

Christopher J. Ferguson
Editor

Video Game Influences on Aggression, Cognition, and Attention

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Springer

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*To my wife, Diana, and son, Roman, who
have, together, always been my foundation.
And to my dad, Stuart, may he rest in peace.*

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About the Editor

Christopher J. Ferguson, PhD is a professor of psychology at Stetson University in DeLand, FL. He has published dozens of articles related to video game influences on behaviors, including video game violence, addiction issues, and representation of female characters in games. He is a fellow of the American Psychological Association and received an Early Career Scientist Award from the Media Psychology and Technology Division of the APA. He also publishes fiction, including a novel, *Suicide Kings*, and short stories that are available at his website ChristopherJFerguson.com.

Introduction



Christopher J. Ferguson

In February 2018, a 19-year-old man entered Marjory Stoneman Douglas High School in Parkland, FL, with an AR-15 rifle and killed 17 students and staff and wounded many others. This tragic crime restarted familiar debates about the impact of mental health, police procedures, and gun control on gun violence in the United States. As the nation began a fevered discussion of gun control in particular, the National Rifle Association (NRA) and its political supporters including President Trump attempted to shift the conversation onto violence in video games. Despite that it was unknown at the time whether the shooter had actually played violent video games (although being a 19-year-old male, odds were that he had as most young males play violent video games), the President called for a meeting on the impact of games to which no scholars were invited. The reaction from the popular press (e.g., Crecente, 2018; Salam & Stack, 2018; Zendle, 2018) was largely negative, and it seemed unlikely any actual policy would result from this meeting, other than to shift the conversation away from gun control debates.

Debates over the impact of violence in video games tend to emerge after mass shootings, particularly when perpetrated by young males (whereas shootings by older males or, more rarely, women such as the young woman who opened fire on offices if YouTube soon after the Parkland shooting do not raise questions of video games). That some young males, such as the shooters in the Virginia Tech (Virginia Tech Review Panel, 2007) and Sandy Hook (State's Attorney for the Judicial District of Danbury, 2013) shootings, ultimately proved not to be avid violent video game players have done little to squelch these debates. Debates regarding the effects of video games among the general public have often raged with great intensity.

Although the issue of video games impacting violent behavior is one of the most high-profile debates waging over video games, it is far from the only one. Other important opposing views are exchanged regarding whether video games detract

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from (or enhance) educational achievement, may or may not be addictive, can prevent dementia in older adults, or if they boost certain types of cognitive abilities.

One of the principles of this book is that debate is good! Arguably, one of the problems in our field of video game studies has come when one group of scholars or another on some side of a debate has attempted to claim consensus and shut down debate. We know that the history of science is littered with scientific consensus views that have proved incorrect. Attempts to stifle academic debates are inherently anti-science. True, some individuals may find themselves uncomfortable with the sometimes endless impasses that seem to come with many of the disputes related to media effects. However, from such discomfort can also come new insight, an awareness that the status quo is not sufficient, and new theory.

The old adage goes “Debates in academia are so vicious because the stakes are so small.” Presumably, this half-joke is meant to poke fun at the insularity of so many academic deliberations that may focus on minor points of pedagogy about which most regular people do not care. However, as we saw from the renewed debates on violence following the Parkland shooting, this is not always true for debates focused on video games. People outside of academia really do care one way or another about video games. Sure, video games are not akin to a cure for cancer, grinding world poverty, or looming threats of war or global warming. Nevertheless, technology clearly does fascinate people, sometimes frightening them, at other times offering the promise of something wondrous.

This popular interest in video games can, at times, make discussions of video game effects difficult. If we accept that video game influences are likely small, nuanced, and idiosyncratic, it may be difficult for researchers to communicate this to a public audience that wants *the answer* regarding whether games are addictive or may help prevent dementia. More than one official at a professional guild organization communicated to me personally how much pressure these organizations are under to provide clear answers to complex questions that will drive public policy.

With this in mind, it may not be surprising that it has often been difficult to discuss video game influences in a way that is strictly objective, collegial, and, indeed, fun. Debates about video games too easily are wound up in questions of morality, money, personal prestige, and politics. The politics of video games and the tenor of debates in the public sphere likely have had a negative influence on arguments among scholars. In effect, video game research has had too many brass rings to grasp for – everything from *saving the children* to grant funding, political and professional prestige, and newspaper headlines. The political narratives about video games can make intellectual conversations about them more difficult.

