al., 2007) and (c) longitudinal (Möller & Krahé, 2009; Wallenius & Punamäki, 2008), where participants were asked about their video game playing habits and about aggressive behaviours and then followed up overtime.

4.2 Study participants

Participants in the studies were both male and female and their ages ranged from 7 to 15 years old. Two of the studies were conducted in the United States (US) (Gentile et al., 2004; Irwin & Gross, 1995), one in the UK (Colwell & Payne, 2000), one in Germany (Möller & Krahé, 2009) and two others were conducted in Finland (Wallenius et al., 2007; Wallenius & Punamäki, 2008). One study (Colwell & Kato, 2005) included two samples of participants, a UK sample and a Japanese sample. The UK sample used in this

Table 6: Participant information

Authors	Year	Sample size	Gender	Age	Location	Ethnic background
Irwin & Gross	1995	60	60 Male	7-8 years Mean = 7.7	US	14 African-American 46 Caucasian
Colwell & Payne and Colwell & Kato	2000 2005	204	91 Male 113 Female	12-14 years Mean = 12.7	UK	-
Gentile et al.	2004	607	316 Male 291 Female	13-15 years Mean = 14	US	-
Colwell & Kato	2005	305	159 Male 146 Female	12-14 years Mean = 12.9	Japan	-
Wallenius et al.	2007	478	218 Male 260 Females	10-14 years Mean = 11.8	Finland	-

			(Sample one: n = 222; Mean age = 10.27 Sample two: n = 256; Mean age = 13.28)			
Wallenius & Punamäki	2008	316	136 Male 180 Female	12-15 Mean = 13.8	Finland	-
Möller & Krahé	2009	143	72 Male 71 Female	Mean = 13.3	Germany	93 German 31 Turkish 19 Other

Table 7: Characteristics of included studies

Authors	Video Game Variable	Measure of Aggression	Main Findings
Experimental Studies on Aggressive Behaviour			
Irwin & Gross (1995)	Playing a marshal arts video game with physical aggression or a non-aggressive motorcycle race video game for 20 minutes.	Behavioural observations of physical and verbal aggression towards others and objects during free play and in a competitive/frustrating situation.	Aggressive video game play was significantly associated with more physical and verbal aggression toward objects and more verbal aggression toward another child during free play and more physical aggression toward another child during competitive/frustrating situation.
Correlational Studies on Aggressive Behaviour			
Colwell & Payne (2000)	Participants reported on their video game playing behaviours including years of play (1 = '*Less than 6 months*', 2 = '*6 months to 1 year*', 3 = '*1-2 years*', 4 = '*More than 2 years*'), frequency (1 = '*Less than once a week*', 2 = '*1-2 times*', 3 = '*3-5 times*', 4 = '*Everyday*', 5 = '*More than once a day*') and duration (1 = '*Less than ½ hour*', 2 =	Dominick's (1984) 13-item aggression scale.	Exposure to video games with aggressive content significantly and positively correlated with aggression. However, this association was not significant once gender was controlled for.

	'*½ hour to 1 hour*', 3 = '*1-2 hours*', 4 = '*2-3 hours*', 5 = '*More than 3 hours*'). Participants listed their three favourite video games. Total video game exposure was calculated by multiplying frequency, duration and number of years of video game play. Total exposure to video games with violent content was calculated by multiplying total video game exposure by the number of violent video games listed in three favourite video games.		Some evidence to suggest violent video game exposure is associated with less aggressive behaviour, particularly for girls.
Gentile et al. (2004)	Participants reported the amount of time spent playing video games. Participants also listed their three favourite	Participants were asked how often they had got into arguments with teachers in the past year (1 = '*Almost*	Students who played more violent video games were more likely to have been involved in a physical fight in the past year and to have been in arguments with

	video games and rated how frequently they played each named video game (1 = '*Rarely*', 7 = '*Often*') and the level of violence of each named video game (1 = '*Little or no violence*', 7 = '*Extremely violent*'). Exposure to video game violence score was computed by multiplying the frequency score for each video game by its violence score and then taking the mean of the three video games. Participants also rated how much violence they prefer to have in their video games (1 = '*No violence'*, 10 = '*Extreme violence*') and how much they prefer to have compared to 2-3 years before (1 = '*A lot less*', 5 = '*A lot more*').	*daily*', 4 = '*Less than monthly*'). Participants were asked ('*yes'/'no'*) whether they had been in a physical fight in the past year.	teachers more frequently. Exposure to violent video games contributed a significant amount of variance in having been involved in physical fights even when controlling for sex, trait hostility and amount of video game play. However, exposure to violent video games did not contribute a significant amount of variance in arguments with teachers once sex, trait hostility and amount of video game play were controlled for. More hostile participants played more violent video games which raises questions about causality.
Colwell &	Participants reported on their video game	Dominick's (1984) 13-item	Violent video game exposure did not

Kato (2005)	playing behaviours including years of play (1 = '*Less than 6 months*', 2 = '*6 months to 1 year*', 3 = '*1-2 years*', 4 = '*More than 2 years*'), frequency (1 = '*Less than once a week*', 2 = '*1-2 times*', 3 = '*3-5 times*', 4 = '*Everyday*', 5 = '*More than once a day*') and duration (1 = '*Less than ½ hour*', 2 = '*½ hour to 1 hour*', 3 = '*1-2 hours*', 4 = '*2-3 hours*', 5 = '*More than 3 hours*'). Participants listed their three favourite video games. Video game exposure was calculated by multiplying the frequency, duration and years of video game play. Violent video game exposure was calculated by video game exposure multiplied by number of aggressive	aggression scale.	significantly predict aggression. The association was, however, negative and, therefore, suggests playing violent video games is associated with less aggressive behaviour. When gender was controlled for, frequency of video game play was significantly associated with aggression. Years of video game play, duration and total video game exposure were not. Preference for aggressive video games was associated with lower levels of aggression. These individuals were, compared with those who preferred non-aggressive video games, more likely to have been playing for longer, play more often and play for longer periods of time. This suggests playing violent

	favourite video games.		video games is associated with less aggressive behaviour.
Wallenius et al. (2007)	Participants reported how often they generally played video games (0 = '*Never*', 1 = '*Less than once a week*', 2 = '*1–2 days a week*', 3 = '*3–5 days a week*', 4 = '*Almost every day*'). Second, participants reported the time they generally spent playing video games during school days and during the weekend (0 = '*Not at all*', 1 = '*Less than an hour*', 2 = '*1–2 hours'*, 3 = '*3–4 hours'*, 4 = '*More than 4 hours a day*'). The intensity of video game playing was indicated by the mean of the frequency and the time of video game playing.	Direct & Indirect Aggression Scale (DIAS; Björkqvist, Lagerspetz, & Österman, 1998).	Video game violence correlated with direct and indirect aggression for both boys and girls. There was a direct association between violent video game play and direct aggression for boys with more frequent playing of violent games being associated with increased aggression. A direct association was not found for indirect aggression for boys or for either direct or indirect aggression for girls. Parent-child communication, social intelligence and age moderated the association between video game

	Participants indicated how often the video games they played contained violence (such as killing, fighting, attacks, kicking) (0 = '*Not at all*', 1 = '*Sporadically*', 2 = '*Often*', 3 = '*Very often'*). No details are given as to how the video game violence score was calculated.		violence and direct and indirect aggression.
Longitudinal Studies on Aggressive Behaviour			
Wallenius & Punamäki (2008)	Participants indicated how often the video games they played contained violence (such as killing, fighting, attacks and kicking) (0 = '*Not at all*', 1 = '*Sporadically*', 2 = '*Often*', 3 = '*Very often'*). Using the same scale, participants reported how often they played the video game genre '*Action, fighting, shooting*' (involving physical violence, shooting and killing).	DIAS (Björkqvist et al., 1998).	There was a significant correlation between video game violence at baseline and direct aggression at follow-up for boys but not for girls. There were significant longitudinal and synchronous links between video game violence and direct aggression. Gender, age and parent-child

	No details are provided as to how the video game violence score was computed. Participants completed the measures at baseline and follow-up (two years later).		communication moderated the relationship between video game violence and aggression.
Möller & Krahé (2009)	At baseline, participants were presented with a list of 40 video games, based on a pilot study. All video games on the list were rated by adult experts for violent content (1 = '*Free of violent content*', 5 = '*High level of violent content*'). Participants were asked to indicate, for each of the video games on the list that they knew, how often they played the video game (0 = '*Never*', 4 = '*Very often*'). Participants' general use of video games	A German translation of seven items of the physical aggression subscale of the Buss and Perry (1992) Aggression Questionnaire and one further item which referred to another form of physical aggression ('*In a fight I have pulled the hair of another person, have scratched or have bitten someone*.') were used to measure physical	Cross-sectional findings at baseline indicated no direct path from exposure to violent video games and physical aggressive behaviour. However, exposure to violence in video games was found to have an indirect effect on aggressive behaviour via the normative acceptance of aggression using paths analyses. A direct path was found from violent video games to indirect/relational aggression and an indirect path between

was measured with two questions: (a) how often do you play video games in the course of the week (1 = '*Less than every other week*', 2 = '*Every other week*', 3 = '*Once a week*', 4 = '*2–3 times a week*', 5 = '*Every other day*', 6 = '*Every day*') and (b) for how long do you normally play video games on the days you play (1 = '*Less than half an hour*', 2 = '*Between 30 min and an hour*', 3 = '*1–2 hrs*', 4 = '*More than 2 hrs*').

At follow-up, 30 months after the baseline measures, participants were presented with a list of 15 categories of video games (including a prototypical example for each category) and asked to indicate for each category how often they played those video games (0 = '*Never*', 4 = '*Very often*'). The categories were rated by a different group of adult experts for violent content using the aggression.

To measure indirect/relational aggression, seven items were developed on the basis of the indirect aggression scale by Buss and Warren (2000).

At both baseline and follow-up, participants were asked to rate for each of the 15 items how well it described their behaviour within the present term of the school year (about 4 months) (1 = '*Not at all like me*', 5 = '*Completely like me*').

these variables via normative beliefs.

Longitudinal analyses found that video game violence at baseline was a significant predictor of physical violence at follow-up. However, it was not a significant predictor of indirect/relational aggression at follow-up.

same scale described above.

Participants were asked to estimate the number of occasions per week they played video games and the length of time per session, using the same questions as the baseline.

The ratings of violent content of video games (baseline) and categories (follow-up) were averaged across raters to provide an index of violent content for each video game and each category respectively.

At baseline, an exposure to video game violence frequency index was computed by multiplying the frequency rating for each video game (0-4) by the violence rating for that video game (1-5) and then averaging across the 40 video games.

A physical aggression score was computed by aggregating scores across the eight physical aggression items and an indirect/relational aggression score was computed by averaging responses across the seven indirect/relational items.

At follow-up, an exposure to video game violence frequency index was produced by multiplying the frequency rating for each video game category (0-4) with the violence rating for that category (1-5) and then averaging the products across the 15 categories.

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study was the same as that for the study by Colwell and Payne (2000). Therefore, the findings from the UK sample in the two studies will be discussed together and separately from the findings from the Japanese sample. All the studies recruited participants from schools.

4.3 Measures of exposure to violent video games

The video game variable varied depending on the design of the study. In the experimental study (Irwin & Gross, 1995), participants played either a violent ('Double Dragon') or a non-violent ('Excitebike') video game for 20 minutes. The researchers claim that the violent video game contained significantly more violence than a non-violent game. They state that the violent video game "*features frequent acts of physical violence displayed by computerized human characters"* whereas the non-violent game "*depicts no interpersonal aggression*" and "*since the player races his motorcycle alone on a track, there is no opportunity for collision with other motorcycles"* (Irwin & Gross, 1995, pp. 341). However, there were no details as to whether the level of violence in the video games was independently assessed. To test whether both the video games induced the same arousal effects, the researchers measured the participants' heart rate before and during video game play. They found no significant differences in heart rate for the two video game conditions and, therefore, concluded that the video games had similar arousal effects.

For the correlational and longitudinal studies, participants were asked questions about the nature of their video game use including the duration, frequency and length of their video game play. In some studies participants were also asked to list their three favourite video games to determine their preference for violent or non-violent video games. This information was used to determine exposure to violent video games.

Colwell and Kato (2005) and Colwell and Payne (2000) measured total video game exposure by multiplying frequency, duration and number of years of play. Total exposure to video games with violent content was then calculated by multiplying total video game

exposure by number of violent video games listed in participant's three favourite games. No details were given about how the authors of either study determined whether video games contained violent content.

Gentile et al. (2004) used a similar but seemingly more accurate measure of violent video game exposure. As well as asking participants about their amount of video game play, they obtained information about the participants' three favourite video games and how frequently they played each named video game. They also asked the participants to rate the level of violence in each named video game. An exposure to video game violence score was then generated by multiplying the frequency score for each video game by its violence score and then taking the mean from the three video games.

In the study by Wallenius et al. (2007), the intensity of video game playing was calculated by the frequency and duration of play. Participants also indicated how often the video games they played contained violence. However, no details are given as to how the video game violence score was calculated. Similarly, in the longitudinal study by Wallenius and Punamäki (2008), participants indicated how often the video games they played contained violence and how often they played a specific genre of video game ('*Action, fighting, shooting*'). However, no further details are given regarding how an exposure to video game violence score was calculated.

Möller and Krahé (2009) used different measures for video game violence at baseline and follow-up. At the baseline, participants were presented with a list of 40 video games based on a pilot study. Participants were asked to indicate, for each of the video games on the list that they knew, how often they played the video game. At the follow-up, participants were presented with a list of 15 categories of video games and asked to indicate for each category how often they played those video games. At both baseline and follow-up participants were also asked to estimate the number of occasions per week they played video games and the length of time per session.

The video games presented at baseline and the categories presented at follow-up were rated by adult experts for violent content. Different groups of experts were used at baseline and follow-up. The ratings of video games (baseline) and categories (follow-up) for violent content showed high inter-rater agreement. For the raters who classified the video games at the baseline, the intra-class correlation was .95. Across the raters for the categories at follow-up, the intra-class correlation was .98. On the basis of these high levels of agreement, violence ratings were averaged across raters to provide an index of violent content for each game and each category respectively. At the baseline an exposure to video game violence score was computed by multiplying the frequency rating for each video game by the violence rating for that game and then averaging across the 40 video games. Similarly, at follow-up, an exposure to video game violence score was produced by multiplying the frequency rating for each category with the violence rating for that category and then averaging the products across the 15 categories.

4.4 Measures of aggressive behaviour

The measures of aggressive behaviours included behavioural observations and self-report. Behavioural observations in the study by Irwin and Gross (1995) included those of the children's behaviour during free-play and during a competitive/frustrating situation. Behaviours that were watched for and coded during free-play included: physical aggression toward a confederate (e.g., hitting, shoving, pinching, pulling at clothes, kicking or pulling hair), physical aggression toward inanimate objects (e.g., hitting or kicking a punching bag, throwing or smashing objects), verbal aggression toward a confederate (e.g., teasing or threats of aggressive acts) and verbal aggression toward inanimate objects (e.g., describing a physically aggressive act). Behaviours observed for and coded during the competitive/frustrating situation included physical and verbal aggression toward the confederate. Free-play lasted for 10 minutes after the end of video game play and the competitive/frustrating situation took place after the free-play. The observations were video taped and then rated by two independent observers blind to the experimental conditions. There appears to be inter-rater reliability as correlations of the

ratings by the two observers ranged from .69 to .99 with a mean of .95 (Irwin & Gross, 1995).

In the correlational studies, self-report measures of aggression were used and included questionnaires about aggressive behaviour and psychometric measures of aggressive, antisocial or hostile behaviour. Two studies (Colwell & Kato, 2005; Colwell & Payne, 2000) used Dominick's (1984) 13-item scale to measure aggression. The scale consists of three sub-scales. There are six items on manifest physical aggression (e.g., '*If somebody hits me first I let them have it'*), three items on aggressive behavioural delinquency (e.g., '*Been in fights with several people on each side'*) and four items on hypothetical aggressive reactions (e.g., '*Suppose someone played a really dirty trick on you, what would you do?*'). Another study (Gentile et al., 2004) used self-reports of whether or not the child had been in a physical fight in the past year and how often they had arguments with teachers.

The other correlational study (Wallenius et al., 2007) and one of the longitudinal studies (Wallenius & Punamäki, 2008) used the DIAS (Björkqvist et al., 1998). This scale consists of 10 items describing direct physical aggression toward others (e.g., '*I might hit a person when I'm irritated*', '*I kick and strike*', '*I take away things from the other person*') and 12 items describing indirect aggression (e.g., '*I ignore the other one*', '*I make friends with another as a kind of revenge*', '*I say bad things behind the other one's back*'). Using a 5-point scale, the participants estimated how often they themselves showed such behaviour with their peers (0 = '*Never*', 1 = '*Very seldom*', 2 = '*Sometimes*', 3 = '*Rather often*', 4 = '*Very often*').

Möller and Krahé (2009) used a German translation of seven items of the physical aggression subscale of the Buss and Perry (1992) aggression questionnaire. They used this in combination with one further item ('*In a fight I have pulled the hair of another person, have scratched or have bitten someone*') to measure physical aggression. Seven items developed on the basis of the indirect aggression scale by Buss and Warren (2000) were used to measure indirect/relational aggression. At both baseline and follow-up,

participants were asked to rate for each item how well it described their behaviour within the present term of the school year. A physical aggression score was computed by aggregating across the eight physical aggression items and an indirect/relational aggression score was computed by averaging responses across the seven indirect/relational items.

4.5 Descriptive data synthesis

The experimental study identified that met the review criteria found evidence for a positive association between video game violence and aggressive behaviour. Irwin and Gross's (1995) study found that participants who played the violent video game showed significantly more physical aggression toward objects during free-play than those who played the non-violent game (F (1, 56) = 9.63, p = .003). The participants who played the violent video game also displayed significantly more verbal aggression toward objects (F (1, 56) = 6.23, p = .016) and toward the confederate (F (1, 56) = 4.94, p = .03) during free-play compared to participants who played the non-violent video game. Finally, the study found that participants who played the violent video game showed significantly more physical aggression towards the confederate in the competitive/frustrating situation (F (1, 56) = 4.96, p = .03). The researchers do not report the data for physical aggression towards the confederate during free-play nor verbal aggression in the competitive/frustrating situation. Therefore, it is assumed, these behaviours did not significantly differ depending on which game the participant played.

Of the four correlational studies found that met the inclusion/exclusion criteria, three found evidence for a positive association between exposure to video game violence and aggressive behaviour (Colwell & Payne, 2000; Gentile et al., 2004; Wallenius et al., 2007). However, most of these associations were no longer significant once confounding variables, such as gender, were controlled for (Colwell & Payne, 2004; Gentile et al., 2004; Wallenius et al., 2007). Some of the findings even suggest a negative relationship between exposure to video game violence and aggressive behaviours (Colwell & Payne, 2004). The fourth study found no significant association between exposure to video game

violence and aggressive behaviour but did find some evidence to support the notion that playing violent video games is associated with less aggressive behaviours (Colwell & Kato, 2005). In addition, the correlations found in these studies are small; Dancey and Reidy (2002) suggest a coefficient of .30 is small.

In the UK sample from the studies by Colwell and Payne (2000) and Colwell & Kato (2005), it was found that, overall, exposure to video games with violent content significantly and positively correlated with aggression ($r = .30$, $p < .001$). However, a significant proportion of the variance in aggression (10.5%) was explained by gender, boys being more aggressive than girls, and by the total amount of time spent playing video games. When gender was controlled for, the relationship between exposure to violent video games and aggression proved not to be significant (for boys, $r = .22$, $p > .05$, for girls, $r = .11$, $p > .05$).

The authors found other associations between video game playing habits and aggression. They found that aggression scores correlated significantly with total game exposure ($r = .29$, $p < .001$). However, frequency of play was associated more highly ($r = .28$, $p < .001$) than duration of play ($r = .21$, $p < .007$) and years of play ($r = .07$, $p > .05$). They also found that aggression scores were not related to the number of games with violent content named among three favourite games ($r = .14$, $p > .05$). This suggests that playing more video games in general is associated with more aggressive behaviour rather than specifically playing more video games with violent content being associated with more aggressive behaviour.

In addition, there was some evidence, although not significant, of a negative relationship between preference for violent content in video games and video game exposure in girls ($r = -.20$, $p > .05$) which suggests that, for girls, the more violent video games they played the less exposure to video games they had. Thus, given the positive correlation between aggression scores and video game exposure, for girls, a preference for violent video games is associated with less aggressive behaviours.

Gentile et al. (2004) found that participants who played more violent video games were significantly more likely to have been involved in a physical fight in the past year (r = .32, p < .001) and were significantly more likely to have been in more frequent arguments with teachers (r = .20, p < .001). Exposure to violent video games contributed a significant amount of variance in participants having been involved in physical fights, even when controlling for sex, trait hostility and amount of play (r = .07, p < .001). However, exposure to violent video games did not contribute a significant amount of variance to having arguments with teachers once sex, trait hostility and amount of play were controlled for (r = .10, p > .05). This suggests that exposure to violence in video games is associated with physical but not verbal aggression. However, the measure for verbal aggression used in this study may not have ecological validity as it only measured participants' verbal aggression towards teachers.

Overall, Colwell and Kato (2005) found that violent video game exposure did not significantly predict aggression (r = - .06, p > .05). The association, whilst not significant, is negative and, therefore, provides some support for the theory that playing violent video games reduces aggression. Similarly to the UK sample used in both this study and the Colwell and Payne (2000) study, Colwell and Kato (2005) found other associations between game playing habits and aggression in Japanese children. They found that aggression significantly correlated with almost all the video game play measures but that, when gender was controlled for, only the association with frequency of video game play remained significant (r = .14, p < .05); number of years, duration and total amount of video game play were not. The researchers also found that preference for violent games was significantly associated with lower levels of aggression (r = -.14, p < .05). These children were, compared with those who preferred non-violent games, more likely to have been playing for longer, play more often and play for longer periods of time. These findings suggest that playing violent video games may reduce aggressive behaviours.

Wallenius et al. (2007) found, for boys, exposure to violence in video games significantly correlated with direct (r = .27, p < .001) and indirect (r = .22, p < .001) aggression and,

similarly, for girls, exposure to video game violence significantly correlated with direct (r = .18, p < .01) and indirect (r = .21, p < .01) aggression. However, using hierarchical multiple regression analysis, they found that there was only a direct association between video game violence exposure and direct aggression for boys (β = .17, p < .05). There was no direct association between video game violence exposure and indirect aggression for boys (β = .06, p > .05) and no direct association between exposure to violence in video games and either direct (β = .05, p > .05) or indirect (β = .11, p > .05) aggression for girls. Further, this study found that, for both boys and girls, social intelligence and parent-child communication moderated the association between exposure to video game violence and direct (for boys, F (17, 200) = 4.77, p < .01; for girls, F (17, 240) = 3.12, p < .001) and indirect (for boys, F (17, 196) = 4.54, p < .001; for girls, F (17, 240) = 4.68, p < .001) aggressive behaviour. These variables only accounted for 22.8%, 22.0%, 12.3% and 19.6%, respectively, of the variance found in aggressive behaviour indicating other variables are influential in aggressive behaviours.

The two longitudinal studies found some evidence to support an association between exposure to video game violence and aggressive behaviour. However, similar to the correlational studies, the correlations found in these studies were small. Wallenius and Punamäki (2008) found a significant correlation between exposure to video game violence at baseline and direct aggression at follow-up for boys (r = .19, p < .05) but not for girls (r = .10, p > .05). Further, regression analyses using the destruction approach (Anderson & Anderson, 1996) were conducted and it was found that there were significant longitudinal (t = 6.41, p < .001) and synchronous (t = 6.59, p < .001) links between exposure to video game violence and direct aggression. It was also found that gender, age and parent-child communication significantly moderated the relationship between violence in video games and aggressive behaviour (F (11, 303) = 13.28, p < .001). Together these variables accounted for 30.1% of the variance found in aggressive behaviours indicating other variables are important in aggressive behaviours.

Finally, in the study by Möller and Krahé (2009), path analyses were used. Cross-sectional findings at baseline indicated no direct path from exposure to violent video

games and physical aggression (r = .09, p > .05). However, exposure to violence in video games was found to have an indirect effect on aggressive behaviour via the normative acceptance of aggression. A direct path was found from exposure to violence in video games to indirect/relational aggression (r = .19, p < .001) and an indirect path between these variables via normative beliefs. Longitudinal analyses found that exposure to video game violence at baseline was a significant predictor of physical violence at follow-up (r = .27, p < .001). However, it was not a significant predictor of relational aggression at follow-up (r = .08, p > .05). Therefore, these findings, and those from the other longitudinal study, suggest exposure to video game violence is associated with aggressive behaviour but that this relationship may not be a causal one. Further, they are consistent with the findings from the correlational studies in that they indicate other variables are influential in this relationship.

4.6 Quality of included studies

A comparison of the study type, quality and outcome can be found in Table 8. There appears to be no significant difference between the different types of studies in terms of quality and there does not appear to be an association between these factors and outcome.

Many criticisms of the quality of video game research have been made (e.g., Anderson et al., 2007d) and some of these criticisms are relevant to the included studies. One of the main criticisms of the quality of the research relates to the use of questionable measures of aggressive behaviour. The experimental study (Irwin & Gross, 1995) did not distinguish between aggressive play and aggressive behaviour. Observations of children's play may have confused mock aggression (e.g., pretending to engage in an imaginary fight) with real aggression (e.g., attempting to hurt someone). Confusing aggressive play with aggressive behaviour can lead to flawed conclusions. In a study that measured both aggressive play and aggressive behaviour (Cooper & Mackie, 1986) it was concluded that violent video games affect play but not behaviour.

