



Australian Government

Attorney-General's Department

**Literature review on the
impact of playing violent
video games on aggression**

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Contents

Synopsis.....	5
Introduction.....	6
Key terms and concepts.....	7
Correlation and effect sizes.....	7
Study designs	8
Experimental research	8
Correlational or cross-sectional research.....	8
Longitudinal research	8
Context.....	10
Historical background to media and video game violence research.....	10
School shootings	11
Political and legal background.....	12
Violent video games (VVGs)	15
Definitions.....	15
Measuring violent content.....	15
Children’s game violence	17
Social acceptability of the violence.....	18
Context of gameplay	19
Aggression.....	21
Aggression and violence	21
Measuring aggression	22
Psychiatric and neuroscientific measures	23
Short-term and long-term effects on aggression.....	24
Vulnerable populations	25

Effects on children.....	26
Pre-existing personality traits	26
Violent crime rates.....	27
Third variables	28
Theories behind the effects.....	29
The General Aggression Model.....	29
Catharsis effect.....	29
Mood management theory	30
Catalyst model	30
Do small effect sizes matter?	32
The ‘smoking and lung cancer’ analogy.....	32
Comparing VVGs to abusive parents and poverty	33
Practical significance of effect sizes	33
Effects accumulating over time	33
Effects accumulating across populations	34
Severity of the consequences	34
Bias accusations.....	35
Publication bias.....	35
Citation bias	36
Steps taken to avoid bias.....	36
Restrictive video game classification in Australia.....	39
Recent research	40
Experimental studies	40
Correlational or longitudinal studies	40
Comparing meta-analytic results.....	41
Conclusion	42
Bibliography	43

SYNOPSIS

Research into violent video games (VVGs) is primarily conducted by psychologists in the United States. It takes place in a controversial political context of free speech disputes and school shootings. Much of this research has shown that playing VVGs is a small to moderate risk factor in later aggressive behaviour, at least in the short-term. However, over the course of this review a number of problems emerged with these findings that reduce their policy relevance.

Critics have pointed to the difficulties of defining and measuring the violent content of video games. Researchers have not devoted sufficient attention to the question of severity of violent content (eg, cartoonish violence vs realistic violence) and whether it has differing effects. Some studies appear to show games featuring cartoonish violence are just as harmful as games featuring realistic violence. It is not known whether socially acceptable violence (such as in the course of playing sports) has a different effect to antisocial violence.

Critics have also pointed to problems with the concept of 'aggression' used in the research. They argue that it is imprecisely defined and measured using unstandardised tests which may not apply in the real world. In addition, the effects of violent video games on aggression tend to be quite small. However, because they are played repeatedly by large parts of the community, they may still be a cause for concern.

There is some consensus in the research that some members of the community, such as people with psychotic personality traits, may be more affected by VVGs than others. However, there is mixed evidence as to whether VVGs have a greater impact on children.

A number of other findings of this review arguably reduce the policy relevance of VVG research.

- There is stronger evidence of short-term VVG effects than of long-term effects.
- The possibility that third variables (like aggressive personality, family and peer influence, socio-economic status) are behind the effect has not been well explored.
- Researchers who argue that VVGs cause aggression have not engaged with or disproved alternative theories propagated by their critics.
- There is little evidence that violent video games have a greater impact than other violent media.

In conclusion, research into the effects of VVGs on aggression is contested and inconclusive.

INTRODUCTION

Ministers responsible for classification asked the Commonwealth to prepare a literature review in May 2010 to assist their consideration of whether the National Classification Scheme should be amended to include an R 18+ classification for computer games. The Minister for Home Affairs asked the Attorney-General's Department to prepare an up to date summary of research into the impact of playing violent computer/video games. The review may also be of interest to members of the public interested in this issue to inform consumer choices.

The primary focus of this review is the debate among psychologists about the effects of violent video games on aggression. The scope of this paper covers the studies cited in group submissions on the December 2009 discussion paper *Should the Australian National Classification Scheme include an R 18+ classification category for computer games?* The majority of these studies were cited in submissions opposed to the introduction of an R 18+ classification for video games. Additional studies expressing alternative findings and theoretical viewpoints were therefore sought for this review. These additional studies were selected because they either contributed significantly to the debate, or were released after the consultation period had closed. All studies used in this review date from the year 2000 to the present.

Academic literature on the impacts of VVGs can be characterised as a debate between two broad schools of thought: 'causationists' and 'critics of causationists'.

- 'Causationists' are those who see violent content in video games as the direct cause of effects in game players.¹ Causationists have consistently argued that playing VVGs increases the risk that participants in laboratory and survey-based studies will behave, think and feel, more aggressively. They also argue that VVGs may have a host of other related negative effects such as desensitisation and lower levels of empathy. Most of this research emanates from a group of psychologists in the United States, led by Professor Craig Anderson. In general, causationists use quantitative methods in their research.
- 'Critics of causationists' focus on the impact of VVGs as being determined by context. They tend to look at the player's interpretation of game content and a range of social, economic, cultural and even biological factors. In general, critics of the 'causationist' perspective come from disciplines such as cultural and media studies, sociology or ethnography, and tend to base their work on more qualitative measures. Recently however, psychologists such as Christopher Ferguson have used quantitative methods to reach differing conclusions about VVG effects. The views of critics of causationists are diverse. They may argue that VVGs have some negative effects on

¹ The term 'causationist' is from T Grimes, J Anderson and L Bergen, *Media Violence and Aggression: Science and Ideology*, 2008, 48-50.

some children, or that there are no effects, or that there are positive effects. They are united, however, in criticising many causationist claims.

KEY TERMS AND CONCEPTS

This section contains an explanation of some of the key concepts involved in the review.

Correlation and effect sizes

Most VVG research involves measuring the correlation between two variables such as exposure to VVGs and aggression. A correlation between two variables only shows a relationship between them. It does not prove causation. The direction the relationship moves in is not clear (eg, do VVGs cause aggression or do aggressive people like VVGs?). A correlation may also be a result of third variables. For example, men tend to be more aggressive than women² and men are more likely to play video games.³ Therefore, what seems to be a VVG effect on aggression may in fact be related to another variable, such as gender.⁴

The correlation between VVGs and aggression is measured by the 'effect size', which is often signified by ' r '. Effect sizes range between $r = -1$ and $r = 1$, with the extreme values meaning there is a perfect correlation. For example, an effect size of $r = 1$ would mean that a change in the first variable would be matched by the exact same change in the second variable. An effect size of $r = 0$ would mean that the two variables are completely uncorrelated.

Generally, effect sizes below $r = 0.1$ are considered non-significant, effect sizes between $r = 0.1$ and 0.3 are considered small, effect sizes between $r = 0.3$ and 0.5 are considered medium and effect sizes above $r = 0.5$ are considered large.⁵ The most recent and comprehensive study on VVG effects has revealed an overall effect on aggression of $r = 0.24$, or $r = 0.15$ when gender and prior aggression are statistically controlled.⁶ Causationist researchers state that these effect sizes, though small, are significant.⁷ The significance of small effect sizes will be discussed later in the review.

² C Ferguson, 'The Modern Hunter-Gatherer Hunts Aliens and Gathers Power-Ups: The Evolutionary Appeal of Violent Video Games and How They Can Be Beneficial,' in N Kock, *Evolutionary Psychology and Information Systems Research: A New Approach to Studying the Effects of Modern Technologies on Human Behavior*, 2010, 329, 331.

³ Interactive Entertainment Association of Australia, *Interactive Australia 2009*, 2008, 36.

⁴ C Ferguson, 'Blazing Angels or Resident Evil? Can Violent Video Games Be a Force for Good?' (2010) 14 *Review of General Psychology* 68, 74.

⁵ J Cohen, 'A Power Primer' (1992) 112 *Psychological Bulletin* 155, 157.

⁶ C Anderson et al, 'Violent Video Game Effects on Aggression, Empathy, and Prosocial Behavior in Eastern and Western Countries: A Meta-Analytic Review,' (2010) 136 *Psychological Bulletin* 151, 162.

⁷ C Anderson, D Gentile and K Buckley, *Violent Video Game Effects on Children and Adolescents: Theory, Research and Public Policy*, 2007, 142.

Study designs

The studies examined in this literature review tend to fall into one of four broad categories: experimental, correlational, longitudinal, and meta-analytic. It is important to understand the differences between these research types, as the findings of each have different strengths and weaknesses.

Experimental research

Experimental research involves the one off testing of a hypothesis, such as a link between two variables. Research involves the direct manipulation of variables, and is therefore the most controlled form of research, providing the most definitive results.

Typically, VVG experimental research involves randomly assigning participants to play either violent or non-violent video games. Afterwards their aggression levels are measured in some way. Due to ethical and logistical considerations, experimenters cannot have participants play only violent or non-violent game, and then observe them in real life and record aggressive behaviours. They are therefore limited to measuring the short-term effects of games on very mild forms of aggression. Often, this is done by having participants play a competitive reaction-time game where they are told their opponent will be subjected to a “noise blast” if they win. Participants can alter the “noise blast” by making it louder or longer. Their aggression is then measured on how much noise they choose to subject their apparent opponents to. (In reality there is no opponent and wins and losses are determined at random). Experimental studies provide stronger evidence of causation, because they randomly assign conditions and directly manipulate variables. This reduces the likelihood that third variables are responsible for effects.

Experimental conditions may be quite different to real world conditions. The ‘external validity’ of an experiment depends on whether its results can be generalised to what would happen in the outside world. For instance, the external validity of a laboratory-based test for aggression would depend on how well its results correlate with aggression in the outside world.

Correlational or cross-sectional research

A correlational study is a one-off measurement of a sample, which aims to characterise a larger group. This is usually done through the application of surveys and questionnaires. Typically, a questionnaire will seek to measure the participant’s exposure to VVGs, their levels of aggressive behaviour, thoughts and feelings, and third variables such as aggressive personality.

Longitudinal research

A longitudinal study looks for changes in a correlational relationship over time. Typically this is done by surveying a sample, in the same way as correlational research, at one point in

time (Time 1). Researchers will then survey the exact same sample at a later date (Time 2). VVG researchers look for a correlation between VVG exposure at Time 1 and aggression at Time 2. Longitudinal research provides the best evidence of long-term effects.

Statements of causation should be drawn with caution from longitudinal and correlational studies, as they only show that a correlation between two variables is present. They do not show the direction of causality or whether a third variable is at work. They often involve self-reported 'pen-and-paper' measures of VVG exposure and aggressive behaviour, which are not always reliable.

Meta-analysis

Meta-analysis is a 'study of studies'. It involves the collation and analysis of a number of studies on a similar topic. Meta-analyses enable researchers to make statements about the findings of entire bodies of scientific literature, identify areas which need more research and compare effect sizes across different types of study.

CONTEXT

Historical background to media and video game violence research

Debates about media violence have taken place for centuries. Scientific interest in the effects of media violence however, only really began in the late 1920s. A body of sociological work known as the ‘Payne Fund Studies’ argued that a link existed between films (particularly the gangster and ‘fallen woman’ films of the 1930s) and delinquent behaviour among young people.⁸ These studies were highly influential and fuelled demands for tighter regulation of the film industry in the United States.⁹

In the 1950s, scientific and legislative attention turned to comic books, which were seen as a cause of juvenile delinquency.¹⁰ In the late 1960s through to the early 1990s, a sharp increase in violent crime rates led to speculation that violent television shows had a similar effect.¹¹ A substantial amount of social science literature emerged which argued that television violence had an effect on aggression. Today however, it is believed that the violent crime spike had more to do with social upheaval, poverty and homelessness.¹²

Video games emerged in the 1970s. Initially these games were played on large machines in public arcades, but by the 1980s it was possible for consumers to play games at home on consoles such as the Atari and the Nintendo. These early consoles had a self-regulation system in place. For example, both had a “no excessive blood and violence policy”.¹³ By the early 1990s, however, the most popular games were violent fighting games such as *Double Dragon*, *Street Fighter* and *Mortal Kombat*. In 1992, the release of *Wolfenstein 3D* sparked the “first-person shooter” genre. This game was followed by the hugely popular game *Doom* in 1993.

The potential detrimental effects of video games have long been a cause of concern. As early as 1976, the game *Death Race* caused controversy as it allowed players to run over human-like stick figures, leaving a gravestone in their wake.¹⁴ Although the television violence debate continued to dominate research agendas, social science researchers began to take an interest in the possible effects of these games in the 1980s.¹⁵

⁸ L Jacobs, *The Wages of Sin: Censorship and the Fallen Woman Film, 1928-1942*, 1997, 5.