This political pressure has undoubtedly resulted in an over eagerness to make definitive conclusions and reach *consensus*. Several times in video game research, certain groups of scholars have declared a consensus regarding specific types of effects, only to see large groups of scholars challenge such views. As one such example, in 2014, a large group of scholars released a statement indicating that a consensus existed that brain games caused no appreciable cognitive benefit for players (Stanford Center on Longevity, 2014). Perhaps predictably, soon after, another

larger group of scholars released their own statement, disagreeing with the first (Cognitive Training Data, 2014). Curiously, some scholars appear to have signed both forms. We have seen similar false claims of consensus in other areas of video game research such as violent games and aggression and addiction.

If consensus statements have taught us anything, it is that we should be suspicious of consensus statements. They do not appear to typically have been constructed with any clear effort to ascertain whether a consensus actually does exist. Rather, certain groups seem to develop them as a means to stake out the desirability of a particular moral or social position. Indeed, they function as a form of social pressure, encouraging conformity rather than proper scientific scrutiny. Even if a consensus were to exist (and they appear rarer than claimed), a consensus is not evidence. Argument to consensus is a logical fallacy, and we must remember that.

Thus, rigorous inquiry, open debate, and skeptical scrutiny are essential values of science. Particular in social and human realms, thinking in terms of *the answer* may be an inherently fraught process. Media effects are likely to be complex, subtle, and idiosyncratic. Although empirical data, particularly when obtained through preregistered, standardized, transparent, rigorous scientific procedures, can be valuable in directing us toward the truth, so too can rigorous and meaning intellectual dialogue.

To that end, this book functions as a platform for such dialogue. To such degree that dialogue occurs within video game studies, it is often of the argumentative acrimonious variety. Although heated debate can indeed have its purpose particularly when some actors act in questionable faith (I am not of the opinion that all dissent must be cordial, and enforced collegiality can, at times, chill rigorous skepticism), one hopes that dialogue between good-faith opponents with differing views can be conducted in an atmosphere of mutual respect.

I observe that there are few areas of video game studies upon which all or even a majority of scholars agree other than simply that video games exist. Therefore, I hope that this book will be an outlet for understanding where debates exist, how scholars have come to differing good-faith conclusions about controversial topics, and how we can discuss these issues in a mutually respectful environment. The intent is that, for different areas of controversy, scholars with opposing views would present their best case for their perspective but do so in a way that demonstrated respect for opposing views. As much as anything, we hope to demonstrate that debating on controversial topics can be fun, enlightening, and valuable even if, at the end of it all, we still do not agree.

In that sense, the aim of this book is not necessarily to convince the reader of any particular perspective regarding video games. I hope that the essays within will inform, but expect readers will still come away with multiple views of what games do or do not do. However, this book will be one small step in distancing game studies from the vitriol, politics, and conformity that have often limited scientific progress. And, more than anything, I hope it will be an interesting read!

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Violent Video Games *Do* Contribute to Aggression



Erica Scharrer, Gichuhi Kamau, Stephen Warren, and Congcong Zhang

Throughout history, concern about the effects of exposure to violence in the media has circulated with the introduction and widespread adoption of many forms of media technology, including film, television, and the Internet. When each of these media types has found its way to the daily lives of the public, their use has triggered expressions of concern about the violent images and actions found within their content. Video games seem to have spurred particularly anxious commentary and critique, likely attributable in large part to their interactive nature, technology that immerses the player in the action, and the notoriety of some of their most popular titles. With games in the Call of Duty and Grand Theft Auto franchises capturing headlines for both popularity and record-breaking sales (Macy, 2017; Minoti, 2017) and for their inclusion of violent images and simulations (Olson, 2012; Saar, 2014), the potential for violence in video games to have an adverse influence has captured the popular imagination.

Scholars, too, have posed research questions and tested hypotheses pertaining to the potential influence of violence in video games on players young and old for quite some time. Using survey design, the social scientist is able to examine the long-term, cumulative ways in which time spent gaming with violent genres and titles might relate to one's level of aggression. Using experimental design, the short-term, immediate impact of gaming can be measured. Despite the use of these research tools in the research performed to date, this topic has generated a rather vehement debate within the scholarly community, with researchers battling it out in published commentaries and other forums on the merits of the studies and on the ways in which those studies have been framed, discussed, and represented. We will trace through some of the most pertinent points of departure among researchers that

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help fuel the debate surrounding the issue. We divide our discussion of the existing research by major method employed—experiments and surveys—to look for correspondence and divergence in approach and findings within similar types of studies.