Table 8: Comparison of study type, quality and outcome

Study	Study Type	Quality Assessment Score	Outcome
Irwin & Gross (1995)	Experimental	72.4%	Significant positive association
Colwell & Payne (2000)	Correlational	65.2%	Significant positive association
Gentile et al. (2004)	Correlational	79.3%	Significant positive association
Colwell & Kato (2005)	Correlational	66.3%	Non-significant negative association
Wallenius et al. (2007)	Correlational	57.6%	Significant positive association
Wallenius & Punamäki (2008)	Longitudinal	57.6%	Significant positive association
Möller & Krahé (2009)	Longitudinal	60.9%	Significant positive association

The measures of aggression used in the correlational and longitudinal studies appear more valid. Four of the studies used standardised measures (Colwell & Kato, 2005; Colwell & Payne, 2000; Wallenius et al., 2007; Wallenius & Punamäki, 2008). However, the measure of aggressive behaviour used by Gentile et al. (2004) consisted of only two questions, one of which may not be truly representative of the participants' behaviour; one item referred to the participants' verbal aggression towards teachers. It could be that adolescents are not verbally aggressive towards authoritative figures (e.g., teachers), possibly due to the negative consequences of such behaviour, but are verbally aggressive towards others (e.g., peers). Further, in the longitudinal study by Möller and Krahé, (2009), the measure of aggressive behaviour was composed of items from standardised measures in combination with items developed for the study which might affect the reliability of the measure.

In addition, the measures used in the correlational and longitudinal studies relied upon self-report. Questions may be raised over the validity of self-report. Whilst only the child would be fully familiar with his or her own behaviour, it could be argued that additional ratings of the children's aggression by associated adults, such as parents or teachers, or by peers would increase the validity. However, it is felt that children's own ratings are more likely to be honest and valid especially when anonymity is assured as it was in some of these studies. In addition, whilst the use of multiple informants may increase levels of ecological validity, it would require a loss of anonymity which is likely to result in socially desirable responses by children to other questions.

Criticisms may be directed towards the quality of the measures of exposure to violent video games. Whilst this review only included studies that used a measure of exposure to violent video games rather than the total amount of video game play, the measures of violent video game exposure used in the studies are questionable. Two of the correlational studies (Colwell & Kato, 2005; Colwell & Payne, 2000) used video game preferences and total game exposure to calculate an exposure to violent video games score. The correlational study by Gentile et al. (2004) was slightly more specific and used the frequency of play of the participants' three favourite games to calculate an exposure to violent video games score. Whilst these may provide an indication of the participants' amount of exposure to violent video games, they do not measure actual exposure. For example, a child may prefer violent video games but rarely plays them due to restrictions placed on their game playing by their parents. Therefore, this may have led to misleading results. The other correlational study (Wallenius et al., 2007) and one of the longitudinal studies (Wallenius & Punamäki, 2008) provided details of measures used to assess exposure to video game violence but failed to specifically describe how a final score was calculated. Möller and Krahé, (2009) on the other hand used different approaches at baseline and follow-up making comparisons across the time periods difficult.

Furthermore, the methods of assessing the level of violence in the video games are questionable. One longitudinal study enlisted experts to rate the level of violence in the video games and genres of video games used (Möller & Krahé, 2009). Whilst there was

high inter-rater reliability between experts at baseline and follow-up, different experts were used at each time. Two of the correlational studies did not report how the level of violence was assessed (Colwell & Kato, 2005; Colwell & Payne, 2000) and, in the other studies (Gentile et al., 2004; Wallenius et al., 2007; Wallenius & Punamäki, 2008), the level was assessed by the participants themselves. Having the participants rate the level of violence may be effective in that it takes into consideration the participant's perception of violence. However, the ratings are not objective and do not allow for valid comparisons between participants.

In the experimental study (Irwin & Gross, 1995), it appears that there were differences in the amount of violent content between conditions and the experimenters did consider the possibility of differences in the levels of arousal between the video games. However, there was no evidence of whether the levels of violent content of the video games were objectively or independently rated or whether the video games were pilot tested for other differences. Additional differences between the violent and non-violent video games may have existed; for example, the non-violent video game may have been more boring or frustrating than the violent video game or there may have been differences in their levels of difficulty. These additional differences may have led to inaccurate results.

For both experimental and correlational studies to be considered as high quality, it is recommended that a sample size of at least 200 should be used (Anderson et al., 2007d). The sample size used is a methodological weakness of the experimental study and one of the longitudinal studies (Möller & Krahé, 2009). However, this was not the case for the correlational or remaining longitudinal studies which all used sample sizes of at least 200. Further, the participants in all seven of the studies were recruited from schools. This may result in biased, unrepresentative, samples as adolescents who have more aggressive tendencies are not likely to be found in school populations due to high rates of expulsion and drop out (Corrado, Cohen, & Odgers, 2000).

All the studies made attempts to control for some confounding variables. Irwin and Gross (1995) considered confounding variables such as the differing levels of arousal of the

video games and personality variables of the participants (impulsive or reflective). The four correlational studies all attempted to control for the confounding variable gender by reporting some results separately for male and female participants. In addition to gender, Gentile et al. (2004) also controlled for the trait hostility and Wallenius et al.'s (2007) study also controlled for age, social intelligence and parent-child communication. Wallenius and Punamäki, (2008) also controlled for age and parent-child communication and Möller and Krahé (2009) controlled for normative beliefs about aggression and hostile attribution bias. Although the studies attempted to control for some confounding variables, many other variables were not considered, most notably exposure to real life violence, which could have impacted on the findings. This is supported by the low amounts of variance in aggressive behaviour accounted for by the variables in the studies (Wallenius et al., 2007; Wallenius & Punamäki, 2008).

Further features of the studies which impacted upon their quality relate to their design. In the experimental study, short-term effects on behaviour were observed as an immediate result of a specific game-playing experience. Whilst these may be representative of real-life experience and they may be long-lasting and cumulative, this is not proven in the laboratory setting. Long-term effects are determined by examining relationships among certain behaviours, personality characteristics or cognitions and video game-playing habits. Furthermore, observations of behaviour for 10 minutes after playing a video game is scarcely conclusive evidence for a causal link between playing violent video games and aggressive behaviour. On the other hand, the correlational studies appear to assess long-term rather than short-term relationships between violent video game exposure and aggressive behaviours. However, due to the nature of correlational studies, causality cannot be established.

5. Discussion

5.1 Main findings

The aim of this review was to examine whether there is an association between exposure to violent video games and aggressive behaviour in children under the age of 18 years. A total of seven studies were included in this review. Six of the studies found evidence to support the existence of a positive association between violent video game exposure and aggressive behaviour (Colwell & Payne, 2000; Gentile et al., 2004; Irwin & Gross, 1995; Möller & Krahé, 2009; Wallenius et al., 2007; Wallenius & Punamäki, 2008). However, the associations found in the correlational and longitudinal studies were small (Dancey & Reidy, 2002). Further, the findings from these correlational studies and some of the longitudinal studies failed to support this association when confounding variables were controlled for, in particular gender (Colwell & Payne, 2000; Gentile et al., 2004; Möller & Krahé, 2009; Wallenius et al., 2007; Wallenius & Punamäki, 2008). The findings from two of the studies also suggested that, despite considering exposure to video game violence, gender, age, social intelligence and parent-child communication, these variables only account for a small amount of variance in aggressive behaviours (Wallenius et al., 2007; Wallenius & Punamäki, 2008). Therefore, this indicates that other variables, not accounted for in the studies, are important in aggressive behaviours. Another study also found that video game violence may not have a direct influence on aggressive behaviour rather it impacts upon behaviour indirectly via cognitive factors (Möller & Krahé, 2009). Furthermore, whilst these studies found a positive association, their findings appear somewhat contradictory as there was also some evidence from them that violent video games may be associated with less aggressive behaviours, particularly for girls. The remaining study found no evidence for a positive association and, conversely, found some evidence to support a negative association and, therefore, the idea that playing violent video games may be associated with less aggressive behaviours (Colwell & Kato, 2005). However, this association was non-significant, thus, any conclusions drawn from this should be tentative.

Consequently, this review's findings mirror that of previous reviews; they are inconclusive and contradictory (e.g., Dill & Dill, 1998; Emes, 1997; Griffiths, 1999). This review found evidence to support both the argument that exposure to violent video games is associated with more aggressive behaviours and the argument that the opposite holds true. It also found that other factors are important in aggressive behaviours, in particular gender. Furthermore, the studies in this review were not of the highest quality, thus, further, more methodologically robust, research needs to be carried out in this field and there is a particular need for longitudinal studies to establish causality.

5.2 Interpretation of the findings

The inconsistencies in the findings from this review, the lack of variance accounted for by variables and the impact upon the relationship between exposure to violence in video games and aggressive behaviour when confounding variables are considered appears to emphasise the fact that the role of playing violent video games in aggressive behaviour is difficult to disentangle from other factors associated with such behaviour. Whilst playing violent video games may play a role in aggressive behaviours, other factors need to be taken into consideration. The GAM suggests factors such as hostile attribution bias, empathy and exposure to real life violence are likely to influence the relationship between exposure to violence in video games and aggressive behaviours.

The studies included in this review assess part, but not all, of the adolescent age range. For example, Colwell and Payne (2000) assessed 12 to 14 year olds whereas Irwin and Gross (1995) assessed 7 to 8 year olds. As a result, these studies do not account for developmental effects. Video games may not have the same effect on children of different ages. Violence in games may have a more pronounced effect in young children but less of an effect, if any, once they have reached their teenage years. The age at which a person first begins playing violent games may influence the amount of effect on them. For example, if a person does not start playing violent games until later in life they may already have well developed moral values and beliefs and attitudes about violence and, as a result, the video games would have less effect. However, if a young child plays violent

video games at a time when they are generating and developing their own beliefs and attitudes and moral values, then the violent video games may have a greater effect and more influence in shaping their schemas and, therefore, their behaviours.

The studies in this review used participants from the US, UK, Germany, Finland and Japan. Given that the study which used participants from both the UK and Japan (Colwell & Kato, 2005) found differences between the cultures in terms of gaming habits, preferences and the associations between these and aggression, it appears the findings of the studies are not generalisable to other cultures and, possibly, even to societies within the same culture. The studies also found gender differences and, therefore, it appears the effects of playing violent video games are not the same for girls and boys.

Additionally, whilst there may be a temptation to interpret findings from these studies as evidence for a causal relationship between violent video game play and aggressive behaviour, whether that be that playing violent video games increases aggressive behaviours or that it reduces them, there is a problem as to the direction of causation. For example, there are three possible explanations which could account for the findings that violent video game play is associated with an increase in aggressive behaviour. Firstly, children's use of violent video games increases their aggressiveness, secondly, aggressive children enjoy playing violent video games more than less aggressive peers and, thirdly, both usage and aggressiveness are determined by a third variable such as exposure to real life violence. With respect to violent video game exposure being associated with less aggressive behaviours, it might be that playing violent video games reduces aggressive tendencies or less aggressive individuals are drawn to violent video games as it provides them with an opportunity to behave in ways that they are morally inhibited to do in real life.

Furthermore, whilst the evidence from the studies for an association between exposure to violent video games and aggressive behaviour was inconsistent, there was consistent evidence (Colwell & Kato, 2005; Colwell & Payne, 2000; Gentile et al., 2004) to suggest total video game exposure was positively associated with aggressive behaviours.

Therefore, it may be that exposure to video games in general is associated with aggressive behaviours and that the violent content of the games is irrelevant. This explanation would be consistent with findings from previous reviews (e.g., Dominick, 1984; Lin & Lepper, 1987), which included studies that measured exposure to violent video games and those that measured total video game exposure, and it may also, in part, explain the inconsistencies in the findings of these reviews.

5.3 Strengths and limitations of the review

This review examined the association between violent video game exposure and aggressive behaviour in children under the age of 18 using a systematic approach which has not been done previously. This review focused specifically on aggressive behaviour and did not include studies that showed effects on aggressive cognitions, affect, arousal and pro-social behaviours. This enabled the review to look at whether violent video game exposure lead to actual aggressive behaviours rather than variables that could potentially, indirectly, lead to aggressive behaviours.

The main weakness of this review is the limited number of studies included. Due to the small number of studies that met the inclusion/exclusion criteria, methodologically weaker studies were still included in the final analysis. Whilst this meant that potentially important findings were not lost, it may have introduced forms of bias by giving too much weight to the findings of studies which are flawed or weaker in design (Ferguson, 2007a). A further weakness is the number of longitudinal studies. Whilst this was not a result of the methodology of the review but of the lack of longitudinal research in the field, it impacts upon the robustness of the review. Longitudinal studies allow for links to be established between exposure to violent video games during childhood and adolescence to subsequent aggressive behaviours. It allows for a more robust examination of the effects as it helps control for other key variables known to affect aggressive behaviours such as childhood neglect, family income, exposure to neighbourhood and family violence, parental education and psychiatric disorders. Thus, alternative explanations can be ruled out.

The search strategies utilised in this review were very specific resulting in the exclusion of many studies. Time constraints restricted the author from utilising other resources, such as websites, books and other electronic resources, which may have been beneficial in increasing the number of studies located. Financial and time constraints contributed to the exclusion of articles in languages other than English. Furthermore, although attempts were made to interpret the statistical information correctly by utilising statistical literature (e.g., Field, 2005), more time would have allowed the author to contact the authors of the studies to get a better understanding of their findings and the effects and strengths of their findings. Exclusion of unpublished work may cause problems of publication bias. Ferguson (2007b) found that there are significant problems with publication bias in this field with studies making strong claims about negative effects even on the basis of relatively weak evidence being more likely to be published than those making claims about positive effects.

The study populations assessed in this review appear 'realistic' in that the studies appear to have used 'typical' children recruited from schools. However, as noted previously, the studies in this review were conducted in the US, Japan, Germany, Finland and the UK and only with school children. As a result, some caution should be exercised in applying findings to other populations especially considering the differences found between Japanese and English children in Colwell and Kato's (2005) study and the high rates of expulsion and drop out from school of adolescents who have more aggressive tendencies (Corrado et al., 2000).

Furthermore, this review on exposure to video game violence has, arguably, been narrow in that it assumes that such video games have only negative effects and ignores the possibility of positive effects. Studies have found potential, positive effects of violent video games compared to non-violent games including increases in visuospatial cognition (Castel, Pratt, & Drummond, 2005; Green & Bavelier, 2003, 2007; Rosser et al., 2007; Sims & Mayer, 2002) and general well-being (Ryan, Rigby, & Przybylski, 2006).

5.4 Conclusions and recommendations

This review was aimed at better understanding the aggressive behavioural outcomes of violent video game playing in children under the age of 18 years. It found that, whilst there was some evidence for exposure to violent video games being associated with increased aggressive behaviour, there was also evidence for an association between exposure to violent video games and less aggressive behaviours. Further, it indicated that additional variables, other than exposure to video game violence, play an important role in aggressive behaviours.

Whilst this review is limited and its findings inconsistent, it strongly indicates a need for further research. The findings highlight the need for more methodologically robust studies which specifically measure exposure to violent video games in children under the age of 18. It especially highlights the need for more extensive longitudinal studies, over longer time periods, taking several other variables into consideration, which would help control for other key variables known to affect aggressive behaviours and to establish causality.

It may also be important for researchers to investigate factors that influence the effects of exposure to violent video games in order to identify which children are most at risk from violence in video games; a large number of people play video games and yet video game violence appears to have relatively little effect on most individuals (Funk, 2001, 2003; Funk & Buchman, 1996). It has been suggested that these 'high risk' individuals may respond more negatively to violent games than the majority of individuals as playing such video games exacerbate existing violent predilections (Funk, 2001, 2003; Funk & Buchman, 1996). Therefore, in order to make intervention efforts more effective and cost-efficient, more research is needed to fully understand factors that influence the outcomes from exposure to violent video games.

In a sample of adults, Bartholow, Sestir and Davis (2005) found that trait hostility and empathy partially account for the effects of exposure to violent video games on

laboratory aggression. Further, the GAM predicts that exposure to real life violence would also have an impact on the effects of exposure to video game violence. Research would also support this as there is substantial evidence indicating an association between exposure to real life violence and aggressive behaviour (DuRant, Cadenhead, Pendergrast, Slavens, & Linder, 1994; Feigelman, Howard, Li, & Cross, 2000; Flannery, Singer, & Wester, 2001; Flannery, Wester, & Singer, 2004; Gorman-Smith & Tolan, 1998; Halliday-Boykins & Graham, 2001; McCloskey & Lichter, 2003; Miller, Wasserman, Neugebauer, Gorman-Smith, & Kamboukos, 1999; Scarpa, 2001; Schiff & McKay, 2003; Shahinfar, Kupersmidt, & Matza, 2001; Weaver, Borkowski, & Whitman, 2008). Therefore, factors such as levels of hostile attribution bias and empathy and exposure to real life violence are likely to mediate and/or moderate the relationship between exposure to video game violence and aggressive behaviour. Consequently, investigation of these factors may help identify those for whom video game violence may pose a particular risk (Funk, 2001, 2003; Funk & Buchman, 1996), thus, guide preventative interventions and allocate limited resources most effectively. This is the aim of the research presented in the following chapter.

Chapter Two:
A Study Exploring the Effects of Exposure to Video Game Violence on Adolescents' Aggressive Behaviours and Factors which Mediate and Moderate the Relationship.

1. Abstract

1.1 Aim: Research into the effects of exposure to violence in video games has suggested that this exposure may be associated with increased aggressive behaviour. Adolescents are considered to be the age group most vulnerable to the negative effects of this exposure due, in part, to the developmental changes, both biological and psychosocial, occurring during adolescence and their high levels of violent video game play. This study aims to explore the effects of exposure to video game violence on aggressive behaviour in a sample of adolescents. It also aims to explore factors which might, potentially, mediate and moderate this relationship; namely hostile attribution bias, empathy and exposure to real life violence.

1.2 Methodology: 55 college students and 50 adolescents involved in the juvenile justice system completed self-report questionnaires which measured exposure to video game and real-life violence, aggressive behaviours, hostile attribution bias, empathy and social desirability.

1.3 Results: Mediational analysis revealed that neither hostile attribution bias nor empathy mediated the relationship between exposure to video game violence and aggressive behaviour. However, when considered as moderators, both hostile attribution bias and empathy appeared to moderate the relationship. Further, moderator analysis also indicated that exposure to real life violence moderates the relationship between exposure to video game violence and aggressive behaviour.

1.4 Conclusions: This study found a significant relationship between playing violent video games and aggressive behaviour. It also found that exposure to real life violence significantly moderated this relationship. This study found that hostile attribution bias and empathy do not significantly mediate the relationship between playing violent video games and aggressive behaviour. However, when considering these variables as moderators, it was found that both hostile attribution bias and empathy significantly

moderated the relationship. Therefore, this study found that levels of hostile attribution bias and empathy do not explain how or why video game violence may lead to aggressive behaviour but rather if an adolescent has high levels of hostile attribution bias, low levels of empathy or is exposed to high levels of exposure to real life violence then exposure to violent video games has a greater influence on their aggressive behaviour. Therefore, it is recommended that interventions for adolescents who play large amounts of violent video games target those with higher levels of exposure to real life violence and hostile attribution bias and lower levels of empathy.

2. Introduction

As described in the previous chapter, there is some research that shows exposure to violence in video games increases aggressive behaviour (Anderson, 2003). However, the research in this field is inconclusive and exposure to video game violence does not appear to affect each individual to the same degree; there are likely to be some groups that are more at risk from the negative effects of exposure to video game violence than others (Funk, 2001, 2003; Funk & Buchman, 1996). Therefore, as societal, political and academic awareness of the adverse effects of exposure to violence in video games increases, it has become increasingly important to identify those most at risk of developing negative effects in order to target interventions and allocate sparse resources effectively.

The majority of studies investigating the effects of video game play sample young adults rather than individuals under the age of 18 years (e.g., Anderson & Dill, 2000). Little research has investigated the effects of exposure to video game violence on adolescents. Further, existing research has failed to consider the co-occurrence of factors, such as hostile attribution bias, empathy and exposure to real life violence, which may mediate and moderate these effects. This present study aims to address this research gap.

2.1 Effects of video game violence on adolescents

Of the different media platforms that adolescents are commonly exposed to, video games are of most concern because they are the preferred leisure activity for many in this demographic (Funk, Hagan, & Schimming, 1999). It is estimated that 80% of today's most popular video games contain violence (Vessey & Lee, 2000) and adolescents appear to have a preference for video games with such content (Funk et al., 1999). In addition, as well as having increasingly violent themes, video games have increased in their sophistication and realism and now require active participation from the consumer. This is in contrast to the passive viewing of violence that occurs in television, films and music videos. Furthermore, video game players are rewarded for implementing violent

strategies and violence in video games is presented as justified, fun and without negative consequences (Funk, 1995). Additionally, many parents are not aware of the violent content of the video games their children play and do not place restrictions on their children's video game use (Funk et al., 1999; Walsh, 2000). For example, in one study, most parents of children aged 8 to 11 years old were unable to correctly name their child's favorite game and, in 70% of these incorrect matches, the child's favorite game had violent content (Funk et al., 1999). Therefore, the effects of playing violent video games on adolescents are an issue which should be of concern.

The majority of research which investigates the effects of video game play has used adult samples (e.g., Anderson & Dill, 2000). However, there are some published studies (Colwell & Kato, 2005; Colwell & Payne, 2000; Cooper & Mackie, 1986; Dominick, 1984; Durkin & Barber, 2002; Fling et al., 1992; Funk, Baldacci, Pasold, & Baumgardner, 2004; Funk & Buchman, 1996; Funk, Buchman, & Germann, 2000; Gentile et al., 2004; Graybill, Kirsch, & Esselman, 1985; Graybill, Strawniak, Hunter, & O'Leary, 1987; Ihori, Sakamoto, Shibuya, & Yukawa, 2007; Irwin & Gross, 1995; Lin & Lepper, 1987; McClure & Mears, 1986; Schutte, Malouff, Post-Gorden, & Rodasta, 1988; Silvern & Williamson, 1987; Slater et al., 2003; van Schie & Wiegman, 1997; Wiegman & van Schie, 1998; Winkel, Novak, & Hopson, 1987) which examine the effects of video games on children and adolescents. The majority of these studies, but not all, have demonstrated a relationship between exposure to violent video games and increased aggressive behaviour. Moreover, whilst small, the effect sizes found in these studies have increased since the 1970s (Anderson et al., 2007d). This may be a result of people playing more video games, the video games becoming increasingly violent, changes in video game technology and/or graphics and sound effects improving markedly over recent years making them more realistic and interactive. This inevitably results in a more powerful experience for the player (Bushman & Anderson, 2001a,b). The following review will focus upon research conducted with children and adolescents dated post-2000 as earlier research may not be as valid.

2.1.1 Video game violence exposure and aggressive behaviours

A variety of studies adopting different research methodology have determined a relationship between video game play and aggressive behaviour. Experimental studies have examined this relationship; for instance, Anderson et al. (2007a) examined a sample of children age 9 to 12 years (n = 161) who were randomly assigned to play either a violent or non-violent video game. The participants subsequently played another game in which they set punishment levels, in the form of noxious noise blasts, delivered to another child participating in the study. In reality, there was no other child receiving the punishments. Aggressive behaviour was measured as the intensity and duration of the noise blast chosen by the participant. It was found that participants who played the violent game delivered significantly higher blasts than those who played the non-violent video game and, therefore, were considered to be more aggressive (Anderson et al., 2007a).

Many correlational studies have also found that violent video game exposure is significantly and positively associated with aggressive behaviours (e.g., Colwell & Kato, 2005; Durkin & Barber, 2002; Gentile et al., 2004). For example, Colwell and Payne's (2000) study of adolescents aged 12 to 14 years (n = 204) found violent video game exposure was significantly and positively correlated with self-reported aggressive behaviours. Anderson et al. (2007b) also found violent video game play significantly and positively correlated with self-reported verbal and physical aggression and violent behaviour in a sample of 14-19 year olds (n = 189). Similarly, Funk et al. (2000) found, in a sample of 10-12 year olds (n = 364), a greater preference for violent video games significantly correlated with, self-reported, poor behavioural conduct. Further, in a larger study of 5,831 students, aged 11 to 16, higher levels of self-reported aggressive behaviour were significantly associated with more video game play and there was a direct, significant correlation between the frequency with which students played video games and their involvement in fights at school (Escobar-Chaves, Kelder, & Orpinas, 2002).

In addition to experimental and correlational studies, longitudinal studies have also found an association between violent video game play and aggressive behaviours. For example, in a study of children aged 8 to 11 years (n = 430), participants were surveyed at two points during the school year (Anderson et al., 2007c). Measures of violent video game exposure and aggressive behaviours were taken including information about behaviours from self-report, peer-nominations and teacher reports. It was found that violent video game play early in the school year was significantly related to later increases in verbal and physical aggression, even after setting controls for sex, race, total screen time, hostile attribution bias, parental involvement and earlier verbal and physical aggression (Anderson et al., 2007c).

Therefore, in summary, there is some empirical evidence to indicate that a relationship exists between video game play and increases in aggressive behaviour. However, as previously mentioned, there is also research that has not found a relationship between video game play and aggressive behaviour and some that finds evidence to suggest video game play reduces aggressive behaviours (e.g., Colwell & Kato, 2005). Several theories and mechanisms are relevant as to how exposure to violence in video games can lead to an increase in aggressive behaviour. The GAM (Anderson & Bushman, 2002; Anderson & Huesmann, 2003; Carnagey & Anderson, 2003), described in chapter one, provides a useful framework for understanding the effects of exposure to violence.

2.2 The General Aggression Model (GAM)

As previously mentioned, according to the GAM, aggressive behaviour is largely based on the learning, activation and application of aggression-related knowledge structures stored in memory, known as cognitive scripts or schema. The model describes a cyclical interaction between a person and the environment. Both person factors (e.g., age, trait hostility) and situational variables (e.g., video games, other people) influence an individual's cognitions, affect and arousal, leading to the possibility of them behaving aggressively in a given social encounter.