⁹ R Maltby, 'More Sinned Against Than Sinning: The Fabrications of "Pre-Code Cinema"', <http://archive.sensesofcinema.com/contents/03/29/pre_code_cinema.html> accessed 27/7/10.

¹⁰ F Wertham, *Seduction of the Innocent: the influence of comic books on today's youth*, 1954.

¹¹ See G Jensen, 'The Invention of Television as a Cause of Homicide: The Reification of a Spurious Relationship,' (2001) 5 *Homicide Studies* 114.

¹² C Ferguson, 'Blazing Angels or Resident Evil? Can Violent Video Games Be a Force for Good?' (2010) 14 *Review of General Psychology* 68, 69.

¹³ C Anderson, D Gentile and K Buckley, *Violent Video Game Effects on Children and Adolescents: Theory, Research and Public Policy*, 2007, 5.

¹⁴ The New York Times, 'Death Race' Game Gains Favor, But Not With the Safety Council, 1976, <<http://select.nytimes.com/gst/abstract.html?res=FB0E10FD385B167493CAAB1789D95F428785F9>>, accessed 09/08/10.

¹⁵ See for instance, C Anderson and C Ford, 'Affect of the game player: Short term effects of highly and mildly aggressive video games,' (1987) 12 *Personality and Social Psychology Bulletin* 390.

As video games have become increasingly popular,¹⁶ their prominence in the media violence debate has increased. The early 1990s saw a large amount of public debate about VVGs like *Mortal Kombat*, *Doom* and *Night Trap*, a game inspired by B-grade horror movies.

By 1994, both the United States and Australia had set up their respective regimes for classifying video games. Also in 1994, the Office of Film and Literature Classification commissioned a literature review into the effects of video games. This review found that ‘[a]lthough the research is not exhaustive and by no means conclusive, it indicates that the stronger negative claims are not supported.’¹⁷ A 1999 update found little reason to change those conclusions.¹⁸

Since the 1999 review, public debate about the effects of violent video games has intensified, particularly in the United States. This interest increases as technology advances and the violence portrayed in VVGs became more lurid. As a result of heightened interest, the number of studies into VVG effects has grown exponentially. The findings of researchers discussed in this paper have sparked heated comment in the mass media and inspired legislation in several jurisdictions of the United States.

School shootings

This section explores the context of the current debate in the United States.

The mass murder at Columbine High School in 1999 created a lot of public interest in the impact of violent media, including VVGs, as the two perpetrators were avid players of the computer game *Doom*.

It is common for researchers supportive of a causal link between VVGs and aggression to note the use of VVGs by some recent school shooters when introducing their studies.¹⁹ In a 2007 study, “causationist” researchers note that a US Federal Bureau of Investigation report, *The School Shooter: A Threat Assessment Perspective* ‘included “fascination with violence-filled entertainment” as one of the warning signs characteristic of school shooters.’²⁰ The actual report emphasises that the list of 45 possible characteristics of a school shooter “is not intended as a checklist,” and that no single trait should be considered out of context or given more weight than the others.²¹

¹⁶ Recent research indicates that 88% of Australian households have a device for playing video games. Interactive Entertainment Association of Australia, *Interactive Australia 2009*, 2008, 9.

¹⁷ K Durkin, *Computer Games ~ their effects on young people: a review*, 1995, 71.

¹⁸ K Durkin and K Aisbet, *Computer Games and Australians Today*, 1999, 25.

¹⁹ C Anderson and K Dill, “Video Games and Aggressive Thoughts, Feelings and Behavior in the Laboratory and in Life,” (2000) 78 *Journal of Personality and Social Psychology* 772.

²⁰ C Anderson, D Gentile and K Buckley, *Violent Video Game Effects on Children and Adolescents: Theory, Research and Public Policy*, 2007, 3.

²¹ United States Department of Justice, Federal Bureau of Investigation, *The School Shooter: A Threat Assessment Perspective*, 2000, 15.

A more recent and comprehensive report found that there was no useful or accurate ‘profile’ for school shooters.²² It also found that of the 41 perpetrators it examined, only 12% had ‘some interest’ in VVGs and only 59% had ‘some interest’ in any violent media whatsoever.²³ Some researchers have even suggested that school shooters may have less interest in VVGs than the average young male.²⁴ Seung-Hui Cho, the perpetrator of the April 2007 Virginia Tech massacre, does not seem to have played video games at all.²⁵

Some critics note that, in some respects, the present debate resembles a ‘moral panic,’ in which deeply held anxieties are projected onto ‘folk devils’.²⁶ Such panics can be started by a dramatic and newsworthy event that evokes latent social fears and concerns.²⁷ Christopher Ferguson argues that references to school shootings in VVG research may unnecessarily contribute to such a panic.²⁸ Causationist researchers, perhaps mindful of these criticisms, have not mentioned school shootings in recent studies.²⁹

Political and legal background

It is important to remember that there are different methods of regulating VVGs in the United States and Australia. The games industry in the United States is largely self-regulating. All games are classified by an industry body called the Entertainment Software Review Board (ESRB). The ESRB classification system includes “Mature 17+” and “Adults Only 18+” ratings. Games retailers are expected to follow these ratings when selling video games. This is a voluntary system, however, and it is not against the law to sell violent media to minors. In Australia, by contrast, any game that does not fit within the MA 15+ category or below is classified RC (Refused Classification) and is unlawful to sell to anyone.

In the context of the public debate about VVGs and school shootings, nine jurisdictions in the United States have introduced legislation which ban the sale of certain VVGs to minors.³⁰ All of these laws have been overturned as unconstitutional on the basis that they are inconsistent with the First Amendment right to free speech. All judicial reviews of VVG literature to date have found that causal links between VVGs and aggressive behaviour are

²² United States Secret Service and United States Department of Education, *The Final Report and Findings of the Safe School Initiative: Implications for the Prevention of School Attacks in the United States*, 2002, 19.

²³ United States Secret Service and United States Department of Education, *The Final Report and Findings of the Safe School Initiative: Implications for the Prevention of School Attacks in the United States*, 2002, 22.

²⁴ C Ferguson, ‘The School Shooting/Violent Video Game Link: Causal Link or Moral Panic?’ (2008) 5 *Journal of Investigative Psychology and Offender Profiling* 25, 29.

²⁵ Virginia Tech Review Panel, *The Virginia Tech Review Panel Report*, 2007, viewed 28 July 2010, <http://www.vtreviewpanel.org/report/report/11_CHAPTER_IV.pdf>, 32, 51.

²⁶ C Ferguson, ‘Blazing Angels or Resident Evil? Can Violent Video Games Be a Force for Good?’ (2010) 14 *Review of General Psychology* 68, 69. See S Cohen, *Folk devils and moral panics*, 1972.

²⁷ G Murdock, ‘Reservoirs of dogma: An archaeology of popular anxieties,’ in M Barker and J Petley (Eds), *Ill effects: the media/violence debate*, 1997, 63.

²⁸ C Ferguson, ‘The School Shooting/Violent Video Game Link: Causal Link or Moral Panic?’ (2008) 5 *Journal of Investigative Psychology and Offender Profiling* 25, 34.

²⁹ C Anderson et al, ‘Violent Video Game Effects on Aggression, Empathy, and Prosocial Behavior in Eastern and Western Countries: A Meta-Analytic Review,’ (2010) 136 *Psychological Bulletin* 151.

³⁰ State laws were passed in Washington (2003), California (2005), Illinois (2005), Michigan (2005), Louisiana (2006), Minnesota (2006), and Oklahoma (2006). City ordinances were passed in St. Louis, Missouri, (2000) and Indianapolis, Indiana (2000).

inconclusive, and have expressed misgivings with the research of the causationist researchers.³¹ The Supreme Court of the United States recently agreed to hear one case on appeal.³²

Researchers on both sides of the VVG debate are regularly called as expert witnesses before courts deciding on laws banning the sale of VVGs to minors and appear before legislative committees and inquiries. They are therefore keenly aware of the political and legal ramifications of their research. Some researchers also engage in debates about appropriate public policy and methods of better communicating their research to the public and policymakers.³³

³¹ See for instance, *Video Software Dealers Association et al v Schwarzenegger et al* (2009) 9th Circuit, 556 F.3d 950, 1960-1963.

³² The New York Times, *Justices to Consider Law Limiting the Sale of Violent Video Games*, New York, 2010, viewed 28 July 2010, < http://www.nytimes.com/2010/04/27/us/27scotus.html?_r=1>. The case on appeal is *Video Software Dealers Association et al v Schwarzenegger et al* (2009) 9th Circuit, 556 F.3d 950. Causationist researchers have contributed to an amicus brief for the Supreme Court's consideration, <<http://www.psychology.iastate.edu/faculty/caa/abstracts/2010-2014/AmicusGruelYeeFinal.pdf>>.

³³ See eg, C Ferguson and C Olson, "The Supreme Court and Video Game Violence: Will Regulation Be Worth the Costs to the First Amendment?" (2010) 35 *The Criminologist* 18, C Barlett and C Anderson, 'Violent Video Games and Public Policy,' in Tobias Bevc & Holger Zapf (Eds) *Wie wer spielen, was wir warden: Computerspiele in unserer Gesellschaft*, 2009.

CURRENT STATE OF THE RESEARCH

The most important contribution made recently to this debate is a 2010 meta-analysis by a large number of causationist researchers.³⁴ This meta-analysis is the most wide-ranging and comprehensive conducted so far. It involved the consideration of 136 papers and involved 130,296 participants. The most significant effect size was found for VVG exposure and aggressive behaviour: $r = 0.24$ (small-moderate).³⁵ When corrected for gender and prior aggression however, the effect is reduced to $r = 0.15$ (small).³⁶ The authors conclude that VVG play is a causal risk factor for aggressive behaviour. Lead author Craig Anderson stated that this will likely be his last meta-analysis of the VVG literature, because of its definitive findings.³⁷ Another researcher, L. Rowell Huesmann, also claims the debate has been effectively settled.³⁸

A critical commentary of the 2010 study casts doubt on these assertions.³⁹ Christopher Ferguson and John Kilburn criticise various aspects of the causationists' methodology. They argue that not only is the most accurate effect size ($r = 0.15$) quite small, but that controlling for other risk factors (such as depression or family violence) reduces the effects to near zero. They also accuse causationists of inventing a 'phantom youth violence crisis'. Causationist authors have defended themselves against these criticisms.⁴⁰

This exchange draws attention to the highly contested nature of the literature. Despite the author's assertions in the 2010 meta-analysis, the debate on this issue continues.

³⁴ C Anderson et al, 'Violent Video Game Effects on Aggression, Empathy and Prosocial Behavior in Eastern and Western Countries: A Meta-Analytic Review,' (2010) 136 *Psychological Bulletin* 151.

³⁵ Aggressive behaviour was measured by over 70 of the studies, involving over 18,000 participants.

³⁶ 'Prior aggression' refers to the participant's levels of aggression at Time 1. Controlling for prior aggression in longitudinal studies allows researchers to accurately measure the long-term change in participant's aggression levels.

³⁷ Iowa State University, *ISU study proves conclusively that violent video game play makes more aggressive kids*, 2010, viewed 5 August 2010, < <http://www.news.iastate.edu/news/2010/mar/vgeffects>>.

³⁸ L Huesmann, 'Nailing the Coffin Shut on Doubts That Violent Video Games Stimulate Aggression: Comment on Anderson et al (2010)' (2010) 136 *Psychological Bulletin* 179.

³⁹ C Ferguson and J Kilburn, 'Much Ado About Nothing: The Misestimation and Overinterpretation of Violent Video Game Effects in Eastern and Western Nations: Comment on Anderson et al (2010)' (2010) 136 *Psychological Bulletin* 174.

⁴⁰ B Bushman, H Rothstein and C Anderson, 'Much Ado About Something: Violent Video Game Effects and a School of Red Herring: Reply to Ferguson and Kilburn (2010)' (2010) 136 *Psychological Bulletin* 182.