The distinction between the term “aggression” and the term “violence” is an important starting place. Most social scientists conceive of aggression as the more general, umbrella term and violence as a narrower subset of actions underneath (Baron & Richardson, 1994). Psychologists and other social scientists generally use the term aggression to signify anything one human might do to intentionally inflict harm on another (Kirsh, 2012). Aggression can have physical (harming with the body or with weapons), verbal (harming with words), and even indirect (harming someone without them having to be present) components (Kirsh, 2012). When aggression takes a physical form, the act can range from causing decidedly illegal and decisively severe (like shooting, stabbing, or engaging in sexual violence) to relatively more minor harm (like children shoving each other on the playground or even acts against objects like slamming a door in anger). Violence is typically confined in its use by scholars to more severe acts of physical forms of aggression, acts at the overtly and seriously harmful end of the aggression continuum (Anderson, Berkowitz, Donnerstein, Huesmann, Johnson, Linz, et al., 2003). Using this logic, not all aggression is violent, but all violence is aggressive. This distinction will prove quite important in our review of the existing research and will factor heavily in the opposing interpretations of the meaningfulness of the existing research evidence.

The Evidence from Experiments

Lab experiments can illuminate the ways in which individuals respond to games of varying types. Yet, the experimenter has to contend with threats to validity in the conditions created by the experiment, including the ways in which aggression is measured. The researcher also has to make sure conditions are equivalent on as many factors as possible besides the amount of violence in the game. Ethical considerations are also exceptionally important. Fundamentally, the researcher would not want to trigger an expression of violence among research participants and therefore has to confine herself to outcome measures generally characterized as aggression rather than violence.

Measuring Aggression in the Lab

How to measure aggression ethically as well as validly and reliably is perhaps the most difficult challenge that social scientists studying video game violence effects face. Employing an indirect measure of aggression, for example, Giumetti and

Markey (2007) first measured dispositional anger (how much a person tends to feel anger and emotional arousal day to day) among 167 college student participants and then randomly assigned them to play violent games or non-violent games on the Xbox for 15 min. Participants were presented with three story stems, describing scenarios in which individuals found themselves in vexing situations. The researchers asked the participants to list 20 things that an individual in that situation might do, say, or feel and measured those responses for the presence of aggression. Those who had played the violent games wrote down significantly more aggressive thoughts, feelings, and actions for the character in the story stem compared to those who played the non-violent games.

In an additional example of an indirect measure, McGloin and colleagues (McGloin, Farrar, Krcmar, Park, & Fisklock, 2016) randomly assigned 488 participants (again, college students) to play the game *Time Crisis 4* (a first person shooter) with a traditional button and joystick controller or with a gun controller for 10 min on the PlayStation 3. The measure of aggression was an adaptation of the Buss-Perry self-report questionnaire that was revised to measure participants' state aggression (their current levels, as expressed by intentions to use verbal or physical aggression) rather than their trait aggression (their general willingness to use aggression on a daily basis). In the results, the researchers found two paths to increased aggression. The effect of playing with a gun controller was associated with participants' perceptions of the naturalness of the controller, which, in turn, predicted realism; which, again in turn, predicted enjoyment; and which, finally, predicted increased reports of state aggression. The effect of playing with a gun controller again predicted perceptions of naturalness in the second path, but then in-game failure (number of times the player was killed and had to press continue) predicted frustration which led to higher reports of state aggression, as well. More and less skilled players, therefore, had different paths to state aggression, yet in each the naturalness of the controller (using a gun to simulate the first person shooting) seemed to make a difference.

When researchers employ direct, physical expressions of aggression in a laboratory setting, they must do so in a manner that does not cause serious harm to research participants. Examples of such measures used in studies of the effects of video games include administering unpleasant tastes or sounds to individuals. A recent study conducted by Arriaga and colleagues (Arriaga, Adrião, Madeira, Cavaleiro, Maia e Silva, et al., 2015) provides a good example and a complex research design. In their study, participants played either *Time Crisis 4* or *Need for Speed* (two games rated similarly by participants for enjoyment, difficulty, and frustration but rated quite differently for violence) and then were shown pictures of victims of violence, during which eye tracking technology measured their pupil dilation. Next, participants participated in a competitive reaction time test in which they and a competitive partner were each trying to achieve the fastest reaction time. The competitive partner was actually a programmed computer, but the participants believed they were issuing unpleasant and loud blasts of noise to a person against whom they were competing. Those who played the violent game had lower pupillary dilation

responses to victims shown in distress or injury (an indication of desensitization) compared to those who played the non-violent game. Those low pupil dilation responses, in turn, predicted increased use of the noise blasts, the behavioral aggression measure used in the study.

Zumbach, Seitz, and Bluemke (2015) employed a unique design using an implicit association task to measure the association between the self and aggressive words before compared to after playing a violent game, thereby avoiding the limits of self-report. The researchers found a closer association between the self and aggressive words after playing a violent game (*Call of Duty: Modern Warfare 2*) compared to before playing (whereas a more explicit measure of aggression did not differ from pre- to post-playing). Playing the game in 3D mode with shutter goggles rather than in 2D mode on the PC did not matter for this outcome.

Choosing Stimulus Materials

Another key challenge in experimental studies is how to select video games for treatment group and control group members to play that are equivalent in as many factors as possible except for the presence of or different types of violence in the game (Adachi & Willoughby, 2011). Anderson and Carnagey (2009) attempted to address the issue of whether competitiveness or violence is the key driving force in links between video game exposure and aggression. They had undergraduate student research participants play either a sports game that contained the typical amount of aggression that one would find in the sport (*Madden Football*, *MVP Baseball 2004*) or a version of those same sports games in which aggressive behaviors are exaggerated within the playing options of the game. In *MLB Slugfest*, players can punch other players, and in *NFL Blitz Football*, the hits are particularly intense. Those who played the games with the gratuitous violence scored higher on one of four state hostility measures (a measure showing an aggravated state) and on a noise blast competitive reaction test. As we have seen, other approaches used to isolate the impact of violence include measuring whether games played across conditions were equivalent in enjoyment, difficulty, or other characteristics (as Arriaga et al., 2015 had done) or having a number of violent and non-violent options (as Giumetti and Markey, 2007 had done).

Game content and mode of play are additional factors that the careful researcher must also consider. There is indication in the research that being rewarded by accruing points or gaining access to new tools, levels, or worlds for aggressive play can stimulate more aggressive thoughts (as measured by a word completion task; completing the beginning of *ki__* as *kill*, for instance) and actions (again, using the competitive reaction time test) compared to being punished for the same acts by losing points (Carnagey & Anderson, 2005). Realism of the game's content may play a role, as well. Barlett and Rodeheffer (2009) found that those who played a

game based on a plausible and even historical premise (Conflict Desert Storm) experienced more aggressive feelings (as measured by the self-report state hostility scale) than those who played a violent game with a fantasy theme (Star Wars Battlefront 2). For aggressive cognitions (the word completion task), playing either of the games with violence led to higher scores compared to the control group. Recent research also suggests that playing a violent game competitively rather than cooperatively with others helps determine aggressive response (Velez, Greitemeyer, Whitaker, Ewoldsen, & Bushman, 2016).

Age is an important factor to consider, as well, when choosing games to use as experimental stimulus materials and when deciding how to measure aggression. Saleem, Anderson, and Gentile (2012) assigned young people aged 9 to 14 to play E-rated games with and without violence and assessed outcomes by asking participants to assign puzzles for an ostensible competitive game partner to solve. They found that playing the more violent games led to more hindering behavior (i.e., assigning the opponent more difficult puzzles), whereas playing the prosocial games led to more helping behavior (i.e., assigning easier puzzles). Konijn, Bijvank, and Bushman (2007) found that among adolescent boys, wishful identification with the game character (an expressed desire to be like the character) interacted with playing a violent game to predict aggression as measured by the competitive reaction time test and corresponding noise blasts.

Of course, this is just a selection of experimental studies conducted on the topic of video game violence and its potential influence on aggression. There are certainly studies in the literature that find such effects are either stronger or contingent on such factors as identifying with the main character (Lin, 2013), having a dispositional tendency toward anger (Engelhardt, Bartholow, & Sauls, 2011), or other factors. There are even some studies that do not show an immediate effect of violent video game playing on aggression at all (e.g., McCarthy, Coley, Wagner, Zengel, & Basham, 2016). Furthermore, experiments, in particular, have been shown to be susceptible to publication bias, meaning that studies that do, indeed, find the effects they are looking for are often more likely to be accepted for publication compared to those that do not find an effect. Relying on the published literature, therefore, runs the risk of overestimating effects. Recently, in fact, researchers have found that the results of experimental studies exploring the effects of video game violence on aggression array in such a way as to indicate the likelihood of such a publication bias (Hilgard, Engelhardt, & Rouder, 2017). It is possible, then, that there are studies that remain unpublished that fail to show a link between video game violence and aggression. Yet, we base our conclusion on what *is* published, since those studies are available for our analysis and interpretation and have undergone rigorous peer review.

The Evidence from Surveys

Surveys Conducted at a Single Point in Time

Cross-sectional studies conducted in the United States have gathered data from undergraduate students and adults outside the university setting. In Fox and Potocki (2015), for instance, respondents estimated frequency of exposure to violent video games during childhood, adolescence, and adulthood. That measure was found to predict more favorable attitudes toward interpersonal aggression, which, in turn, predicted both hostile sexism and rape myth acceptance. Tang and Fox (2016) determined that number of hours of online game play, game involvement, and hostile sexism each predicted male players' use of generalized or sexualized harassment of other players during online game play. Ivory, Ivory, and Lanier (2017) surveyed 533 college students from across the United States. Most central to our topic, they found amount of weekly video gaming predicted participants' reports of the number of times they had carried a weapon in the past year, the number of times they had gotten into a physical fight, and the number of times those fights required someone seeking medical attention. Amount of time spent with action games, in particular, a genre in which violence is typically quite central, also predicted carrying a weapon and getting into fights requiring medical attention.

Cross-sectional surveys have gathered data from children and/or adolescents from various locations around the globe (e.g., Brändle, Cardaba, & Rivera, 2015; Breuer, Festl, & Quandt, 2014; Dittrick et al., 2013; Gentile, Lynch, Linder, & Walsh, 2004; Lam, Cheng, & Liu, 2013; Möller & Krahé, 2009; Rudaksikira, Muula, & Siziya, 2008; You, Kim, & No, 2015). Lam et al. (2013), for instance, found that among adolescents from two cities in Northeast China, moderate to high levels of violent video game exposure predicted reporting being a perpetrator as well as being concurrently a perpetrator and a victim of cyberbullying. Similarly, in Canada, Dittrick et al. (2013) found those 10- to 17-year-olds whose three favorite games contained violence were more likely to report bullying peers both on- and offline. In the United States, Rudatsikira, Muula, and Siziya (2008) found, in a large national sample of youth, that playing video games for 3 h or more daily was one of several significant predictors of reporting having engaged in a physical fight on school property in the 12 months prior to the survey. In Germany, Festl, Scharkow, and Quandt (2013) found that although most respondents scored quite low, higher scores on the Game Addiction Scale were associated with self-reports of physical aggression and anger among a large sample of respondents aged 14 and older. Prior research had shown that meeting the criteria for game addiction was strongly associated with time spent with games (Lemmens, Valkenburg, & Peter, 2011).

Surveys Conducted over Multiple Points in Time

Of course, correlation is not causation, even with a number of control variables included in data analysis. The prime concern with the cross-sectional approach is that researchers cannot rule out the reverse explanation and that observed links between aggression and violent gaming are explained by those high in aggressiveness seeking out violent games rather than the game causing their aggression. Longitudinal studies measure respondents over multiple points in time, and are therefore able to establish the sequence necessary for a causal interpretation, with violent gaming preceding and predicting aggression rather than (or perhaps in addition to) aggression preceding and predicting violent gaming. Möller and Krahé (2009) used cross-lagged path analysis and found a significant relationship between violent video game use at time 1 and physical aggression at time 2. Slater et al. (2003) studied data from over 2500 children in grades 6 and 7 for 2 years. Results pointed to a “downward spiral” of mutually reinforcing associations between violent media use (which included Internet, TV, and video and computer games) and aggressive thoughts, values, and behavior. Aggression of the young person predicted the selection of violent media consistently throughout the periods of data collection, whereas violent media use predicted the youth’s aggression increasingly over time. Research by Fikkers, Piotrowski, Weeda, Vassen, and Valkenburg (2013) using longitudinal data from 499 10- to 14-year-olds in the Netherlands showed that exposure to television and video game violence was not a significant predictor of changes in aggression over time on its own. However, the media violence measure interacted with exposure to conflict within the family to modestly but significantly predict increases in aggression. The aggression measure used in the study included name calling, pushing, hitting or kicking, purposely tripping, threatening to beat up, or fighting. Finally, Willoughby, Adachi, and Good (2012) surveyed 1492 adolescents over the course of 9th through 12th grade. The dependent variable they used was self-reports of both typical aggressive behavioral patterns and specific aggressive behaviors enacted over the past year. More violent video game play predicted higher scores on these measures, even after controlling for prior levels of aggression. Non-violent video game use did not predict change in aggression, and prior aggression generally did not predict greater violent video game use.

Measuring Serious Levels of Harm

In surveys investigating a form of aggression likely to qualify as violence due to the severity of harm measured, the evidence for a meaningful connection between violent gaming and these behaviors is less consistent. In a large longitudinal sample of school-going youth, Ybarra, Huesmann, Korchmaros, and Reisner (2014) determined that violent video gaming was associated concurrently with carrying a weapon to school. Exelmans, Custers, and Van den Bulck (2015) found that among