Therefore, according to this model, exposure to violence in video games may have an immediate impact in increasing aggressive behaviour by teaching aggressive behaviour (Bandura, 2001), priming hostile thoughts (Gentile et al., 2004) and increasing aggressive affect and arousal (Schneider, Lang, Shin, & Bradley, 2004). Exposure to violence in video games may also have long-term effects according to this model. Violent video games promote learning, rehearsal and reinforcement of aggressive knowledge structures and emotional desensitising to violent stimuli. These influence how individuals perceive, interpret and react to the world and may lead to long-term changes in individuals' personalities making them more aggressive. According to the GAM, repeated exposure to violent video games leads to well-rehearsed and automatised aggressive knowledge structures, the enactment of which depends on how relevant they are in a specific situation (Buckley & Anderson, 2006).

As a result, based on the GAM, exposure to violence in video games should be associated with and predict aggressive behaviours. Specifically, higher exposure to violent video games should be associated with higher levels of aggressive behaviour. This being said, this model also indicates that situational variables, which include real life violence, interact with person variables, such as personality characteristics and attitudes, to influence behaviour. Therefore, this model indicates that a number of variables, including hostile attribution bias and empathy, may mediate the relationship between exposure to violence and aggressive behaviours and that exposure to real life violence may moderate the relationship.

A moderator is defined as "*a qualitative or quantitative variable that affects the direction and/or strength of the relation between an independent or predictor variable and a dependent or criterion variable"* (Baron & Kenny, 1986, pp.1174). This is distinct from a mediator which is defined as a variable which "*accounts for the relationship between the predictor and criterion. Mediators explain how external physical events take on internal psychological significance. Whereas moderator variables specify when certain effects will hold, mediators speak to how or why such effects occur"* (Baron & Kenny, 1986, pp.1174). Unlike mediators where the predictor is causally antecedent to the mediator,

moderators and predictors are at the same level in regard to their causal role to the outcome variable. In other words, moderator variables will always function as independent variables whereas mediator variables shift roles from effects to causes depending on the focus of the analysis (Baron & Kenny, 1986).

2.3 Possible mediators of the effects of video game violence

There have been some research findings demonstrating individual differences in response to the effects of violent video games (e.g., Bartholow et al., 2005; Lynch, 1994, 1999). This suggests that there are mediating factors in the relationship between exposure to video game violence and aggressive behaviours. The GAM also indicates mediating factors are involved in the relationship. Both the research (e.g., Bartholow et al., 2005; Lynch, 1994, 1999) and the GAM suggest hostile attribution bias and empathy as possible mediators.

2.3.1 Hostile attribution bias as a mediator

Hostile attribution bias is a cognitive bias that refers to how one views the world when ambiguous, negative events occur and is related to aggressive behaviour. If a person has a bias towards attributing hostility to others' actions, that person is more likely to respond aggressively to others (Crick, 1995; Crick & Dodge, 1994; Crick & Grotpeter, 1995). Studies have found that playing a violent video game can cause increased hostile attribution bias in children (e.g., Gentile et al., 2004; Kirsh, 1998). In a survey of 13-14 year olds (n = 231) exposure to violent video games was significantly and positively correlated with hostile attribution bias (Krahé & Möller, 2004). Similarly, in the longitudinal study by Anderson et al. (2007c), in addition to measures of violent video game exposure and aggressive behaviours, measures of hostile attribution bias were taken. It was found that violent video game play early in the school year was significantly related to changes in hostile attribution bias later in the school year.

2.3.2 Empathy as a mediator

A second variable that may mediate the effects of video game play is empathy as studies with adolescent and child participants have found relationships between exposure to violent video games and empathy (e.g., Barnett et al., 1997; Funk, Buchman, Jenks, & Bechtoldt, 2003; Sakamoto, 1994; Wei, 2007) and there is a well documented link between low empathy and aggressive behaviour (Eisenberg, 2000; Miller & Eisenberg, 1988). Funk et al. (2003) used both a correlational and an experimental approach to test whether violent video games affect empathy in children. The sample included children (n = 31) aged 5-7 years and 8-12 year olds (n = 35). A significant relationship was found in the correlational study, regular violent video game play correlated with lower empathy scores, but there was no significant relationship in the experimental study. However, because empathy is typically considered to be a trait rather than a state, it is unlikely that measures would be sensitive enough to find changes in empathy after playing a video game for 15 minutes (Bartholow et al., 2005).

2.4 Possible moderators of the effects of video game violence

Prevalence studies and official statistics suggest that, in addition to high levels of exposure to violence through playing video games, the majority of adolescents are exposed to violence in real-life (Bell & Jenkins, 1993; Berman, Kurtines, Silverman, & Serafini, 1996; Department of Health, 2005; Fitzpatrick & Boldizar, 1993; Singer et al., 1999). A review of studies examining the amount violence adolescents are exposed to in their community have indicated that 76-82% of adolescents report being a victim of violence and 93-96% a witness of violence (Scarpa, 2003). According to the GAM, exposure to real life violence would have similar effects on aggressive behaviour to video game violence exposure, thus, indicating that exposure to real life violence may moderate the relationship between exposure to video game violence and aggressive behaviours.

Research would appear to support this notion. Studies have found that adolescents who are exposed to higher levels of violence, directly through victimisation or indirectly

through witnessing violence, at home or in the community, exhibit more aggressive behaviours (DuRant et al., 1994; Feigelman et al., 2000; Flannery et al., 2004; Gorman-Smith & Tolan, 1998; Halliday-Boykins & Graham, 2001; McCloskey & Lichter, 2003; Miller et al., 1999; Scarpa, 2001; Schiff & McKay, 2003; Shahinfar et al., 2001; Weaver et al., 2008).

2.5 Limitations of previous research

A number of methodological weaknesses are inherent within much of the research that has investigated the negative effects of exposure to violent video games. As previously mentioned, the majority of studies investigating the effects of video game play use young adults rather than individuals under the age of 18 years (e.g., Anderson & Dill, 2000). However, research suggests adolescents may be the age group most vulnerable to the negative effects of exposure to violence. Adolescents engage in high levels of violent video game play (Kirsh, 2003). Further, adolescence is a time in which individuals experience large developmental changes, both biological and psychosocial. For example, adolescents experience rapid growth and maturation and increasing sexual feelings and they face changes in the emotional, social and psychological relationships with their parents and peers (Steinberg, 2001).

There are further sampling issues in the existing research on the effects of exposure to violence in video games. For instance, studies which have consisted of samples of children and adolescents have, typically, relied upon normative or low-risk populations in that the majority of samples were drawn from high school populations (e.g., Anderson et al., 2007a,b,c). Adolescents who have more aggressive tendencies are not likely to be found in high school populations due to high rates of expulsion and drop out (Corrado et al., 2000).

Additionally, findings from previous research may not be generalisable to the UK population. The majority of research on the effects of exposure to violence in video game has been carried out in the US which may not be as relevant in the UK due to cultural

differences (Youth Justice Board, 2009). For instance, in the US it is a constitutional right to carry a firearm. As a result, it is possible that adolescents in the US commit more acts of violence and more severe acts and are, themselves, exposed to greater amounts of violence. Official figures would appear to support this. For example, the most recent statistics for homicide rates per 100,000 population, for individuals aged 10–29 years, report the rate for the UK being 0.9 compared to 11 in the US (World Health Organization, 2002). Further, the US is the world's leader in incarceration due to its commitment to mass imprisonment and the death penalty still exists in some states (Garland, 2001). Therefore, it is also likely that there are differences between the US and UK in terms of attitudes to violence. Indeed, studies have found cultural differences between the US and UK with regards to this (e.g., Cooke & Puddifoot, 2000). For example, a study by Cooke (2004) compared the attitudes of young people in the US (n = 145), Great Britain (n = 177) and Western Australia (n = 219) towards the possession and use of firearms. The results indicated that American respondents were in greatest favour of gun possession, scoring significantly higher than Australian and British respondents in the belief that it is a citizen's right to own a gun and that guns provide protection from crime. It was also found the Australian and British respondents scored higher on items referring to the belief that guns stimulate crime. Research into the effects of violence in video games on aggressive behaviour would appear to support this notion of cultural differences as some studies conducted in the US (e.g., Anderson et al., 2007b) have found higher effect sizes than those conducted in the UK (e.g., Colwell & Payne, 2000).

In addition to sampling issues, researchers have employed different definitional approaches and measurement instruments. Many of the studies on exposure to video game violence have used non-specific measurement of exposure to violence in video games; for example, investigating total video game play only (e.g., Dominick, 1984; Lin & Lepper, 1987). Moreover, researchers have used a variety of measures of aggression including behavioural, cognitive, affective, physiological and pro-social measures. As a result, it is difficult to evaluate, compare and build upon findings across studies. Further, some of these measures are considered inappropriate (Freedman, 2001). For example, Anderson et al. (2007a) used the intensity and duration of a loud noise that one

participant inflicted on another as their measure of aggression whereas Cooper and Mackie (1986) observed whether the children in their study chose to play with 'aggressive' or 'non-aggressive' toys. These measures of aggressive behaviour, pushing a button or choosing to play with a certain toy, do not appear to have ecological validity.

Whilst studies have found a relationship between exposure to violent video games and aggressive behaviour, some researchers remain sceptical about the detrimental effects of violent video games (e.g., Bensley & van Eenwyk, 2001; Ferguson, 2007a; Sherry, 2001, 2007). Experimental studies have shown an association between playing violent video games and aggressive behaviours. However, these can only demonstrate short-term effects. On the other hand, correlational studies can not demonstrate causality and it may be that aggressive adolescents are drawn to violent video games rather than aggressive behaviours being a result of video game playing (Kirsh, 2003). Further, few of the correlational studies find very strong relationships between exposure to violence in video games and aggressive behaviours. Many findings (e.g., Colwell & Kato, 2005; Funk et al., 2000; Weigman & van Schie, 1998) have effect sizes less than Cohen's (1992) recommendation of $r \geq .10$ as the cut-off for a 'small' effect size and some find no relationship (e.g., Williams & Skoric, 2005).

Interpretation of the existing research may also be compromised because most studies on the effects of violent video games do not measure individual differences and situational variables that may mediate or moderate the effects such as hostile attribution bias, empathy and exposure to real life violence (Gentile et al., 2004). Consequently, whilst the results from previous studies suggest that relationships between exposure to violence in video games and aggressive behaviour exist, investigations into confounding variables have been lacking. The co-existence of other variables, which may influence the relationship, makes inferences, particularly causal ones, difficult and may account for the lack of relationship found in some studies (e.g., Williams & Skoric, 2005). Further, as previously mentioned, exposure to violence does not affect each individual to the same degree. There are likely to be some groups that are more at risk from the negative effects of such exposure than others. For example, Bartholow et al. (2005) found that trait

hostility and empathy partially account for the effects of exposure to violent video games on laboratory aggression and the GAM predicts that exposure to real life violence would have an impact on the effects of exposure to video game violence. Therefore, the lack of investigation into co-existing factors means that those most at risk of developing negative effects from exposure to video game violence have not been identified. This knowledge would help to target interventions and allocate sparse resources effectively.

Taking these limitations of previous studies into consideration, as well as the scoping literature searches employed prior to initiating this study, it is concluded that there is a need to further investigate the specific link between playing violent video games and aggressive behaviours in adolescents and to explore the effects of hostile attribution bias, empathy and exposure to real life violence on this relationship. Therefore, this study aims to explore the effects of exposure to video game violence on aggressive behaviours in a sample of adolescents comprising individuals from two populations: adolescents involved in the juvenile justice system and college students. Further, this study aims to explore factors which may mediate or moderate this relationship; namely hostile attribution bias, empathy and exposure to real life violence.

From the current evidence base and the GAM, the following research questions are considered:

1) Is there a relationship between playing violent video games and aggressive behaviours?

2) Does hostile attribution bias and empathy mediate the relationship between exposure to violent video games and aggressive behaviour?

3) Does exposure to real life violence moderate the relationship between exposure to violent video games and aggressive behaviour?

3. Method

3.1 Participants

The total sample consisted of 105 male adolescents from two groups, 55 college students and 50 adolescents involved in the juvenile justice system. The sample consisted of the two groups in order to recruit a diverse range of adolescents. It was hoped that analysing the data from the two group as one sample rather than separately would result in the findings being more representative of the population compared to previous research which, typically, only used participants from colleges. Demographic information for the participants can be found in Table 9.

The age of the participants ranged from 16 to 17 years with a mean age of 16.5 years (SD = 0.50; YO mean = 16.5, SD = 0.50; College mean = 16.6, SD = 0.49). There was no significant difference between the age of the participants in the groups ($t_{(103)} = -1.630$, $p = .106$). The majority of adolescents involved in the juvenile justice system had one or more convictions for assault (n = 31, 62%) and many had one or more convictions for robbery (n = 22, 44%). Other offences included: possession of a weapon (n = 7, 14%), criminal damage (n = 6, 12%), theft (n = 3, 6%), affray (n = 3, 6%), driving offences (n = 2, 4%), drug offences (n = 2, 4%), burglary (n = 1, 2%) and harassment (n = 1, 2%). All had at least one conviction for a violent crime using the categories described by Roe and Ashe (2008) (see Appendix G). None of the college group reported having any convictions.

Preliminary analyses (Chi-Square and Mann Whitney-U tests) revealed significant differences between the groups on factors related to their ethnicity, home environment and parental status (see Table 9). It appears the college students were more likely to describe themselves as Asian or Mixed Parentage whereas adolescents involved in the juvenile justice system were more likely to describe themselves as White. Those involved with the juvenile justice system were also more likely to come from a single parent household whereas college students were more likely to live with both their biological

Table 9: Demographic information and differences between groups

	Total (N=105)	YO (n=50)	College (n=55)	x^2	P value
Ethnicity:				30.200	.000**
Black	26.7%	24.0%	29.0%		
Asian	28.6%	24.0%	32.7%		
White	41.0%	46.0%	36.4%		
Mixed Parentage	3.8%	6.0%	21.8%		
Home environment:				102.581	.000**
Parents	64.8%	38.0%	89.0%		
Single Mother	26.7%	48.0%	7.3%		
Mother and Step-Father	5.7%	8.0%	3.6%		
Other	2.9%	6.0%	0%		
Parental Status:				37.771	.000**
Married	55.2%	40.0%	69.0%		
Single Mother	15.2%	24.0%	7.2%		
Separated/Divorced	29.5%	36.0%	23.6%		

YO = Young Offenders

* $p < .05$ ** $p < .001$

parents. Further, the parents of adolescents involved in the juvenile justice system were more likely to be divorced or separated or a single parent compared to the college students whose parents were more likely to be married.

3.2 Procedure

Ethical approval for the study was sought and gained from the University of Birmingham's School of Psychology ethics committee. Following this, participants were recruited through schools in Birmingham and through the local Youth Offending Teams

(YOTs) and the Intensive Supervision and Surveillance Programme (ISSP)[1] within the Birmingham area. The heads of all schools within the area whose pupils matched the participant criteria (males between 16 and 18 years) and the managers of the five YOTs and the ISSP in the area were contacted, provided with information about the study (see Appendix H) and asked for their permission to conduct the research at their institution (see Appendix I). One school, the ISSP and one YOT agreed.

Participants from the YOT and the ISSP were recruited during reparation sessions. All young people eligible for the study who attended these sessions were approached for their participation. Participants from the schools were recruited during their general studies lesson. All pupils who attended these lessons met the eligibility criteria.

Participants from both groups were given the opportunity to discuss the scope and purpose of the research prior to consenting to participate. They were given an information sheet (see Appendix J) and asked to sign a consent form (see Appendix K). All participants had the right to withdraw from the study at any point and were given the opportunity to withdraw their data up to the point of publication. All participants were informed that their responses would be kept confidential and added to an anonymised database. They were informed their questionnaires would be stored in a secure location. All participants were also provided with contact details of services should they experience any negative effects from participating and were given the opportunity to ask questions or discuss any issues with the researcher. Once consent forms were signed, participants were given the questionnaires to complete (see Appendix L).

[1] The ISSP is a non-custodial intervention established by the Youth Justice Board in 2001 and is available in England and Wales. The ISSP targets the most prolific and serious young offenders between the ages of 12 and 17. To be eligible for the ISSP, a young person must have been charged, warned or convicted of four or more separate offences within the last twelve months, have received a minimum of one community or custodial sentence or have a history of repeated offending whilst on bail.

3.3 Measures

All participants completed a questionnaire pack which took approximately 30 minutes to complete. The pack consisted of a demographic information sheet (see Appendix L, part one) and six questionnaires measuring: (1) video game habits (see Appendix L, part two); (2) aggressive behaviours (see Appendix L, part three); (3) hostile attribution bias (see Appendix L, part eight); (4) empathy (see Appendix L, part five); (5) exposure to real-life violence (see Appendix L, part seven) and; (6) socially desirable responding (see Appendix L, part six); these are described below.

3.3.1 Video game habits

Video game habits were measured by a questionnaire developed for the study adapted from those used in previous research on the effects of video game exposure (e.g., Cowell & Kato, 2005; Cowell & Payne, 2000). Firstly, participants reported for how many years they had been playing video games. To measure the total amount of video game play for each participant, a weekly amount of video game playing was calculated from the product of frequency (1 = '*Less than once',* 2 = '*1-2 times,* 3 = '*3-5 times*', 4 = '*Every day'*) and duration (1 = *Less than ½ hour'*, 2 = *'½ hour to 1 hour'*, 3 = '*1-2 hours*', 4 = '*2-3 hours'*, 5 = '*More than 3 hours*'). For example, if an individual played video games once or twice a week, for one to two hours each time, they would receive a score of 6 (2x3). In order to measure violent video game exposure, similar to Anderson and Dill's (2000) approach, participants were asked to list the three video games they currently played most often and, on average, how many hours per week they played each named video game. These responses were scored on an 8-point Likert scale (1 = '*Less than 1 hour'*, 2 = '*1-5 hours'*, 3 = '*6-10 hours'*, 4 = '*11-15 hours'*, 5 = '*16-20 hours'*, 6 = '*21-25 hours'*, 7 = '*26-30 hours'*, 8 = '*More than 30 hours'*). Four experts in the field of video games were then asked to rate how violent each video game is on a 7-point Likert scale (1 = '*Little or no violence*', 7 = '*Extremely violent*') (see Appendix M) and the average score was taken. Inter-rater reliability of the ratings was assessed using Intra-Class Correlation (ICC). The ICC coefficient was .99 indicating strong agreement between the experts' ratings (Field,

2005). A video game violence exposure score was then computed for each participant by multiplying the frequency of play for each video game by its violence score and taking the sum of the three scores. For example, if an individual played one video game, rated 6 for violence, for an average of three hours a week, one video game, rated 5 for violence, for an average of four hours a week and a third video game, rated 7 for violence, for an average of 30 minutes they would receive a video game violence score of 29 ([6x2] + [5x2] + [7x1]). This method for calculation has been used in previous research (e.g., Colwell & Payne, 2000; Colwell & Kato, 2005).

Participants listed up to three favourite video games. This was used to measure the participant's preference for violent video games. As before, the participant's three favourite video games were rated by experts for their level of violence using the 7-point Likert scale. The scores were summed, with higher scores indicating a greater preference for violent video games. And finally, in order to measure parental involvement, the participants were asked how often their parents/guardians put limits on for how long they are allowed to play video games, how often their parents/guardians stop them from playing a video game because of its rating or content and how aware their parents/guardians are of what video games they play. Responses were rated on a 5-point Likert scale, ranging from '*Always*' to '*Never*'. The sum of scores was taken and used as a measure of parental involvement. Previous research has used these calculation methods (e.g., Gentile et al., 2004)

3.3.2 Aggressive behaviour

In order to measure aggressive behaviour, similar to previous studies (e.g., Gentile et al., 2004), participants were asked how often they had been in physical fights with their teachers and peers in the past year and how often they had been in verbal arguments, that did not result in physical aggression, with their teachers and peers in the past year. Responses were rated on an 8-point Likert scale (1 = '*Never*', 2 = '*1-2 times in the year'*, 3 = '*3-5 times in the year*', 4 = '*1-2 times a month*', 5 = '*3-5 times a month*', 6 = '*1-2 times a week*', 7 = '*3-5 times a week*', 8 = '*Everyday*'). Responses were summed so that

higher scores indicated a higher incidence of aggressive behaviour. In addition, participants were asked if they had ever been involved with the juvenile justice system, court, sentenced to a young offenders institute, arrested or convicted of any offence(s) and, if so, for what.

3.3.3 The Social Situations Hostile Attribution Survey (SSHAS; adapted from Crick, 1995; Nelson & Crick, 1999)

An adapted version of the Social Situations Hostile Attribution Survey (SSHAS; Crick, 1995; Nelson & Crick, 1999), that has been reliably used in previous research (e.g., Buchanan, Gentile, Nelson, Walsh, & Hensel, 2002), was used to measure the participants' hostile attribution bias. This instrument is composed of 10 stories, each describing an instance of provocation in which the intent of the provocateur is ambiguous. The stories were developed to reflect common situations that adolescents might encounter. Four of the stories depict instrumental provocations (e.g., breaking a peer's CD player) and six represent relational provocations (e.g., whispering and laughing as a peer walks by). Participants answer two questions following each story. The first question presents four possible reasons for the peer's/peers' behaviour, two of which reflect hostile intent and two indicate benign intent. The second question asks whether the provocateur(s) intended to be mean or was/were merely being thoughtless. Participants' responses to the items were summed within and across the stories. Possible scores ranged from 0 to 8 for the instrumental subscale and 0 to 12 for the relational subscale, with higher scores indicating higher levels of hostile attribution bias. Acceptable internal reliability has been found for both instrumental (Cronbach's alpha = .74) and relational (Cronbach's alpha = .81) provocation items of the SSHAS (Buchanan et al., 2002). Participants in the current study only completed items on the relational subscale in order to reduce the length of the questionnaire and testing time required. The relational subscale was selected rather than the instrumental subscale due to its higher internal reliability.

3.3.4 The Children's Empathic Attitudes Questionnaire (CEAQ; Funk, Fox, Chan, & Curtiss, 2008)

The Children's Empathic Attitudes Questionnaire (CEAQ; Funk et al., 2008) was used to measure empathy towards others. The CEAQ is a 16-item measure of empathy intended for use with children and adolescents. The CEAQ items include statements that indicate empathy in response to an actual event (e.g., '*When I see a person who is upset it really bothers me*') and those that reflect empathy in anticipation of an event (e.g., '*I would get upset if I saw someone hurt an animal'*). The items on the CEAQ are rated on a 3-point Likert scale (1 = '*No*', 2 = '*Maybe*', 3 = '*Yes*'). A total score is calculated, with higher scores indicating higher empathy. The CEAQ demonstrates acceptable psychometric characteristics. Internal consistency reliability, as estimated from Cronbach's alpha, has been found to be moderate at .77 (Funk et al., 2008). For the purpose of this study the items were reversed scored (1 = '*Yes*', 2 = '*Maybe*', 3 = '*No*') such that higher scores indicate lower empathy. The reason for this was to ensure there was a positive relationship between all the variables which was required for the analyses used.

3.3.5 The Screen for Adolescent Violence questionnaire (SAVE; Hastings & Kelley, 1997)

The Screen for Adolescent Violence questionnaire (SAVE; Hastings & Kelley, 1997) was used to measure exposure to real-life violence. The SAVE is a self-report measure for adolescents which assesses their indirect and direct exposure to violence in school, home and community settings. The SAVE consists of 32 items which are rated on a 5-point Likert format to indicate the frequency of occurrence of experiences (1 = '*Never'*, 2 = '*Hardly ever'*, 3 = '*Sometimes*', 4 = '*A lot'*, 5 = '*Almost always'*). Scores range from 0 to 160, with higher scores reflecting greater violence exposure. The SAVE has demonstrated good internal consistency, test-retest reliability and validity. Cronbach's alpha ranges from .90 to .94, indicating good internal reliability. Two-week test-retest coefficients ranged from .53 to .92 (Hastings & Kelley, 1997). Further, the SAVE has been found to correlate with similar constructs, such as the Trauma Symptom Checklist

for Children (TSCC; Briere, 1996), the Impact of Events Scale (IES; Horowitz, Wilner, & Alvarez, 1979) and the Youth Self Report (YSR; Achenbach, 1991), as well as with neighbourhood crime rates (Hastings & Kelley, 1997). Additionally, it has been found to adequately distinguish between low and high violence exposure groups (Hastings & Kelley, 1997).

3.3.6 The Crandall Social Desirability Test for Children, Short Form (CSDTC-SF; Carifio, 1994)

The Crandall Social Desirability Test for Children (Crandall, Crandall, & Katkovsky, 1965) was developed to measure the tendency of children and adolescents to give socially desirable answers rather than answers reflecting the individual's true opinion. This original 48-item version was reduced to 12 stand-alone items using factor analytic instrument reduction techniques to enhance its usefulness in research by Carifio (1994). Items are rated as either '*true*' or '*false*', scored according to the manual, and the percentage of socially desirable answers measured, with higher scores indicating socially desirable response patterns (Carifio, 1994). The Cronbach's alpha coefficient for the CSDTC-SF has been found to be .73 and test-retest reliability was demonstrated to be .87 at four days (Carifio, 1994).

3.4 Treatment of data

Once demographic and psychometric data were collected, the measures were scored and added to a Statistical Package for the Social Sciences (SPSS), Version 18.0, database for analysis in an anonymised format. For the purpose of the current research, preliminary analyses included bivariate analyses and descriptive statistics to examine differences between the two groups, the group of adolescents involved in the juvenile justice system and the college group.