VIOLENT VIDEO GAMES (VVGs)

Definitions

The term ‘video game’ (used interchangeably with the term ‘computer game’ in this review) covers a broad range of products that can be played on a range of devices: from arcade machines to computers and home consoles, over the internet or on mobile phone devices. A useful definition appears in the *Classification (Publications, Films and Computer Games) Act 1995* (Cth), which defines a computer game as a ‘computer program and any associated data capable of generating a display on a computer monitor, television screen, liquid crystal display or similar medium that allows the playing of an interactive game.’⁴¹

Defining violent content in a video game is more difficult. According to Anderson and Bushman, a medium such as video games becomes violent when it depicts intentional attempts by individuals (including non-human cartoon characters) to inflict harm on others.⁴² This definition may include acts of extreme violence, such as realistic criminal acts in the *Grand Theft Auto* series. It may also include acts that would be considered harmless by many consumers, such as *Pacman* eating ghosts. Using Anderson and Bushman’s definition, *Pacman* and other games rated G may be VVGs.

In a 2009 paper, Kyle Kontour notes that the vast majority of VVG research comes from a psychological perspective and rarely cites useful studies in the mass communications, cultural or game studies fields.⁴³ Kontour argues the insularity of the debate has meant that researchers ‘do not fully understand digital games’.⁴⁴ The author suggests that VVG researchers adopt a methodology which draws on the concerns and insights of other disciplines. In particular, Kontour highlights the importance of the content and context of gameplay.

This section will explore the problem of measuring violent content, and whether its severity and context determines the size of effects.

Measuring violent content

As noted by some researchers, there is no ‘gold standard’ of what a violent video game entails.⁴⁵ There are three different methods used to determine violent content: gamer feedback, independent coding and classification category.

⁴¹ *Classification (Publications, Films and Computer Games) Act 1995* (Cth) s 5A.

⁴² C Anderson and B Bushman, ‘Effects of Violent Video Games on Aggressive Behavior, Aggressive Cognition, Aggressive Affect, Physiological Arousal and Prosocial Behavior: A Meta-Analytic Review of the Scientific Literature,’ (2001) 12 *Psychological Science* 353, 354.

⁴³ K Kontour, ‘Revisiting Violent Videogames Research: Game Studies Perspectives on Aggression, Violence, Immersion, Interaction and Textual Analysis,’ (2009) 1 *Digital Culture and Education* 6.

⁴⁴ K Kontour, ‘Revisiting Violent Videogames Research: Game Studies Perspectives on Aggression, Violence, Immersion, Interaction and Textual Analysis,’ (2009) 1 *Digital Culture and Education* 6, 12.

⁴⁵ C Olson et al, ‘M-Rated Video Games and Aggressive or Problem Behavior Among Young Adolescents,’ (2009) 13 *Applied Developmental Science* 188.

Gamer feedback

- Typically, defining the content of a given video game as violent or non-violent is left up to the participants themselves, who rate the violence of the games they have played in a questionnaire. When individuals self-report violent content, their ideas of violence are subjective and will not necessarily produce a consistent measure of VVG exposure.⁴⁶

Independent coding

- Another method is to enlist independent ‘coders’, who rate the violence in games by established objective criteria.

Classification category

- Alternatively, violent games may be chosen by the rating they have received from regulatory bodies such as the Australian Classification Board or the United States ESRB.

The different methods of assessing violent content can contradict each other, making it difficult to form a solid conclusion about levels of violence in a game. For instance, a 2007 Dutch study found that the most aggressive participants in the noise blast game were those who had played a violent game and identified with the violent character in the game.⁴⁷ Experimenters used a group of 102 male adolescents as coders, who rated a number of games for violent content. Some of the games rated by coders as non-violent had received violent content descriptors from classification bodies. (Two of the games in the study’s non-violent category, *Tony Hawk’s Underground* and *Final Fantasy*, are classified as M in Australia for ‘medium level animated violence’.)

Another problem is that violent and non-violent games may differ in other ways. In a 2000 experimental study, the two games selected differed in excitement levels as well as in violent content. The non-violent game used in the study, *Myst*, is a slow-paced game which rewards patience and logic. The violent game, *Wolfenstein 3D*, is a fast-paced game which rewards skill and reflexes. These games are not merely a “nonviolent game” and a “violent game”, but games which differ hugely in content, genre, aesthetic and speed. Differences can call into question whether it is violent content or some other game content that is causing aggressive effects.

⁴⁶ C Olson et al, ‘M-Rated Video Games and Aggressive or Problem Behavior Among Young Adolescents,’ (2009) 13 *Applied Developmental Science* 188.

⁴⁷ E Konijn, M Bijvank and B Bushman, ‘I Wish I Were a Warrior: The Role of Wishful Identification in the Effects of Violent Video Games on Aggression in Adolescent Boys,’ (2007) 43 *Developmental Psychology* 1038.

Children's game violence

Video games are a 'moving target' in that they are constantly changing and becoming more advanced. Researchers from both sides of the debate have commented that VVG studies should use the most up-to-date games to ensure external validity.⁴⁸ The violence in the 1976 game *Death Race* is far removed from the violence in the 2008 game *Grand Theft Auto IV*. This observation about differing violent content raises a related question: does realistic, graphic violence have a greater effect on aggression than the cartoonish, abstract violence commonly seen in older VVGs and contemporary games aimed at children?

There is little research into the differing effects of mildly violent games aimed at children and extremely violent games aimed at adults. The studies that do exist show mixed results. For instance, a 2003 study had children play a children's VVG or a non-violent children's video game.⁴⁹ The children were then asked to respond to 10 scenarios, some of which were designed to produce aggressive responses, others empathetic responses. No correlation was found between playing the mildly violent game and aggressive or empathetic responses. The authors speculate that the relatively benign games that were allocated to the children may not have been violent enough to produce a response, suggesting that mildly violent children's games are not harmful. The strength of this finding is limited because there was no group that played a more violent game, which would have allowed for comparison.

A 2007 study was designed to test the question of whether mildly violent games aimed at children increase aggression and whether they do so in children and in university students.⁵⁰ The study used 161 young participants and 354 older participants. They were randomly assigned to violent or non-violent children's games. Some of the older participants were also randomly assigned to violent games aimed at teenagers. Participants played one of the games for 20 minutes and then played a "noise blast" game. The study found that brief exposure to children's violent games increased the risk of aggressive behaviour in both children and young adults. Among the older players, there was no significant difference in effects between the violent children's games and the violent teen's games.

The authors note that these findings suggest that it doesn't matter how graphic, gory, or realistic the violence portrayed is, the effects are the same no matter the age of the participant.⁵¹ Arguably, *Pacman* ought to have a similar impact as *Grand Theft Auto*. Problems with game selection reduce the reliability of the results however. Some of the games were made as early as 1991 (*Oh No! More Lemmings!*). Also, the Macintosh

⁴⁸ C Ferguson and S Rueda, 'The Hitman Study: Violent Video Game Exposure Effects on Aggressive Behavior, Hostile Feelings, and Depression,' (2010) 15 *European Psychologist* 99, 101, C Barlett, R Harris, and R Baldassaro, 'Longer You Play, the More Hostile You Feel: Examination of First Person Shooter Video Games and Aggression During Video Game Play,' (2007) 33 *Aggressive Behavior* 486, 491.

⁴⁹ J Funk et al, 'Playing violent video games, desensitization and moral evaluation in children,' (2003) 24 *Applied Developmental Psychology* 413.

⁵⁰ C Anderson, D Gentile and K Buckley, *Violent Video Game Effects on Children and Adolescents: Theory, Research and Public Policy*, 2007, Study 1.

⁵¹ C Anderson, D Gentile and K Buckley, *Violent Video Game Effects on Children and Adolescents: Theory, Research and Public Policy*, 2007, 67.

computers that were used aren't popular gaming platforms. Other VVG researchers have argued that to ensure results are externally valid, the games and gaming equipment being used should be both current and popular.⁵²

Christopher Barlett and colleagues investigated how effects differ when the use of a 'light gun' controller,⁵³ amount of blood,⁵⁴ and realism of the violence⁵⁵ are controlled by the experimenter. The authors found that the use of a light gun controller, higher amounts of blood, and more 'real world' violence tended to make players more aggressive. These studies support the view that if VVGs do have a negative impact, the severity of the violence increases that impact. The measures of aggressions used in these studies are somewhat problematic, however. In the 'light gun' study for instance, there was no measure of aggressive behaviour.⁵⁶ Instead, Barlett et al used responses to 'story stems' involving judges sentencing criminals and parents punishing children to measure aggressive thoughts. Other causationist researchers have noted that these sorts of questions may be measuring stable, long-term beliefs and attitudes which should not be 'influenced by playing a video game for a few minutes'.⁵⁷

Given the mixed results of these studies, more research into the adverse effects of severe violence is needed before any conclusions can be drawn.

Social acceptability of the violence

Defining a VVG is complicated further when the question of socially acceptable violence is considered. Is simulated violence used in a football match, in self-defence, or towards Nazi soldiers in World War II as harmful as simulated criminal violence? There is limited research into this matter and the results are mixed.

Craig Anderson and Nicholas Carnagey have explored the question of social acceptability and competitiveness in a 2009 study.⁵⁸ They compare sports games that contained violence allowed by the rules of the game (eg, tackling) with sports games that contained unacceptable

⁵² See C Barlett, R Harris, and R Baldassaro, 'Longer You Play, the More Hostile You Feel: Examination of First Person Shooter Video Games and Aggression During Video Game Play,' (2007) 33 *Aggressive Behavior* 486, 491, C Ferguson and S Rueda, 'The Hitman Study: Violent Video Game Exposure Effects on Aggressive Behavior, Hostile Feelings, and Depression,' (2010) 15 *European Psychologist* 99, 101.

⁵³ A 'light gun' controller is a control device for video games that is shaped like a gun and used by pointing at targets on the screen and pulling the trigger. C Barlett, R Harris, and R Baldassaro, 'Longer You Play, the More Hostile You Feel: Examination of First Person Shooter Video Games and Aggression During Video Game Play,' (2007) 33 *Aggressive Behavior* 486.

⁵⁴ C Barlett, R Harris and C Bruey, 'The effect of the amount of blood in a violent video game on aggression, hostility and arousal,' (2008) 44 *Journal of Experimental Social Psychology* 539.

⁵⁵ C Barlett and C Rodeheffer, 'Effects of Realism on Extended Violent and Nonviolent Video Game Play on Aggressive Thoughts, Feelings and Physiological Arousal,' (2009) 35 *Aggressive Behavior* 213. 'Realism' in this study referred to whether the violence might occur in real life, as opposed to whether it looked realistic.

⁵⁶ C Barlett, R Harris, and R Baldassaro, 'Longer You Play, the More Hostile You Feel: Examination of First Person Shooter Video Games and Aggression During Video Game Play,' (2007) 33 *Aggressive Behavior* 486.

⁵⁷ C Anderson et al, 'Violent Video Game Effects on Aggression, Empathy and Prosocial Behavior in Eastern and Western Countries: A Meta-Analytic Review,' (2010) 136 *Psychological Bulletin* 151, 157.

⁵⁸ C Anderson and N Carnagey, 'Causal effects of violent sports video games on aggression: Is it competitiveness or violent content?' (2009) 45 *Journal of Experimental Social Psychology* 731.

and excessive violence. They found that the excessively violent sports games tended to make players more aggressive. This suggests that where violent content is socially unacceptable it creates a greater risk of aggressive behaviour.

Christopher Ferguson and Stephanie Rueda have also explored the differing effects of games featuring socially acceptable violence and socially unacceptable violence.⁵⁹ They compared the effects of the game *Call of Duty 2*, which involves killing German soldiers in World War II, with the game *Hitman: Blood Money*, which involves contract killings. They found no difference in effects on aggression between the two games.

Overall it is not clear that more severe or antisocial violent content will result in greater effects on aggression. More research specifically aimed at this question is needed before conclusions can be reached.

Context of gameplay

Kontour also argues that ‘a more situated approach’ to game-playing be used in VVG research.⁶⁰ So far, little attention has been given to the cultural or social context of game playing, and whether it may alter the effects of VVGs.

Craig Anderson et al have explored differences in VVG effects in ‘Western’ and ‘Eastern’ cultures in a 2010 meta-analytic study.⁶¹ The groupings are problematic, given that the Eastern studies appear to be entirely drawn from a single country (Japan). The authors found that there was no significant difference between these groups in the results of experimental or correlational studies. In longitudinal data however, the VVG effect was significantly larger in Western ($r=0.137$, small) than in Eastern studies ($r=0.038$, not significant). The authors of the 2010 study suggest that this difference may be attributable to the use of different measures of aggression in different countries.⁶² This result could however suggest that there is little long term VVG effect on aggression in Japan.