3.4.1 Data Integrity

Data was originally collected from 57 adolescents involved in the juvenile justice system and 60 college students. Of the adolescents involved with the juvenile justice system, 7 were excluded from the sample group. Four were removed from analysis due to a high percentage of socially desirable answers (more than 25%) on the social desirability measure, CSDTC-SF. These scores were at the top of the distribution of scores (Carifio, 1994) and suggested that the participants were responding to the measure in a socially desirable manner. Because a high score on this measure could indicate that the participants responded in a similar and inaccurate manner to the other measures, the data from these participants was removed. A further 3 were removed due to a significant number of missing items. Therefore, a total of 50 participants from the group of adolescents involved in the juvenile justice system were in the final analysis. Of the college sample, 5 were excluded from the final analysis due to a high percentage of socially desirable answers on the CSDTC-SF. None of these participants had a significant number of missing items. Thus, 55 participants from colleges were included in the analyses.

3.4.2 Assumptions of Analyses

Prior to mediator and moderator analysis, it was necessary to ensure the assumptions of linear and multiple regressions were met (Dancey & Reidy, 2002). Firstly, the sample was a sufficient size. There were 105 participants and 5 variables; Dancey and Reidy (2002) suggest at least 15 participants for every variable. Secondly, the variables to be used in the regression models were normally distributed which was assessed using Kolmogorov-Smirnov test (see Table 10). The predictor variables were linearly related to the dependent variable and there were no outliers which were both assessed through plotting scatter plots (see Appendix N). Further, prior to the mediational analysis, it was necessary to ensure that colinearity between variables did not affect the regression statistic, thus, inter-correlations were computed. Pearson correlation coefficients were below .70 (see Table 11) and, therefore, the variables are considered to be acting

independently of one another. Further, this indicated that mean-centring was not required (Tabachnick & Fidell, 2000).

In addition to ensuring the assumptions of regression analyses were met, a power analysis using the G*Power programme (Faul, Erdfelder, Lang, & Buchner, 2007) was conducted to approximate the sample size needed for the analysis. The sample size was based on a statistical power of .80, with a small effect size and evaluated at the alpha level of .05. This revealed that 68 participants were required.

Table 10: Test for normality

	Kolmogorov-Smirnov Z	**Asymp. Sig. (2-tailed)**
Years of play	2.290	.000**
Total video game play	1.764	.004**
Preference for violent video games	1.169	.130
Total video game violence	.737	.649
Parental Involvement	2.915	.000**
Aggressive behaviour	.805	.536
Hostile attribution bias	1.284	.074
Empathy	.806	.544
Exposure to Real life violence	1.170	.130

* $p < .05$ ** $p < .001$

3.4.3 Analyses

3.4.3.1 Mediator analysis

As hostile attribution bias and empathy were hypothesised to mediate the relationship between exposure to video game violence and aggressive behaviour, this was explored using the four-step meditational procedure advocated by Baron and Kenny (1986), Judd and Kenny (1981) and Kenny, Kashy and Bolger (1998):

Step 1: The dependent variable (DV) must be regressed onto the independent variable (IV) to demonstrate that there is an effect to be mediated.

Step 2: The mediator must be regressed onto the IV.

Step 3: The DV must be regressed onto the mediator whilst controlling for any effects of the IV. It is insufficient merely to correlate the mediator with the DV; the mediator and the DV may be correlated because they are both caused by the IV. Thus, the IV must be controlled in establishing the effect of the mediator on the DV.

Step 4: To establish that this variable completely mediates the IV-DV relationship, the effect of the IV on the DV controlling for the mediator should be zero. Therefore, for full mediation, the DV should no longer be significantly regressed onto the IV whilst controlling for the effects of the mediator. However, partial mediation may be achieved when the pathway is reduced in absolute size but not reduced to non-significant levels. The statistical significance of partial mediators can be tested using the Baron and Kenny (1986) modification of the Sobel test.

Table 11: Correlations between main study variables

Variable	EVGV	AB	HAB	Empathy	ERLV
EVGV	-	.235*	.049	.108	.105
AB	-	-	.598**	.563**	.597**
HAB	-	-	-	.572**	.497**
Empathy	-	-	-	-	.411**
ERLV	-	-	-	-	-

EVGV = Exposure to video game violence, AB = Aggressive behaviour, HAB = hostile attribution bias, ERLV = Exposure to real life violence

* $p < .05$ ** $p < .001$

3.4.3.2 Moderator analysis

In order to explore moderator effects, the procedure advocated by Baron and Kenny (1986) was used. In this procedure a path diagram is used as both a descriptive and an analytic procedure. The essential properties of a moderator variable are summarised in Figure 3.

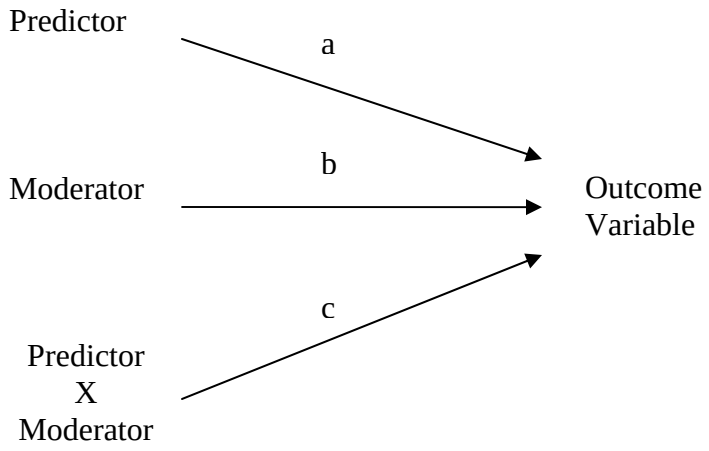

Figure 3: Diagram of the moderator model (Baron & Kenny, 1986, pp. 1174).

The model in Figure 3 has three causal paths that feed into the outcome variable, in this case aggressive behaviour: the impact of the predictor, exposure to video game violence (path *a*), the impact of a moderator, real life violence (path *b*), and the interaction or product of the predictor and a moderator (path *c*). The moderator hypothesis is supported if the interaction (path *c*) is significant. There may be main effects for the predictor and moderator (paths *a* and *b*) but these are not directly relevant conceptually for testing the moderator hypothesis. It is desirable that the moderator variable be uncorrelated with both the predictor and the outcome variable to provide a clearly interpretable interaction term. However, this is not a necessity (Baron & Kenny, 1986).

3.4.4 Data reporting

For the purpose of the present mediational and moderator analyses, linear and multiple regressions were used to account for the continuous nature of the data. Regressions are

expressed in terms of the Beta (β) coefficients, their standard error (SE) and significance levels. β values are the regression coefficients and SE reflects the accuracy of the regression equation as a whole and of the coefficient (Bryman & Cramer, 1999). The meditational property of a variable is described by identifying the percentage of the total effect that is explained by the presence of that variable. This effect is calculated by examining the reduction in β coefficients (Kenny et al., 1998). The effect of a moderating variable is quantified by the coefficient of the interaction term (Baron & Kenny, 1986). In addition, for regressions which explored the effects of variables in the relationship, the Nagelkerke R squared (R^2) is provided to report how much of the overall variance the model accounts for.

During preliminary analyses described previously, it was found that all variables were normally distributed (see Table 10) with the exception of years of play (Kolmogorov-Smirnov Z = 2.290, $p < .01$), total video game play (Kolmogorov-Smirnov Z = 1.764, $p < .01$) and parental involvement (Kolmogorov-Smirnov Z = 2.915, $p < .01$). As a result, measures of central tendencies for variables which were not normally distributed are reported in terms of their mode and range rather than mean and standard deviation. Further, non-parametric analysis was conducted on these variables when exploring differences between the groups.

4. Results

4.1 Descriptive analysis

4.1.1 Video game habits

The majority of participants had been playing video games for 8 years (mode), with the number of years ranging from 4 to 13. They played video games, typically, for '1-2 hours', '3-5 times per week', ranging from 'less than half an hour' for 'less than once a week' to playing 'daily' for 5 hours. Participants typically played alone (n = 102, 97%) and with friends (n = 84, 80%) and a small number played with siblings (n = 14, 13%). The most common reasons for playing video games were for entertainment (n = 65, 62%), social reasons (n = 52, 50%) and because of boredom (n = 51, 49%). Some participants also reported playing for relaxation (n = 13, 12%) and to relieve stress (n = 1, 1%). The majority of participants played in their rooms (n = 98, 93%) or at a friend's house (n = 83, 79%). A small percentage played in the general living area (n = 9, 9%). The majority of participants (n = 55, 52%) also reported that their parents or guardians 'never' put limits on how much time they are allowed to play video games, were 'never' aware of what games they played and 'never' stopped them playing a game because of its rating or content.

There were no significant differences between the two groups, adolescents involved in the juvenile justice system and college students, with regards to how long they had been playing video games ($Z = -1.253$, $p = .210$) or the amount of parental involvement ($Z = -1.197$, $p = .231$). Their level of violent video game play ($t_{(103)} = 1.308$, $p = .192$) and preference for violent video games ($t_{(103)} = -.613$, $p = .537$) also did not significantly differ. However, there was one significant difference between the groups with respect to video game habits. It would appear that the adolescents who were involved in the juvenile justice system played significantly more video games overall ($Z = -2.736$, $p < .01$) (i.e., violent and non-violent). The lack of differences between the two groups in

terms of age and video game habits supports the analysis of the two groups as a whole sample rather than separately.

4.1.2 Comparison of characteristics of adolescents involved in the juvenile justice system and college students

Despite few differences between the groups in terms of their video game habits, there were significant differences between the groups with regards to aggressive behaviour, hostile attribution bias, empathy and exposure to real life violence (see Table 12). The sample of adolescents involved in the juvenile justice system were significantly more likely to report having engaged in aggressive behaviour in the past year ($t_{(103)} = 4.870$, $p < .01$), lower empathy ($t_{(103)} = -3.613$, $p < .01$), higher hostile attribution bias ($t_{(103)} = 8.106$, $p < .01$) and more exposure to real life violence ($t_{(103)} = 3.382$, $p < .01$).

Table 12: Descriptive analysis of study variables

	Total Statistics (N=105)		**YO (n=50)**		**Student (n=55)**		**t-test for Equality of Means**		
Variable	**Mean**	**Std. Dev.**	**Mean**	**Std. Dev.**	**Mean**	**Std. Dev.**	**t**	**df**	**Sig. (2-tailed)**
AB	13.49	4.90	15.70	4.01	11.47	4.80	4.870	103	.000**
Empathy	17.48	7.10	19.82	6.32	15.35	7.15	3.384	103	.001**
HAB	5.59	3.67	7.98	2.71	3.42	3.02	8.106	103	.000**
ERLV	65.45	15.55	70.58	13.06	60.78	16.27	3.382	103	.001**
EVGV	28.54	12.25	30.18	11.67	27.05	12.68	1.308	103	.192

YO = Young Offenders, AB = Aggressive behaviour, HAB = hostile attribution bias, ERLV = Exposure to real life violence, EVGV = Exposure to video game violence

* $p < .05$ ** $p < .001$

4.2 Mediational analysis: The role of hostile attribution bias and empathy

In the mediational model, the DV was aggressive behaviour and the IV the amount of exposure to video game violence. Mediator variables were hostile attribution bias and empathy. Each factor's contribution to the model was analysed independently. For each equation in the regression model, Table 13 displays the β coefficients, SE, Beta, significance levels and Nagelkerke R^2 values.

Table 13: Regression analysis examining the mediating effects of hostile attribution bias and empathy on exposure to video game violence predicting aggressive behaviour

Equation Variables Step:	**Nagelkerke R^2**	**B**	**SE**	**β**	**t**	**Sig.**
1. EVGV predicting AB	.055	.094	.038	.235	2.450	.016*
2a. EVGV predicting HAB	.002	.015	.029	.049	.500	.618
2b.EVGV predicting Empathy	.012	.062	.057	.108	1.100	.274

EVGV = Exposure to video game violence, AB = Aggressive behaviour, HAB = hostile attribution bias

* p <.05

The first equation found aggressive behaviour significantly regressed onto video game violence (F (1,104) = 6.003, p = .016, R^2 = .055). Thus, step one of the mediational procedures was met, demonstrating that there was an effect to be mediated. Neither mediator variable significantly regressed onto the IV (exposure to video game violence); hostile attribution bias (F (1,104) = .250, p = .618, R^2 = .002); empathy (F (1,104) = 1.211, p = .274, R^2 = .012). Thus, step 2 of the meditational procedure for both hostile attribution bias and empathy was not met. Given this, steps 3 and 4 of the mediational procedure were not conducted as the results of step 2 suggest hostile attribution bias and empathy do not significantly mediate the relationship between exposure to video game violence and aggressive behaviour. However, these variables significantly correlated with the DV (see Table 11), aggressive behaviour. Therefore, it would appear they could be

influential in the relationship between exposure to video game violence and aggressive behaviour, only not as mediators. As a result, hostile attribution bias and empathy were considered and analysed as moderators, as described below.

4.3 Moderator analysis

In the moderator model, the DV was aggressive behaviour and the IV was the amount of exposure to video game violence. Moderator variables were hostile attribution bias, empathy and exposure to real life violence. Separate equations were calculated for each moderator. Tables 14, 15 and 16 display the B coefficients, SE, *β*, significance levels and Nagelkerke R^2 values for each equation in the models.

4.3.1 Hostile attribution bias

Table 14: Regression analysis examining the moderating effects of hostile attribution bias on exposure to video game violence predicting aggressive behaviour

Paths	**Nagelkerke R^2**	**B**	**SE**	***β***	**t**	**Sig.**
1. Path *a* (EVGV predicting AB)	.055	.094	.038	.235	2.450	.016*
2. Path *b* (HAB predicting AB)	.358	.800	.106	.598	7.576	.000**
3. Path *c* (Interaction of EVGV and HAB predicting AB)	.427	.023	.003	.653	8.756	.000**

EVGV = Exposure to video game violence, AB = Aggressive behaviour, HAB = hostile attribution bias

* $p < .05$; ** $p < .01$

In the first step of the moderator model, as previously reported, aggressive behaviour significantly regressed onto exposure to video game violence ($F(1,104) = 6.003$, $p =$

.016, R^2 = .055) (path *a*). Hostile attribution bias was regressed onto aggressive behaviour (path *b*) in the second step; the effect of hostile attribution bias on aggressive behaviour was significant (F (1,104) = 57.389, $p < .001$, R^2 = .358) (path *b*). In the final step, aggressive behaviour significantly regressed onto the interaction variable (hostile attribution bias multiplied by exposure to video game violence, path *c*) (F (1,104) = 76.660, $p < .001$, R^2 = .427). This indicates that hostile attribution bias significantly moderates the relationship between exposure to violent video games and aggressive behaviour.

4.3.2 Empathy

Table 15: Regression analysis examining the moderating effects of empathy on exposure to video game violence predicting aggressive behaviour

Paths	**Nagelkerke R^2**	**B**	**SE**	***β***	**t**	**Sig.**
1. Path *a* (EVGV predicting AB)	.055	.094	.038	.235	2.450	.016*
2. Path *b* (Empathy predicting AB)	.317	.389	.056	.563	6.913	.000**
3. Path *c* (Interaction of EVGV and Empathy predicting AB)	.299	.008	.001	.547	6.624	.000**

EVGV = Exposure to video game violence, AB = Aggressive behaviour

* $p < .05$; ** $p < .01$

The same process was repeated for empathy. Empathy was regressed onto aggressive behaviour; the effect of empathy on aggressive behaviour was significant (F (1,104) = 47.789, $p < .001$, R^2 = .317) (path *b*). In the final step, aggressive behaviour significantly regressed onto the interaction variable (empathy multiplied by exposure to video game violence, path *c*) (F (1,104) = 43.877, $p < .001$, R^2 = .299). This suggests that empathy

significantly moderates the relationship between exposure to violent video games and aggressive behaviour.

4.3.3 Exposure to real life violence

Table 16: Regression analysis examining the moderating effects of exposure to real life violence on exposure to video game violence predicting aggressive behaviour

Paths	**Nagelkerke R^2**	**B**	**SE**	***β***	**t**	**Sig.**
1. Path *a* (EVGV predicting AB)	.055	.094	.038	.235	2.450	.016*
2. Path *b* (ERLV predicting AB)	.356	.188	.025	.597	7.547	.000**
3. Path *c* (Interaction of EVGV and ERLV predicting AB)	.236	.002	.000	.486	5.643	.000**

EVGV = Exposure to video game violence, AB = Aggressive behaviour, ERLV = Exposure to real life violence

* p <.05; ** p <.01

Finally, the moderating effects of exposure to real life violence were explored. Exposure to real life violence was regressed onto aggressive behaviour (path *b*); the effect of exposure to real life violence on aggressive behaviour was significant (F (1,104) = 56.964, p < .001, R^2 = .356) and, in the final step, aggressive behaviour significantly regressed onto the interaction variable (exposure to real life violence multiplied by exposure to video game violence, path *c*) (F (1,104) = 31.841, p < .001, R^2 = .236) suggesting that exposure to real life violence significantly moderates the relationship between exposure to violent video games and aggressive behaviour.

4.3.4 Moderator properties

The moderator properties of hostile attribution bias, empathy and exposure to real life violence on the relationship between exposure to video game violence and aggressive behaviour are quantified by the coefficient of the interaction term (Baron & Kenny, 1986). These are demonstrated by the β values. The moderator properties of all three variables, hostile attribution bias (β = .653), empathy (β = .547) and exposure to real life violence (β = .486), appear to be of a medium level (Dancey & Reidy, 2002). Further, these variables, hostile attribution bias, empathy and exposure to real life violence, accounted for 35.8%, 31.7% and 35.6% of the variance in aggressive behaviour respectively whereas exposure to violence in video games accounted for 5.5%.

5. Discussion

5.1 Overview

The purpose of this study was to explore the relationship between exposure to violence in video games and aggressive behaviour and factors which may mediate and moderate this relationship; namely hostile attribution bias, empathy and exposure to real life violence. Specifically, this study aimed to consider three research questions. Firstly, whether there is a relationship between playing violent video games and aggressive behaviours in adolescents. Secondly, whether hostile attribution bias and empathy mediate the relationship between exposure to violent video games and aggressive behaviour in adolescents and, finally, whether exposure to real life violence moderates the relationship between exposure to violent video games and aggressive behaviour.

Two groups of adolescents were included in the sample, adolescents involved in the juvenile justice system and college students. There were few differences between the groups in terms of their video game habits except that their total amount of video game play significantly differed with adolescents involved in the juvenile justice system playing significantly more video games. It is possible that this is because adolescents in this group have more free time as fewer are involved in education or vocation. There were also significant differences between the groups in terms of aggressive behaviour, hostile attribution bias, empathy and exposure to real life violence. Adolescents involved in the juvenile justice system reported more aggressive behaviours, higher levels of hostile attribution bias, lower empathy and greater exposure to real life violence. Further, there were demographic differences between the groups. However, there was no significant difference in the ages of the participants in each group. The data from the two groups were analysed as a whole rather than separately. This was because the purpose of the study was to utilise a sample which included a diverse range of individuals to investigate the effects of video game violence on behaviour and factors that affect this relationship rather than explore differences between individuals who have offended and those who have not.

With regards to the research questions, this study found a significant relationship between exposure to video game violence and aggressive behaviour. The results indicated that individuals who played more violent video games reported more aggressive behaviours. This is consistent with previous research (e.g., Colwell & Kato, 2005; Durkin & Barber, 2002; Gentile et al., 2004). However, exposure to violent video games only accounted for 5.5% of the variation in aggressive behaviour. This suggests that other variables also have an influence.

This study explored the potential influence of three such variables: hostile attribution bias, empathy and exposure to real life violence. These variables accounted for 35.8%, 31.7% and 35.6% of the variance in aggressive behaviour respectively. This suggests that these variables have more of an influence on aggressive behaviour than the amount of exposure to violence in video games. Further, exposure to video game violence did not significantly predict hostile attribution bias or empathy in this study which suggests that playing violent video games does not significantly affect these variables. This is contrary to previous studies (e.g., Bartholow et al., 2005)

According to the GAM, hostile attribution bias and empathy should mediate the relationship between exposure to violence in video games and aggressive behaviour. The results of this study do not support this. This suggests that levels of hostile attribution bias and empathy do not explain how or why video game violence may lead to aggressive behaviour. However, these variables significantly correlated with aggressive behaviour. Therefore, they were considered and analysed as moderators along with exposure to real life violence. This moderator analysis revealed that hostile attribution bias, empathy and exposure to real life violence significantly moderated the relationship between exposure to video game violence and aggressive behaviour. Given a moderator specifies when certain effects will hold, these findings indicate that if an individual has high levels of hostile attribution bias, low levels of empathy or is exposed to high levels of exposure to real life violence then exposure to violent video games has a stronger influence on aggressive behaviour.

The moderator properties of hostile attribution bias, empathy and exposure to real life violence on the relationship between exposure to video game violence and aggressive behaviour are quantified by the coefficient of the interaction term. The results found in this study suggest that the moderator effects of hostile attribution bias, empathy and exposure to real life violence on the relationship between exposure to video game violence and aggressive behaviour are of a medium level. Further, they also indicate that hostile attribution bias has stronger moderator properties than empathy which has stronger moderator properties than exposure to real life violence. In order words, high hostile attribution bias and exposure to real life violence and low empathy increase the effects of exposure to video game violence on aggressive behaviour. However, high hostile attribution bias has a greater influence on the effects than low empathy which has a greater effect than high exposure to real life violence.

5.2 Methodological considerations and future research

Several limitations of this research need to be acknowledged. This study relied upon self-report. Specifically, participants may have inaccurately reported information about themselves (Aiken & Groth-Marnat, 2006). This could result from difficulty reading or understanding questions, carelessness in completing forms or to personal biases in perceptions of one's own behaviour. Further, inaccurate responses could be a result of the participants' concerns about responding truthfully, particularly in the group of adolescents involved in the juvenile justice system, due, possibly, to their fears of negative consequences should they admit delinquent behaviours. In this study, it was hoped that problems with reading or understanding measures were minimised by having the researcher, teachers and youth offending workers present to answer questions. In order to minimise concerns and encourage honesty, the questionnaires were anonymous. Further, the CSDTC-SF was included in the questionnaire pack in order to decrease the likelihood of invalid data.

In future studies, problems with accuracy of perceptions during self-report may be minimised by using multiple methods to collect data including parent or teacher reports

and recorded information about aggressive behaviour (e.g., school or police records). This approach was not used in this study as it was felt that adolescents' own ratings were more likely to be honest and valid as only the individual would be fully familiar with his or her own behaviour. Further, teacher or peer ratings of aggression would require a loss of anonymity which is likely to result in socially desirable responses to other items by the adolescents (Cowell & Kato, 2005; Cowell & Payne, 2000). Related to this, the levels of violence in video games in this study were rated by video game developers. Their perception of the level of violence may have been biased due to their vocation and, thus, may not be representative of the general population or, indeed, the participants. Therefore, the reliability of the ratings and, as a result, the study's findings could have been affected. In future, researchers might consider participants and members of the general population to rate the levels of violence in the video games as well as experts.

The sample used in this study was relatively small and limited; it included participants from one school, a YOT and the ISSP in a large urban area. As a result, the generalisability of the findings to adolescents in general may be limited. Therefore, to expand on the findings, further research should be conducted with other samples of adolescents, from a variety of locations, both urban and rural, and institutes (e.g., young offender institutes and state, public and private schools) and samples which include individuals in employment and those not in education or employment.

Other limitations of this study concern the variables used. Because hostile attribution bias and empathy are internal, psychological variables, they are likely to be measured with error. The presence of measurement error tends to produce an underestimation of the effect of a mediator and overestimation of the effect of the IV on the DV when all co-efficients are positive (Judd & Kenny, 1981). This could mean that successful mediators, such as hostile attribution bias and empathy, are overlooked. Further, Baron and Kenny (1986) indicate that, whilst not a necessity, it is desirable that a moderator not be correlated with either the DV or IV. In this study, all the moderators significantly correlated with the DV (aggressive behaviour); none significantly correlated with the IV

(exposure to violent video games). As a result, the interaction terms are likely to have been affected, thus, clouding the interpretation of the findings.

A further problem with the analyses used in this study is that of causality. For the purpose of the analyses and consistent with the GAM, it was assumed that aggressive behaviour does not cause exposure to video game violence. However, it is possible that aggressive adolescents seek out violent video games rather than violent video games causing aggressive behaviour (Kirsh, 2003). Further, it is possible that hostile attribution bias, empathy or exposure to real life violence is the IV and video game violence mediates the relationship between aggressive behaviour and these variables. Longitudinal research into this phenomenon is required to investigate causality.

Related to this, the variables found to be moderators in this study, hostile attribution bias, empathy and exposure to real life violence, may not be the 'true' moderators rather they may be variables with which the 'true' moderator correlates. For instance, exposure to real life violence was found to be a moderator but the 'true' moderator might be poverty, a variable with which exposure to real life violence correlates (Attar, Guerra, & Tolan, 1994). Unless the moderator is a manipulated variable, one can not know whether it is a 'true' moderator or just a 'proxy' moderator (Baron & Kenny, 1986).

Furthermore, this study looked at both physical and verbal aggression. Since, in video games, players are rewarded for physical and not verbal aggression it could be that exposure to violence in video games only has an effect on physical aggression. Thus, the effects of violent video games on physical, aggressive behaviour in this study are diluted by the inclusion of verbal aggression. Future research could also investigate other variables that might affect the relationship between video game violence and aggressive behaviour such as gender, academic achievement, mental health issues and experience of abuse. This study only examined the effects of three variables on the relationship between video game violence and aggressive behaviour. These variables only accounted for a relatively small percentage of the variance in aggressive behaviour. Therefore, it would appear other variables also influence this relationship and, thus, require investigation.

5.3 Conclusions and clinical implications

Consistent with previous research and the GAM, this study found a significant relationship between playing violent video games and aggressive behaviour. It also found that exposure to real life violence moderated this relationship. However, contrary to the GAM, this study found that hostile attribution bias and empathy do not mediate the relationship between playing violent video games and aggressive behaviour. When considering these variables as moderators, it was found that both variables significantly moderated the relationship. Therefore, this study found that levels of hostile attribution bias and empathy do not explain how or why video game violence may lead to aggressive behaviour rather, the findings of this study indicate that, if an adolescent has high levels of hostile attribution bias, low levels of empathy or is exposed to high levels of exposure to real life violence then the effects of exposure to violent video games has a greater impact upon their aggressive behaviour.

Suggestions for future research have been discussed previously. However, in terms of clinical implications of this study's findings, it is recommended that, in order for interventions to be most effective and to allocate scarce resources optimally, interventions for adolescents who play large amounts of violent video games target those with higher levels of exposure to real life violence and hostile attribution bias and low levels of empathy. This is because the impact of playing such video games on the individual's aggressive behaviour is likely to be greater. As demonstrated in this study, adolescents involved in the juvenile justice system are likely to spend more time play video games, are exposed to more risk factors for aggression (e.g., exposure to real life violence) and are at increased risk from the effects of video games. Therefore, it is recommended that services attempt to engage these individuals in education or vocational training and increase the variety of leisure activities available to them (e.g., sports clubs, music and drama). It would be hoped that by engaging young people in alternative activities, their exposure to video game violence and, therefore, its effects on them would be reduced.

The findings of this study, consistent with those of others, also indicate that the relationship between video game violence and aggression is complex and moderated through both situational and individual variables such as exposure to real life violence and hostile attribution bias and empathy. Furthermore, the effects of video game violence appear to vary by gender and age and parent-child relationship (e.g., Wallenius et al., 2007). Therefore, in accordance with the Nested Ecological Theory (Belsky, 1980; Bronfenbrenner, 1979; Dutton, 1985), no one factor can answer the question as to why aggression results but rather we must consider the interplay of several factors at several levels of the environment and individual level. Indeed, the following chapter describes an individual with several interacting factors, both environmental and person factors, which are all hypothesised to play a role in the development and maintenance of her aggressive behaviour.

Chapter Three:
A Case Study of an Adolescent Presenting with Aggressive Behaviours

Chapter Four:
Critique of a Psychometric Assessment:
The Psychological Inventory of Criminal Thinking Styles (Version 3.0)

1. Introduction

Throughout this thesis the importance of cognitions in aggression has been documented. For instance, the GAM, described in preceding chapters, like many other theories, emphasises the importance of cognitive factors in the formation and maintenance of aggressive behaviours. The importance of cognitions was also demonstrated in the case study presented in the previous chapter. Consequently, there would appear to be a need for a reliable and valid assessment tool which measures cognitions associated with aggressive behaviour. This chapter presents a critique of such a measure, the Psychological Inventory of Criminal Thinking Styles (PICTS) (Version 3.0), developed by Walters (1995). In this chapter, an overview of the instrument will be provided as will a discussion of the scientific properties of the tool, its applicability to offenders and its potential value as a research tool.

1.1 Background

The lifestyle model of criminal conduct (Walters, 1990) purports that serious criminal lifestyles arise from three influences: conditions, choices and cognitions. Over time, these influences become interdependent, forming a complex, dynamic and multidirectional system. The model emphasises the role of cognitive factors in the formation and continuation of criminal behaviour including aggression. Based on earlier clinical observations and in depth research into the cognitive correlates of crime (Walters & White, 1989), the model asserts there are eight interrelated thinking styles which facilitate and maintain a criminal lifestyle (Walters, 1990). As a result of this work, Walters went on to develop the PICTS (Walters, 1995) as a tool to identify each of the eight thinking styles in offending populations. Other assessments of cognitions of offenders include the Criminal Sentiments Scale–Modified (CSS-M; Simourd, 1997) and the TCU Criminal Thinking Scales (TCU CTS; Knight, Garner, Simpson, Morey, & Flynn, 2006). These assessments were developed for use with adult males; none have been developed specifically for use with young offenders. However, research has been carried out on the use of the PICTS with adolescents.

2. Overview

The first version of the PICTS was developed in 1989 and consisted of 32 items, 4 items for each thinking style, rated on a 3-point Likert-type scale ('*Agree*', '*Uncertain*', '*Disagree*'). In 1990 (Version 2.0), two validity scales were added and the rating scale changed to a 4-point scale (*'Strongly agree', 'Agree', 'Uncertain', 'Disagree'*). In 1992, the PICTS was again revised (Version 3.0) resulting in the doubling of the number of items for each scale from 4 to 8. For the latest version, Version 4.0, revised validity scales were added but no changes to the thinking-style scales were made. This revision occurred because research showed that the internal consistency, test-retest reliability and preliminary validity of the validity scales were well below the levels attained by the eight thinking style scales (Walters, 2001). These revised scales demonstrate improved internal consistency, test-retest stability and criterion validity on par with results recorded previously with the eight thinking style scales (Walters, 2001). To date, little research has been conducted with the latest version, Version 4.0 (Walters, 2006a). Therefore, this review will focus on a critique of the PICTS Version 3.0.

The PICTS Version 3.0 is an 80-item inventory consisting of 10 scales (see Table 22); two validity scales (confusion [Cf], defensiveness [Df]) and eight thinking-style scales (mollification [Mo], cut-off [Co], entitlement [En], power orientation [Po], sentimentality [Sn], superoptimism [So], cognitive indolence [Ci], discontinuity [Ds]). Each scale is comprised of eight items. Each item is assessed by a 4-point Likert scale (1 = '*Disagree*', 2 = '*Not sure'*, 3 = '*Agree*', 4 = '*Strongly agree*'). Thus, the total raw score for a scale may range between 8 and 32, with higher scores indicating greater criminal attitudes.

Table 22: Descriptions of the PICTS scales

Scale	Description
Mollification (Mo)	The Mo thinking style is the justification and rationalisation of criminal behaviour by focusing on social injustice, minimisation of the severity of specific antisocial behaviours or projection of

	blame onto the victims. High scores reflect a tendency to externalize blame for the consequences of offending and offer rationalizations and excuses for committing crimes. Low scores reflect a greater willingness to take responsibility for one's behaviour.
Cut-off (Co)	The Co thinking style is the rapid elimination of fear, anxiety and other psychological deterrents to criminal behaviours. High scores indicate a low frustration tolerance and a tendency to remove deterrents to criminal behaviour with drugs, mental impairment or short phrases (e.g., 'fuck it'). Low scores denote good emotional coping skills.
Entitlement (En)	The En thinking style is an attitude of ownership, privilege and the misidentification of wants as needs. High scores reflect an attitude of privilege or ownership, often including a tendency to misidentify wants as needs. Low scores reflect a consideration of other's perspectives and an ability to discriminate between wants and needs.
Power orientation (Po)	The Po thinking style gives rise to outward displays of aggression designed to control and manipulate others. High scores indicate a need to achieve a sense of control and authority over others. Low scores reflect social conformity.
Sentimentality (Sn)	The Sn thinking style reflects self-centred attempts to atone for one's own past criminal behaviours by performing various good deeds. High scores denote a belief that one is a 'good person' despite the destructive consequences caused by involvement in criminal behaviour. Low scores indicate a more realistic view of the impact of one's criminal behaviour on other people.

Superoptimism (So)	The So thinking style involves overestimating one's chances of avoiding the negative consequences of one's criminal behaviour. High scores indicate a belief that the negative consequences of criminal behaviour can be avoided indefinitely. Low scores reflect a more realistic view of the effect criminal behaviour has on oneself.
Cognitive indolence (Ci)	The Ci style reflects an inclination toward lazy thinking, short-cuts in problem-solving and uncritical acceptance of personal ideas and plans. High scores reflect poor critical reasoning and an over-reliance on cognitive short cuts in dealing with social problems. Low scores reflect adequate planning and reasoning skills.
Discontinuity (Ds)	The Ds thinking style presumes a lack of premeditation and a disruption of thought process which affects an individual's ability to follow through on initially good intentions through poor self-discipline. High scores denote inconsistency in thinking and behaviour. Low scores indicate an ability to follow intentions through into behaviour.
Confusion (Cf) *	The Cf scale is designed to identify a 'faking bad', malingering or 'yea-saying' response set and consists of extreme items that are rarely endorsed by most people. Some respondents may have elevated scores on this scale as a result of comprehension difficulties caused by poor concentration, limited reading ability or unfamiliarity with the English language. High scores indicate psychological distress, mental confusion, poor reading ability or a deliberate attempt to portray one of the above. Low scores denote a lack of distress, confusion or deception.

Defensiveness (Df) *	The Df scale is sensitive to ‘faking good’ response sets in which respondents try to create overly favourable impressions of their psychological stability by denying ordinary human foibles and concerns. High scores indicate a defensive test-taking style where an attempt is being made to conceal minor difficulties or deficiencies. Low scores indicate a willingness to acknowledge the existence of any limitations.

*Validity scales

Taken from Walters (1996) pp. 111-112.

3. Psychometric properties

In order for a psychological test to be described as 'good', it should possess certain characteristics; data should be at least interval level, it should be reliable, valid, discriminating and have appropriate norms (Kline, 1986). The PICTS data is at interval level, thus, fulfils the first criterion. Reliability and validity of the measure will be discussed in turn.

3.1 Reliability

In psychometrics, the concept of reliability refers to the degree of consistency within a measure and the replicability of results. Kline (2000) cites a coefficient of .70 or above as an indicator of high reliability.

3.1.1 Internal reliability

Internal reliability refers to the consistency of items within a measure. In theory, if a test has high internal reliability, items of the measure should tap the same construct and, therefore, inter-item correlations should be high.

The internal reliability of the PICTS has been examined in several studies. In Walters' (1995) original study, consisting of a sample of 450 male offenders, the PICTS was found to have a moderately high level of internal consistency for three of the thinking-style scales with alpha coefficients of .78, .76 and .79 for the Co, Ci and Ds scales respectively. Moderate levels of internal consistency were found for the five remaining thinking-style scales with alpha coefficients of .64, .59, .65, .55 and .63 for the Mo, En, Po, Sn and So scales.

Palmer and Hollin (2003) report similar findings in their sample of 255 male offenders. They found good internal reliability for the thinking-style scales of the PICTS with the exception of the Sn scale. Coefficient alphas were .68, .81, .72, .78, .64, .73 and .82 for

the Mo, Co, En, Po, So, Ci and Ds scales and .43 for the Sn scale. These findings are similar to those of other studies (e.g., Bulten, Nijman, & van der Staak, 2009; Walters, 1996, 2006b; Walters & Elliott, 1999; Walters, Elliott, & Miscoll, 1998) and indicates the thinking-style scales of the PICTS have an acceptable level of internal consistency.

3.1.2 Test-retest reliability

Test-retest reliability refers to the replicability of the scores. Therefore, the same score should be replicated for each participant when retested overtime. Research has shown the PICTS to have good test-retest reliability (e.g., Walters et al., 1998). Walters (1995) found no significant differences between participants when retested at 2 weeks, 12 weeks and both 2 and 12 weeks. The 2 week test-retest reliabilities for the scales were moderately high to high, with Pearson product-moment correlations ranging from between .73 and .85. The 12 week test-retest reliabilities were moderate to moderately high, ranging between .57 and .72. Therefore, the test-retest reliability of the PICTS appears adequate.

3.2 Validity

Validity demonstrates that the test measures what it claims to measure. There are many different types of validity which can demonstrate a test's psychometric properties.

3.2.1 Face validity

Face validity is concerned with how the measure appears to the individual taking the test. A measure is said to have face validity if it appears to measure what it attempts to measure. There are no studies looking expressly at the face validity of the PICTS. However, items on the PICTS clearly measure thinking styles which would appear to facilitate and maintain a criminal lifestyle.

3.2.2 Concurrent validity

Concurrent validity refers to the ability of a test to highly correlate with other tests that measure similar concepts and have proven reliability and validity. Offenders who begin offending at an earlier age and those with a more extensive criminal history are more likely to have deeply ingrained criminal attitudes in comparison to those who begin offending later and who have committed fewer criminal offences. Therefore, the concurrent validity of the PICTS has been assessed by correlating the thinking-style scales with indicators of criminal history such as prior arrests, commitments and age at first arrest/conviction (e.g., Walters, 1995).

For instance, Palmer and Hollin (2003) correlated the thinking-style scales of the PICTS with age at first offence and number of previous convictions. Age at first offence was negatively related to five of the scales. Pearson correlation coefficients were -.25, -.31, -.21, -.17, -.13, -.25, -.30 and -.27 for the Mo, Co, En, Po, Sn, So, Ci and Ds scales respectively. Five of these correlations (Mo, Co, So, Ci, Ds) remained significant even after the Bonferroni procedure was applied ($p < .0025$). This suggests that the earlier a person began their offending, the more entrenched were their criminal attitudes. The number of previous convictions was positively related to all but one of the thinking-styles scales. Correlation coefficients were .16, .24, .11, .04, .12, .18 and .23 for the Mo, Co, En, Po, So, Ci and Ds scales. The Sn scale was negatively related to the number of previous convictions ($r = -.07$). Only two of these correlations, Co and Ds, remained significant after the Bonferroni correction procedure ($p < .0025$). These results suggest that greater amounts of previous offending are related to more criminal attitudes.

Concurrent validity of the PICTS has also been assessed by correlating the thinking-style scales with scores on established measures of criminality such as the Personality Assessment Inventory developed by Morey (1991) (e.g., Walters & Geyer, 2005), domains of the NEO Personality Inventory-Revised by Costa and McCrae (1992) (e.g., Bulten et al., 2009) and the Lifestyle Criminality Screening Form by Walters (1998) and Walters, White and Denney (1991) (e.g., Walters et al., 1998). These studies found the

PICTS significantly correlated with these measures. Together these findings suggest the PICTS has good concurrent validity.

3.2.3 Content validity

Content validity assesses whether the test items are appropriate to the content domain of the test and whether they are a representative sample of the infinite number of items one could test in order to measure the construct. It can be assessed, in part, by factor analysis.

Factor analysis has been used to investigate the underlying structure of the PICTS in several studies (e.g., Bulten et al., 2009; Walters et al., 1998; Walters, 2005a). In a study by Walters (1995), four factors were identified from the 80 items using exploratory factor analysis. He labelled these factors 'problem avoidance', 'interpersonal hostility', 'self-deception' and 'denial of harm'. However, none of these factors were clearly associated with any of the PICTS scales, with items from the scales loading across the four factors. Using this same data, Egan, McMurran, Richardson and Blair (2000) performed a principal-components analysis on the eight PICTS thinking-style scales. This analysis revealed only one factor, accounting for 59% of the variance, on which all of the eight scales loaded heavily. When a two-factor solution was imposed on the data, six scales (Mo, Co, Sn, So, Ci, Ds) loaded on the first factor and represented a 'lack of thoughtfulness' and four scales (Mo, En, Po, Sn) loaded on the second factor and represented 'wilful hostility'.

Similarly, exploratory factor analysis by Palmer and Hollin (2003) also revealed only two factors, accounting for 65% of the variance. The first factor, which accounted for 51% of the variance, contained the eight thinking-style scales and the second factor, which accounted for 14% of the variance, contained the two validity scales. Therefore, whilst this data indicates that the eight clinical scales of the PICTS are measuring a unitary theoretical construct of criminal thinking, it is questionable whether the thinking styles are qualitatively distinct. These studies suggest further investigation is required into the content validity of the PICTS.

3.2.4 Predictive validity

Predictive validity refers to the extent to which a measure is able to predict a specified outcome. The PICTS appears to have predictive validity as the thinking-style scales scores have been found to be predictive of both future disciplinary problems in prison (Walters, 1996, 2005b, 2006b, 2007a,b; Walters & Elliott, 1999; Walters et al., 1998; Walters & Schlauch, 2008) and outcome following release from prison (Walters, 1997, 2005a; Walters & Elliott, 1999; Walters et al., 1998). For example, the predictive validity of the PICTS was assessed by Walters (1996) in a sample of 536 medium-secure prisoners. Scores on six of the eight thinking-style scales (Co, En, Po, Sn, Ci, Ds) of the PICTS correlated significantly with future disciplinary problems even when using the Bonferroni correction (p = .0042) for multiple comparisons. Pearson correlation values were .08, .16, .16, .20, .15, .10, .13 and .12 for each of the scales Mo, Co, En, Po, Sn, So, Ci and Ds respectively.

3.3 Discriminative validity

A scale is said to be discriminating if it adequately differentiates between groups that should differ based on theoretical assumptions or previous research. To examine the discriminative validity of the PICTS, Palmer and Hollin (2003) divided a sample of 235 offenders into three security level bands using the Level of Service Inventory-Revised (LSI-R; Andrews & Bonta, 1995). A multivariate analysis of variance (MANOVA) was carried out and a significant effect was found for security level band (F (20, 446) = 4.11, p < .001). Seven of the PICTS scales (Mo, Co, En, Po, So, Ci, Ds) showed significant differences across the three security level bands, even after the Bonferroni correction was applied (p < .005). Post-hoc analyses using the Scheffé test revealed that, for the Mo, En, Po, So, Ci and Ds scales, the minimum security level group scored significantly lower than the other two groups. For the Co subscale, all three groups scored significantly differently from each other, with the maximum security level group scoring highest and the minimum security level group having the lowest scores.

Similarly, Walters (1995) explored the relationship between criminal thinking styles and criminal background in a sample of 150 offenders using the Lifestyle Criminality Screening Form (LCSF; Walters et al., 1991) which has been found to discriminate between groups hypothesised to contain persons with differing levels of commitment to a criminal lifestyle (i.e., minimum vs. maximum security inmates). The total LCSF score was found to correlate significantly with the Co (r = .24), Sn (r = .17), Ci (r = .18) and the Ds scales (r = .22) of the PICTS. Two correlations (Co, Ds) remained significant after the Bonferroni correction to control for multiple comparisons.

These studies demonstrate that the majority of the PICTS scales clearly differentiate between security levels of offenders indicating that those offenders who have a higher level of criminogenic risk and need have more criminal attitudes than those at a lower level of risk and need, thus, demonstrating the discriminate validity of the PICTS.

3.4 Appropriate normative data

Another characteristic of an effective test is good norms which are sets of scores from a clearly defined sample. The sample from which the norm is derived must be sufficiently large and universal, encompassing a wide range of individuals in order for it to reflect the population as a whole. The standard is used to make a judgement about what an individual's score means. Thus, they help provide information about an individual by enabling the score obtained from them to be interpreted meaningfully (Field, 2005).

Walters (1995) suggests that results gathered from his original study could be utilised as clinical norms due to large sample size and high replicability of results. Whilst the study included individuals from different races, it only looked at thinking styles in a sample of North American males, therefore, the data gathered may not be applicable to other populations in particular adolescents. However, since the development of the PICTS, studies have indicated there is some replication of the scores found in the original sample with samples in different countries (e.g., Palmer & Hollin, 2003), with females (e.g.,

Walters et al., 1998; Walters & Elliott, 1999) and with young people (Palmer & Hollin, 2004).

4. Limitations

The PICTS was developed and normed on an adult male North American sample. Studies have shown the validity of the PICTS is influenced by the action of moderator variables such as age, gender, ethnic status, education and offence type (Hatch-Maillette, Scalora, Huss, & Baumgartner, 2001; McCoy et al., 2006; Palmer & Hollin, 2003, 2004; Walters, 1995, 1997; Walters & Elliott, 1999; Walters et al., 1998; Walters, Trgovac, Rychlec, Di Fazio, & Olson, 2002). For example, comparisons of the PICTS scores of male and female offenders in North America have revealed significantly higher scores among females than males on the thinking-style scales (Walters & Elliott, 1999; Walters et al., 1998). There are also differences in the PICTS's utility in predicting future behaviour between male and female offenders, with female inmates exhibiting different patterns of correlation for disciplinary and release outcome (Walters & Elliott, 1999). Differences on the PICTS scales have also been reported between North American and English male offender samples (Palmer & Hollin, 2003), with English offenders scoring significantly higher on all of the thinking styles with the exception of the En and Sn scales. Further, Palmer and Hollin (2004) found that, in a sample of young, English offenders, young offenders scored significantly higher than English, adult offenders on four of the PICTS scales (Co, So, Ci, Ds). Therefore, the PICTS may have limitations with certain populations.

However, whilst studies have found that the scores of different populations are significantly different from the original sample and the psychometric properties of the PICTS scales do not perform as well with these populations, these studies have also found that, from a psychometric perspective, the indices of reliability and validity of the PICTS are still of an appropriate level (e.g., Palmer & Hollin, 2004).

In addition to possible limitations of use with certain populations, the overlap of thinking-style scales, as demonstrated by factor analyses (e.g., Egan et al., 2000; Palmer & Hollin, 2003), suggests that, it is possible, the items on the PICTS scales tap into a unitary

theoretical construct of criminal thinking rather than eight qualitatively distinct thinking styles. As a result, further investigation into the content validity of the PICTS is required.

From a practical point of view, cognitions are notoriously hard to assess due to their unique nature. Even if people have similar cognitions, the interpretation of and meaning they attribute to them and, thus, their responses may differ. Further, many people are unaware of their cognitions at the time they are thinking them. Whilst they may be able to hypothesise about what they might have thought this is likely to be biased by their beliefs and attitudes and subsequent events. In addition, interpreting an individual's cognitions as 'normal' or not based solely on a set of scores appears to lack ecological validity. These are some of the issues that have been experienced when using the PICTS. However, whilst the scores themselves may be less useful, this assessment measure is a useful tool in gathering a lot of information in a short space of time and provides clinicians with guidance for possible avenues of questioning.

5. Conclusions

From the results presented in this chapter, it would appear that the PICTS has a good empirical foundation as demonstrated by the reasonably well-established internal consistency, test-retest reliability and validity of the thinking-style scales. Further, the validity scales in the PICTS are a favourable addition to the measure as they are designed to detect gross patterns of untruthful responding.

However, research has shown that moderator variables, such as age, gender, ethnic status, education and offence type, influence the validity and reliability of the PICTS. Nonetheless, it is still considered a useful tool as subsequent research has confirmed and extended Walter's initial validation of the PICTS and shown it to be psychometrically sound with other samples such as English participants (Palmer & Hollin, 2003), Dutch participants (Bulten et al., 2009), females (Walters et al., 1998; Walters & Elliott, 1999) and young offenders (Palmer & Hollin, 2004). Therefore, it is suggested that recalibration of the scales may be needed for wide-scale use with other populations. In addition, factor analysis indicates the eight thinking styles may not be qualitatively distinct. Therefore, as Walters (1995) has commented, further factor analysis is needed to allow for conclusive comment on the underlying structure of the PICTS.

Chapter Five:
Discussion

1.1 Presentation of findings

The purpose of this thesis was to examine factors associated with aggressive behaviours in adolescents. This investigation began by reviewing the current literature regarding the effects of exposure to violence in video games on aggressive behaviour in children under the age of 18 years. This review indicated that there is some evidence to suggest there is an association between exposure to video game violence and aggressive behaviours in children under the age of 18 years. However, there were few studies on this and the findings of the studies were inconsistent. Further, the literature review indicated that there are a number of methodological issues with research in this area that need to be addressed. For example, the review identified that many of the studies on exposure to video game violence used non-specific measurement of exposure to violence in video games including investigating total video game play rather than actual violent video game play (e.g., Dominick, 1984; Lepper, 1987). Researchers have also used a variety of measures of aggressive behaviour, some of which are considered inappropriate (Freedman, 2001). This literature review also indicated that the samples used in studies recruited participants from schools. Adolescents who have more aggressive tendencies are not likely to be found in high school populations due to high rates of expulsion and drop out (Corrado et al., 2000). Therefore, the findings of these studies might not be truly representative of the adolescent population. Furthermore, it was also found that the existing research on the effects of violent video games did not often measure individual differences and situational variables that may mediate and moderate these effects such as hostile attribution bias, empathy and exposure to real life violence.

In chapter two an empirical piece of research was presented examining the relationship between exposure to video game violence and aggressive behaviour in a sample of adolescents. It investigated factors which might, potentially, mediate and moderate this relationship; namely hostile attribution bias, empathy and exposure to real life violence. This research indicated that there was a relationship between exposure to violence in video games and aggressive behaviour. In accordance with the GAM, this research found that exposure to real life violence moderated this relationship. However, the GAM also

suggests that video game violence should be mediated by hostile attribution bias and empathy. This study found no evidence to support this as neither hostile attribution bias nor empathy were found to be mediators of the relationship. Nevertheless, it did find that both these variables moderated the relationship.

The case study in chapter three was an account of an assessment, formulation and planned intervention with a young person presenting with aggressive behaviours. This case study indicated a number of factors that were hypothesised to have contributed to the individual's aggressive behaviour. These include: exposure to domestic violence, family breakdown, substance misuse, low academic achievement and association with deviant peers. Furthermore, this case study highlighted some considerations with regards to treatment and intervention with young females who present with aggressive tendencies. In particular, this case study demonstrated that research has tended to focus on offending by males and, thus, assessment tools and interventions have, typically, been designed and evaluated using male offenders.

Chapter four contains a critical review of a psychometric assessment, the PICTS, which was used in the case study. This indicated that the PICTS is shown to have good reliability and validity with adult males. However, this tool may not be as reliable and valid with other populations. It would appear that the PICTS is less reliable and valid when used with other populations such as adolescents and females. Therefore, consistent with the findings of the case study, this demonstrates that research has historically focused on adult males and neglected other populations.

1.2 The contribution of the thesis to the current literature

The current thesis made several contributions to the existing literature. Previous reviews investigating the links between exposure to video game violence and aggressive behaviour in adolescents, with the exception of Anderson's (2003) meta-analytic review, have included studies on both adults and children and adolescents but have not, specifically, analysed the effects of violent video games on children under the age of 18.