Another finding that highlights the importance of context is that of parent-child communication. A 2007 Finnish correlational study sought to examine the roles of age, social intelligence and parental communication in the relationship between VVG exposure and direct and indirect aggression.⁶³ It was found that where parent-child communication was poor, effects on aggression tended to be higher, particularly among the younger group of

⁵⁹ C Ferguson and S Rueda, ‘The Hitman Study: Violent Video Game Exposure Effects on Aggressive Behavior, Hostile Feelings, and Depression,’ (2010) 15 *European Psychologist* 99. The games were *Hitman: Blood Money*, which involves contract killings, and *Call of Duty 2*, which involves killing Nazi soldiers in World War II.

⁶⁰ K Kontour, ‘Revisiting Violent Videogames Research: Game Studies Perspectives on Aggression, Violence, Immersion, Interaction and Textual Analysis,’ (2009) 1 *Digital Culture and Education* 6, 25.

⁶¹ C Anderson et al, ‘Violent Video Game Effects on Aggression, Empathy and Prosocial Behavior in Eastern and Western Countries: A Meta-Analytic Review,’ (2010) 136 *Psychological Bulletin* 151, 170.

⁶² C Anderson et al, ‘Violent Video Game Effects on Aggression, Empathy and Prosocial Behavior in Eastern and Western Countries: A Meta-Analytic Review,’ (2010) 136 *Psychological Bulletin* 151, 169.

⁶³ M Wallenius, R Punamäki, and A Rimpelä, ‘Digital Game Playing and Direct and Indirect Aggression in Early Adolescence: The Roles of Age, Social Intelligence and Parent-Child Communication,’ (2007) 36 *Journal of Youth and Adolescence* 325.

children. Other studies have also found good parent-child communication tends to reduce negative VVG effects.⁶⁴ These findings highlight the importance of home environment to the effects of VVGs.

The finding that culture and parent/child communication may moderate the effects of VVGs suggests that the context of VVG play has an important influence on effects. No empirical research directly exploring game playing context was found for this review.

⁶⁴ C Anderson, D Gentile and K Buckley, *Violent Video Game Effects on Children and Adolescents: Theory, Research and Public Policy*, 2007, Study 1.

AGGRESSION

In addition to the challenges of defining and measuring violent content, researchers have also faced difficulty in defining and measuring ‘aggression’.

Aggression and violence

The definition of aggression is highly contested. Aggression is typically defined by causationist researchers as ‘behaviour directed toward another individual carried out with the proximate (immediate) intent to cause harm.’⁶⁵ There are a number of behaviours that fit into this category, including verbal aggression as well as physical harm. Aggression can be either direct (within the presence of the other individual) or indirect (behind their back). Causationist researchers Bushman and Huesmann have argued that while ‘aggression was an adaptive behaviour for many of our ancient ancestors,’ aggression today ‘seems maladaptive and destructive’.⁶⁶ They note that most social psychologists are interested in why people become aggressive and how to reduce it.

Christopher Ferguson defines aggression as “behaviour that is intended to increase the social dominance of the organism relative to the dominance position of other organisms.”⁶⁷ This suggests that aggression is an instrumental behaviour which is not necessarily antisocial. Ferguson argues that the causationist definition of aggression fails to distinguish between prosocial aggression, (which is necessary to assert oneself, engage in debate and discourse, and for success in the military, law enforcement and business) and antisocial aggression (undesirable, abnormal aggression).⁶⁸

Critics of causationists note that in VVG research the words aggression and violence are used ‘almost interchangeably, as if one inevitably leads to another.’⁶⁹ Causationist scholars define violence as being an extreme form of aggression and at times use findings about milder forms of aggression to generalise about more severe forms of aggression and violence.⁷⁰ Ferguson argues that the confusion between aggression and violence is caused by a lack of ‘clinical

⁶⁵ C Anderson and B Bushman, ‘Human Aggression’ (2002) 53 *Annual Review of Psychology* 27, 28.

⁶⁶ B Bushman and L R Huesmann, ‘Aggression’, in S T Fiske, D T Gilbert and G Lindzey (eds), *Handbook of social psychology*, 2010, 833.

⁶⁷ C Ferguson, ‘The Modern Hunter-Gatherer Hunts Aliens and Gathers Power-Ups: The Evolutionary Appeal of Violent Video Games and How They Can Be Beneficial,’ in N Kock, *Evolutionary Psychology and Information Systems Research: A New Approach to Studying the Effects of Modern Technologies on Human Behavior*, 2010, 329, 331.

⁶⁸ C Ferguson, ‘The Wild West of Assessment: Measuring Aggression and Violence in Video Games,’ in L Annetta and S Bronack (Eds), *Serious Educational Game Assessment: Practical Methods and Models for Educational Games, Simulations and Virtual Worlds*, 2010, 31, 37-8.

⁶⁹ L Kutner and C Olson, *Grand Theft Childhood: The Surprising Truth About Violent Video Games and What Parents Can Do*, 2008, 73. See also T Grimes, J Anderson and L Bergen, *Media Violence and Aggression: Science and Ideology*, 2008, 127.

⁷⁰ C Anderson, D Gentile and K Buckley, *Violent Video Game Effects on Children and Adolescents: Theory, Research and Public Policy*, 2007, 13.

cut-offs'.⁷¹ If a clinical cut-off was included in an aggression measure, then participants who scored higher than the cut-off would be considered abnormally aggressive. A lack of clinical cut-offs can lead to results that state that VVG players are more 'aggressive', despite the fact that they are still within the 'normal' range of aggressive behaviour.

Measuring aggression

Another highly contentious issue is measuring aggression. Critics of VVG research argue there are a number of problems with the laboratory measures of aggression used by causationists, arguing that commonly used measures of aggression do not tell us much about real-world aggressive acts or violence.⁷² For example, it is not clear whether individuals delivering slightly higher or lower "noise blasts" to their opponents will be more or less aggressive in real life.⁷³ Critics claim that other measures, such as teacher/peer/parent ratings, word games which evaluate the 'accessibility' of 'aggressive thoughts' and hypothetical aggression tests do not correlate well with acts of real world aggression and violence.⁷⁴

Another potential concern with VVG research is that it generally uses the 'convenience samples' of university students and children, who may not be representative of the population or relevant to the hypothesis under study. For example, a correlational study conducted in 2000 purports to measure the correlation of violent video games with "real world aggressive and delinquent behaviour."⁷⁵ However, it is not clear from the study what proportion of the sample, which consisted of university students, engaged in such behaviour. It has also been noted that university students may be expected to exhibit below average levels of aggression and that this may affect the results.⁷⁶

Another controversial aspect of the VVG literature is that the aggression measures are often unstandardised and results are difficult to compare across studies.⁷⁷ Causationists acknowledge this problem,⁷⁸ but argue that there are high levels of correlation between some

⁷¹ C Ferguson, 'Blazing Angels or Resident Evil? Can Violent Video Games Be a Force for Good?' (2010) 14 *Review of General Psychology* 68, 75.

⁷² C Ferguson, 'Blazing Angels or Resident Evil? Can Violent Video Games Be a Force for Good?' (2010) 14 *Review of General Psychology* 68, 74.

⁷³ L Kutner and C Olson, *Grand Theft Childhood: The Surprising Truth About Violent Video Games and What Parents Can Do*, 2008, 73.

⁷⁴ C Ferguson, 'The Wild West of Assessment: Measuring Aggression and Violence in Video Games,' in L Annetta and S Bronack (Eds), *Serious Educational Game Assessment: Practical Methods and Models for Educational Games, Simulations and Virtual Worlds*, 2010, 31, 38.

⁷⁵ C Anderson and K Dill, "Video Games and Aggressive Thoughts, Feelings and Behavior in the Laboratory and in Life," (2000) 78 *Journal of Personality and Social Psychology* 772, Study 1.

⁷⁶ C Ferguson, 'Blazing Angels or Resident Evil? Can Violent Video Games Be a Force for Good?' (2010) 14 *Review of General Psychology* 68, 75.

⁷⁷ C Ferguson, 'The Wild West of Assessment: Measuring Aggression and Violence in Video Games,' in L Annetta and S Bronack (eds), *Serious Educational Game Assessment: Practical Methods and Models for Educational Games, Simulations and Virtual Worlds*, 2010, 31, 36.

⁷⁸ C Anderson et al, 'Violent Video Game Effects on Aggression, Empathy and Prosocial Behavior in Eastern and Western Countries: A Meta-Analytic Review,' (2010) 136 *Psychological Bulletin* 151, 170.

unstandardised aggression measures.⁷⁹ The difficulty with unstandardised measures is they provide an opportunity for researchers to pick and choose results that best fit their preconceived hypotheses. Ferguson has claimed that this sort of data manipulation is ‘not only possible but probable... particularly in such a highly politicised research field.’⁸⁰

The problem of unstandardised measures is demonstrated in a 2000 study where the authors used a ‘noise blast’ game to measure aggression.⁸¹ The authors had four measures of aggressive behaviour: volume of noise after a win, volume of noise after a loss, length of noise after a win and length of noise after a loss. The only significant effect was found in the noise duration after a loss measure, which was used as evidence that VVG exposure increases the risk of aggressive behaviour. Of the four different aggression measures used, only the one that supported the author’s hypothesis was highlighted.⁸² Christopher Ferguson noted that if the authors had made the proper statistical corrections, even the fourth result would have been insignificant.⁸³

Psychiatric and neuroscientific measures

A few studies have looked at the impact that media violence and VVGs have on the functioning of the brain, beyond traditional psychological and behavioural effects. Three studies examined in this review found that violent media/VVGs had an impact on psychiatric measures of executive function,⁸⁴ neuroscientific measures of aggression⁸⁵ and desensitisation.⁸⁶ All three found significant effects. The first two studies do not examine VVGs specifically and were funded by the ‘Center for Successful Parenting’, which is committed to spreading awareness of the negative effects of violent media. The last study examined a small sample, with only 34 participants. Further research in this area is needed.⁸⁷

⁷⁹ B Bushman, H Rothstein and C Anderson, ‘Much Ado About Something: Violent Video Game Effects and a School of Red Herring: Reply to Ferguson and Kilburn (2010)’ (2010) 136 *Psychological Bulletin* 182, 185.

⁸⁰ C Ferguson, ‘The Wild West of Assessment: Measuring Aggression and Violence in Video Games,’ in L Annetta and S Bronack (eds), *Serious Educational Game Assessment: Practical Methods and Models for Educational Games, Simulations and Virtual Worlds*, 2010, 31, 36.

⁸¹ C Anderson and K Dill, ‘Video Games and Aggressive Thoughts, Feelings and Behavior in the Laboratory and in Life,’ (2000) 78 *Journal of Personality and Social Psychology* 772.

⁸² C Anderson and K Dill, ‘Video Games and Aggressive Thoughts, Feelings and Behavior in the Laboratory and in Life,’ (2000) 78 *Journal of Personality and Social Psychology* 772, 786.

⁸³ C Ferguson, ‘Violent Video Games: How Hysteria and Pseudoscience Created a Phantom Public Health Crisis’ (2008) *Paradigm* 12, 13.

⁸⁴ W Kronenberger et al, ‘Media Violence Exposure and Executive Functioning in Aggressive and Control Adolescents,’ (2005) 61 *Journal of Clinical Psychology* 725.

⁸⁵ V Mathews et al, ‘Media Violence Exposure and Frontal Lobe Activation Measured by Functional Magnetic Resonance Imaging in Aggressive and Nonaggressive Adolescents,’ (2005) 29 *Journal of Computer Assisted Tomography* 287.

⁸⁶ B Bartholow, B Bushman and M Sestir, ‘Chronic violent video game exposure and desensitization to violence: Behavioral and event-related brain potential data,’ (2006) 42 *Journal of Experimental Social Psychology* 532.

⁸⁷ C Anderson et al, ‘Violent Video Game Effects on Aggression, Empathy, and Prosocial Behavior in Eastern and Western Countries: A Meta-Analytic Review,’ (2010) 136 *Psychological Bulletin* 151, 171. See also N Carnagey, C Anderson, and B Bartholow, ‘Media Violence and Social Neuroscience: New Questions and New Opportunities,’ (2007) 16 *Current Directions in Psychological Science* 178, 181.