Most previous reviews have included a wide range of measures related to aggression including behavioural, cognitive, affective, physiological and pro-social measures. Furthermore, many of the studies included in these reviews have not, specifically, measured exposure to violent video games; some have merely looked at total video game play (e.g., Dominick, 1984; Lin & Lepper, 1987). The review presented in this thesis differs in that it focuses on the effects of playing violent video games on children under the age of 18, it only included studies that looked specifically at aggressive behaviours and it only included studies that used a measure of exposure to violent video games. The present review is, therefore, deemed to be a valuable addition to literature in this area.

The literature review revealed that a number of methodological weaknesses are inherent within much of the research that has investigated the negative effects of exposure to violent video games. In addition, the literature review indicated that few studies investigated the potential of other variables to mediate and moderate this relationship. Therefore, the current research presented in chapter two has made a valid contribution to the literature as it addressed some of the limitations of previous studies and a gap in the literature. Further, the findings of this study have clinical implications in that they suggest potential areas and populations for interventions to target. Specifically, the findings of this research indicate that, in order for interventions to be most effective and to allocate scarce resources optimally, interventions for adolescents who play large amounts of violent video games should target those with higher levels of exposure to real life violence and hostile attribution bias and lower levels of empathy.

The case study in chapter three demonstrated that a number of factors appear to play a role in the development and maintenance of aggressive behaviours in adolescents. It also highlighted some of the issues that should be considered during assessment and treatment of adolescent females who present with aggressive behaviours which may prove useful to clinicians and researchers. In particular, it demonstrated that current research on risk factors for aggressive behaviours in adolescents has predominately focused on males and that, as a result, assessment tools and interventions have been developed and validated on males. Consequently, there appears to be a need for researchers and clinicians to

investigate female offending behaviours and develop gender specific assessment tools and interventions which may increase their effectiveness and, thus, reduce recidivism in this population.

The critique of the psychometric assessment tool in chapter four may, specifically, be of use in providing clinicians and researchers with information about the potential utility of the PICTS. It also identified areas of future research; namely the need for reliable norms for use of the PICTS with populations other than adult, American, males including adolescents.

1.3 Limitations of this thesis

The main limitation of the literature review was the number of studies included and, as a result, methodologically weaker studies were included. This may have introduced forms of bias by giving too much weight to the findings of studies which are flawed or weaker in design (Ferguson, 2007a). It would have been useful if the literature review had included broader criteria such as unpublished work and non-English research. Exclusion of unpublished work may cause problems of publication bias as studies making strong claims about negative effects even on the basis of relatively weak evidence have been more likely to be published than those making claims about positive effects (Ferguson, 2007b). Further research might also have been identified by hand searching relevant journals.

The research study in chapter two relied upon self-report and, as a result, may have been biased by socially desirable responding. The sample used was relatively small and limited, therefore, limiting the generalisability of the findings. Other limitations of this study concern the variables used. Hostile attribution bias and empathy are internal, psychological variables and, as such, they are likely to be measured with error. In addition, this study only investigated the influence of three variables on the relationship between video game violence and aggressive behaviour. There are likely to be many other variables that affect this relationship. The ideal conditions for moderation were also

not met. Whilst not a necessity, it is desirable that a moderator not be correlated with the DV, in this case aggressive behaviour, or IV, in this case exposure to video game violence (Baron & Kenny, 1986). All the moderators in this study significantly correlated with the DV; none significantly correlated with the IV. As a result, the interaction terms are likely to have been affected and, thus, the interpretation of the findings. Further, because it was not a longitudinal study, no causal interpretations can be made.

The case study presented in chapter three was constrained due to the individual breaching her order. This meant that the proposed intervention could not be carried out and, thus, its effectiveness was not assessed.

1.4 Clinical implications and implications for future research

Throughout this thesis the clinical implications have been discussed and areas for future research identified. In particular, the research presented in chapter two indicated that, in order for interventions to be most effective and to allocate scarce resources optimally, interventions for adolescents who play large amounts of violent video games should target those with higher levels of exposure to real life violence and hostile attribution bias and lower levels of empathy. This is because the findings suggest the impact of playing such video games on the aggressive behaviour of these individuals is likely to be greater.

Therefore, this thesis is of use to clinicians, in particular those involved in the juvenile justice system, and parents. For example, many young people, in particular those serving sentences in the community, such as the individual described in the case study, and those in custody, are not involved in education or vocational training and have limited engagement in pro-social activities. As a result, they have vast amounts of free time. Many of these adolescents spent this time engaging in anti-social activities, such as misuse of drugs and alcohol and delinquent acts, and playing video games. This thesis indicates that involvement in these activities may serve to increase the risk of the individual being aggressive. Thus, the findings of this thesis indicate that clinicians and parents should attempt to engage adolescents in education or vocational training and

increase the variety of leisure activities available to them (e.g., sports clubs, music and drama). Moreover, this thesis indicates that members of society and politicians can also play a role in helping reduce the aggressive behaviours displayed by adolescents; for example, by providing and engaging adolescents in pro-social activities. It is hoped that by engaging young people in these alternative activities, in addition to reducing their exposure to video game violence and any, subsequent, negative effects of this exposure, their aggressive behaviour would be reduced.

In terms of the importance of this thesis to researchers, it identifies a number of areas for future research. For example, both the literature review and empirical study indicate that there is a need for more research into the relationship between exposure to violent video games and aggressive behaviour in adolescents. In particular, longitudinal research into this phenomenon is required to investigate causality. In addition, research needs to further investigate factors that mediate and moderate the effects of playing violent video games in order for interventions to be most effective. The case study indicates gender, parental involvement, substance use and mental health play an important role in aggressive behaviour and, thus, are potential factors researchers could investigate.

The case study also indicated a need for researchers and clinicians to investigate female offending behaviours and develop gender specific assessment tools and interventions which may increase the effectiveness of assessments and interventions and, thus, reduce recidivism in this population. This view was supported by the critique.

Overall, this thesis is of importance as it demonstrated that, in order to fully understand aggressive behaviours displayed by adolescents, clinicians, researchers, politicians and society need to consider a variety of factors at several levels, both environmental and individual, and to recognise the interaction between these. In doing so, not only will knowledge and understanding about adolescent aggression increase, the effectiveness of assessments of and interventions for aggressive adolescents will also improve.

1.5 Conclusion

A valuable point was noted throughout this thesis; no one factor can answer the question as to why aggression results but rather we must consider the interplay of several factors at several levels of our environment and at the individual level. In other words, in order to understand aggressive behaviours of adolescents, a multi-factorial model should be used taking into consideration variables at the ontogenic and macro, micro and exosystem levels and the dynamic and interactive nature of the relationships between these variables. For example, in order to understand the variables involved in the development and maintenance of an adolescent's aggressive behaviour, one needs to take into account macrosystem level factors such as the general societal attitude and legal response towards adolescents and their aggressive behaviour. Factors at the exosystem level, including the individual's exposure to real life violence, also need to be considered. Attention needs to be paid to factors at the microsystem and ontogenic level as well. Microsystem level factors might include: association with deviant peers, family dynamics and abuse and neglect. Factors at the ontogenic level are related to individual development. These might include: cognitive biases, levels of empathy, exposure to violent video games, gender, substance misuse and academic achievement.

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Appendices

Appendix A: Syntax Used to Search Electronic Databases

Cochrane Library

(gam* OR comput* OR video gam* OR videogam*):ab and (violen* OR aggress* OR antisocial OR behav* OR offen* OR delinqu*):ab and (adolescen* OR teen* OR child* OR you*):ab

PsycINFO (including Journals@OVID full text)

1.	violen*	mp. [mp=title, abstract, heading word, table of contents, key concepts]
2.	aggress*	mp. [mp=title, abstract, heading word, table of contents, key concepts]
3.	antisocial	mp. [mp=title, abstract, heading word, table of contents, key concepts]
4.	behav*	mp. [mp=title, abstract, heading word, table of contents, key concepts]
5.	offen*	mp. [mp=title, abstract, heading word, table of contents, key concepts]
6.	delinquen*	mp. [mp=title, abstract, heading word, table of contents, key concepts]
7.	gam*	mp. [mp=title, abstract, heading word, table of contents, key concepts]
8.	comput*	mp. [mp=title, abstract, heading word, table of contents, key concepts]
9.	video gam*	mp. [mp=title, abstract, heading word, table of contents, key concepts]
10.	videogam*	mp. [mp=title, abstract, heading word, table of contents, key concepts]
11.	1 or 2 or 3 or 4 or 5 or 6	
12.	7 or 8 or 9 or 10	
13.	11 and 12	
14.	limit 13 to (human and english language and abstracts and non disordered populations and (childhood <birth to 12 years> or adolescence <13 to 17 years>) and (160 preschool age <age 2 to 5 yrs> or 180 school age <age 6 to 12 yrs> or 200 adolescence <age 13 to 17 yrs>) and yr="1985 - 2008")	

ASSIA

((AB=videogam*) OR (AB=(video gam*)) OR (AB=comput*) OR (AB=gam*)) AND ((AB=delinquen*) OR (AB=offen*) OR (AB=behav*) OR (AB=antisocial) OR (AB=aggress*) OR (AB=violen*)) AND ((AB=you*) OR (AB=child*) OR (AB=teen*) OR (AB=adolescen*))

MEDLINE

1.	violen*	mp. [mp=title, abstract, heading word, table of contents, key concepts]
2.	aggress*	mp. [mp=title, abstract, heading word, table of contents, key concepts]
3.	antisocial	mp. [mp=title, abstract, heading word, table of contents, key concepts]
4.	behav*	mp. [mp=title, abstract, heading word, table of contents, key concepts]
5.	offen*	mp. [mp=title, abstract, heading word, table of contents, key concepts]
6.	delinquen*	mp. [mp=title, abstract, heading word, table of contents, key concepts]
7.	gam*	mp. [mp=title, abstract, heading word, table of contents, key concepts]
8.	comput*	mp. [mp=title, abstract, heading word, table of contents, key concepts]
9.	video gam*	mp. [mp=title, abstract, heading word, table of contents, key concepts]
10.	videogam*	mp. [mp=title, abstract, heading word, table of contents, key concepts]
11.	1 or 2 or 3 or 4 or 5 or 6	
12.	7 or 8 or 9 or 10	
13.	11 and 12	
14.	limit 13 to (abstracts and english language and humans and yr="1985 - 2008" and ("child (6 to 12 years)" or "adolescent (13 to 18 years)") and humans)	

ERIC

((AB=videogam*) OR (AB=(video gam*)) OR (AB=comput*) OR (AB=gam*)) AND ((AB=delinquen*) OR (AB=offen*) OR (AB=behav*) OR (AB=antisocial) OR (AB=aggress*) OR (AB=violen*)) AND ((AB=you*) OR (AB=child*) OR (AB=teen*) OR (AB=adolescen*))

Web Of Science

Title=(gam*) OR Title=(comput*) OR Title=(video gam*) OR Title=(videogam*) AND Title=(violen*) OR Title=(aggress*) OR Title=(antisocial) OR Title=(behav*) OR Title=(offend*) OR Title=(delinquen*) AND Title=(adolescen*) OR Title=(you*) OR Title=(child*) OR Title=(teen*)
Refined by: Document Type=(ARTICLE OR REVIEW) AND Subject Areas=(PSYCHOLOGY, EXPERIMENTAL OR PSYCHOLOGY, DEVELOPMENTAL OR PSYCHOLOGY, EDUCATIONAL OR PSYCHOLOGY, CLINICAL OR PSYCHOLOGY OR CRIMINOLOGY & PENOLOGY OR SOCIAL SCIENCES, INTERDISCIPLINARY OR PSYCHOLOGY, APPLIED OR PSYCHOLOGY, MULTIDISCIPLINARY OR PSYCHOLOGY, SOCIAL)

EMBASE

1.	violen*	mp. [mp=title, abstract, subject headings, heading word, drug trade name, original title, device manufacturer, drug manufacturer name]
2.	aggress*	mp. [mp=title, abstract, subject headings, heading word, drug trade name, original title, device manufacturer, drug manufacturer name]
3.	antisocial	mp. [mp=title, abstract, subject headings, heading word, drug trade name, original title, device manufacturer, drug manufacturer name]
4.	behav*	mp. [mp=title, abstract, subject headings, heading word, drug trade name, original title, device manufacturer, drug manufacturer name]
5.	offen*	mp. [mp=title, abstract, subject headings, heading word, drug trade name, original title, device manufacturer, drug manufacturer name]
6.	delinquen*	mp. [mp=title, abstract, subject headings, heading word, drug trade name, original title, device manufacturer, drug manufacturer name]
7.	gam*	mp. [mp=title, abstract, subject headings, heading word, drug trade name, original title, device manufacturer, drug manufacturer name]
8.	comput*	mp. [mp=title, abstract, subject headings, heading word, drug trade name, original title, device manufacturer, drug manufacturer name]
9.	video gam*	mp. [mp=title, abstract, subject headings, heading word, drug trade name, original title, device manufacturer, drug manufacturer name]
10.	videogam*	mp. [mp=title, abstract, subject headings, heading word, drug trade name, original title, device manufacturer, drug manufacturer name]
11.	1 or 2 or 3 or 4 or 5 or 6	
12.	7 or 8 or 9 or 10	
13.	11 and 12	
14.	limit 13 to (abstracts and human and english language and yr="1985 - 2008" and (school child <7 to 12 years> or adolescent <13 to 17 years>))	

Appendix B: Methodological Problems Associated with Previous Research

1. Non-violent game condition contained violence, and there was no suitable non-violent control condition.
2. Violent video game condition contained little or no violence.
3. Evidence that the violent and non-violent conditions differed significantly in ways that could contaminate the conditions. For example, the non-violent condition being more (or less) difficult, boring, or frustrating than the violent condition. In other words, were the violent and non-violent games equated on potentially confounding variable (e.g. with difficulty, equating can be done by selecting games based on pilot testing or by measuring the to-be-controlled characteristic during the main study and statistically controlling for it).
4. A pre-post design was used but only the average of the pre- and post-manipulation measures was reported.
5. Each research session involved both a video game player and an observer but only the player-observer measures was reported.
6. The aggressive behaviour measure was not aggression against another person for example, aggression against an object or non-human character.
7. Arousal differences between the violent and non-violent video game conditions weren't controlled by pre-testing and/or game selection (i.e. were equally arousing violent and non-violent games intentionally chosen to control for potential arousal effects on aggressive behaviours).
8. Affective differences between the violent and non-violent video game conditions weren't controlled by pre-testing and/or game selection (i.e. were games intentionally chosen by the researchers to have the same affective impact to control for potential affective influences on aggressive behaviours).
9. In correlational studies, the measure of the video game exposure was not specifically tied to violent video games (e.g. the amount of time spent on any kind of video game was measured instead of time spent on violent video games).

Adapted from Anderson, Gentile, & Buckley (2007).

Appendix C: Quality Assessment Form (Correlational Studies)

Question	Yes	Partly	No	Unknown	Comments
Problem					
Is the problem clearly stated and is the study addressing the potential of violent video games to affect aggressive behaviours?					
Are the hypotheses clearly stated?					
Is the relationship to previous research made clear?					
Study Design					
Are the assumptions of the study clearly stated?					
Are the limitations of the study clearly stated?					
Are important terms in the study clearly defined?					
Is the research design fully descriptive?					
Is the study design an appropriate way of answering the question under the circumstances?					
Has the study addressed the question being asked?					
Sampling and Selection Bias					
Was the recruitment of the sample appropriate?					
Is the sample representative of the population?					
Is there anything special about the sample? (*reverse score*)					
Was a sufficient sample size used?					
Was the sample selected in an unbiased manner? Were measures taken to reduce self-selection bias?					
Is there a sufficient description of the participants?					
Is there sufficient information on demographic/background factors?					
Have the authors identified all					

important confounding factors?					
Performance and Measurement Bias					
Was the intervention carried out in the same way for all participants/groups?					
Was aggressive behaviour clearly defined and accurately measured?					
Was video game exposure clearly defined and accurately measured?					
Was violent video game exposure specifically defined and accurately measured?					
Were measures in place to ensure participants fully understood the instructions and terms used?					
Were the outcome measures objective?					
Were the outcome measures valid and reliable for the defined population? Did the outcome measures truly reflect what they are supposed to measure?					
Were assessment instruments for outcome standardised?					
Were outcome measures pre-tested?					
Was the level of video game violence independently and objectively rated?					
Was inter-rater reliability ascertained? Is the reliability coefficient reported?					
Were the participants blind to the research?					
Were the assessors blind to the research?					
Were the outcome measures anonymous?					
Confounding Variables					
Were confounding variables considered and controlled for in the design and/or analysis?					
Statistics					
Was the statistical analysis					

appropriate?					
Was the statistical analysis used correctly?					
Results					
Are the results unbiased?					
Are the results significant?					
Is the effect size reasonable?					
Are methods and design reliable?					
Have limitations been addressed?					
Outcome Bias					
Are the conclusions clearly stated?					
Are the conclusions supported by the evidence presented?					
Can the results be due to chance, bias or a confounding variable? (*reverse score*)					
Is the tone of the report impartial?					
Were conclusions based on the data and unbiased by other information?					
Applicability of findings					
Can results be applied to all children regardless of culture and background?					
Can the results be applied to the UK population?					

Appendix D: Quality Assessment Form (Experimental Studies)

Question	Yes	Partly	No	Unknown	Comments
Problem					
Is the problem clearly stated and is the study addressing the potential of violent video games to affect aggressive behaviours?					
Are the hypotheses clearly stated?					
Is the relationship to previous research made clear?					
Study Design					
Are the assumptions of the study clearly stated?					
Are the limitations of the study clearly stated?					
Are important terms in the study clearly defined?					
Is the research design fully descriptive?					
Is the study design an appropriate way of answering the question under the circumstances?					
Has the study addressed the question being asked?					
Sampling and Selection Bias					
Was the recruitment of the sample appropriate?					
Is the sample representative of the population?					
Is there anything special about the sample? (*reverse score*)					
Was a sufficient sample size used?					
Was the sample selected in an unbiased manner? Were measures taken to reduce self-selection bias?					
Is there a sufficient description of the participants?					
Is there sufficient information on demographic/background factors?					
Are the controls described and appropriate?					

Were the controls randomly selected from the sample?					
Have the authors identified all important confounding factors?					
Were the groups comparable in all important confounding variables?					
Performance and Measurement Bias					
Was the intervention carried out in the same way for all participants/groups with the exception of the experimental variable?					
Was aggressive behaviour clearly defined and accurately measured?					
Was non-violent video game exposure clearly defined and accurately measured?					
Was violent video game exposure specifically defined and accurately measured?					
Were the outcome measures objective?					
Were the outcome measures valid and reliable for the defined population? Did the outcome measures truly reflect what they are supposed to measure?					
Were assessment instruments for outcome standardised?					
Were outcome measures pre-tested?					
Was the level of video game violence independently and objectively rated?					
Was inter-rater reliability ascertained? Is the reliability coefficient reported?					
Were the participants blind to the research?					
Were the outcome assessors blind to the intervention?					
Attrition Bias					
Were drop-out rates and reasons					

for drop-out similar across groups?					
Were these drop outs dealt with appropriately when carrying out analysis?					
Confounding Variables					
Were confounding variables considered and controlled for in the design and/or analysis?					
Statistics					
Was the statistical analysis appropriate?					
Was the statistical analysis used correctly?					
Results					
Are the results unbiased?					
Are the results significant?					
Is the effect size reasonable?					
Are methods and design reliable?					
Have limitations been addressed?					
Outcome Bias					
Are the conclusions clearly stated?					
Are the conclusions supported by the evidence presented?					
Can the results be due to chance, bias or a confounding variable? (*reverse score*)					
Is the tone of the report impartial?					
Were conclusions based on the data and unbiased by other information?					
Applicability of findings					
Can results be applied to all children regardless of culture and background?					
Can the results be applied to the UK population?					

Appendix E: Quality Assessment Form (Longitudinal Studies)

Question	Yes	Partly	No	Unknown	Comments
Problem					
Is the problem clearly stated and is the study addressing the potential of violent video games to affect aggressive behaviours?					
Are the hypotheses clearly stated?					
Is the relationship to previous research made clear?					
Study Design					
Are the assumptions of the study clearly stated?					
Are the limitations of the study clearly stated?					
Are important terms in the study clearly defined?					
Is the research design fully descriptive?					
Is the study design an appropriate way of answering the question under the circumstances?					
Has the study addressed the question being asked?					
Sampling and Selection Bias					
Was the recruitment of the sample appropriate?					
Is the sample representative of the population?					
Is there anything special about the sample? (*reverse score*)					
Was a sufficient sample size used?					
Was the sample selected in an unbiased manner? Were measures taken to reduce self-selection bias?					
Is there a sufficient description of the participants?					
Is there sufficient information on demographic/background factors?					
Have the authors identified all important confounding factors?					

Performance and Measurement Bias					
Was the intervention carried out in the same way for all participants/groups?					
Was aggressive behaviour clearly defined and accurately measured?					
Was video game exposure clearly defined and accurately measured?					
Was violent video game exposure specifically defined and accurately measured?					
Were measures in place to ensure participants fully understood the instructions and terms used?					
Were the outcome measures objective?					
Were the outcome measures valid and reliable for the defined population? Did the outcome measures truly reflect what they are supposed to measure?					
Were assessment instruments for outcome standardised?					
Were outcome measures pre-tested?					
Was the level of video game violence independently and objectively rated?					
Was inter-rater reliability ascertained? Is the reliability coefficient reported?					
Were the participants blind to the research?					
Were the assessors blind to the research?					
Were the outcome measures anonymous?					
Confounding Variables					
Were confounding variables considered and controlled for in the design and/or analysis?					
Statistics					
Was the statistical analysis appropriate?					

Was the statistical analysis used correctly?					
Results					
Are the results unbiased?					
Are the results significant?					
Is the effect size reasonable?					
Are methods and design reliable?					
Have limitations been addressed?					
Outcome Bias					
Are the conclusions clearly stated?					
Are the conclusions supported by the evidence presented?					
Can the results be due to chance, bias or a confounding variable? (*reverse score*)					
Is the tone of the report impartial?					
Were conclusions based on the data and unbiased by other information?					
Applicability of findings					
Can results be applied to all children regardless of culture and background?					
Can the results be applied to the UK population?					

Appendix F: Data Extraction Form

General Information

Date of extraction:

Author:
Article title:
Source:
Identification of the reviewer:
Notes:

Re-verification of study eligibility

Population:	Under 18 years	Y	N	?
Exposure:	Violent video games	Y	N	?
Comparator:	Nonviolent video games	Y	N	?
Outcome:	Aggressive behaviour	Y	N	?
Date of Publication: post 1995		Y	N	?

Study design

Experimental Correlational Longitudinal

Continue? Yes No

Specific Information

Population
Target population (describe):

Inclusion criteria:

Exclusion criteria:

Recruitment procedures (participation rates if available):

Characteristics of participants (describe):

No. of participants:
Age:
Ethnicity:
Gender:
Class:
Nationality:
Geographical region:

Other information:

Method
Brief outline of study:

Video game variable (e.g. Measure of video games use, measure of violent video game use, video games played):

Assessment of level of video game violence and who assessed this?

Measure of aggressive behaviour:

Other variables that were measured:

Who carried out measures?

Was inter-rater reliability ascertained?

Were the assessors blind (where appropriate)?

Were the participants blind?

Were the surveys anonymous (where appropriate)?

If a tool was used was it reliable and valid? Was it appropriate for the population?

What were the follow-up periods (where applicable)?

Drop out rates and reasons:

Were the experimental and control groups comparable (where applicable)?

Were confounding variables controlled for in the design?

Notes:

Analysis
Statistical technique used:

Were confounding variables assessed and controlled for in analysis?

Notes:

Findings and Conclusions
What were the results?

What were the conclusions?

Were the conclusions supported by the results?

Limitations:

Strengths:

Overall study quality good reasonable poor

Appendix G: Offence Categories as Defined by Roe and Ashe (2008)

Property-related offences

- **Burglary**: domestic burglary; commercial burglary.
- **Vehicle-related thefts**: theft of a vehicle; theft of parts of outside of a vehicle; theft of items inside a vehicle; attempted theft of a vehicle; attempted theft from a vehicle.
- **Other thefts**: theft from place of work; theft from school; theft from shop; theft from the person; miscellaneous thefts.
- **Criminal damage**: damage to a vehicle; damage to other property.

Violent offences

- **Robbery**: robbery of an individual; robbery of a business.
- **Assault**: assault resulting in injury; non-injury assault.

Drug selling

- **Selling drugs**: selling Class A drugs; selling other drugs.

Appendix H: Information Sheet for Institutions

School of Psychology,
University of Birmingham,
Edgbaston,
Birmingham,
B15 2TT

Dear ,

RE: Investigating the use of video games and their impact on teenagers.

We would like to invite you to provide your consent for adolescents on your programme/at your school to take part in a research study. Before you decide you need to understand why the research is being done and what it will involve for you. Please take time to read the following information carefully. Talk to others about the study if you wish. Ask the researcher if there is anything that is not clear or if you would like more information. Take time to decide whether or not you wish to take part.

What is the purpose of the study?

The aim of this study is to investigate how an adolescent's experiences and video game play might affect how they feel and behave. Individuals taking part in this study will be asked to fill out some questionnaires which should take approximately 30 minutes to complete.

Who has been invited?

People invited to take part in this study are male and aged 16-18 years. Your service/school has been contacted because adolescents on your programme/at your school match these requirements. Participation in this research study is completely voluntary and you do not have to take part if you do not wish to. Whether or not you provide your consent for participation in this research study will have no effect on your current or future relationship with the University of Birmingham.

What will happen if adolescents decide take part?

If you decide to allow adolescents in the programme/at the school to take part in this research study, you will be asked to sign a consent form and then arrangements will be made for the investigator to come into the reparation sessions/general studies lessons and administer questionnaires to the adolescents.

The adolescents will be given information about the study and asked to volunteer to participate. Their consent will be obtained and once gained they will be given a set of questionnaires to complete.

The participants in the study will be offered an optional session after completion of the questionnaires where they can talk about the purpose of the questionnaire and ask any questions or raise any concerns they may have.

What are the possible disadvantages and risks of taking part?

During participation in this study, participants may feel anxious about answering some questions. However, participants are provided with details of helplines to contact in the information sheet and they will have the opportunity to discuss their concerns in the voluntary session or with the researcher, individually, if desired.

What are the possible benefits from taking part?

The participants will receive no direct benefit from taking part in this study. However, participation will provide beneficial information about how life experiences and video game play might be related to feelings and behaviour.

What happens when the research study stops?

We will not contact you or the participants after completion of the questionnaires. However, we will be happy to provide you with a report of the study findings, when such becomes available. If you would like a copy of our report or any other details regarding the study, please ask.

What if there is a problem?

Please feel free to contact the investigators with any problems or queries associated with the research using the details on this information sheet.

Will participation in the study be kept confidential?

The data collected in this study will be only used for the purpose described in this information sheet, and will be available only to the researchers listed. The participants' identity will not be recorded as part of the data, and will not be revealed in any publication that may result from this study. All information the participants provide will be kept confidential. All information related to you and the participants' involvement in this research study will be stored in a locked filing cabinet at the researchers place of work. Data gathered from this study will be maintained as long as required by regulations, which is up to 5 years following the publication of empirical articles or communications describing the results of the study.

What will happen if adolescents don't want to carry on with the study?

Participants are free to withdraw from the study at any time. Should they choose to withdraw, they can also request that any data collected from their participation be withdrawn from the study. If they request this, any data collected from them will be located and destroyed. Participants may make this request up to the point of publication.

Participants will be asked to make up a five character code consisting of letters and numbers and then to write the code on the questionnaires. Should the participants decide to withdraw their data up to the point of publication they should contact the investigator with the code asking for their data to be withdrawn.

What will happen to the results of the research study?

The results of this study will be part of the investigators doctoral research and may be published in an academic journal.

Should you wish for any further details or if you agree to take part in this research study please contact one of the researchers (details below). Thank you for you time and we hope to hear from you soon.

Hannah Goddard

Contact details of the researchers included in this project:
Post Graduate Investigator:
Hannah Goddard
Telephone: [redacted]
Email address: [redacted]
Address: Sc[redacted]l of Psychology, University of Birmingham, Edgbaston, Birmingham, B15 2TT

Supervisor:
Dr Louise Dixon
Telephone: [redacted]
Email address: [redacted] of Birmingham, Edgbaston, Birmingham, B15 2TT

Appendix I: Consent Form for Institutions

I do/do not (please delete as appropriate) agree to allow adolescents who give their individual consent to participate in the project titled *Investigating the use of video games and their impact on teenagers*, to be conducted by Hannah Goddard, a post-graduate student from the University of Birmingham. I understand that participating adolescents will be asked to complete questionnaires measuring exposure to violence, empathy towards others, feelings of hostility and aggression. This should take approximately 30 minutes. Participants' responses will remain anonymous and all information will be kept strictly confidential. I am aware of the risks involved in this study, specifically that some participants might become distressed while completing the questionnaires. I am also aware of the benefits, including increasing our knowledge of the effects of violent video games.

_____ _____

Authorised signature Date

_____

Print name

Appendix J: Participant Information Sheet

I would like to invite you to take part in a research study. Before you decide you need to understand why the research is being done and what it would involve for you. Please take time to read the following information carefully. Talk to others about the study if you wish. Ask the researcher if there is anything that is not clear or if you would like more information on anything. Take your time to decide whether or not you wish to take part.

What is the purpose of the study?

The aim of this study is to look at how your life experiences and video game play might be related to your feelings and behaviour. If you take part in this study you will be asked to fill out some questionnaires which should take around 30 minutes.

Why have I been invited?

People invited into this study are male and aged between 16-18 years. You have been invited because you match these requirements.

Do I have to take part?

Your participation in this research study is completely voluntary and you do not have to take part if you do not wish to. There is no penalty if you choose not to participate. If you decide to take part, I will ask you to sign a consent form to show you have understood what you need to do and have agreed to take part. You are free to withdraw at any time, without giving a reason. Whether or not you provide your consent for participation in this research study will have no effect on your current or future relationship with the University of Birmingham, your school or the youth offending service (if applicable).

What will happen to me if I take part?

If you decide to take part in this research study, you will be asked to sign a consent form and then complete some questionnaires. Here are some examples of questions you will be asked: How often do you play video games? Have you been in a physical fight in the past year? Would you get upset if you saw someone hurt an animal?

You will also be provided with an opportunity to attend a voluntary session held by the researcher in which you will be able to ask questions, raise any concerns and to gain more information about the study.

What are the possible disadvantages and risks of taking part?

During participation in this study, you may feel anxious about answering some questions. If you feel uncomfortable at anytime we encourage you to talk to someone such as a teacher or the researcher or raise your concerns in the voluntary session. There are also a

number of helplines you can call in confidentiality should you need, some are provided below:

Samaritans
Website: www.samaritans.org
Tel: 08457 90 90 90

Childline
Websire: www.childline.org.uk
Tel: 0800 1111

Get Connected
Website: www.getconnected.org.uk
Tel: 0808 808 4994

Youth2Youth
Website: www.youth2youth.co.uk
Tel: 020 8896 3675

What are the possible benefits from taking part?

You will receive no direct benefit from taking part in this study. Your participation may, however, provide beneficial information about how experiences in life and through video game play might be related to feelings and behaviour.

What happens when the research study stops?

I will not contact you after completion of the questionnaires. However, there will be an optional session where you can ask me questions and I will be happy to provide you with a report of the study findings when it is finished. If you would like a copy of the report or any other details regarding the study, please contact me using the details below

What if there is a problem?

Please feel free to contact the investigators with any problems or queries associated with the research using the details below.

Will my taking part in the study be kept confidential?

The data collected in this study will be used only for the purpose described in this information sheet, and will be available only to the researchers listed here. All records related to your involvement in this research study will be stored in a locked filing cabinet. Data gathered from this study will be maintained as long as required by regulations, which is up to 5 years following the publication of empirical articles or communications describing the results of the study.

Your identity will not be recorded as part of your data, and will not be revealed in any publication that may result from this study. All information you provide will be kept confidential. You will not be asked to write your name anywhere on the questionnaires.

What will happen if I don't want to carry on with the study?

You are free to withdraw from the study at any time. Should you choose to withdraw, you can also request that any data collected from your participation be withdrawn from the study up to the point of publication. If you request this, any data collected from you will be located and destroyed.

If you decide to fill out the questionnaire, you will make up a five character code and then to write the code on your questionnaire. Should you decide to withdraw your data you should contact the investigator with the code asking for your data to be withdrawn – so remember your code.

What will happen to the results of the research study?

The anonymous results of this study will form part of my degree programme research and may be published in an academic journal.

Thank you for your time.
Hannah

Contact details of the researchers involved in this project:
Student Investigator:
Hannah Goddard
Telephone: [redacted]
[redacted]of Birmingham, Edgbaston, Birmingham, B15 2TT

Supervisor:
Dr Louise Dixon
Telephone: [redacted]
Address: School of Psychology, University of Birmingham, Edgbaston, Birmingham, B15 2TT

Appendix K: Participant Consent Form

I confirm that I am willing to fill out some questionnaires for a research project run by Hannah Goddard (the researcher). This will take approximately 30 minutes on average.

In doing this I confirm that the researcher has explained the nature and purpose of the questionnaires, which will help provide beneficial information about how life experiences and video game play might be related to some feelings and behaviour.

I confirm that I have had the following explained to me and understand each point:

- I understand that I do not have to take part in this research. If I choose not to I will not be penalised in anyway.
- If I choose to participate in the research I understand that my responses to the questionnaires will be confidential. I will choose a code which will be used to identify which questionnaires are mine should I decide to withdraw from the study. Only I will be able to identify which questionnaires I filled out.
- If I choose to participate in the research I understand that I have the right to withdraw my responses up to the point of publication. If I want to withdraw any of my questionnaires I will simply contact the facilitator with my number and ask them to ensure this is done.
- I understand the confidential questionnaires will be examined for the purpose of research only. The anonymous results will be written up into a report as part of the researcher's degree programme research. Furthermore they may be published in academic journals.
- I understand there is a risk I may feel a bit anxious about answering some questions. However, I have been provided with telephone numbers and website addresses to contact for support should I desire.
- I have been informed that there is a voluntary session being held by the researcher which I may attend after completing the questionnaires should I so chose. I have also been given the contact details of the researcher and her supervisor should I have any questions about the study.
- I understand that at all points in time the results will be confidential and that no one, other than myself, will be able to identify me through this information.

I therefore give my informed consent for my confidential questionnaires to be used by researchers.

Signature…….. Date……..

Appendix L: Questionnaire

Thank you for agreeing to take part in this study. Please answer the questions below. Remember, it is completely anonymous so please answer honestly. Please attempt to answer all questions. There are no right or wrong answers.

ID code: _____ (Please write an ID code of your choice here. This should be remembered and used if you should wish to withdraw from the study).

Part One: About You

Please tick the box or fill in the blank with information about yourself.

1.) Age: _____

2.) Nationality: _____

3.) Ethnicity:

- o White
- o Black
- o Hispanic
- o Asian
- o Mixed Race
- o Other (please describe)_____

4.) Mother/Female Guardian's occupation: _____

5.) Mother/Female Guardian's Education Level:

- o None
- o O Level/ GCSE
- o A Level
- o Undergraduate degree
- o Post-graduate degree (Masters, Ph.D., M.D.)
- o Don't know

6.) Father/ Male Guardian's occupation: _____

7.) Father/ Male Guardian's Education Level:

- None
- O Level/ GCSE
- A Level
- Undergraduate degree
- Post-graduate degree (Masters, Ph.D., M.D.)
- Don't know

8.) Are your parents:

- Married
- Living together but not married
- Divorced
- Separated
- Single parent
- Other

9.) Who do you currently live with:

- Biological parents
- Adoptive parents
- Foster parents
- Other (please state) _____

10.) How many brothers and sisters do you have?

Brothers _____
Sisters _____

11.) How old are they?

Brothers _____

Sisters _____

Part Two: Video Game Play

1.) How long have you been playing video games regularly? (please tick)

- o Less than 6 months
- o 6 months to a year
- o 1-2 years
- o 2-5 years
- o More than 5 years (please state) _____ years

2.) In an average school week how many times do you play video games? (please tick)

- o Less than once a week
- o 1-2 times a week
- o 3-5 times a week
- o Every day

3.) On average, when you play, how long do you play for? (please tick)

- o Less than ½ hour
- o ½ hour to 1 hour
- o 1-2 hours
- o 2-3 hours
- o More than 3 hours (please state) _____ hours

4.) Please write the name of your three **favourite** video games.

1. _____
2. _____
3. _____

5.) Please list the three video games you currently play **most often** and how often, on average, you play them.

Game	How often
1. _____	Hours per week _____
2. _____	Hours per week _____
3. _____	Hours per week _____

6.) Who do you play with? (please tick all that apply)

- o Alone
- o With parents/guardians
- o With siblings
- o With friends
- o Online
- o Other (please state) _____

7.) Where do you play? (please tick all that apply)

- o At home in my room
- o At home in a general living area
- o At a friends house
- o Other (please state) _____

8.) Please indicate why you play (e.g. relaxation, entertainment, boredom, social).

_____

9.) How often do your parents/guardian put limits on how much time you are allowed to play?

Always				Never
1	2	3	4	5

10.) How often do your parents/guardians stop you from playing a game because of its rating or content?

Always Never

1 2 3 4 5

11.) Are your parents/guardian aware of what games you play?

Always Never

1 2 3 4 5

Part Three

1.) How often have you been in a physical fight with authority figures in the past year? (please tick)

- o Never
- o 1-2 times in the year
- o 3-5 times in the year
- o 1-2 times a month
- o 3-5 times a month
- o 1-2 times a week
- o 3-5 times a week
- o Everyday

2.) How often have you been in a physical fight with peers in the past year? (please tick)

- o Never
- o 1-2 times in the year
- o 3-5 times in the year
- o 1-2 times a month
- o 3-5 times a month
- o 1-2 times a week
- o 3-5 times a week
- o Everyday

3.) How often have you had verbal arguments with authority figures (e.g. teachers, staff, parents, YOT officer etc.) that has not resulted in physical aggression in the past year?

- o Never
- o 1-2 times in the year
- o 3-5 times in the year
- o 1-2 times a month
- o 3-5 times a month

- 1-2 times a week
- 3-5 times a week
- Everyday

4.) How often in the past year have you been in a verbal argument with peers that has not resulted in physical aggression?

- Never
- 1-2 times in the year
- 3-5 times in the year
- 1-2 times a month
- 3-5 times a month
- 1-2 times a week
- 3-5 times a week
- Everyday

5.) Have you ever been in trouble with the law or involved with juvenile court?

- Yes
- No

6.) Have you ever been arrested

- Yes (please state number of times arrested) _____
- No

7.) Have you any convictions?

- Yes (please state number of convictions) _____
- No

8.) If “yes” please indicate what they were for:

_____

_____

9.) Have you ever been sentenced to a young offender institute?

- o Yes (please state number of times) _____
- o No

Part Four

Please answer the following questions thinking of what you actually did during the last 7 days. For each question, mark with a circle how many times you did that behaviour during the last 7 days.

During the last 7 days…	0 times	1 times	2 times	3 times	4 times	5 times	6 or more times
1.) I teased students to make them angry.	0	1	2	3	4	5	6+
2.) I fought back when someone hit me first.	0	1	2	3	4	5	6+
3.) I said things about other kids to make other students laugh.	0	1	2	3	4	5	6+
4.) I encouraged other students to fight.	0	1	2	3	4	5	6+
5.) I pushed or shoved other students.	0	1	2	3	4	5	6+
6.) I got into a physical fight because I was angry.	0	1	2	3	4	5	6+
7.) I slapped or kicked someone.	0	1	2	3	4	5	6+
8.) I called other students bad names.	0	1	2	3	4	5	6+
9.) I threatened to hurt or hit someone.	0	1	2	3	4	5	6+

Part Five

Below is a list of statements about situations that happen to people every day. Please read each statement carefully. Mark the answer that describes how you feel. Your answers are private and no one will know how you answered.

1. When I'm mean to someone, I usually feel bad about it later.

No Maybe Yes

2. I'm happy when the teacher says my friend did a good job.

No Maybe Yes

3. I would get upset if I saw someone hurt an animal.

No Maybe Yes

4. I understand how other people feel.

No Maybe Yes

5. I would feel bad if my guardian's friend got sick.

No Maybe Yes

6. Other people's problems really bother me.

No Maybe Yes

7. I feel happy when my friend gets a good grade.

No Maybe Yes

8. When I see a person who is upset it really bothers me.

No Maybe Yes

9. I would feel bad if the student sitting next to me got in trouble.

No Maybe Yes

10. it's easy for me to tell when my parent or guardian has a good day at work.

No Maybe Yes

11. It bothers me when my teacher doesn't feel well.

No Maybe Yes

12. I feel sorry for people who can't find anyone to hang out with.

No Maybe Yes

13. Seeing a person who is crying makes me feel like crying.

No Maybe Yes

14. If two people are fighting, someone should stop it.

No Maybe Yes

15. It would bother me if my friend got grounded.

No Maybe Yes

16. When I see someone who's happy, I feel happy too.

No Maybe Yes

Part Six

Please circle True or False for each statement as it applies to you.

1. I am always respectful to older people	True	False
2. Sometimes I don't feel like doing what my teachers want me to.	True	False
3. Sometimes I have felt like throwing things or breaking them.	True	False
4. I never talk back to my parent/guardian	True	False
5. When I make a mistake, I always admit that I am wrong.	True	False
6. I sometimes feel like making fun of other people.	True	False
7. I always wash my hands before every meal.	True	False
8. Sometimes I wish I could just hang out instead of going to school.	True	False
9. I have never been tempted to break a rule or law.	True	False
10. Sometimes I dislike helping my parent/guardian even though I know they need my help around the house.	True	False
11. Sometimes I say things just to impress my friends.	True	False
12. I never shout when I feel angry.	True	False

Part Seven

Please read and answer the following statements about violent things that have happened at home, at school, or in your neighbourhood involving you. For each statement please circle the word that best describes how often these things have happened. Please make sure your answers are things you have seen in real life, not on television. (For example, if you've only seen a person carrying a gun on television, you would circle never on this paper).

1. I have seen someone carry a gun.

Never **Hardly ever** **Sometimes** **A lot** **Almost always**

2. Someone has pulled a gun on me.

Never **Hardly ever** **Sometimes** **A lot** **Almost always**

3. Grownups beat me up.

Never **Hardly ever** **Sometimes** **A lot** **Almost always**

4. Someone my age threatened to beat me up.

Never **Hardly ever** **Sometimes** **A lot** **Almost always**

5. I have been shot at.

Never **Hardly ever** **Sometimes** **A lot** **Almost always**

6. I have seen the police arrest someone.

Never **Hardly ever** **Sometimes** **A lot** **Almost always**

7. Someone my age hits me.

Never **Hardly ever** **Sometimes** **A lot** **Almost always**

8. I have seen someone get killed.

Never **Hardly ever** **Sometimes** **A lot** **Almost always**

9. I have seen a grownup hit a kid.

Never **Hardly ever** **Sometimes** **A lot** **Almost always**

10. I have heard about someone getting shot.

Never **Hardly ever** **Sometimes** **A lot** **Almost always**

11. Someone has pulled a knife on me.

Never **Hardly ever** **Sometimes** **A lot** **Almost always**

12. Grownups threaten to beat me up.

Never **Hardly ever** **Sometimes** **A lot** **Almost always**

13. I have had shots fired at me.

Never **Hardly ever** **Sometimes** **A lot** **Almost always**

14. I have seen someone carry a knife.

Never **Hardly ever** **Sometimes** **A lot** **Almost always**

15. I have seen someone get shot.

Never **Hardly ever** **Sometimes** **A lot** **Almost always**

16. I have been attacked with a knife.

Never **Hardly ever** **Sometimes** **A lot** **Almost always**

17. I have seen a kid beat up a grown up.

Never **Hardly ever** **Sometimes** **A lot** **Almost always**

18. I have seen people scream at each other.

Never **Hardly ever** **Sometimes** **A lot** **Almost always**

19. I have seen someone pull a gun on someone.

Never **Hardly ever** **Sometimes** **A lot** **Almost always**

20. I have seen someone get beaten up.

Never **Hardly ever** **Sometimes** **A lot** **Almost always**

21. I have heard about someone getting killed.

Never **Hardly ever** **Sometimes** **A lot** **Almost always**

22. I have heard of someone attacked with a knife.

Never **Hardly ever** **Sometimes** **A lot** **Almost always**

23. I have heard of someone getting beaten up.

Never **Hardly ever** **Sometimes** **A lot** **Almost always**

24. I have seen someone pull a knife on someone.

Never **Hardly ever** **Sometimes** **A lot** **Almost always**

25. I have been badly hurt.

Never **Hardly ever** **Sometimes** **A lot** **Almost always**

26. I have seen someone get attacked with a knife.

Never **Hardly ever** **Sometimes** **A lot** **Almost always**

27. I hear gunshots.

Never **Hardly ever** **Sometimes** **A lot** **Almost always**

28. I have seen someone get badly hurt.

Never **Hardly ever** **Sometimes** **A lot** **Almost always**

29. I have run for cover as people started shooting.

Never **Hardly ever** **Sometimes** **A lot** **Almost always**

30. Grownups scream at me.

Never **Hardly ever** **Sometimes** **A lot** **Almost always**

31. I have heard of someone carrying a gun.

Never **Hardly ever** **Sometimes** **A lot** **Almost always**

32. Grownups hit me.

Never **Hardly ever** **Sometimes** **A lot** **Almost always**

Part Eight

You will be reading several stories. Try to imagine that the situation in each story is happening to you. Please answer the questions after each story by putting a circle around the letter for the best answer according to how you would feel.
REMEMBER. Imagine that you are the person in the story.

Library Situation

Imagine that you are supposed to meet a friend in front of the library and you are looking for him/her. You can't wait to see your friend because you have to tell him/her about something important that happened to you. After a few minutes you go into the library. When you find your friend, he/she is talking with someone else, someone that you don't like very much. Your friend says that you can all study together as a group.

1. Why did your friend choose to include that person?
    a. My friend was mad at me about something.
    b. My friend didn't know that I wanted to talk with him/her alone.
    c. My friend was ignoring me to get back at me for something.
    d. My friend didn't see me in front of the library.

2. In this situation, do you think that your friend was
    a. deliberately trying to be mean?
    b. just being thoughtless, but not deliberately trying to be mean?

Shopping Centre Situation

Imagine that you are going to the shopping centre to do some shopping with a friend. You are supposed to meet near the food place where you and your friend always eat together. Just as you are coming down the escalator to meet your friend, you see her/him coming out of another store with another person that you don't really like. They look like they have been shopping together for a while because they have a bunch of bags with them.

1. Why did your friend choose to go shopping with someone else instead of you?

a. My friend was trying to diss me.

b. My friend just forgot we were supposed to meet.

c. My friend was ignoring me to get back at me for something.

d. My friend just came early and was still going to meet me later.

2. In this situation, do you think that your friend was

a. deliberately trying to be mean?

b. just being thoughtless, but not deliberately trying to be mean?

Concert Situation

Imagine that a concert that you really want to see is happening this weekend. You overhear two students you know say they are going to the concert. They say a bunch of students are all going together because they can get cheap tickets. They ask around after class to see if anyone wants to go with them, but no one asks you. They act like you are not even there.

1. Why didn't the students ask you to go to the concert?

a. The students were planning to ask me to go later.

b. The students were deliberately ignoring me to make me mad.

c. The students were trying to diss me.

d. The students haven't had a chance to ask me to go yet.

2. In this situation, do you think that the students were

a. deliberately trying to be mean?

b. just being thoughtless, but not deliberately trying to be mean?

Hallway Situation

Imagine that you are standing in the hallway one morning before class. As you are standing there, two students from your class walk by. As they walk by you, they look at you, whisper something to each other, and then they laugh.

1. Why did the two students laugh when they walked by you?

    a. The students were bad mouthing me (spreading rumours).

    b. The students were laughing at a joke that one of them told.

    c. The students were just having fun.

    d. The students were trying to make me mad.

2. In this situation, do you think that the two students were

    a. deliberately trying to be mean?

    b. just being thoughtless, but not deliberately trying to be mean?

Invitation Situation

Imagine that you are in the bathroom one day after class. While you are in there, two other students you know come in and start talking to each other. You hear one of them invite the other one to a party at his/her house. The student says that there are going to be a lot of people at the party. You have not been invited to this party.

1. Why hasn't the student invited you to the party at his/her house?

    a. The student doesn't want me to come to the party.

    b. The student hasn't had a chance to invite me yet.

    c. The student is ignoring me to get back at me for something.

    d. The student was planning to invite me later.

2. In this situation, do you think that the two students were

    a. deliberately trying to be mean?

    b. just being thoughtless, but not deliberately trying to be mean?

Walk Situation

Imagine that you are taking a walk to the store one day. After you walk a block or two, you see two students that you know from a class. As you pass by them you say, hi. The two students act as if you are not there, they don't say anything to you. Then they say something to each other that you can't hear and they continue to walk the other way.

1. Why didn’t the two students say hello to you?

    a. They didn’t see me standing there.

    b. They didn’t hear me say hi to them.

    c. They were talking behind my back.

    d. They were ignoring me to make me mad.

2. In this situation, do you think that the students were

    a. deliberately trying to be mean?

    b. just being thoughtless, but not deliberately trying to be mean?

Appendix M: Games Rating Form

Please rate the following games for their level of violence.