Despite changes in the measures of aggression used, VVG effect sizes have remained relatively stable in the past decade.⁸⁸ The policy relevance of the VVG effects literature would be increased, however, if researchers employed standardised measures of aggression which correlate well with real-world aggression and violence and that differentiates between prosocial and antisocial aggression.⁸⁹

Short-term and long-term effects on aggression

To establish whether playing VVGs has a long-term effect on aggression, researchers have used longitudinal studies. However, many of the longitudinal studies examined for this review show mixed or nonsignificant results.

The 2007 book *Violent Video Game Effects: Theory, Research and Public Policy* included the first longitudinal study produced on the effects of VVGs.⁹⁰ 430 students ranging from 7-11 years old were surveyed at two points during the school year. There was an average of five months between the two measurements, a relatively short period for a longitudinal study. It was found that VVG exposure at Time 1 tended to lead to higher levels of aggressive behaviour and lower levels of prosocial behaviour at Time 2. The reverse was also true. The authors note that this relationship appears to be “bidirectional” and VVGs make players more aggressive as well as attracting players who are already more aggressive. This finding undermines a clear direction of causality. The authors speculate that if there had been a greater lag between measurements, the confusion would disappear.

Other studies with longer lag times have not found significant effects. A 2008 Finnish longitudinal study measured 316 students two years apart,⁹¹ and found a direct positive relation between VVGs and direct aggression both in the short and long-term. When controlling for variables such as gender and prior aggression however, the long-term effect between VVGs and direct aggression became insignificant.

Other studies have shown stronger results. A 2009 German longitudinal study involving 143 adolescents measured 30 months apart found a direct effect between VVG exposure at Time 1 and physical aggression at Time 2 ($r = 0.27$, moderate).⁹² No link was found between

⁸⁸ Compare J Sherry, ‘The Effects of Violent Video Games on Aggression: A Meta-Analysis,’ (2001) 27 *Human Communication Research* 409 with C Anderson et al, ‘Violent Video Game Effects on Aggression, Empathy, and Prosocial Behavior in Eastern and Western Countries: A Meta-Analytic Review,’ (2010) 136 *Psychological Bulletin* 151.

⁸⁹ C Ferguson, ‘Blazing Angels or Resident Evil? Can Violent Video Games Be a Force for Good?’ (2010) 14 *Review of General Psychology* 68, 75.

⁹⁰ C Anderson, D Gentile and K Buckley, *Violent Video Game Effects on Children and Adolescents: Theory, Research and Public Policy*, 2007, Study 3.

⁹¹ M Wallenius and R Punamäki, ‘Digital Game Violence and Direct Aggression in Adolescence: A Longitudinal Study of the Roles of Sex, Age and Parent-Child Communication,’ (2008) 29 *Journal of Applied Developmental Psychology* 286.

⁹² I Möller and Barbara Krahe, ‘Exposure to Violent Video Games and Aggression in German Adolescents: A Longitudinal Analysis,’ (2009) 35 *Aggressive Behavior* 75.

VVG exposure and physical aggression at Time 1 however, and the sample size was small. As a result of this, the study has been characterised as inconclusive.⁹³

Another 2008 study found much stronger results. It involved three independent samples and 1595 participants ranging from 9 to 18 years old.⁹⁴ Participants came from both the United States and Japan. The measurements were separated by three to six months. A significant effect was found between VVG exposure at Time 1 and aggressive behaviour at Time 2 ($r = 0.28$, moderate). This study provides strong evidence for a long-term effect, unlike other longitudinal studies.

A comprehensive 2010 meta-analysis measured the overall VVG effect on aggressive behaviour found by longitudinal studies.⁹⁵ Of the 12 longitudinal studies it analysed, the correlation between VVG exposure at Time 1 and aggressive behaviour at Time 2 was a moderately significant $r = 0.20$. When controlling for aggressive behaviour at Time 1 and gender however, the effect size drops to a non-significant result of $r = 0.075$.

Despite a number of longitudinal studies being published by causationist scholars in recent years, the findings of long-term effects remain mixed and inconclusive. When gender and pre-existing aggression effects are controlled, VVG effects tend to disappear. Meta-analysis of the existing studies shows that no significant VVG effect on aggressive behaviour has been proven to last over the long term.

Vulnerable populations

All researchers accept the possibility that some segments of the population are more vulnerable to VVG effects than others. The key point of difference is that causationist researchers also believe that no-one is immune to VVG effects,⁹⁶ while many critics of causationists believe that most of the population is unaffected.⁹⁷

This section will examine the evidence that children or people with certain personality traits are more vulnerable to VVG effects.

⁹³ C Ferguson and C Olson, 'The Supreme Court and video game violence: Will regulation be worth the costs to the First Amendment?' (2010) 35 *The Criminologist* 18, 19.

⁹⁴ C Anderson et al, 'Longitudinal Effects of Violent Video Games on Aggression in Japan and the United States,' (2008) 122 *Pediatrics* e1067.

⁹⁵ C Anderson et al, 'Violent Video Game Effects on Aggression, Empathy and Prosocial Behavior in Eastern and Western Countries: A Meta-Analytic Review,' (2010) 136 *Psychological Bulletin* 151, 162.

⁹⁶ C Barlett and C Anderson, 'Violent Video Games and Public Policy,' in Tobias Bevc & Holger Zapf (eds) *Wie wer spielen, was wir warden: Computerspiele in unserer Gesellschaft*, 2009, 6.

⁹⁷ See for instance P Markey and C Markey, 'Vulnerability to Violent Video Games: A Review and Integration of Personality Research,' (2010) 14 *Review of General Psychology* 82.

Effects on children

Causationist researchers believe that younger children are likely to be more vulnerable to long-term VVG effects.⁹⁸ Anderson et al's 2010 meta-analysis showed no evidence that younger participants were more affected than older participants.⁹⁹ This was particularly true in longitudinal research, where the strongest effects might be expected. This suggests that VVGs affect young adults as much as they affect children. The authors note that meta-analysis may not be the best tool for this task and suggest further longitudinal studies involving different-age participants. One such longitudinal study conducted in 2008 found that VVG exposure has a greater effect on aggression in younger participants than it did on older participants.¹⁰⁰

Pre-existing personality traits

Another potentially vulnerable group is people with aggressive or psychotic personality traits. A 2007 Australian study hypothesized that any short-term VVG effect on aggression would be mediated by the participant's aggressive personality traits and their aggressive emotions before playing the game.¹⁰¹ The study was designed so that the 107 adolescent participants' angry emotions would be measured before, during and after violent game play. The study found those participants who had non-aggressive personalities tended to experience no change in aggressive emotions. Aggressive participants who were not angry before game play tended to experience an increase in anger, and those who were angry prior to playing tended to experience a decrease in anger. Overall, VVG exposure was not linked with aggressive emotions.

This study also correlated long-term VVG exposure with the personality factors of psychoticism and introversion, and negatively correlated VVG exposure with extroversion.¹⁰² Other studies have shown that people with psychotic personality traits are also potentially more vulnerable to VVG effects. The personality traits most associated with psychoticism are high neuroticism (easily upset, angry and depressed), low agreeableness (lack of concern for others and their feelings) and low conscientiousness (breaks rules, promises, doesn't think before acting).¹⁰³ In 2010, Markey and Markey examined the interaction between VVGs and

⁹⁸ C Anderson et al, 'Violent Video Game Effects on Aggression, Empathy and Prosocial Behavior in Eastern and Western Countries: A Meta-Analytic Review,' (2010) 136 *Psychological Bulletin* 151, 170. See also C Anderson, *Violent Video Games: Myths, Facts and Unanswered Questions*, Psychological Science Agenda, October 2003, viewed 11/08/10 < <http://www.apa.org/science/about/psa/2003/10/anderson.aspx>>.

⁹⁹ C Anderson et al, 'Violent Video Game Effects on Aggression, Empathy and Prosocial Behavior in Eastern and Western Countries: A Meta-Analytic Review,' (2010) 136 *Psychological Bulletin* 151, 170.

¹⁰⁰ C Anderson et al, 'Longitudinal Effects of Violent Video Games on Aggression in Japan and the United States,' (2008) 122 *Pediatrics* e1067.

¹⁰¹ G Unsworth, G Devilly and T Ward, 'The Effect of Playing Violent Video Games on Adolescents: Should Parents Be Quaking In Their Boots?' (2007) 13 *Psychology, Crime and Law* 383.

¹⁰² G Unsworth, G Devilly and T Ward, 'The Effect of Playing Violent Video Games on Adolescents: Should Parents Be Quaking In Their Boots?' (2007) 13 *Psychology, Crime and Law* 383.

¹⁰³ P Markey and C Markey, 'Vulnerability to Violent Video Games: A Review and Integration of Personality Research,' (2010) 14 *Review of General Psychology* 82.

psychotic personality traits.¹⁰⁴ The authors found that individuals with psychotic personalities were most susceptible to VVG effects on aggression. Most other personality types were completely unaffected. Markey and Markey compare VVGs to peanuts, in that they are only harmful to a small minority of the population with a pre-existing disposition. They suggest that VVG research should now focus on vulnerable populations.

Violent crime rates

Critics of causationist researchers often note that violent crime rates in the United States are at their lowest since the 1960s.¹⁰⁵ This information has been interpreted in different ways, with some critics suggesting that VVGs may be behind the decline in crime¹⁰⁶ and others saying the decline prove VVGs have no effect.¹⁰⁷

In response to these arguments, causationist authors note that violence is caused by multiple factors (such as incarceration rates, gun laws, drug use, age distribution, poverty rates, etc) and those factors change over time. They argue this renders the ‘declining crime’ argument ‘so weak as to be embarrassing.’¹⁰⁸ Cheryl Olson, though critical of the causationist model, acknowledges that although violence has not risen with the spread of violent games, this is not proof that they are harmless.¹⁰⁹ Indeed, much of the decline may be due to decreasing gun use.¹¹⁰

The increase in violent crime from the late 1960s to the early 1990s has been cited as evidence of the detrimental effects of violent television.¹¹¹ Some critics of media violence effects have argued that the correlation between television violence and crime rates in the late 1960s was purely coincidental and the crime spike was caused by other factors.¹¹² However, it has also been argued that the reverse situation, (as VVG sales increase, crime rates drop) is evidence that VVGs do not have detrimental effects.¹¹³ Overall it seems likely that VVG effects cannot be readily correlated with declining crime rates.

¹⁰⁴ P Markey and C Markey, ‘Vulnerability to Violent Video Games: A Review and Integration of Personality Research,’ (2010) 14 *Review of General Psychology* 82

¹⁰⁵ C Ferguson, ‘Violent Video Games: How Hysteria and Pseudoscience Created a Phantom Public Health Crisis’ (2008) *Paradigm* 12, 13.

¹⁰⁶ J Sherry, ‘Violent Video Games and Aggression: Why Can’t We Find Effects?’ in R Preiss (Ed), *Mass media effects research: advances through meta-analysis*, 2009, 245, 259.

¹⁰⁷ C Ferguson, ‘Violent Video Games: How Hysteria and Pseudoscience Created a Phantom Public Health Crisis’ (2008) *Paradigm* 12, 13.

¹⁰⁸ C Anderson, D Gentile and K Buckley, *Violent Video Game Effects on Children and Adolescents: Theory, Research and Public Policy*, 2007, 21.

¹⁰⁹ C Olson, ‘Media Violence Research and Youth Violence Data: Why Do They Conflict?’ (2004) 28 *Academic Psychiatry* 144, 145.

¹¹⁰ C Olson, ‘Media Violence Research and Youth Violence Data: Why Do They Conflict?’ (2004) 28 *Academic Psychiatry* 144, 146.

¹¹¹ G Jensen, ‘The Invention of Television as a Cause of Homicide: The Reification of a Spurious Relationship,’ (2001) 5 *Homicide Studies* 114.

¹¹² C Ferguson, ‘Blazing Angels or Resident Evil? Can Violent Video Games Be a Force for Good?’ (2010) 14 *Review of General Psychology* 68, 69.

¹¹³ C Ferguson, ‘Violent Video Games: How Hysteria and Pseudoscience Created a Phantom Public Health Crisis’ (2008) *Paradigm* 12, 13.

Overall, VVG effects are not undermined by declining crime rates, as violent crime is not easily explained by any single factor.

Third variables

While causationists acknowledge that VVGs are not the only risk factor of violence, they have been criticised for failing to take into account other risk factors in their research.¹¹⁴ Third variables that may cause aggressive and violent behaviour include aggressive personality traits, gender, family violence, genetics, socio-economic status, peer delinquency and depression. Without controlling for relevant third variables, it is possible that one of these factors is causing aggression and VVG exposure and exaggerating the true effect of VVGs.

Two 2009 studies demonstrate the importance of controlling for relevant third variables. Both were correlational studies involving a large number of participants. Both found a significant link between VVGs and aggression. The first study noted however that what VVG effects were found were explicable by ‘individual characteristics, experiences and environment, including discipline, supervision and affection from parents; affiliation with antisocial peers; and family or community violence.’¹¹⁵ The second study found that aggressive effects only occur in combination with other factors such as the influence of family and peers, antisocial personality traits, and depression.¹¹⁶

Causationist researchers have responded to criticisms by stating that third variables such as aggressive personality traits can themselves be ‘conceptualised as additional outcomes of high exposure to violent video games’¹¹⁷ and that accounting for them may lead to underestimates of the effects of VVGs.¹¹⁸ Causationists acknowledge that there ‘is no single correct answer’ to the question of third variables in VVG research.¹¹⁹ Further research into third variables that are unlikely to be outcomes of VVG exposure, such as family violence or socio-economic status, may provide clearer conclusions.

¹¹⁴ C Ferguson, ‘Blazing Angels or Resident Evil? Can Violent Video Games Be a Force for Good?’ (2010) 14 *Review of General Psychology* 68, 74.

¹¹⁵ C Olson et al, ‘M-Rated Video Games and Aggressive or Problem Behavior Among Young Adolescents,’ (2009) 13 *Applied Developmental Science* 188, 195.

¹¹⁶ C Ferguson, C Miguel and R Hartley, ‘A Multivariate Analysis of Youth Violence and Aggression: The Influence of Family, Peers, Depression and Media Violence,’ (2009) 155 *The Journal of Pediatrics* 1.

¹¹⁷ B Bushman, H Rothstein and C Anderson, ‘Much Ado About Something: Violent Video Game Effects and a School of Red Herring: Reply to Ferguson and Kilburn (2010)’ (2010) 136 *Psychological Bulletin* 182, 185.

¹¹⁸ C Anderson et al, ‘Violent Video Game Effects on Aggression, Empathy and Prosocial Behavior in Eastern and Western Countries: A Meta-Analytic Review,’ (2010) 136 *Psychological Bulletin* 151, 160, 170.

¹¹⁹ C Anderson et al, ‘Violent Video Game Effects on Aggression, Empathy and Prosocial Behavior in Eastern and Western Countries: A Meta-Analytic Review,’ (2010) 136 *Psychological Bulletin* 151, 170.

THEORIES BEHIND THE EFFECTS

A scientific finding that VVGs have an effect on aggression has limited use for other researchers unless the cause of that effect has a theoretical explanation. Correlational data does not tell researchers about causality, but a theory explaining the effects can make correlational data more convincing.

The General Aggression Model

The causationist explanation for why VVGs cause aggression is often based on the General Aggression Model (GAM). GAM is a synthesis of a number of earlier theories that emerged from aggression research, particularly broader media violence research.¹²⁰ This model suggests that aggressive behaviour is caused by socially learned knowledge structures in the brain. Based on this model, the authors predict that playing VVGs will increase aggressive behaviour in the short-term (through arousal and the “priming” of pre-existing aggressive knowledge structures) and in the long-term (by increasing the quantity and accessibility of aggressive knowledge structures).

Causationists state that where researchers have a theory that explains the cause of an effect, and that theory is supported by correlational research, and all plausible alternative explanations have been discounted, causal statements may be made about correlation.¹²¹ Causationists argue that they can make such statements, because they have a strong and robust theory of why VVGs cause aggression and that their critics have not provided an alternative theoretical explanation.¹²²

However, other researchers do have alternative theories. These include the catharsis effect, mood management theory and the catalyst model.

Catharsis effect

Within psychology, some commentators suggested VVGs may have a ‘catharsis’ effect, where they actually reduce aggression in players.¹²³ However, a catharsis effect is not well supported in the research and causationists have been able to dismiss it.¹²⁴

¹²⁰ See C Anderson and B Bushman, ‘Human Aggression’ (2002) 53 *Annual Review of Psychology* 27.

¹²¹ C Barlett and C Anderson, ‘Violent Video Games and Public Policy,’ in Tobias Bevc & Holger Zapf (Eds) *Wie wer spielen, was wir warden: Computerspiele in unserer Gesellschaft*, 2009, 13.

¹²² C Barlett and C Anderson, ‘Violent Video Games and Public Policy,’ in Tobias Bevc & Holger Zapf (Eds) *Wie wer spielen, was wir warden: Computerspiele in unserer Gesellschaft*, 2009, 13. See also L Huesmann and L Taylor, ‘The Case against the Case against Media Violence,’ in D Gentile (Ed), *Media Violence and Children: A Complete Guide for Parents and Professionals*, 2003, 107.

¹²³ See e.g., J Sherry, ‘Violent Video Games and Aggression: Why Can’t We Find Effects?’ in R Preiss (Ed), *Mass media effects research: advances through meta-analysis*, 2009, 245.

¹²⁴ C Anderson, D Gentile and K Buckley, *Violent Video Game Effects on Children and Adolescents: Theory, Research and Public Policy*, 2007, 144-149.

Mood management theory

A 2007 Australian study by critical psychologists Gabrielle Unsworth, Grant Devilly and Tony Ward criticised GAM, questioning whether something as stable as personality can be so easily changed by violent media, and noting that the model does not consider other learning experiences which may ‘provide a less aggressive alternative to conflict resolution.’¹²⁵

Unsworth, Devilly and Ward propose their own model based on ‘mood-management theory’, which suggests that VVGs serve to stimulate the player and relieve boredom, or to act as a coping mechanism for the temporary relief of stress and anxiety.¹²⁶ The authors hypothesized this meant that the player’s personality and pre-game feelings would determine their post-VVG feelings. The study first measured the aggressive personality traits and angry feelings of participants, then measured them again after they had played a VVG. It was found that aggressive participants who were angry before playing became less angry and aggressive participants who were not angry before playing became angrier. Non-aggressive participants experienced no changes in anger. These results support the idea that VVGs are an important tool for the management of mood in some individuals.

A paper released in 2010 by Christopher Ferguson and Stephanie Rueda also explored ‘mood-management theory’.¹²⁷ The authors used techniques to ensure participants were frustrated and then had them play nonviolent and violent games. A measurement of the hostile and depressed feelings of participants was taken before and after gameplay. The authors found no effect of VVG play on either hostile or depressed feelings. Participants who reported high levels of VVG exposure however, tended to be less depressed and less hostile than other participants.¹²⁸

Catalyst model

Another theory of VVG effects was put forward in a 2008 article by Christopher Ferguson et al.¹²⁹ The authors criticised GAM, claiming it implies that players passively model whatever they see. Instead, they proposed “the catalyst model.” The starting point of this model is biological factors, such as genetic predisposition to an aggressive temperament and personality.

The study found that environmental factors, such as family violence, may motivate a biologically predisposed individual to aggression and violence. Media violence merely provides models on which to base the form or style of the violence. It was found that once

¹²⁵ G Unsworth, G Devilly and T Ward, ‘The Effect of Playing Violent Video Games on Adolescents: Should Parents Be Quaking In Their Boots?’ (2007) 13 *Psychology, Crime and Law* 383, 385.

¹²⁶ D Zillmann, ‘Mood management: Using entertainment to full advantage’ (1988) in L Donohew, H E Sypher and E T Higgins (Eds), *Communication, social cognition, and affect*, 1988, 147.

¹²⁷ C Ferguson and S Rueda, ‘The Hitman Study: Violent Video Game Exposure Effects on Aggressive Behavior, Hostile Feelings and Depression,’ (2010) 15 *European Psychologist* 99.

¹²⁸ C Ferguson and S Rueda, ‘The Hitman Study: Violent Video Game Exposure Effects on Aggressive Behavior, Hostile Feelings and Depression,’ (2010) 15 *European Psychologist* 99.

¹²⁹ C Ferguson et al, ‘Violent Video Games and Aggression: Causal Relationship or Byproduct of Family Violence and Intrinsic Violence Motivation?’ (2008) 35 *Criminal Justice and Behaviour* 311.

family violence was controlled, exposure to VVGs did not predict the commission of violent crimes.

Unlike GAM, these alternative theories are not backed up by large amounts of empirical evidence. However, they remain 'plausible alternative explanations' to GAM, and further research is required if they are to be discounted as theories of VVG effects.

DO SMALL EFFECT SIZES MATTER?

Many social scientists believe that the effect sizes found in VVG research are trivially small.¹³⁰ Causation researchers often claim though that their results, while small, are similar to the effect of smoking on lung cancer.¹³¹ The usefulness of such effect size analogies is discussed in this section.

The ‘smoking and lung cancer’ analogy

To demonstrate their arguments about the public health risks of VVGs, causationist researchers sometimes analogue VVG effects with other effect sizes that have motivated public health policies.

When discussing the effect of television violence on aggression, Anderson and Bushman claimed television effects were only slightly less ($r = 0.31$) than the effect of smoking on lung cancer ($r = 0.4$).¹³² The authors took the analogy further by implying that the entertainment industry is interfering with the science in the same way as the “big money interests of the tobacco industry”.¹³³ These statements have also been used repeatedly with regard to VVG effects.¹³⁴

Critics claim that Bushman and Anderson’s calculations of the smoking/lung cancer correlation are incorrect and that the effect of smoking on lung cancer is actually much larger ($r = 0.9$).¹³⁵ Other researchers in the field have also questioned whether psychological and medical effect sizes are comparable at all.¹³⁶ As the definitions and measurements and VVGs are contested, comparing VVG effects with correlations between two easily defined variables (i.e. “smoking” and “lung cancer”) is more likely to mislead readers than to inform them.

¹³⁰ C Anderson, D Gentile and K Buckley, *Violent Video Game Effects on Children and Adolescents: Theory, Research and Public Policy*, 2007, 142.

¹³¹ B Bushman, H Rothstein and C Anderson, ‘Much Ado About Something: Violent Video Game Effects and a School of Red Herring: Reply to Ferguson and Kilburn (2010)’ (2010) 136 *Psychological Bulletin* 182, 184.

¹³² B Bushman and C Anderson, ‘Media Violence and the American Public: Scientific Facts versus Media Misinformation,’ (2001) 56 *American Psychologist* 477, 481-482. They use the effect size found by Paik and Comstock in 1994, $r = 0.31$. H Paik and G Comstock “The effects of television violence on antisocial behaviour: A meta-analysis,” (1994) *Communication Research*, 21.

¹³³ B Bushman and C Anderson, ‘Media Violence and the American Public: Scientific Facts versus Media Misinformation,’ (2001) 56 *American Psychologist* 477, 481-482.

¹³⁴ B Bushman, H Rothstein and C Anderson, ‘Much Ado About Something: Violent Video Game Effects and a School of Red Herring: Reply to Ferguson and Kilburn (2010)’ (2010) 136 *Psychological Bulletin* 182, 184.

¹³⁵ J Block and B Crain, ‘Omissions and Errors in “Media Violence and the American Public”’ (2007) 62 *American Psychologist* 252. See also the response by B Bushman and C Anderson, ‘Measuring the Strength of the Effect of Violent Media on Aggression’ (2007) 62 *American Psychologist* 253.

¹³⁶ C Ferguson, “Is Psychological Research Really as Good as Medical Research? Effect Size Comparisons Between Psychology and Medicine” (2009) 13 *Review of General Psychology* 130. See also L Kutner and C Olson, *Grand Theft Childhood: The Surprising Truth About Violent Video Games and What Parents Can Do*, 2008, 61-63, R Weber, U Ritterfeld and A Kostygina, ‘Aggression and Violence as Effects of Playing Violent Video Games?’ in P Vorderer and J Bryant (eds), *Playing Video Games: Motives, Responses and Consequences*, 2006, 347, 356.

Comparing VVGs to abusive parents and poverty

Another effect size comparison that is sometimes raised is that ‘the long term effect of video game violence on later aggression and violence is larger than most known risk factors for adolescent violence, such as abusive parents, poverty, and antisocial parents.’¹³⁷

This statement is drawn from a list of “risk factors for aggressive/ and violent behaviour” in a 2007 study by Craig Anderson, Douglas Gentile and Katherine Buckley.¹³⁸ In this list, the effect size given for VVG exposure ($r = 0.30$) is given an equivalent value to gang membership ($r = 0.31$) and is higher than abusive parents and poverty.

However, the authors do not clearly state that the VVG effect was on ‘aggression’, while the gang membership effect was on serious crimes and violence.¹³⁹ As ‘aggression’ itself is a low-level ($r = 0.22$) predictor of serious crime and violence,¹⁴⁰ the VVG effect on serious crimes and violence would likely be very small or even non-existent. An analogy between VVG effects on aggression and social and economic effects on serious crime is likely to mislead readers, given the confusion between aggression and violence noted earlier in this review.

Anderson has repeated this claim, with a footnote acknowledging that aggression measures are not ‘strictly comparable’ with serious violent outcomes.¹⁴¹ Anderson seems to have moved away from this misleading analogy, as he recently stated that the effects of VVG play on aggression ‘are not huge effects – not on the order of joining a gang vs not joining a gang.’¹⁴²

Practical significance of effect sizes

There are a number of studies which have stated that small effect sizes may have serious ramifications in certain circumstances, such as where small effects accumulate over time, across populations, and where the consequences are severe.

Effects accumulating over time

Abelson has noted that a baseballer’s batting skill has a very small effect on their performance when they are called up to bat.¹⁴³ Batting skill has a much greater effect,

¹³⁷ C Barlett and C Anderson, ‘Violent Video Games and Public Policy,’ in Tobias Bevc & Holger Zapf (Eds) *Wie wir spielen, was wir warden: Computerspiele in unserer Gesellschaft*, 2009.

¹³⁸ C Anderson, D Gentile and K Buckley, *Violent Video Game Effects on Children and Adolescents: Theory, Research and Public Policy*, 2007, 143.

¹³⁹ The effects data on gang membership, abusive parents, etc, is drawn from United States Department of Health and Human Services, *Youth Violence: A Report of the Surgeon General*, 2001, Table 2.

¹⁴⁰ United States Department of Health and Human Services, *Youth Violence: A Report of the Surgeon General*, 2001, Table 2.

¹⁴¹ C Anderson et al, ‘Violent Video Game Effects on Aggression, Empathy, and Prosocial Behavior in Eastern and Western Countries: A Meta-Analytic Review,’ (2010) 136 *Psychological Bulletin* 151, 170.

¹⁴² Quoted in Iowa State University, *ISU study proves conclusively that violent video game play makes more aggressive kids*, 2010, viewed 5 August 2010, < <http://www.news.iastate.edu/news/2010/mar/vvgeffects>>.

¹⁴³ R Abelson, ‘A Variance Explanation Paradox: When a Little is a Lot’ (1985) 97 *Psychological Bulletin* 129.

however, when that player's batting performance is measured across an entire season. Following this logic, causationists argue that as VVGs are played repeatedly over long time periods, small effects on aggression should accumulate over time.¹⁴⁴

Effects accumulating across populations

Recent research indicates that 88% of Australian households have a device for playing video games.¹⁴⁵ Small VVG effects on aggression, it is argued, are therefore likely to have a greater practical significance as they are used by such a significant portion of the population. Critics have questioned whether effects can be consistent or stable across large populations, given huge differences in content and the context of media use.¹⁴⁶

Severity of the consequences

Effect sizes measure the risk that one variable will lead to another variable. The relative significance of that risk depends upon how severe the consequences are. For instance, during an experiment on the effects of aspirin reducing heart attacks, the researchers ended the experiment prematurely when it was found that aspirin had a very small, but positive, effect on reducing heart attacks.¹⁴⁷ Despite the small effect size, it was thought to be unethical to continue giving half the sample a placebo, given the extremely serious consequences. This episode demonstrates how important the severity of consequences is when interpreting effect sizes.

Anderson, Gentile and Buckley state that 'aggression' is a severe consequence which increases the practical significance of VVG effect sizes.¹⁴⁸ Ferguson has disagreed with this assessment, arguing that although outcomes of death or serious morbidity will increase the practical significance of small effect sizes, 'a weakly validated... measure of behaviour within individuals may be essentially nonnoticeable in the "real world"'.¹⁴⁹

The significance of the small effect sizes typically found in VVG research is one of the most controversial aspects of the literature. Though effect size analogies can be misleading, small VVG effects may still have serious ramifications when they accumulate over time and across large populations (noting the above point by critics who query the link about effects accumulating across populations).

¹⁴⁴ B Bushman, H Rothstein and C Anderson, 'Much Ado About Something: Violent Video Game Effects and a School of Red Herring: Reply to Ferguson and Kilburn (2010)' (2010) 136 *Psychological Bulletin* 182, 184.

¹⁴⁵ Interactive Entertainment Association of Australia, *Interactive Australia 2009*, 2008, 9.

¹⁴⁶ T Grimes, J Anderson and L Bergen, *Media Violence and Aggression: Science and Ideology*, 2008, 60.

¹⁴⁷ R Rosenthal, 'How Are We Doing in Soft Psychology?' (1990) 45 *American Psychologist* 775.

¹⁴⁸ C Anderson, D Gentile and K Buckley, *Violent Video Game Effects on Children and Adolescents: Theory, Research and Public Policy*, 2007, 144.

¹⁴⁹ C Ferguson, 'An effect size primer: A guide for clinicians and researchers,' (2009) 40 *Professional Psychology: Research and Practice*, 532, 536.

BIAS ACCUSATIONS

The highly politicised nature of the literature has resulted in a debate that is often acrimonious. Accusations of bias, whether conscious or unconscious, have been made by both sides. Much of the discussion, however, surrounds the perceived bias of causationist researchers.

At a recent presentation, Dr. Ian Lewis at the University of Tasmania claimed that there was ‘definitely... a clear bias,’ particularly among researchers who find negative effects.¹⁵⁰ Tom Grimes, James Anderson and Lori Bergen have stated that causationist claims are propelled by an unhealthy mix of science and ideology.¹⁵¹ A 1999 literature review commissioned by the Office of Film and Literature Classification found that the accumulating evidence for VVG effects was ‘provided largely by researchers keen to demonstrate the games’ undesirable effects.’¹⁵² The president of the Entertainment Software Association has claimed that researchers making causal claims had come to the debate with a preconceived notion about the harmful effects of video games.¹⁵³ These claims cannot be easily proved and no evidence has been provided. However, there are two forms of bias that causationists have been criticised for that do have some validity: publication bias and citation bias.

Publication bias

Publication bias is also known as the “file drawer” effect. Studies that show a positive effect are more likely to be published than those which show no effect. Therefore, when an overall effect size is calculated with a meta-analysis (collation) of published studies, the final figure may be an over-estimation of the true effect. Critics claim this problem is exacerbated when the subject of research is politically controversial.¹⁵⁴

In two meta-analyses published in 2007, Christopher Ferguson found that the effect of VVGs on aggression tended to become non-significant when they were ‘corrected’ for publication bias.¹⁵⁵ This has been criticised by causationist scholars, who dispute the method used to correct for bias. They also state that Ferguson used a very small number of articles, with a considerable amount of overlap between meta-analyses.¹⁵⁶

¹⁵⁰ I Lewis, ‘Games and Controversy,’ presented at the University of Tasmania, 29 July 2010.

¹⁵¹ T Grimes, J Anderson and L Bergen, *Media Violence and Aggression: Science and Ideology*, 2008, 48-50.

¹⁵² K Durkin and K Aisbet, *Computer Games and Australians Today*, 1999, 25.

¹⁵³ Quoted in C Anderson, D Gentile and K Buckley, *Violent Video Game Effects on Children and Adolescents: Theory, Research and Public Policy*, 2007, 153.

¹⁵⁴ C Ferguson, ‘Blazing Angels or Resident Evil? Can Violent Video Games Be a Force for Good?’ (2010) 14 *Review of General Psychology* 68, 74.

¹⁵⁵ C Ferguson, ‘Evidence for Publication Bias in Video Game Violence Effects Literature: A Meta-Analytic Review,’ (2007) 12 *Aggression and Violent Behavior* 470, C Ferguson, ‘The Good, The Bad and the Ugly: A Meta-analytic Review of Positive and Negative Effects of Violent Video Games,’ (2007) 78 *Psychiatric Quarterly* 309.

¹⁵⁶ C Anderson et al, ‘Violent Video Game Effects on Aggression, Empathy, and Prosocial Behavior in Eastern and Western Countries: A Meta-Analytic Review,’ (2010) 136 *Psychological Bulletin* 151, 153.

Citation bias

Critics of causationist scholars state that they fail to mention work that contradicts their hypotheses or findings.¹⁵⁷ Part of the reason for this was revealed in a 2009 paper, in which Barlett and Anderson state that many of the critics of causationist research do not meet their criteria of an ‘expert’.¹⁵⁸ They do not cite any of these critics, although many actually do meet their definition of an expert. When critics are cited it is sometimes only to dismiss their research. L Rowell Huesmann has accused critics of being blind to the causal effect between VVGs and aggression ‘because playing these games is an important part of their identity’.¹⁵⁹

Steps taken to avoid bias

Accusations of conscious bias are unproven and unwarranted, though there does seem to have been some problems with publication and citation bias. Recently, researchers have acknowledged these problems, and are seeking to engage in a constructive and open debate with their colleagues.¹⁶⁰ Causationist researchers have responded to Ferguson’s criticisms about publication bias, and now examine their results for any signs of a ‘file drawer effect’. They report very weak evidence of bias,¹⁶¹ and argue the best way to avoid it is to use as many unpublished studies as possible.¹⁶²

¹⁵⁷ C Ferguson, ‘Blazing Angels or Resident Evil? Can Violent Video Games Be a Force for Good?’ (2010) 14 *Review of General Psychology* 68, 74-76.

¹⁵⁸ C Barlett and C Anderson, ‘Violent Video Games and Public Policy,’ in Tobias Bevc & Holger Zapf (Eds) *Wie wer spielen, was wir warden: Computerspiele in unserer Gesellschaft*, 2009.

¹⁵⁹ L R Huesmann, ‘Nailing the Coffin Shut on Doubts that Violent Video Games Stimulate Aggression: Comment on Anderson et al (2010)’ (2010) 136 *Psychological Bulletin* 179, 180.

¹⁶⁰ C Anderson et al, ‘Violent Video Game Effects on Aggression, Empathy and Prosocial Behavior in Eastern and Western Countries: A Meta-Analytic Review,’ (2010) 136 *Psychological Bulletin* 151.

¹⁶¹ C Anderson et al, ‘Violent Video Game Effects on Aggression, Empathy and Prosocial Behavior in Eastern and Western Countries: A Meta-Analytic Review,’ (2010) 136 *Psychological Bulletin* 151.

¹⁶² C Anderson et al, ‘Violent Video Game Effects on Aggression, Empathy, and Prosocial Behavior in Eastern and Western Countries: A Meta-Analytic Review,’ (2010) 136 *Psychological Bulletin* 151, 152.

POSITIVE EFFECTS

VVG researchers have sometimes been criticised for seeking negative effects without any consideration of possible benefits.¹⁶³ Video games can be used for a variety of prosocial reasons, including educational purposes by schools, health care providers, businesses and the military.¹⁶⁴

There is a small amount of research that suggests that video games can encourage social interaction.¹⁶⁵ A study by Durkin and Barber found that playing video games was linked with family closeness, physical activity, school attendance, mental health and lower drug use.¹⁶⁶ This study used data from 1988, so its relevance to current video games can be questioned. However, recent demographic research in Australia has shown that gamers and non-gamers enjoy the same non-media leisure activities and that ‘social gaming’ of various kinds is increasing.¹⁶⁷

In a 2010 paper, Ferguson states that human beings are attracted to aggression and violence, and that there may be benefits in including moderate amounts of violence in educational games.¹⁶⁸ In 2007, Ferguson examined research findings of the link between VVG exposure and visuospatial cognition.¹⁶⁹ Visuospatial cognition involves the processing of visual information and may be important in a number of career paths.¹⁷⁰ Reviewing seven studies, Ferguson found a moderate correlation between VVG exposure and improved visuospatial cognition ($r = 0.36$).¹⁷¹ In a 2010 study, Ferguson and Rueda found that long-term exposure to VVGs was correlated with reduced depression and hostility.¹⁷²

Causationist scholars accept that video games can be beneficial, but state that violent content

¹⁶³ C Ferguson, ‘The Good, The Bad and the Ugly: A Meta-analytic Review of Positive and Negative Effects of Violent Video Games,’ (2007) 78 *Psychiatric Quarterly* 309.

¹⁶⁴ E Swing and C Anderson, ‘Unintended Negative Consequences of Exposure to Violent Video Games’ (2007) 12 *Cognitive Technology* 1. For a recent example, see The Australian, ‘National broadband network chief Mike Quigley’s \$2m payday for science,’ 2010, last viewed 18/08/10.
<<http://www.theaustralian.com.au/news/nation/national-broadband-network-chief-mike-quigleys-2m-payday-for-science/story-e6f9g6nf-1225885428833>>

¹⁶⁵ C Ferguson, ‘Blazing Angels or Resident Evil? Can Violent Video Games Be a Force for Good?’ (2010) 14 *Review of General Psychology* 68, 77.

¹⁶⁶ K Durkin and B Barber, ‘Not so doomed: computer game play and positive adolescent development,’ (2002) 23 *Applied Developmental Psychology* 373.

¹⁶⁷ Interactive Entertainment Association of Australia, *Interactive Australia 2009*, 2008, 22-23.

¹⁶⁸ C Ferguson, ‘The Modern Hunter-Gatherer Hunts Aliens and Gathers Power-Ups: The Evolutionary Appeal of Violent Video Games and How They Can Be Beneficial,’ in N Kock, *Evolutionary Psychology and Information Systems Research: A New Approach to Studying the Effects of Modern Technologies on Human Behavior*, 2010, 329, 338.

¹⁶⁹ C Ferguson, ‘The Good, The Bad and the Ugly: A Meta-analytic Review of Positive and Negative Effects of Violent Video Games,’ (2007) 78 *Psychiatric Quarterly* 309.

¹⁷⁰ C Ferguson, ‘Blazing Angels or Resident Evil? Can Violent Video Games Be a Force for Good?’ (2010) 14 *Review of General Psychology* 68, 76.

¹⁷¹ C Ferguson, ‘The Good, The Bad and the Ugly: A Meta-analytic Review of Positive and Negative Effects of Violent Video Games,’ (2007) 78 *Psychiatric Quarterly* 309.

¹⁷² C Ferguson and S Rueda, ‘The Hitman Study: Violent Video Game Exposure Effects on Aggressive Behavior, Hostile Feelings, and Depression,’ (2010) 15 *European Psychologist* 99.

is unrelated to beneficial outcomes.¹⁷³ A 2007 study by Gentile and Gentile found that VVGs motivate players ‘to persevere in acquiring and mastering a number of skills, to navigate through complex problems and changing environments, and to experiment with different identities until success is achieved.’¹⁷⁴ The authors claim that their effectiveness as ‘exemplary teachers’ is the reason that VVGs have negative effects on players.

Researchers agree that video games can have significant positive effects. However, the role of violent content in those positive effects is controversial and under-researched.

¹⁷³ C Barlett, C Anderson, and E Swing, ‘Video Game Effects – Confirmed, Suspected and Speculative: A Review of the Evidence,’ (2009) 40 *Simulation and Gaming* 377, 389.

¹⁷⁴ D Gentile and J Gentile, ‘Violent Video Games as Exemplary Teachers: A Conceptual Analysis,’ (2007) 37 *Journal of Youth Adolescence* 127.

ARE VIOLENT VIDEO GAMES MORE HARMFUL THAN VIOLENT TV AND FILM?

This question is of particular concern to Ministers, as video games are subject to higher restrictions than other media such as television and film. This section examines the current research into the harmful effects of VVGs compared to other violent media.

Restrictive video game classification in Australia

On 4 November 1993, the Standing Committee of Attorneys-General (Censorship) met to discuss the classification of computer and video games. Ministers expressed unanimous agreement that the ‘interactivity and repetitive impact of violence be given due weight’.¹⁷⁵ After this meeting, the Office of Film and Literature Classification released a draft version of the *Guidelines for the Classification of Computer Games*. The draft Guidelines used more restrictive criteria for classifying video games, but it included R 18+ and X 18+ classifications. The public was invited to respond to the draft Guidelines.

Senator Margaret Reynolds responded to the discussion paper on behalf of the Senate Select Committee on Community Standards Relevant to the Supply of Services Utilising Electronic Technologies.¹⁷⁶ In this submission, Senator Reynolds expressed dismay that the Committee’s earlier recommendations for excluding the R 18+ and X 18+ classifications¹⁷⁷ had not been followed. The Committee’s submission emphasised the increased dangers of video games:

The Committee cannot emphasise strongly enough that the difference in sensory impact of video and computer games when compared to videos is as substantially different as television is to radio. The psychological impact of video and computer games is significantly more profound because they are interactive, intensive and repetitive. The effect of these influences on immature minds may be dramatic.¹⁷⁸

Ministers unanimously agreed in early 1994 to remove the R 18+ and X 18+ classifications from the draft Guidelines. Today, R 18+ and X 18+ equivalent video games are still classified RC.

¹⁷⁵ Standing Committee of Attorneys-General – Censorship, *Sydney – 4 November 1993 meeting*, item 3(ii).

¹⁷⁶ Office of Film and Literature Classification, *Report on Public Submissions on Draft Computer Games Classification Guidelines*, 1993, Appendix 5.

¹⁷⁷ Senate Select Committee on Community Standards Relevant to the Supply of Services Utilising Electronic Technologies, *Report on Video and Computer Games and Classification Issues*, 1993, paragraph 2.88.

¹⁷⁸ Senate Select Committee on Community Standards Relevant to the Supply of Services Utilising Electronic Technologies, *Report on Overseas Sourced Audiotex Services, Video and Computer Games and R-Rated Material on Pay TV*, 1994, Paragraph 2.7.

Recent research

Causationist researchers feel that there are a number of reasons why VVGs should have a greater effect than violent television/other media. These include:

- the higher levels of attention required
- higher levels of interactivity
- identification with violent characters
- reinforcement of violent acts, and
- the frequency of violent scenes.¹⁷⁹

While some arguments are compelling, these predictions do not have strong empirical support. This is partially due to difficulties in comparing the effects. There are three methods used so far to explore differences in effects between media: conducting experimental studies, correlational studies, and comparing meta-analytic results.

Experimental studies

Finding a difference between VVGs and other media violence effects in a scientific experiment comes down to the issue of violent content. An experimenter must somehow find a way of matching the violent content of an hour of VVG play with an hour of a film or TV episode. However, the interactivity of VVGs means that it is difficult to control the amount of violence the game-playing participants are exposed to.

One solution is to have one group of participants play a VVG, and to have another group of participants watch the same VVG being played. A 2008 study attempted this method, with inconclusive results.¹⁸⁰ Though the ‘VVG players’ behaved more aggressively than the ‘VVG watchers’, there was no substantial difference in aggression between the VVG players and those who had played a nonviolent game.

A weakness of this method is that it is not clear whether watching someone else play a video game is comparable to watching a film or television show. Video games are not designed to be consumed in this way and may be experienced as boring. This is particularly true of the game used in the study (*Tekken 3*). It is a fighting game that is repetitive and contains very few cinematic elements.

Correlational or longitudinal studies

Another method of measuring the difference between VVG and other violent media effects is survey-based correlational studies. A 2004 correlational study found that VVGs tended to

¹⁷⁹ Drawn from N Carnagey and C Anderson, ‘Violent video game exposure and aggression: a literature review,’ (2004) 45 *Minerva Psichiatrica* 1.

¹⁸⁰ H Polman, B de Castro and M van Aken, ‘Experimental Study of the Differential Effects of Playing Versus Watching Violent Video Games on Children’s Aggressive Behaviour,’ (2008) 34 *Aggressive Behavior* 256.

decrease empathy more than violent films.¹⁸¹ The study also found that violent films had a greater effect on pro-violence attitudes than VVGs did. The authors do not note this discrepancy, instead claiming that '[a]s anticipated, exposure to video game violence was associated with lower empathy and stronger proviolence attitudes.'¹⁸²

In three 2007 studies by Anderson, Gentile and Buckley, VVGs were found to be correlated with more aggression than violent film and TV.¹⁸³ Overall, the correlational data seems to support the idea that VVGs may have a greater impact than other media.

Comparing meta-analytic results

A further method of measuring the difference in media effects is to compare the overall effect sizes found by meta-analyses of television violence effects and VVG effects. The effect of television violence on aggression has been calculated at $r = 0.31$.¹⁸⁴ This figure has been widely accepted by VVG researchers.¹⁸⁵ The latest and most extensive meta-analysis of VVG effects research found an overall effect of $r = 0.24$ ($r = 0.15$ when controlling for gender and prior aggression).¹⁸⁶ A comparison of these figures suggests VVGs have a smaller effect than televised violence.

Overall, the experimental findings on the relative impact of VVGs are inconclusive. Correlational data suggests they have a greater impact and meta-analytic data suggests they have a lesser impact. These results are very mixed and more research is needed to directly compare effects, leaving the question of whether VVGs have a greater impact than other violent media unresolved.

¹⁸¹ J Funk et al, 'Violence exposure in real-life, video games, television, movies and the internet: is there desensitization?' (2004) 27 *Journal of Adolescence* 23, 32.

¹⁸² J Funk et al, 'Violence exposure in real-life, video games, television, movies and the internet: is there desensitization?' (2004) 27 *Journal of Adolescence* 23, 33.

¹⁸³ C Anderson, D Gentile and K Buckley, *Violent Video Game Effects on Children and Adolescents: Theory, Research and Public Policy*, 2007, Studies 1-3.

¹⁸⁴ H Paik and G Comstock "The effects of television violence on antisocial behaviour: A meta-analysis," (1994) 21 *Communication Research* 516.

¹⁸⁵ J Sherry, 'The Effects of Violent Video Games on Aggression: A Meta-Analysis,' (2001) 27 *Human Communication Research* 409, B Bushman and C Anderson, 'Media Violence and the American Public: Scientific Facts versus Media Misinformation,' (2001) 56 *American Psychologist* 477. It must be noted that this is the largest effect size that has been found for television violence, and has been criticised by some researchers. See e.g., C Ferguson and J Kilburn, 'The Public Health Risks of Media Violence: A Meta-Analytic Review,' (2009) 154 *Journal of Pediatrics* 759.

¹⁸⁶ C Anderson et al, 'Violent Video Game Effects on Aggression, Empathy and Prosocial Behavior in Eastern and Western Countries: A Meta-Analytic Review,' (2010) 136 *Psychological Bulletin* 151.

CONCLUSION

Overall, the literature examining VVG effects on aggression is divided. A 2010 meta-analysis involved vast numbers of studies and participants, and is viewed as the pinnacle of the debate so far.¹⁸⁷ The authors found an overall effect size of $r = 0.24$ ($r = 0.15$ when controlling for gender and prior aggression), which is in the small to moderate range. The high prevalence of VVG use in the community means this small effect size remains a cause for concern.

However, there are a number of issues that have been raised with the VVG effect literature that arguably reduce the literature's policy relevance. These include:

- the divided nature of the literature, which is embroiled in a larger social and political controversy
- the contested definitions and measures of 'aggression' and 'violent video games'
- that insufficient attention has been directed at third variables which may explain some of the effect
- that the strongest evidence has been found for short term VVG effects, and conclusions regarding long term effects have not been as strong
- that there is little evidence there is any difference in the effect of VVGs on children, adolescents and young adults
- that some studies appear to show games featuring cartoonish violence are just as harmful as games featuring realistic violence, and
- there is no conclusive evidence that VVGs are more harmful than other violent media.

Significant harmful effects from VVGs have not been persuasively proven or disproven. There is some consensus that VVGs may be harmful to certain populations, such as people with aggressive and psychotic personality traits. Overall, most studies have consistently shown a small statistical effect of VVG exposure on aggressive behaviour, but there are problems with these findings that reduce their policy relevance. Overall, as illustrated in this review, research into the effects of VVGs on aggression is contested and inconclusive.

¹⁸⁷ C Anderson et al, 'Violent Video Game Effects on Aggression, Empathy and Prosocial Behavior in Eastern and Western Countries: A Meta-Analytic Review,' (2010) 136 *Psychological Bulletin* 151.

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