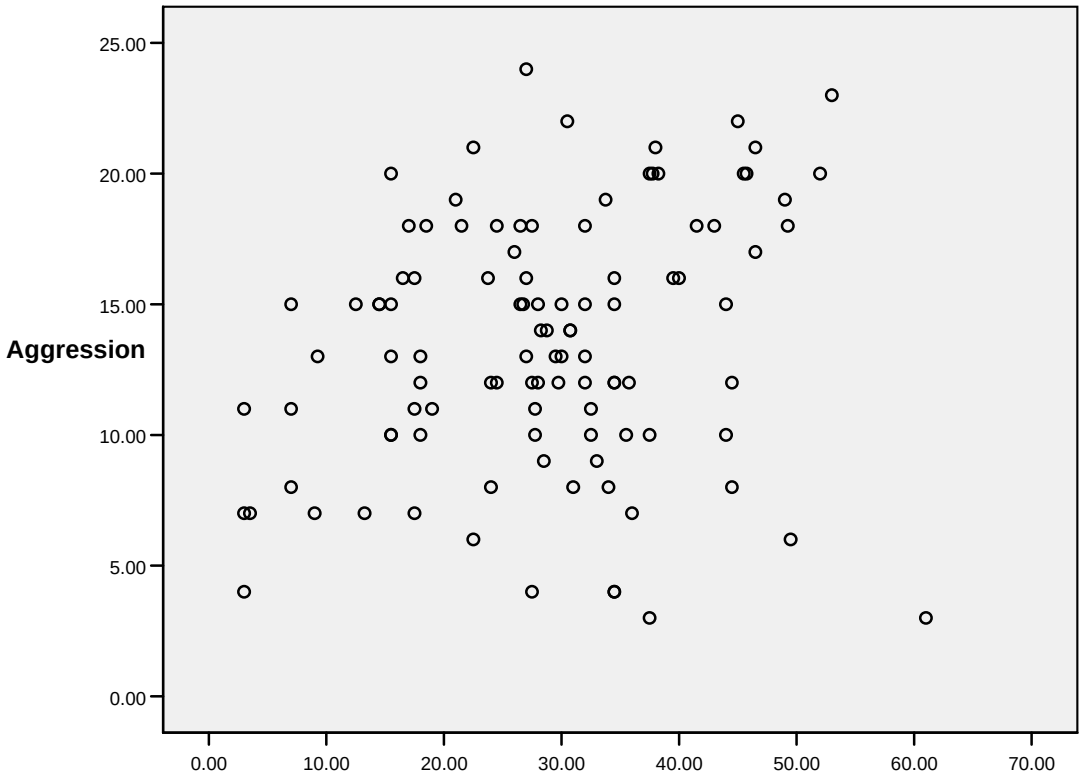
Game	Little or No violence			Moderate violence		Extremely violent	
50 Cent: Blood on the Sand	1	2	3	4	5	6	7
Assassins Creed II	1	2	3	4	5	6	7
Batman Arkham Asylum	1	2	3	4	5	6	7
Bioshock	1	2	3	4	5	6	7
Bond: Quantum of Solace	1	2	3	4	5	6	7
Burnout Paradise	1	2	3	4	5	6	7
Call of Duty: Modern Warfare 2	1	2	3	4	5	6	7
Collin Mcrea Dirt 2	1	2	3	4	5	6	7
Crackdown	1	2	3	4	5	6	7
Dave Mirra Freestyle BMX	1	2	3	4	5	6	7
Death Jam Vendetta	1	2	3	4	5	6	7
Driver: Parallel lines	1	2	3	4	5	6	7
Fallout 3	1	2	3	4	5	6	7
FIFA	1	2	3	4	5	6	7
Fight Night Round 4	1	2	3	4	5	6	7
Frontline Fuel of War	1	2	3	4	5	6	7
Gears of War 2	1	2	3	4	5	6	7
God of War 2	1	2	3	4	5	6	7
Godfather II	1	2	3	4	5	6	7
Grand Theft Auto IV	1	2	3	4	5	6	7
Grand Turismo 4	1	2	3	4	5	6	7
Grid	1	2	3	4	5	6	7
Halo ODST	1	2	3	4	5	6	7
Hitman Bloody Money	1	2	3	4	5	6	7
Infamous	1	2	3	4	5	6	7
Juiced	1	2	3	4	5	6	7
Kingdom Hearts 2	1	2	3	4	5	6	7
Legend of Zelda Twilight Princess	1	2	3	4	5	6	7
Mario Kart	1	2	3	4	5	6	7
Medal of Honor Airbourne	1	2	3	4	5	6	7
Metal Gear Solid 4	1	2	3	4	5	6	7
Mortal Kombat vs DC	1	2	3	4	5	6	7
Motorstorm Pacific Rift	1	2	3	4	5	6	7
Need for speed	1	2	3	4	5	6	7
PES 10	1	2	3	4	5	6	7
Resident Evil 5	1	2	3	4	5	6	7
Saints Row 2	1	2	3	4	5	6	7
Sims 3	1	2	3	4	5	6	7

Skate 2	1	2	3	4	5	6	7
Slitherlink	1	2	3	4	5	6	7
Smackdown vs Raw 09	1	2	3	4	5	6	7
Spiderman: Web of Shadows	1	2	3	4	5	6	7
Street Fighter IV	1	2	3	4	5	6	7
Tekken 6	1	2	3	4	5	6	7
Ultimate Fighting Champion	1	2	3	4	5	6	7
Wall-e	1	2	3	4	5	6	7

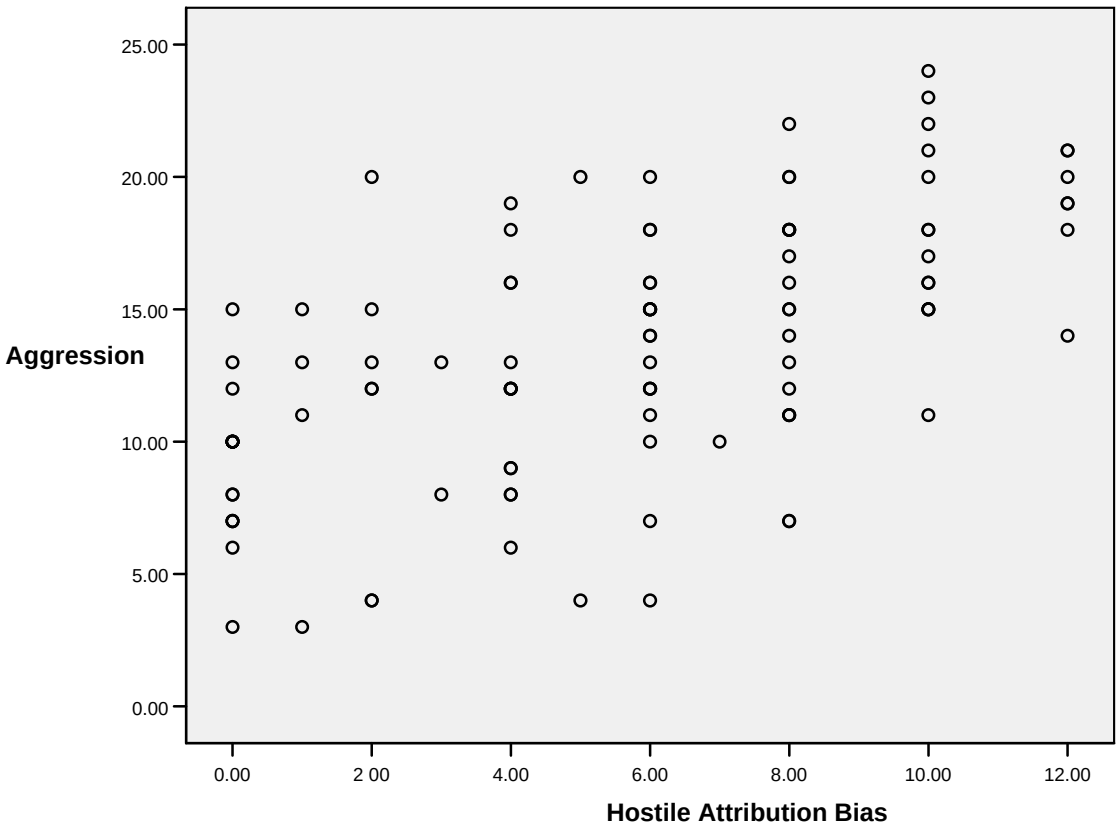
Thank you

Appendix N: Scatter Plots

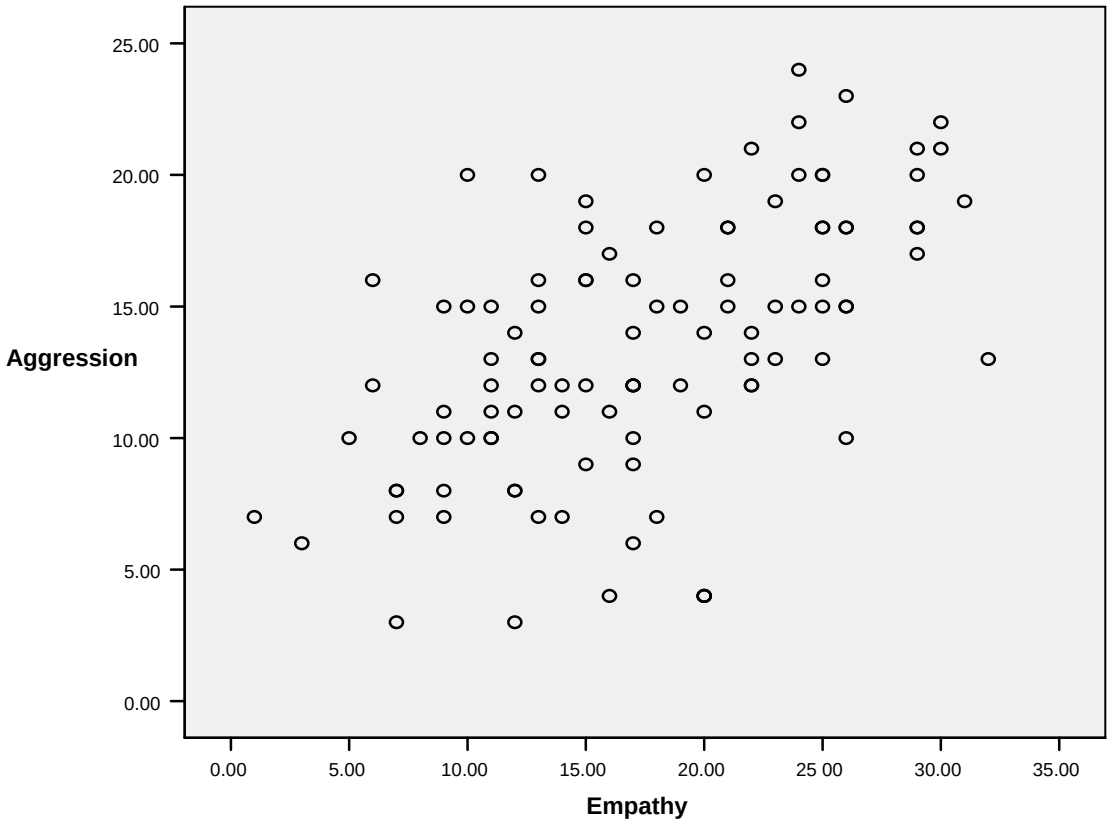
Scatter Plot of Aggression and Exposure to Video Game Violence



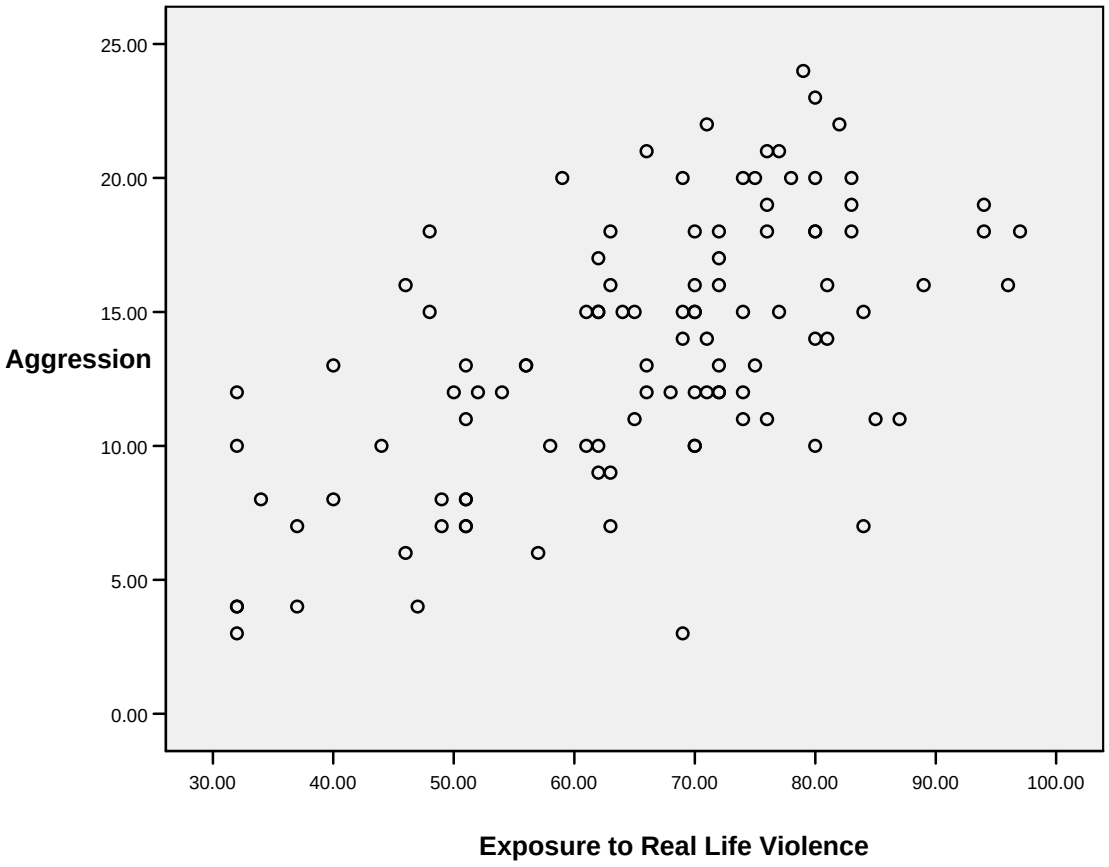
Scatter Plot of Aggression and Hostile Attribution Bias



Scatter Plot of Aggression and Empathy (Reverse Score)



Scatter Plot of Aggression and Exposure to Real Life Violence



Appendix O: Case Study Consent Form

I ……. agree to participate in one-to-one sessions at the ISSP. These sessions have been explained to me and I understand that the purpose of them is to help me to better understand my feelings, thoughts and behaviours which have led me to come into contact with the judicial system. I understand that I may withdraw from the sessions at any time but that doing so may lead to consequences on my order. I also understand that I will have to fill out some questionnaires before and after the ISSP. I understand that no one will be told about my participation in the one-to-one sessions or my responses on the questionnaires, aside from my programme manager at ISSP. I understand that the facilitator of the one-to-one sessions will use my information for a case study at the University of Birmingham but that all the information will be anonymous so that all information remains confidential. I also understand that third parties, such as staff at the University of Birmingham, will view this anonymous information. Finally, I understand I have the right to withdraw consent for my information to be used in this way up to one month after the date of consent.

Signed ……. Date ……

Appendix P: Session Plans

Session one – Introduction to therapy

Plan: Build rapport. Establish the purpose and rules of sessions. Set boundaries and explain confidentiality. Specify aims and expectations of sessions. Develop a written problem list.

Purpose: To build a rapport with the client and to identify problems the client wishes to work on during therapy. Complete "Problem List" and "Aims and Expectations" worksheets.

Homework: To develop the problem list further and to suggest any other goals she would like to work on during therapy.

Session two – The costs of anger and understanding anger

Plan: Review homework from previous session. Discuss what makes the client angry, identify situations or factors personal to her that makes her angry and which make her angriest using the "What Makes Me Angry" worksheet. Complete the "Anger Has Its Uses" worksheet and then discuss the costs of anger, physiological, emotional, and interpersonal. Discuss anger payoffs (short-term positives) and the downsides (long-term consequences) of these (e.g. reduces stress, hides emotional pain, gains attention, punishment and revenge).

Purpose: To make the client aware of what makes her angry, the problems associated with anger and how this can impact negatively on a person's life. To enable the client to understand the reasons why they become angry.

Homework: Complete the "Costs and Benefits of Anger" worksheet. Complete an "Anger Log".

Session three – Relaxation skills

Plan: Discuss the anger log from the previous session. Teach progressive relaxation training, relaxation imagery, deep breathing, and cue-controlled relaxation.

Purpose: To teach the client how to relax in any situation in order to prevent an angry response. Reduce overall tension. Discover which relaxation techniques work best for the client.

Homework: Continue with anger logs. Practise the relaxation techniques.

Session four – Trigger thoughts and thought distortions

Plan: Review homework from previous session. Discuss how thoughts about a situation can influence emotions and how events can be wrongly interpreted. Work through the 'Hot Thoughts' worksheets. Discuss thought distortions that are likely to increase feelings of anger (blaming, magnifying the situation, inflammatory global labelling, misattributions, overgeneralization, demanding). Identify trigger thoughts for the client from the anger log and themes of these thoughts. Discuss alternatives to becoming angry and coping thoughts to replace each of the trigger thoughts using the 'Taking Control' worksheet.

Purpose: To teach the client how to recognise anger-triggering thoughts and how to replace them with coping thoughts.

Homework: Continue with anger logs and relaxation practice.

Session five – Creating coping thoughts

Plan: Review homework from previous session. Review clients progress so far and her feelings on her progress so far. Discuss coping thoughts and establish which the client thinks would work for her. Discuss how to plan for anger provoking situations and make a coping plan for one anger-provoking situation likely to occur in the forth-coming week using the 'Coping Plan' worksheet.

Purpose: To teach the client how to manage her thoughts and how this is related to managing anger. To identify coping thoughts that work for her so she can employ these.

Homework: Use one of the three coping thoughts in angry situations over the next week. Continue anger log and relaxation practice.

Session six – Anger inoculation

Plan: Review homework from previous week. Discuss how to monitor coping efforts and introduce new anger log. Introduce and discuss anger inoculation and teach a structured rehearsal of coping thoughts and relaxation coping skills. Discuss which coping skills work best for the client (relaxation coping, coping thoughts, and coping behaviours).

Purpose: To teach a new set of coping skills and help the client to keep track of which coping strategies work best for her.

Homework: Continue with relaxation practice and begin new anger log.

Session seven – Coping plans

Plan: Review homework from previous week. Spend some time reviewing the information that has accumulated in the anger log records, particularly look back on times when the client felt upset or angry but was unable to employ the new skills. Identify three

problem areas and focus intervention on these by planning responses using ‘Coping Plan’ worksheet.

Purpose: To identify ongoing problems when unable to employ new skills and to work on these in particular.

Homework: Continue filling in anger log and practising relaxation techniques.

Session eight – Problem solving communication and real-life coping

Plan: Review homework from the previous week. Discuss the advantages and disadvantages of three coping styles: passive, aggressive, and assertive, and recommend the use of the assertive style. Discuss the use of assertive statements, what these are, and how they work (facts, feelings, fair requests, and consequences). Discuss the notion of using negotiation and compromise when there is a conflict of interests or needs and setting limits requests/demands. Review the clients coping thoughts, discuss the best coping thoughts.

Purpose: To examine three different coping styles and enable the client to see why their previous style has not been functional. To synthesise what the client has learned so far about anger management and help him understand how this can work in ‘real life’.

Homework: Continue filling out the anger log and practicing coping skills.

Session nine – Blocks to real life coping and being good to yourself.

Plan: Discuss obstacles the client may face to coping with anger. Discuss practical ways of recalling coping thoughts and employing coping strategies in real life situations. Talk about how issues such as mood and stress affect anger episodes.

Purpose: To enable the client to understand that coping in real life situations may still be difficult after therapy and controlling anger is an ongoing exercise. To enable the client to deal with distress in proactive ways so anger is needed less in her life.

Homework: Continue recording any significant anger incidents in anger log, along with coping efforts.

Session ten – Review

Plan: Review the programme.

Purpose: To conclude the intervention. To provide ways of dealing with anger in the long term. To enable the client to move forward and to see how far she has come and how much has changed since starting therapy.

Homework: Continue to manage anger even thought therapy has ended.

Appendix Q: Worksheets

Problem List

Please list any current problems you are experiencing and would like to work on in these sessions

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

Aims

What are you aims in these sessions?
Please list them below:

1. **_____**
2. **_____**
3. **_____**
4. **_____**

Expectations

What do you expect during and after these sessions?
Please list them below:

1. **_____**
2. **_____**
3. **_____**
4. **_____**

What Makes Me Angry

Please list some of the things that make you angry e.g. being told what to do by your parents or people calling you or your family names etc. Write them on the scale below with the one that makes you most angry at number 10 and the one that makes you least angry at number 1.

10 _____

9 _____

8 _____

7 _____

6 _____

5 _____

4 _____

3 _____

2 _____

1 _____

Anger Has Its Uses

Anger can be helpful in certain situations:

- **Anger can help us identify what is important to us –** e.g. if you become angry when someone lies to you, that is a sign honesty is important to you.
- **Anger can warn you of violence** – e.g. just because you are angry does not mean you have to become violent, anger can act as a warning so when you feel anger coming you have a choice to become violent or not.
- **Anger can encourage you to stand up for your beliefs –** e.g. if someone says something rude about your family anger will make you challenge that.

See if you can think of any other ways anger can be helpful and write them below.

1. **_____**
2. **_____**
3. **_____**
4. **_____**

Cost and Benefits of Anger

Short term **+ ves / benefits**	**- ves / costs**
Long term **+ ves / benefits**	**- ves / costs**

Anger Log

Where were you?

_____

What happened?

_____
_____
_____

Who was there?

_____
_____

What were you thinking about when this happened?

_____
_____
_____

How angry were you?

Not at all	A little	Fairly	Very	Furious
1	2	3	4	5

What did you do? / How did you react?

_____
_____
_____
_____

What then happened?

_____
_____
_____

Hot Thoughts

Anger can be OK but when you lose control of it and become aggressive this is when problems occur.
In order to start controlling your anger you need to understand that YOU cause your anger no one else and so that only you can keep your anger under control. You may not think this is the case, you may think that it is other people who cause you to become angry by their actions but hopefully the following tasks will show you this is not the case.

Look at the following examples, which of these thoughts do you believe to be true?

- When I am mad I HAVE to let it out
- Holding in my anger is bad for me, it is better for me to let it out.
- The person I am mad at is a total loser and deserves to suffer.
- Other people or things make me angry.

For each of the above thoughts write below whether you think it is true or not and why.

1. When I am mad I HAVE to let it out

_____
_____
_____

2. Holding in my anger is bad for me, it is better for me to let it out.

_____
_____
_____

3. The person I am mad at is a total loser and deserves to suffer.

_____
_____
_____

4. Other people or things make me angry.

_____
_____
_____

> If you believe any of these thoughts it will be difficult for you to learn to manage your anger. All of these thoughts are false, but lots of people believe them. Don't feel bad if you agree with some or all of them, those thoughts and others like them are the reason for your problems with anger.

So, why are they false?

When I am mad I HAVE to let it out – if someone offered you a million pounds not to become angry would you be able to do it? Letting out your anger is a choice you make, no one ever has to let it out.
Holding in my anger is bad for me, it is better for me to let it out – research has shown that letting it out can actually be more damaging than keeping it in and can lead you to become angry more easily in the future.
The person I am mad at is a total loser and deserves to suffer – no one is a total loser or deserves to suffer, everyone has good and bad points. Just because you do not like someone does not mean they deserve to suffer.
Other people or things make me angry – this is the most commonly held belief but is totally wrong. We create our own feelings which is why different people can feel differently about the same thing.

YOU AND YOU ALONE CONTROL HOW YOU FEEL!

Not convinced? Then complete the following exercise:

You're walking through town when someone pushes past you and makes you drop what you are carrying. What do you think?

_____
_____
_____
_____

What have you written? Are there any thoughts that might make you angry?

So, you turn to confront the person who walked you when you see they are blind so could not see you. Now what do you think?

_____
_____
_____
_____

Is what you written different to what you wrote first? If it is why is that? It is not the situation that has changed, someone has still walked into you but your thoughts have changed possibly stopping you from getting angry.

If you are controlling your anger through your own thoughts this means you can learn to control your anger!

Spot the Hot Thoughts

Hopefully by now you will have realised that some thoughts cause anger. Let's put this to the test. Look at the list of thoughts below and put an X after the ones that probably cause anger.

1. People should not be such idiots _____
2. I don't like maths but I guess I can stand it _____
3. Even though my parents can be hard to live with they are not the worst parents in the world _____
4. If people don't listen to what I say they deserve to suffer _____
5. My life stinks because people don't do what I tell them _____
6. Classes should not be so boring _____
7. I wish my parents would let me go out at the weekend but even if they don't I can still have fun _____

If you put an X next to 1, 4, 5 & 6 then congratulations, you are right!
All these thoughts do one thing, they DEMAND something. When demands go unmet there is anger.

Now, think of a time in the past week when you have got angry.

What did you get angry about?

_____
_____
_____

What were you demanding?

_____
_____
_____

If you find this difficult, think of yourself using the following "hot" words

SHOULD / SHOULD NOT
MUST /MUST NOT
HAVE TO
OUGHT TO

Using your anger logs try and identify your own hot thoughts and write them below.

_____

_____

_____

_____

_____

_____

Taking Control

Now, taking each of your "hot" thoughts in turn try thinking of alternatives.

1. _____
2. _____
3. _____
4. _____
5. _____

Coping Plan

Situation:

_____

_____

_____

Possible hot thoughts:

_____

_____

_____

Alternative coping thoughts:

_____

_____

_____

Coping actions:

_____

_____

_____

Anger Log 2

Where were you?

_____

What happened?

_____
_____
_____

Who was there?

_____
_____

What were you thinking about when this happened?

_____
_____
_____

How angry were you?

Not at all	A little	Fairly	Very	Furious
1	2	3	4	5

What did you do? / How did you react?

_____
_____
_____
_____

What then happened?

_____
_____
_____

How well do you think you handled this situation?

Badly Not very well OK Well Very Well

What could you do next time, what thoughts or actions would make this situation go better in future?

_____

_____

_____

_____

_____

Appendix R: Evaluation Form

I have found this programme useful:

Very									Not at all
1	2	3	4	5	6	7	8	9	10

I have enjoyed this programme:

Very									Not at all
1	2	3	4	5	6	7	8	9	10

Circle the words that best describe the programme and add any you think are missing!

Confusing Helpful Irrelevant Entertaining

Relaxing Easy Interesting

Depressing Difficult Stressful Fun

Stimulating Relevant Disappointing

Comparing your behaviour now and before the course, please answer the following:

The frequency of my anger and aggressive behaviours is:
1. much improved
2. improved
3. the same
4. worse
5. much worse

Comments:

The severity of this is:
1. much improved
2. improved
3. the same
4. worse
5. much worse

Comments:

The harm or damage from my behaviour is:
1. much improved
2. improved
3. the same
4. worse
5. much worse

Comments:

My understanding of why these behaviours happen is:
1. much improved
2. improved
3. the same
4. worse
5. much worse

Comments:

My ways of managing and coping with the behaviours is:
1. much improved
2. improved
3. the same
4. worse
5. much worse

Comments:

Please add any other comments: