THE EFFECTS OF VIDEO GAME SALES ON VIOLENT CRIME RATES IN CANADA

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Abstract

Video games are a relatively new phenomenon, and as such there has been a plethora of research done to help understand the effects of video games. When it comes to the influence of video games on violent crime, there has been much research on the topic but with little consensus. Additionally, the existing literature cannot provide any conclusive evidence, with some stating that video games influence violent behavior and others stating the opposite. This paper attempts to contribute to the research by trying to answer the question of whether an increase in video game sales can influence increases in violent behavior. A quantitative approach was used, analyzing popular video game sales as well as violent crime rates in Canada to find a relationship between the two variables. It was found that increases in video game sales have led to increases in violent crime rates. This can help influence policy makers on making laws and policies that affect video games in the future, such as stricter regulations for purchasing violent video games.

Keywords: video games, violence, aggression, violent behavior

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Table of Contents

Table of Abbreviations

APA: American Psychological Association

CDS: Child Development Supplement

COD: Call of Duty

ESA: Entertainment Software Association

ESRB: Entertainment System Rating Board

EU: Europe

FPS: First Person Shooter

GAM: General Aggression Model

IDSA: Interactive Digital Software Association

LVL/lvl: Level

NA: North America

PSID: Panel Study on Income Dynamics

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"We are no longer worried that children are missing school because of video games, though. We are worried that they are murdering their classmates because of video games." - Tom Bissell, n.d.

Video games have become a staple in entertainment since its introduction in October, 1958. However, as time passed on, the levels of violence portrayed in these games have drastically increased. The game *Mortal Kombat* was one of the first video games that has portrayed grotesque violence to young players. These types of video games caused great concern and distress amongst parents. In response to the increase in these video games, the IDSA, later renamed the ESA in 2004, founded the ESRB to review and rate games for appropriate media consumption (ESRB, n.d., *Our History*). Video games and their influence on the minds of vulnerable populations have always been on the forefront of questions. A persistent argument against video games is that video games are a cause of increased levels of violence. According to Dr. Anderson in the American Psychological Association (2003), 40 years of research has highlighted the debate "concerning whether such exposure is a significant risk factor for aggressive and violent behavior" (para. 1). However, a definitive answer has not yet been found.

These are recent cases that attracted media attention that portrayed video game players, both average gamers and professional players, who were involved in violence and violent crime causing both public and media panic without much scientific analysis or exploration. A Canadian example took place in early 2020 in Toronto, when 24-year-old Menhaz Zaman beat and killed his family with a crowbar. Menhaz was described as a typical shy kid. He was dutiful and was his mother's favorite child. When he wasn't helping with chores or going to the mosque with his father, he "was tucked away in his bedroom on his laptop" (Laidlaw, 2020, para. 5).

Menhaz was engaged in the game *Perfect World* and his online persona. In it, he was free to do as he pleased. However, his addiction to the game began to impact his life outside. He began failing his classes at Yale, and eventually dropped out. In order to maintain the facade that he was still in school, he would leave on the same bus as other students. He would instead go to the mall to play the video game. He knew he could not tell his parents that he dropped out of school, and started to develop a plan on how to avoid this confrontation. According to Laidlaw (2020), Menhaz "was fantasizing about killing his parents. He spent three years planning how to do it" (para. 16).

Another example is the case of Li Wei Jun. Jun, who was referred to as "Vasilii", was a Chinese professional *League of Legends* player and streamer. In October 2017, during a streaming session, Vasilii confronted his girlfriend. Jacob Wolf (2017), a writer for ESPN, states that Vasilii knocked over his desk and camera, and loud shouting and crying could be heard. He later reappeared telling his viewers that he needed to leave the game because police had arrived. After this incident, a domestic violence investigation opened in regards to Vasilii, and he lost many contracts and was banned from any competitive matches in the future.

Cases such as these may paint video games as the main culprit of violence. However, we must ask whether or not video games are the main factor in these people's decision to commit violence, or whether there is some underlying factor that is triggered by the playing of video games. As stated previously, there is yet to be a consensus about the effects of video games on violent behavior. Some state that video games mitigate violent behavior while others state that video games promote more violent behavior. This paper aims to further the research on the relationship between video games and violence.

Research Question and Methodology

This research aims to find a relationship between viewing violence in video games and behaving violently. The project utilizes an explanatory analysis design to examine the potential causal relationship of playing violent video games and exhibiting violent behavior in reality. The explanatory analysis utilizes a quantitative study approach, where we compare sales charts of selected popular video games with the rates of violent crimes in Canada to see potential connections and correlations that may indicate video games as a cause of violent crime. This study began with a semi-systematic literature review to determine the historical data from a multitude of different disciplines as well as find any influences for the methodologies used to find the data needed for analysis. Utilizing the key terms of "violence" and "video games", peer-reviewed articles were selected. Literature was then analyzed to determine the level of understanding in the topic as well as develop a framework for the gathering and analysis of data.

Statistical data of popular video game sales as well as violent crime rates were gathered. Video game data consisted of the most popular games for the years of 2010-2021. Violent crime rate data also aligned with these years. Analysis consisted of comparing rises in video game sales and rises in violent crime to see if a connection can be formed. Two or more matching peaks or similar trends must be found in order for a connection to be made between videogames and violence. Additionally, bivariate correlation equations were utilized to find significant correlation relationships between the two variables.

The research paper attempted to determine the connection between the consumption of violent video game media and the level of violent crime reported. Specifically, the paper attempted to answer the following question: How has violent video game sales influenced the level of crime in Canada between 2010 and 2020?

Previous Research

There has already been a plethora of research done on the topic of video game violence and violent behavior. Much of this research had been done in the United States but the journey to understanding the effects of violent media had been a global effort. Within the research done, there have been a number of methodologies that have been utilized. Some researchers have used the quantitative approach, following adolescence while introducing them to different genres of games to see any differences, while others have utilized the qualitative approach, such as survey data and interviews.

The following studies include both quantitative studies and qualitative studies ranging from 2005 to 2021. The studies covered both male and female gamers, as well as youth and adults. It was noted that many of the quantitative studies conducted supported the notion that video game violence did not contribute to rises in societal violence while the qualitative studies analyzed supported the notion that video game violence had strong relationships to increases in behavioral violence. Additionally, quantitative studies regarding the subject were more sociological and focused on the macro level, while qualitative studies were more psychological and focused on the micro level. Only one of the following studies based their research on the sales of violent video games and how those sales affected societal violence.

The study by Suziedelyte (2021) is a quantitative study that attempts to answer the question of whether violent media affects violent behavior in children. Prior to her experimentations, Suziedelyte goes over a brief history on the debate regarding the effects of violent video game media on violent behavior in real life. She then highlighted the legislative action proposed against video games in the United States and how they all failed on the basis of free speech rights (Suziedelyte, 2021, p. 105). More specifically, Suziedelyte highlights that the

debate on whether video games influence violent behavior generally intensifies after major mass shooting incidents, such as the Sandy Hook Elementary School shooting in 2012 (Suziedelyte, 2021, p. 105). Suziedelyte hypothesized that violent video games do not increase the levels of real-world violence, but rather decrease the likelihood of violence by being a substitute to other activities that may promote violence. She utilizes a combination of surveys, game statistics, and child/parent reported violence as her methodology for collecting data. She utilized the Child Development Supplement in the Panel Study on Income Dynamics to find her sample of children aged 8-18. Suziedelyte bases her study on the theoretical framework of (1) direct impact of violent media on real-life violence, (2) substitution of video-gaming and other violence-related activities, and (3) selection of violence-prone boys into the newly released video games (Suziedelyte, 2021, p. 123). She found that playing video games reduced the likelihood of real-life violence because video games were a substitute activity to more violence-based activities such as drugs and alcohol.

Overall, Suziedelyte utilized a quantitative approach in order to find a relationship between violent video games and real-life violence. She utilizes a relevant theoretical framework and stated some limitations with her approach. However, she does not use any prior research as a foundation for her research. More specifically, Suziedelyte does not mention any theoretical or methodological influences for her study. Overall, her findings are surprising and oppose many "anti-video game" views.

According to the findings by Suziedelyte (2021), a risk factor for a male adolescent in committing crime would be their inherent proneness to violence and aggressiveness. Findings from Suziedelyte (2021) also suggest that video games, especially newly released video games, would be a protective factor against adolescents committing crime. Overall, Suziedelyte (2021)

suggests that a boy's natural tendencies of violence and aggression can be mitigated by the playing of video games, as video games occupy the time that boys can use to commit crime.

Similarly, Ferguson and Olson (2014) also analyzed the effects that violent video games had on children. However, unlike Suziedelyte (2021), Ferguson and Olson (2014) analyzed the influence of video games on the behavior of children with mental health issues. Ferguson and Olson (2014) conduct a qualitative study on whether violence in video games would promote delinquency and bullying in children with depression or attention deficit symptoms. Similarly to Suziedelyte (2021), Ferguson and Olson (2014) begin with a brief history on the debate between video games and violent behavior. In their study, they focus on if "children with clinically elevated mental health symptoms constitute a 'vulnerable' population" (Ferguson & Olson, 2014, p. 129) of those susceptible to the influence of violent video games. They hypothesized that those with clinically elevated levels of depression are more likely to be influenced by violence in video games. Additionally, they hypothesized that those with clinically elevated attention deficit symptoms are more likely to be influenced by violence in video games (Ferguson & Olson, 2014, p. 129). They had a sample of 377 children with either clinically elevated levels of depression or clinically elevated levels of attention deficit symptoms. Ferguson and Olson exposed these children to violent video games and measured the tendencies of delinquency and bullying behavior. Specifically, Ferguson and Olson (2014) analyzed "[g]ender, parental involvement, trait aggression, stress, family/peer support and exposure to video game violence, as well as the interaction between exposure to violent video game and trait aggression" (p. 131) and inputted them into a regression equation to find significant relationships. They found that the exposure of violent video games was not associated with delinquency nor bullying behavior in those with clinically elevated levels of depression or attention deficit symptoms.

The findings found by Ferguson and Olson (2014) supported the notion that violence in video games did not contribute to the perceived increase of aggression and real-world violence. They also highlight the many limitations in their study. However, they did not mention how they did not use baseline data with "normal" children to compare and contrast their data. To explain it further, Ferguson and Olson (2014) focused on data collected from children exhibiting or possessing mental health issues and had seldom mentioned any comparison with children who did not exhibit mental health symptoms. Ferguson and Olson (2014) had identified many risk factors in explaining why children become aggressive or bully, including the development of many mental health issues. Ferguson and Olson (2014) also stated the presence of other risk factors and that mental health symptoms were not a direct risk factor to violent or aggressive behavior. The findings from Ferguson and Olson (2014) suggest that playing video games would be a protective factor, as it allows parents and children to form stronger bonds, thereby giving parents the ability to watch over their children. Overall, their findings, like Suziedelyte's findings, suggest that video games do not contribute to increases in real-world violence.

Christopher J. Ferguson has been a main figure in the research of video game violence in relation to exhibited violent/aggressive behavior. Like the study done in 2014, the double study by Ferguson (2015) analyzed if movie and video game violence can predict real-world violence in society. Similarly to Suziedelyte (2021) and Ferguson and Olson (2014), Ferguson (2015) also discusses the debate regarding the influence of violent media on violent behavior in society. However, unlike the others, Ferguson (2015) also discusses the academic history of the topic. More specifically, Ferguson (2015) highlights how a majority of the studies done were in a laboratory setting, and that these types of studies do not replicate public situations as effectively. Ferguson (2015) also highlights the inability to formulate a consensus on the topic.

Ferguson (2015) utilizes a quantitative research model that compares frequencies of crime with levels of portrayed violence. Ferguson's study is unique in that he separates it into two parts: Movies and Video games. He discusses each part individually and combines the data to determine a conclusion. Ferguson (2015) utilizes both unit sales data for violent video games and cases of youth violence in society and compares the two variables in order to produce findings for his research study. He found that although the graphic violence in movies did not contribute to societal violence, the increased frequency of violence in movies has correlated with an increase of societal violence. In terms of video games, Ferguson (2015) found that video games actually decreased the levels of violence. Overall, Ferguson finds that a conclusion cannot be formulated because the influence of violent media is dependent on the individual and cannot be generalized easily.

Overall, Ferguson (2015) gives a unique take on the debate on violence in media. He states that it cannot be generalized, as the influence that media has on people are individualized and behavioral changes are on a case-by-case basis. Ferguson (2015) highlights many of the limitations involved in his study as well, such as the unlikelihood that a causality relationship can be established, which can aid in future research on the topic. The study by Ferguson (2015) highlights several risk factors, including a youth's apparent vulnerability to violent media effects and the consistency of age groups for youth and their increased likelihood of committing crime compared to older members. Findings by Ferguson (2015) suggest that the introduction of video games has been a protective factor for youth, as the act of playing video games removes the opportunity for crime to be committed by youth, seeing that youth are more likely to engage in the playing of especially newly released video games.

Although he is well known for researching the effects of violence in video game media, Ferguson is not the only contributor to the research of video game violence and behavioral violence. Similarly to Ferguson (2015), Bartholow (2005) also does a double study analyzing whether increased exposure to video game violence resulted in increased hostility and aggression. However, unlike the prior articles which highlights the debate on violent video games, Bartholow (2005) discusses the academic history of the topic and goes over previous findings by other researchers. Bartholow (2005) highlights many studies, saying that many of these studies have found that violence does cause increases in aggressive behavior in the short-term and increases in antisocial behavior in the long-term (p. 1573-1574). However, Bartholow (2005) states that more research is needed to fully understand the long-term effects of exposure to violent video games and behavior.

The first study attempted to find a connection between previous violent video game exposure and the likelihood of self-reported aggression. The study involved 200 male undergraduate students answering a questionnaire about their experiences with video games, personality, trait hostility and aggression (p. 1575-1576). Bartholow (2005) analyzes the personal traits in association with exposure of violence from video games, such as aggression and empathy. He found that violence in video games can influence aggression through an increased hostility trait, and that empathy levels had decreased as well.

The second study attempted to find whether a history of violent video gameplay could also contribute to the results of the first study. Bartholow (2005) interviewed 95 out of the 200 participants from the first study after participants played either a non-violent or violent game. The second study also attempted to find relationships between video game history, personality, trait hostility and aggression. However, unlike the first study, the second was based in a

laboratory setting. He found that a history of violent video game playing is linked to an increase to the aggressive behavior found in these participants. Overall, Bartholow (2005) found that violence in video games has an influence on aggressive behavior.

The article by Bartholow (2005) is unique in its analysis of the player's history of violence in video games. However, some limitations present themselves. The most obvious is the absence of data from female participants. Males can be more aggressive and violent than females, as highlighted in a news article by Bartle (2019), which can be a large influence in the data collected by researchers. Findings also suggest that violent video games are a risk factor in criminal behavior, along with inherent aggressive and hostile traits. Findings from Bartholow (2005) portray the other side of the debate on video game violence, suggesting that video game violence can be considered an influence in crime and criminal behavior.

Findings from both Ferguson (Ferguson and Olson, 2014; Ferguson, 2015) and Bartholow (2005) have highlighted the debate on violent video games and their influence on the behavior of players. Ferguson (Ferguson and Olson, 2014; Ferguson, 2015) suggests that violent video game media has been a protective factor for players against committing crime. However, Ferguson has yet to explain why this could be the case. Przybylski et al. (2009) seeks to fill this gap in literature by conducting six studies. They aimed to determine if violent content was a motivating factor in people's prolonged enjoyment of video game play. Przybylski et al. (2009) conducted two surveys and four experiments and based their research on the self-determination theory (SDT), which explains that people are motivated to grow by three universal psychological needs (Cherry, 2021, What Is Self-Determination Theory? section). The first study attempts to determine the relationships between game enjoyment, immersion and motivation to play video games and the "psychological need satisfactions of autonomy and competence" (p. 247). They

utilized a sample population of 1,028 members aged between 18 to 39, which contained both males and females. By utilizing a survey in which participants answered with regards to a self-selected favorite game, they found that the psychological need satisfactions of competence and autonomy were related to enjoyment, immersion and motivation. Additionally, they found that violent content may not be associated with player motivation.

The second study attempted to find if trait aggression would add variation to the findings in the first study. They utilized a sample of 68 undergraduates with a mean age of 19.5 years and measured the same variable as in the first study, expecting that trait aggression would change in a laboratory setting. They utilized *House of the Dead III* on the XBOX as their research game of choice and measured trait aggression in preference of future gaming as well as the need satisfactions stated in the first study. Participants were asked to play the game for 15 minutes, as a typical game session was reported to be between five and 30 minutes, and were then interviewed with a set series of questions about their experiences, trait aggression and self-determination. They found that enjoyment, preference and presence were correlated with competence and autonomy. They also found that trait aggression was connected to future preference of games, but not connected to the enjoyment of the game. Additionally, they found that trait aggression was not related with competence but associated with autonomy in the context of violent games.

The third study is similar to the second, trying to find a relation between competency, autonomy, and predicted preference, but with both violent and non-violent games. They use *Glider Pro 4* as their non-violent game and *Marathon 2* as their violent game. They found that similarly to study two, competence and autonomy was connected to enjoyment, preference and

presence. They also found that trait aggression did not have much relation to individual differences, but could be used to predict enjoyment and future preference in regard to game type.

The fourth study also focused on the effects of violence on enjoyment and future preference. They used and modified a commercially available game, *Half Life 2*, to remove any variability of gameplay unlike study three. Przybylski et al. (2009) had a sample population of 101 students with a mean age of 19.6 years. After playing the game, participants were asked to complete a questionnaire. After analyzing the data, they found that similarly to the other studies, player need satisfaction is able to predict enjoyment, preference, and presence. Additionally, they found that trait aggression is able to predict future play, and that players with higher aggression would prefer higher violence and those with lower aggression prefer low violence.

For the fifth study, Przybylski et al. (2009) attempted to determine the effects of violent content and aggression on the opt-in behavior on avid gamers. For the fifth study, 39 students with a mean age of 19.54 participated for extra credit. Participants were males who played video games for five hours or more per week. They were asked to play *HOTD3* with a random level of violence, from low violence to high violence. They found that the results mirrored that of study four.

The last study is a survey that attempts to determine the role of "dispositional aggression" in account for game results and value of play in regular players (Przybylski et al., 2009, p. 254). They predict that similarly to the other studies, need satisfaction would provide variance in enjoyment, presence, and interest (Przybylski et al., 2009, p. 254). Additionally, they predicted that ESRB rating would interact with trait aggression in predicting the player's game value (Pzybylski et al., 2009, p. 254). Participants consisted of 1,642 people aged 18 to 43 from the community in study one. The results were similar to the previous studies, in that players'

psychological need satisfaction was able to predict enjoyment in players, and that trait aggression was connected to future preference.

Overall, by using this data in the context of our study, we can say that those with higher trait aggression will be more likely to consume more violent video game content than those with lower trait aggression. However, some limitations of the studies do present themselves. The most common, again, is the lack of female participants. Males are more prone to aggression, as highlighted by Bartle (2019), which can result in inaccurate data. It was found that those with higher aggressive traits were more likely to prefer violent video games, but did not enjoy violent video games more than nonviolent video games. An aggressive person's preference in violent video games, even with the absence of elevated enjoyment compared to nonviolent games, can be indicative of a protective factor against real-world violent behavior. The study, in its entirety, suggests that video games are enjoyable because they satisfy a psychological need that may not be able to be satisfied in the real world, and that violent content has little influence within this context. This finding is relevant because it counters the popular belief that violence in video games is a cause of real world violence by stating that violent content does not have as much of an impact as some may think. Additionally, a psychological need for a person with an aggressiveness trait may be the expression of their aggression, in which video games can be an outlet for them instead of expressing aggression in the real world.

All of the articles discussed have made huge strides towards the question of whether video games cause violent behavior. However, as mentioned previously, many of these articles are limited in that researchers' sample populations consist mainly of male participants, thereby leaving a gap when it comes to female behavior. Eastin (2006) strives to fill this gap by analyzing female participant behavior and experiences with violent video game content.

The article by Eastin (2006) is a study consisting of three experiments on the effects of video game violence on female players. Eastin (2006) highlights that while there has been a history regarding video game violence and real-life aggression on males, there is a lack of information regarding how this violence affects female players. He begins with an academic history of the topic, but also provides a theoretical background that will be used throughout the study. Eastin (2006) uses the General Aggression Model (GAM) developed by Anderson and Bushman (2002) which can be used to "explain why exposure to violent media increases human aggression" (p. 353).

The first experiment attempted to find a relationship between the user's gender and their in-game character's gender. Eastin (2006) hypothesized that matching genders would provide more presence to the user (p. 356). Additionally, he hypothesized that those with matching genders would express more aggressive thoughts than those with opposite genders (Eastin, 2006, p. 356). Participants consisted of 76 female students aged between 18 and 32. They were asked to play *Unreal Tournament: Game of the Year Edition* and were assigned to random genders and against AI computer players with randomized genders. At the end, they were asked to answer a questionnaire. Eastin (2006) found that participants with same-gendered characters had increased presence within the game compared to those with opposite genders. Additionally, those with same-gendered characters exhibited higher levels of aggression. Eastin (2006) also found that when facing male opponents, regardless of character gender, players exhibited higher aggression.

The second experiment is similar to the first in that Eastin (2006) analyzes presence and aggression, but rather than playing against AI bots, the participants played against other players. Eastin (2006) hypothesized that playing against a human opponent would increase presence within the game (p. 361). Moreover, he hypothesized that playing against human opponents

would increase aggression while playing (Eastin, 2006, p. 361). Participants consisted of 75 students aged 18 to 24 from introduction communication classes at Ohio State University. Participants were assigned into two groups: those whose opponents were human, and those whose opponents were AI bots. While some believed they were playing against humans, all participants were playing against AI bots. All controlled variables were the same in study two as they were in study one. Eastin (2006) found similar results in the first study, where the gender of a player's character highly contributed to the players' presence within the game and more aggressive thoughts. However, Eastin (2006) found that opponent type did not contribute at all to players' presence, but players with "human opponents" were found to display more aggressive thoughts during gameplay (p. 362-363).

The final experiment expands on study two, but attempts to find correlations between aggression, presence and human male opponents. Like experiment two, Eastin (2006) hypothesized that human opponents would increase presence and aggressive thoughts compared to AI opponents (p. 364). However, Eastin (2006) also proposes two research questions regarding whether opposite gender opponents would increase presence and aggressive thoughts (p. 364). For experiment three, a sample of 81 female participants aged 18 to 29 were recruited. Like experiment two, participants were told they were playing against both human opponents and AI opponents. Both male and female opponents were used. Eastin (2006) found that, similarly to experiment two, the hypothesis that human opponents would increase presence lacked any statistical significance (p. 365). Additionally, opponent gender also lacked any statistical significance in regard to player presence (Eastin, 2006, p. 365). However, he did find that opponent type contributed to aggressive thought and that male opponents produced greater aggressive thought in participants (Eastin, 2006, p. 366).

Overall, the findings produced by Eastin (2006) were surprising in that there are increased levels of aggression when female players are opposed by other players, specifically males. Additionally, findings indicate that female players are more able to connect and be immersed in the game if their character is also female. This article is important as it highlights what has been missing in the other articles. Eastin (2006) was able to fill in the gap in literature that researches the effects of violent media on women.

All of these articles highlight the fluctuating and inconclusive debate on whether violence in video games cause increased levels of violence and aggression. While some say that violence in video games do increase aggression and violence, others state that video game violence does not contribute to increases in aggression and violence. Especially after major violent crimes such as mass shootings is this debate emphasized in the political environment. Additionally, many of the articles done are based in the United States, which restricts information to just the U.S. perspective. Further research is required because the long-term effects of video games are still not well understood. With this paper, I hope to contribute to the debate with a Canadian perspective in order to help academia and scholars add to the ocean of knowledge and information regarding the subject.

The Current Study

Method

The current study attempted to determine the relationship between video game sales and levels of violence and aggression. Specifically, the current study was attempting to find a relationship between an increase in video game sales and increased levels of violent crime rates in Canada to establish causation. In order to determine if this connection is a causality

relationship, we must first fulfill three criteria (T. Trussler, personal communication, October 27, 2020). The first criteria is whether or not video games are associated with an increase in violent behavior. The second criteria consist of the temporal order of the variables. The third and final criteria is that the relationship cannot have a spurious relationship or intervening variable. From this, the following hypotheses were produced:

H: An increase in video game sales will lead to an increase in violent crime rates

H_0: There is no relationship between video game sales and violent crime rates

This methodology was also used by Ferguson in his 2015 study on whether movie or video game violence can be used to predict societal violence in the United States. In the study, Ferguson (2015) utilized a similar methodology to the current study, comparing video game unit sales to youth violence rates to see if a relationship could be determined. The current study has also employed this methodology, comparing video game unit sales to violent crime rates in order to determine a relationship between the two variables.

Definitions

In this study, violence will be defined as "the use of physical force so as to injure, abuse, damage, or destroy" (Merriam-Webster, n.d.). As such, violent crime will refer to crimes that result from this use of physical force.

Measures

Video Game Sales. Data consisted of sales information from popular FPS games, such as *Call of Duty* and *Halo*. These games were selected to represent the FPS genre due to their high success and popularity amongst players. Additionally, these two titles were highly influential to the genre, and many other games copied the style and gameplay of these two games. FPS games

were the selected genre to represent violent video games due to its focus on player presence, where players were able to project themselves onto their character, instead of playing as an already established character. FPS games were also selected because of their emphasis on a more realistic experience and realistic graphics.

Sales data from other games such as *Minecraft* were also collected to compare and contrast with FPS sales data. *Minecraft* was also selected due to its high popularity with players, as most video game players have at least heard about it. *Minecraft* was also chosen to represent a less violent game category because of its child-friendly designs and simple gameplay mechanics. These data sets were dated between 2010 and 2021 from official sources and/or through websites such as *statista*. Unit sales data was collected worldwide.

Violent Crime Data. Data consisted of reported cases of violent crime such as assault and homicide in Canada. Assault and homicide were chosen because these two crimes are reflected in the video games chosen for the study. These data sets were dated between 2010 and 2021 from official government sources, such as StatsCan, and police reports.

Procedure

The study consisted of comparing and contrasting data sets regarding violent crime rates with data sets on video game sales. Data sets on violent crime rates were collected through Statistics Canada, while data on video game sales were collected through various statistics websites and official sales numbers by companies. Data sets regarding video game sales were then compared against the data sets collected regarding crime rates to see if there were any related data points to suggest a relationship between video game sales and violent crime. Two or more matching data points indicates a relationship as having only one matching point may indicate only coincidence. Data trends will also be considered when establishing a relationship

between video game violence and crime rates, where similar or opposite trends can signify either risk or protective factors respectively. Similar to the study by Ferguson (2015), bivariate correlation equations were also utilized in order to find significant correlations between video game sales and violent crime rates.

Collected Data Sets

Assault

Based on statistical data provided by Statistics Canada (2021), there have been slow increases in assault incidents in Canada after 2014. Data consisted of both adult and youth crime incidents and has been split between the three types of assault: level 1, level 2, and level 3. According to the Canadian Criminal Code of Canada (1985), assault occurs when an individual intentionally applies force to another person without consent (s. 265(1a)). Assault level 2 is assault with a weapon or causing bodily harm, and level 3 is aggravated assault (Criminal Code of Canada, 1985, s. 267-268(1)). Assault was selected due to its reflection in gameplay of *Halo*, *Call of Duty* and *Minecraft*. The data is presented in table 1.

Table 1.

Actual incidents of assaults between 2010 and 2020.

Level	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
1	175,289	173,099	170,291	158,259	153,832	157046	159592	163279	170138	188186	177580
2	51,955	50,431	49,807	46,019	45,096	47388	49945	52140	54218	59704	64807
3	3,481	3,526	3,532	3,241	3,273	3320	3466	3584	3584	3973	3817

Note. Adapted from *Table 35-10-0177-01 Incident-based crime statistics, by detailed violations, Canada, provinces, territories and Census Metropolitan Areas* by Statistics Canada, 2021. Copyright 2021 by Statistics Canada.

Homicides

Homicide, as defined in the Canadian Criminal Code (1985), occurs when someone "directly or indirectly, by any means, causes the death of a human being" (s. 222(1)). From 2015 to 2020, there has been a drastic increase of homicide incidents in Canadian metropolitan areas (Statistics Canada, 2021, Table 35-10-0177-01). Data consisted of actual incidents for both adult and youth crime. Similarly, homicide was selected due to its reflection in the gameplay of the selected video games. The data is presented in table 2.

Table 2.

Actual incidents of homicides between 2010 and 2020.

Year	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**
Act. Inc.	554	598	543	512	521	609	612	666	658	687	743

Note. Adapted from *Table 35-10-0177-01 Incident-based crime statistics, by detailed violations, Canada, provinces, territories and Census Metropolitan Areas* by Statistics Canada, 2021. Copyright 2021 by Statistics Canada.

Halo (per units sold)

Halo is one of the most influential game series in the FPS genre. According to Hornshaw (2019), *Halo* "changed the conception of what games could be for a lot of players" (para. 10) and "its approaches to gameplay and presentation made for that truly 'epic' experience that games

have continued to try to capitalize on ever since" (Hornshaw, 2019, para. 10). As of February 24, 2021, the *Halo* series has sold over 81,000,000 copies, with 47,000,000 copies just from the last 11 years worldwide (Welfare, 2021). Data consisted of legally purchased copies sold worldwide, as data presented were from official sales sources, such as Bungie. The data is presented in table 3.

Table 3.

Sales numbers for *Halo* per unit sold between 2010 and 2021.

Year	**2010**	**2012, Oct 31**	**2012, Dec 6**	**2014**	**2015**	**2021**
Units sold	34mil	46mil	50mil	60mil	65mil	81mil

Note. Information for 2011, 2013, and information between 2015 and 2021 are missing. Adapted from *The Halo Franchise Sales History: A Collection Of Data* by Welfare, 2021, https://www.resetera.com/threads/the-halo-franchise-sales-history-a-collection-of-data.438679/

Call of Duty (per units sold)

The *Call of Duty* series can be argued as the most popular FPS games of all time. According to the Guinness World Records (2013), *Call of Duty* was the best-selling shooter video game series. Additionally, *Call of Duty* was the most successful video game franchise created in the US and the third best-selling franchise of all time (Wikipedia, 2022). As of April 2021, the *Call of Duty* franchise has sold more than 400 million units worldwide (Clement, 2021). Similarly, data consists of legally purchased copies sold worldwide, as the data came from official sources. Data is presented in table 4.

Table 4.

Sales numbers for *Call of Duty* per unit sold between 2014 and 2021.

Year	**2014**	**2016**	**2019**	**2021**
Units sold	175mil	250mil	300mil	400mil

Note. Information for 2010-2013, 2015, 2017, 2018, and 2020 are missing. Adapted from "Lifetime unit sales generated by Call of Duty series worldwide as of April 2021 (in millions)" by J. Clement, 2022. Copyright 2022 by Statista. https://www.statista.com/statistics/1244224/cod-lifetime-unit-sales/

Minecraft (per units sold)

Minecraft is a popular open-world building survival game where the player must forage their surroundings for supplies to make tools and houses. According to the Washington Post (2013), *Minecraft* is a video game that allows players to create and break various blocks in a three-dimensional environment. Although being created in 2011, its popularity has yet to drastically change. As of August 2021, there are 141 million monthly active users in online servers or in single-player (Clement, 2021). Sales for *Minecraft* have also been increasing since its launch. In 2020, there has been a cumulative total of 200 million sales for *Minecraft* (Curry, 2022, Minecraft Sales section). Additionally, in 2018, there has been a cumulative total of 93 million sales for *Minecraft: Pocket Edition* (Curry, 2022, Minecraft: Pocket Edition Sales section). Collected data consisted of legally purchased units of *Minecraft* worldwide, as data came from official sources. Data is shown in table 5 and table 6 respectively.

Table 5.

Sales numbers for *Minecraft* per unit sold from its launch in 2011 to 2020.

Year	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**
Units Sold	4mil	9mil	33mil	54mil	72mil	100mil	122mil	154mil	176mil	200mil

Note. Adapted from "Minecraft Sales" by D. Curry, 2022, *Minecraft Revenue and Usage Statistics (2022),* https://www.businessofapps.com/data/minecraft-statistics/

Table 6.

Sales numbers for *Minecraft: Pocket Edition* per unit sold from its launch in 2012 until 2018.

Year	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**
Units Sold	3mil	14mil	21mil	30mil	50mil	63mil	93mil

Note. Adapted from "Minecraft Sales" by D. Curry, 2022, *Minecraft Revenue and Usage Statistics (2022),* https://www.businessofapps.com/data/minecraft-statistics/

Data Analysis

To test our hypothesis, graphs were developed from the data sets gathered. Crime rate graphs were then compared with video game sales graphs in order to find similar trends. Similar trends suggested a relationship between sales and crime rates. Additionally, bivariate correlation equations were utilized in order to determine significant relationships between video game sales and violent crime rates.

Results

By analyzing the data and presenting them in graph format, we can clearly see a positive curve with the sales in video games. This is not surprising as throughout the last 20 years, video games have increased in popularity. The *Call of Duty* franchise is notable because its sales have doubled in the past six years alone. This can be attributed to the series' yearly releases of new games, as well as the ongoing Covid-19 pandemic which forced many people to stay home. The newly found boredom at home may have motivated many people to purchase games to entertain themselves during this time.

In terms of crime rates, we can see that all of the crimes being monitored have increased in incidents after 2014. This is indicative that there is at least a connection between video games and violent crime. However, other factors of criminal behavior could have influenced this sudden increase in incidents. For example, a drop in oil prices in 2014 could have contributed to loss of jobs, resulting in increased stress and desperation, ultimately leading to increased crime.

Assault lvl. 1

Overall, it is noted that there were upward trends of assault lvl. 1 crime rates that corresponded with game sales between 2014 and 2019. Especially in 2018 and 2019, there has been a sharp increase in lvl. 1 assault incidents in Canada. Moreover, in 2018-2019, video game sales continued to rise, with *Call of Duty* having a sharp increase in unit sales after 2018. *Minecraft* had the most sales of all three video games analyzed, jumping from 54 million unit sales in 2014 to 176 million unit sales in 2019. This could be due to the restrictions placed due to Covid-19 and the sudden influx of people staying home.

However, post-2019 crime rates have decreased significantly, while video game sales continue their upward trend. This could be an indication that video games can be a means to

deter people from committing crime. However, this could also be a result of the Covid-19 pandemic, as the restrictions to stay at home had taken away the opportunities to commit crime, as proposed by the routine activity theory. Routine activity theory suggests that crime is dependent on three factors: motivated offender, suitable targets, and lack of guardianship (Tibbetts & Piquero, 2021, p. 67). Motivated offenders are more likely to target easier victims, such as houses without security or drunk people. Additionally, there is an increased chance that crime will occur if there is a lack of a capable guardian, such as a police officer, a guard dog, or an alarm (Tibbetts & Piquero, 2021, p. 68). Graphs for assault lvl. 1 are shown in Figures 1 to 3.

As can be seen, *Halo* unit sales are positively correlated to assault lvl 1. The bivariate correlation between the two variables is $r = 0.23$ ($df = 6$, $p = 0.00$). Although the correlation is relatively weak, a positive correlation indicated that increases in video game sales have resulted in increases in assault incidents for both adult and youth crime. A p-value of 0 also indicates that the relationship is statistically significant.

Additionally, contrary to the inverse relationship suggested by Figure 2, *Call of Duty* unit sales are also positively correlated to assault lvl 1. The bivariate correlation between these two variables is $r = 0.73$ ($df = 3$, $p = 0.00$). Similarly to the relationship between *Halo* and assault lvl 1, the relationship between *Call of Duty* and assault lvl 1 are statistically significant. However, the positive correlation between *Call of Duty* sales and assault lvl 1 is significantly stronger than the correlation between *Halo* sales and assault lvl 1.

Like the other two games, *Minecraft* also had a positive correlation to assault lvl 1. The bivariate correlation is $r = 0.50$ ($df = 9$, $p = 0.00$), signifying a statistically significant positive correlation between *Minecraft* sales and assault lvl 1 incidents.

Figure 1

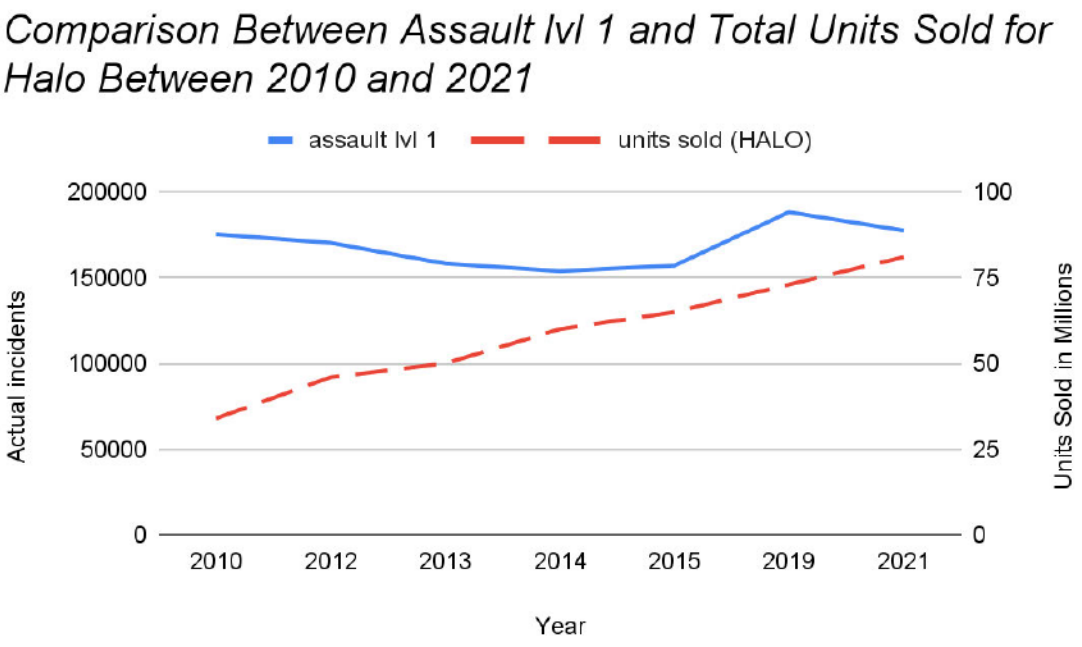


Figure 2

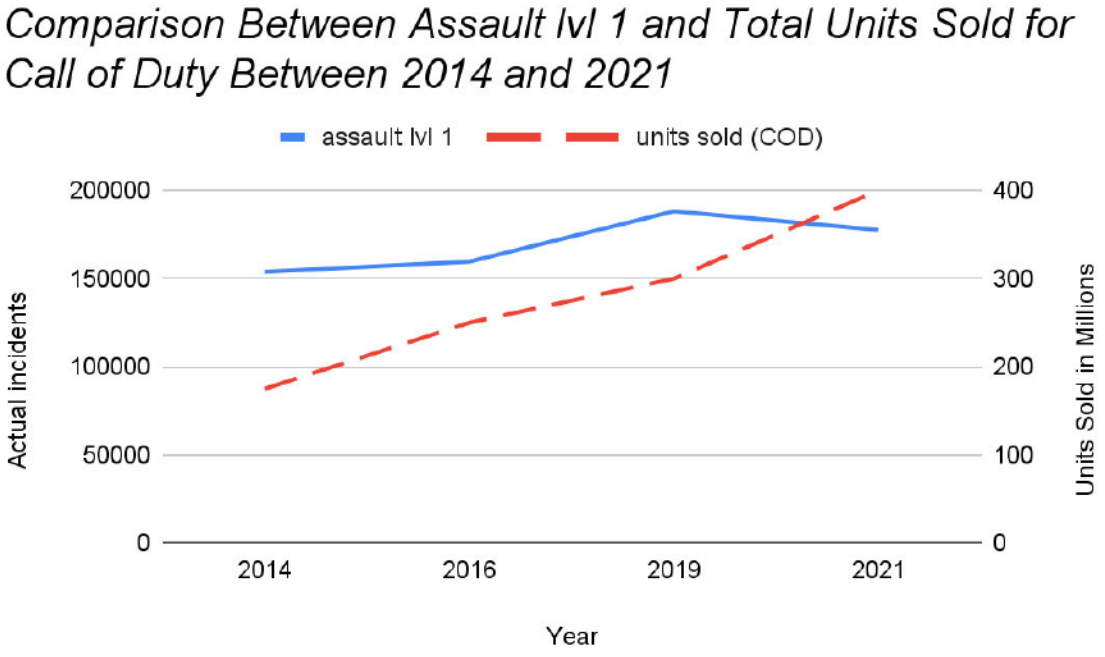
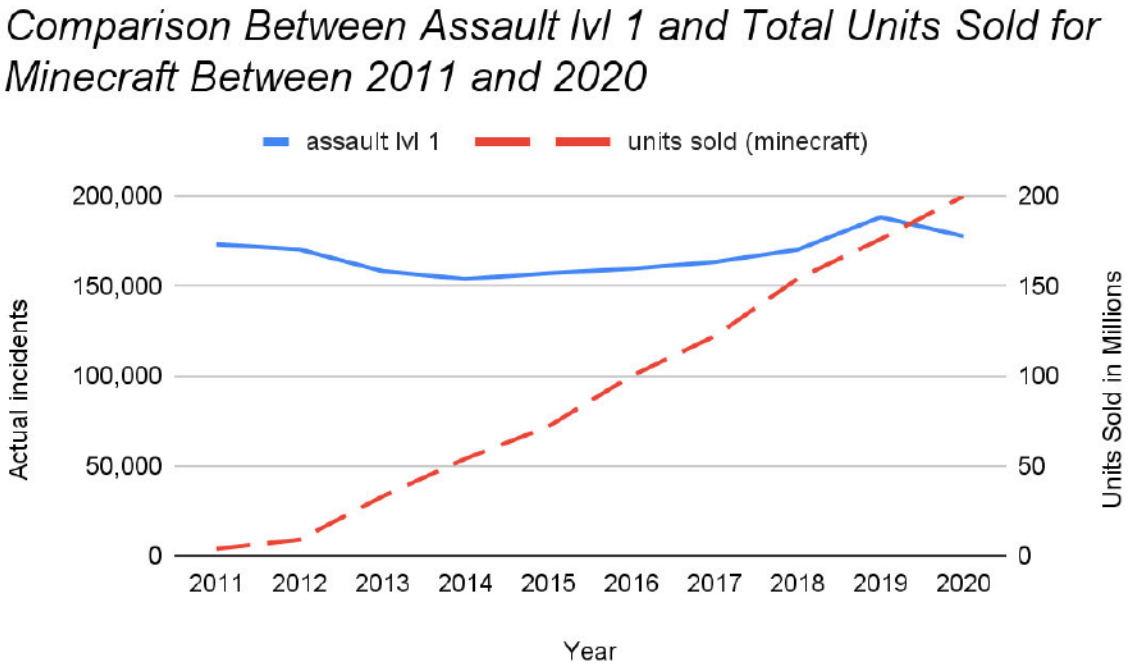


Figure 3



Assault lvl. 2

Overall, crime rates regarding assault lvl. 2 show stronger correlations between video games and violence. Crime rates for assault lvl. 2 intercept with sales data for *Halo* twice as seen in Figure 4. This can be an indication that the increased popularity of *Halo* has contributed to the rise in incidents of level 2 assault. A similar graph was produced for crime rates in comparison to *Call of Duty* unit sales, indicating the influence that *Call of Duty* had on level 2 assault crime rates in 2016. This data is showcased in Figure 5. Again, the drop in crime rates in 2019 could be the result of pandemic factors following the routine activity theory.

The weakest relationship is with *Minecraft*, a less violent game in comparison to the other games analyzed. While *Halo* and *Call of Duty* sales intercepted with crime rates at least twice, *Minecraft* sales rates only intercepted with crime rates once. According to our outlined

measurement system, this is not enough to formulate a relationship between level 2 assault incidents and *Minecraft*. The graph is shown in Figure 6.

In terms of bivariate correlation, *Call of Duty* shows the strongest positive correlation with level 2 assault. The bivariate correlation between *Call of Duty* unit sales and level 2 assault incidents are $r = 0.97$ ($df = 3$, $p = 0.00$), indicating a nearly perfect positive correlation that is also statistically significant.

Shockingly, the second strongest correlation is with *Minecraft*. The bivariate correlation for lvl 2 assault and *Minecraft* unit sales is $r = 0.82$ ($df = 9$, $p = 0.00$). The results of the bivariate correlation equation indicate that increases in *Minecraft* unit sales rates are highly correlated with increases in lvl 2 assault incidents. This correlation is also statistically significant.

The correlation between *Halo* unit sales and lvl 2 assault incidents is the weakest out of the three games analyzed. However, the correlation is still positive, meaning that increases in *Halo* sales also increase lvl 2 assault incidents for both adult and youth crime. The bivariate correlation between the two variables is $r = 0.60$ ($df = 6$, $p = 0.00$). Although weaker than the correlations with the other games, the correlation between *Halo* unit sales and lvl 2 assault incidents is still statistically significant.

Figure 4

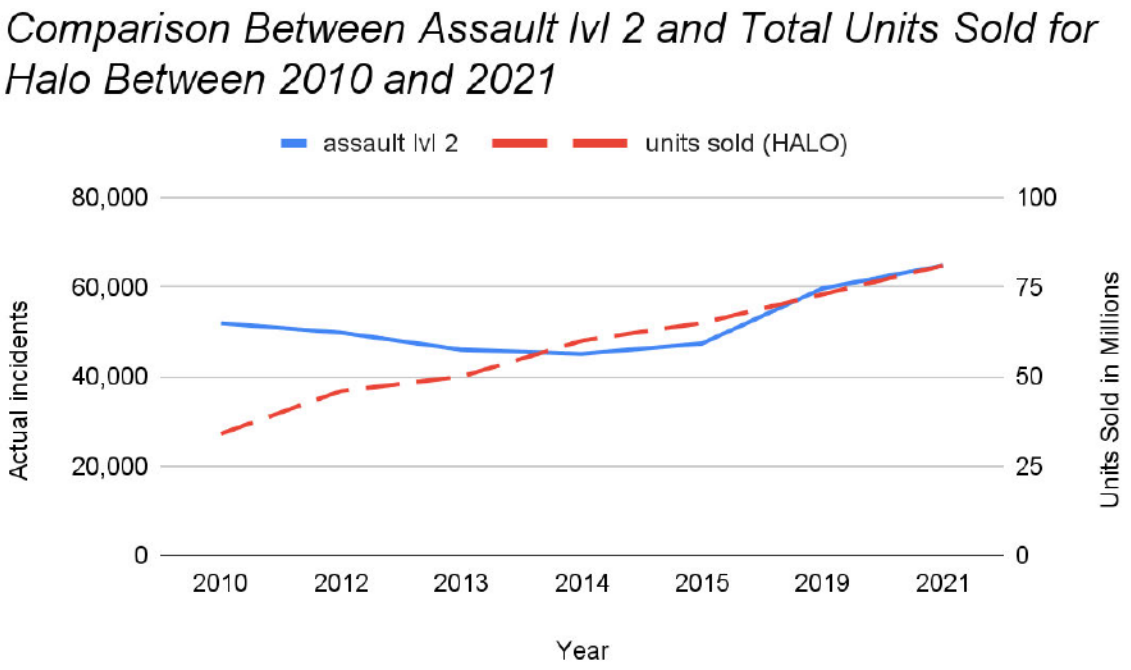


Figure 5

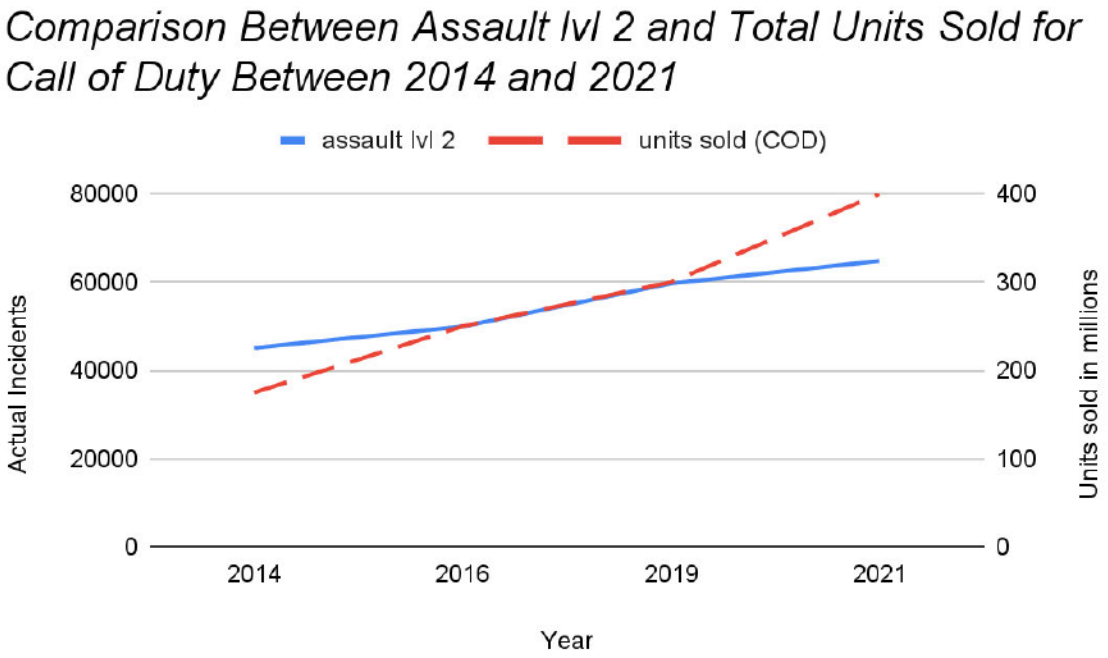
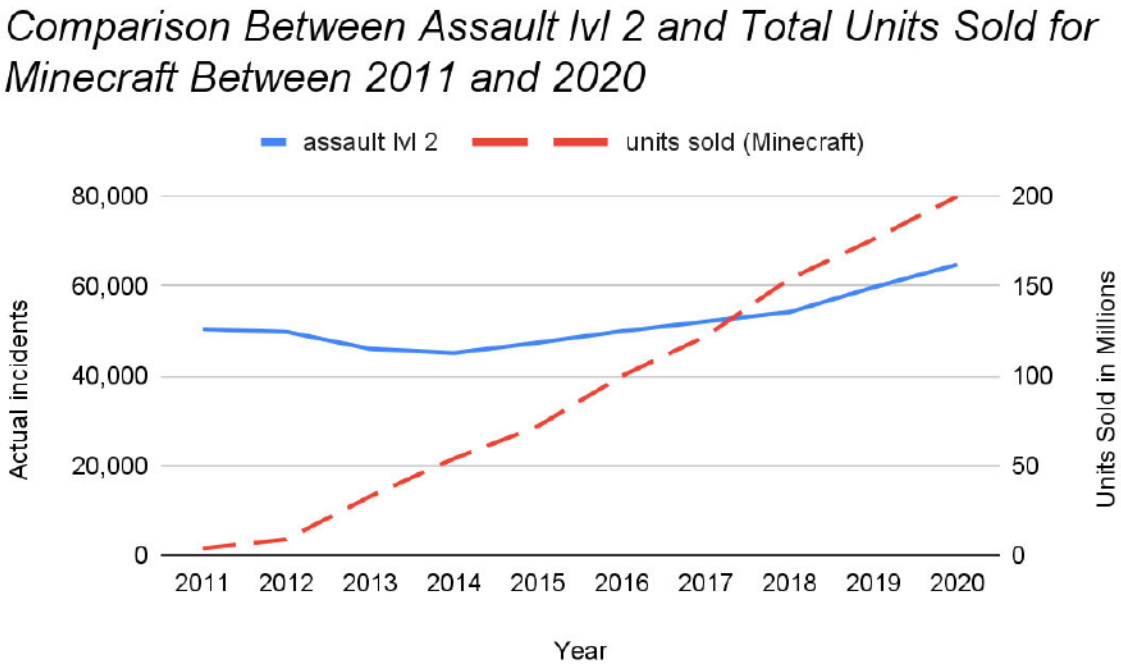


Figure 6



Assault lvl. 3

The relationship between crime rates for level 3 assault and video game sales is the weakest out of the three levels. By analyzing the graphs, we can see little data regarding video games' influence on increasing violence and aggression. However, it is observed that an increase in video game sales have contributed to a slight increase in incidents of level 3 assault. The decrease in crime rates in 2019 can be due to the pandemic and the absence of opportunities to commit crime. Graphs are shown in Figures 7 to 9.

Call of Duty game unit sales still possess the strongest correlation out of the three analyzed games ($r = 0.79$, $df = 3$, $p = 0.00$). *Minecraft* game unit sales and lvl 3 assault have similar correlation with $r = 0.72$ ($df = 9$, $p = 0.00$). Again, *Halo* game sales have the weakest correlation with lvl 3 assault with $r = 0.54$ ($df = 6$, $p = 0.00$). Bivariate correlation equations for

all three games indicate a positive correlation with lvl 3 assault that is also statistically significant.

Figure 7

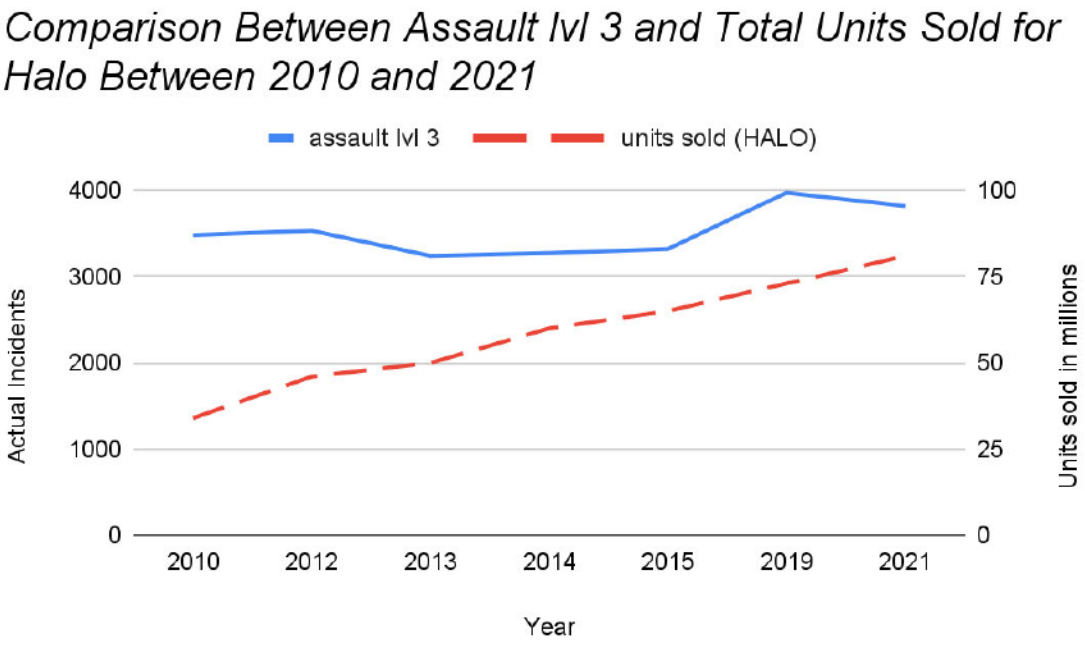


Figure 8

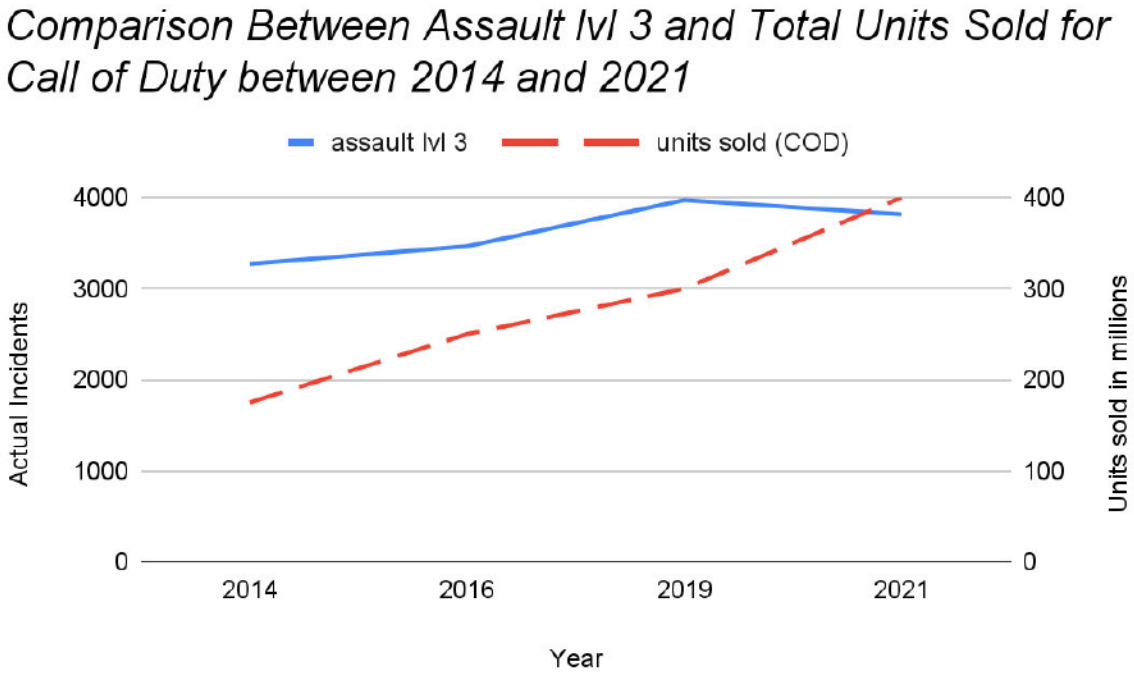
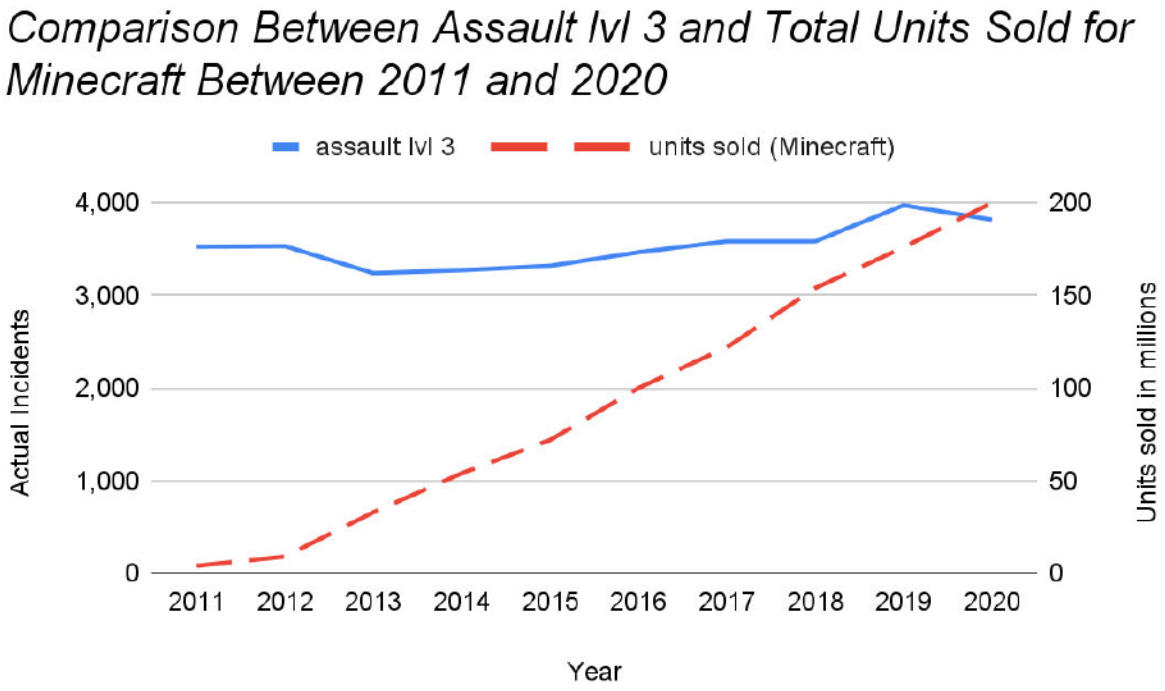


Figure 9



Homicide

It can be said that video games have caused an overall decrease in incidents of homicide in Canada between 2010 and 2020. However, the relationship between homicides and all three games is not strong enough to determine, based on the presented graphs.

The sales for *Halo* can be seen to deter some homicide rates. As sales increase, crime rates would decrease. The opposite can be said when sales decrease, where crime rates would increase. However, there is not enough data to formulate a strong correlation. The graph is shown in Figure 10.

The relationship between homicide crime rates and *Call of Duty* unit sales data would suggest a causation relationship until 2019. Both crime and sales increase steadily, suggesting that the increase in game sales also increases homicide rates. However, post-2019, as video game

sales drastically increased, homicide rates began to decrease. This can indicate a sort of deterrence relationship between the two variables. The graph is shown in Figure 11.

Surprisingly, sales data for *Minecraft*, a game advertised to mainly children, has a strong correlation to homicide rates like the two previous, more violent video games. By analyzing the graph, it can be observed that crime rates are steadily rising alongside the unit sales of *Minecraft*. While the other games have a deterrence relationship, where increases in video game sales correspond to decreases in crime, *Minecraft* sales rates have more of a causal relationship, where increases in sales also correspond to increases in crime rates. However, similarly to the others, there is not enough data to formulate a strong relationship between the two variables. The graph is shown in Figure 12.

Drops in homicide crime incidents as well as increases in game sales in 2019 could also be the result of the heavy restrictions placed during the peak of the Covid-19 pandemic. Following the routine activity theory, due to the sudden restrictions to stay home for many people, the opportunities for crime were no longer present, thereby deterring crime from occurring. Additionally, as stated previously, people staying home would find entertainment in video games, thus explaining the increase in video game sales.

Contrary to graphical results, bivariate correlation results suggest that there are strong correlations between all three games and homicide rates. The correlations between video game sales and homicide rates are the strongest out of the analyzed crime rates. Again, *Call of Duty* sales rates have the strongest correlation to homicide rates, having an almost perfect positive correlation ($r = 0.98$, $df = 3$, $p = 0.00$). *Minecraft* and *Halo* game sales also have strong correlations with homicide rates, where $r = 0.88$ ($df = 9$, $p = 0.00$) and 0.81 ($df = 6$, $p = 0.00$) respectively.

Figure 10

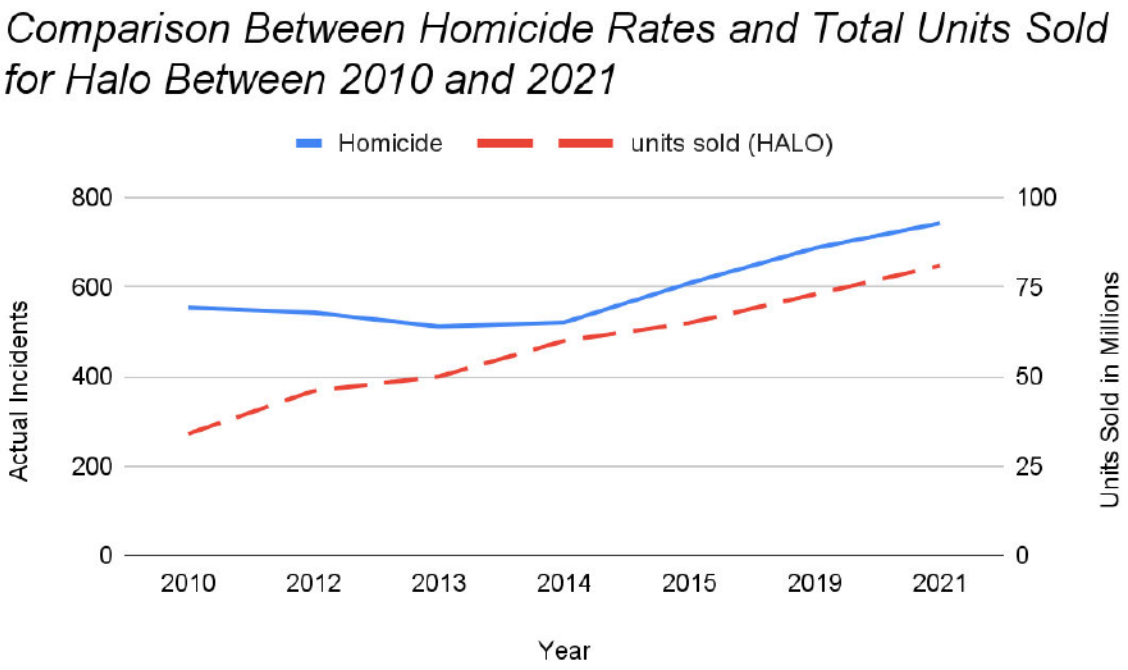


Figure 11

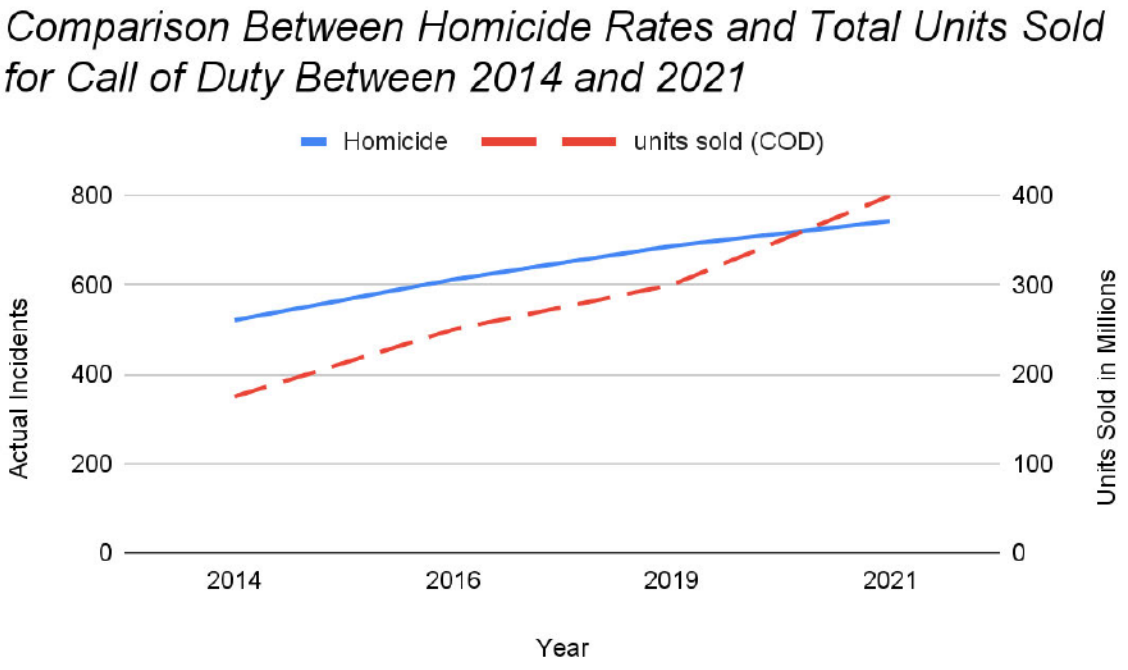
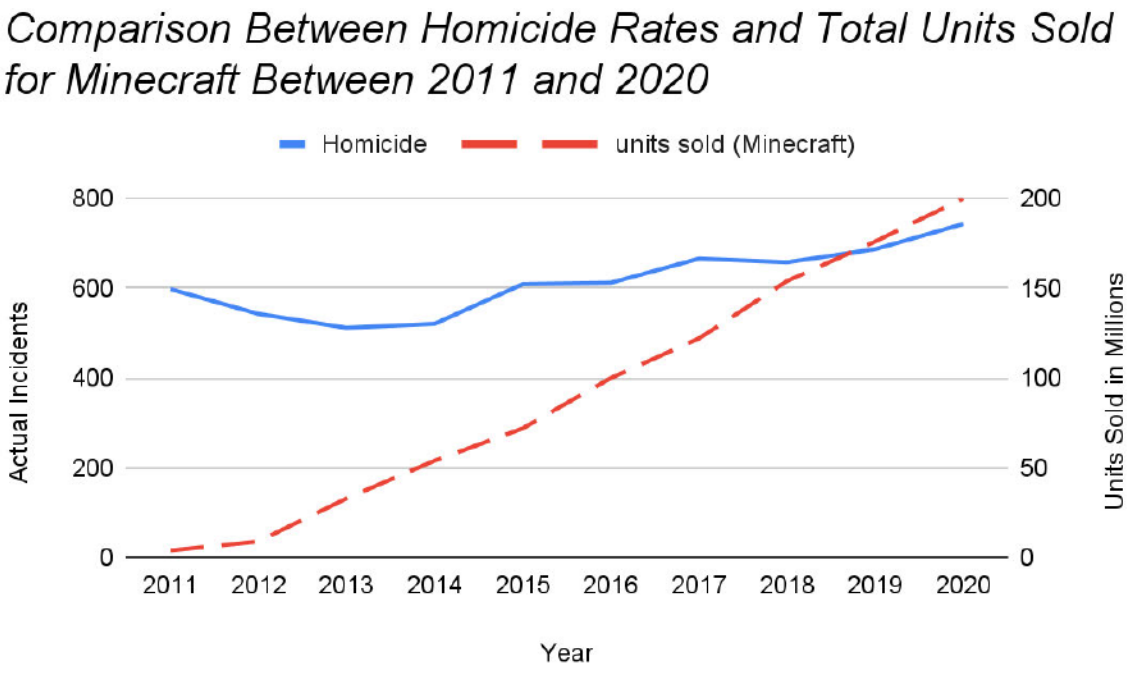


Figure 12



Discussion

The issue of whether video game violence causes societal violence has been a topic of debate for many years. There have been many studies and experiments conducted that have failed to provide a consensus on this topic. On one hand, studies like the one conducted by Ferguson (2015) have shown that video game violence had an inverse relationship with societal violence, meaning that rises in video game sales have resulted in decreases in youth violence. On the other hand, studies like the one conducted by Bartholow (2005) indicate that video game violence has a positive correlation with societal violence and aggression, meaning that increased exposure to violence in video games also increases the likelihood of criminal behavior.

The current study examined the impact of video game sales on incidents of societal violence related to assaults and homicides. In general, the proposed hypothesis is accepted. Graph data collected suggests that rises in unit sales for video games does contribute to the rise

of violent crime rates in Canada. Additionally, Pearson's bivariate correlation coefficient results indicate strong positive correlations between video game unit sales and crime rates. All correlations also possess statistical significance, meaning that it is unlikely that increases in video game sales would also increase crime rates by chance.

Crime is a result of motivation and opportunity, but a criminal also requires the skills necessary to commit the crime (J. Winterdyk, personal communication, January 12, 2022). The graphical data may suggest that video games have provided potential criminals an idea of the skills necessary to successfully commit crime. Many games, like *Call of Duty* and *Halo*, have strived to provide the most realistic experience of combat and thus can provide a visual representation of skills used in many combat scenarios, such as reloading a firearm or hand-to-hand combat. Players can learn and mimic these actions from video games which will give them the skills to pull off many crimes, two of which we analyzed.

As stated previously, a causality relationship must fulfill three criteria (T. Trussler, personal communication, October 27, 2020). By analyzing the graphs produced by the data sets, an association relationship between video games and violent behavior can be determined. Additionally, the increase in sales for some video games have preceded the rise in the violent crime rates that we looked at after 2014. Therefore, both the first and second criteria of the causality relationship are established.

The last criteria will be more difficult to determine. Crime is a complex phenomenon, and many factors can contribute to why crime occurs. Data suggests that video games are a risk factor of crime. As seen in the graphs for crime and *Call of Duty* sales rates, crime would increase when video game sales would increase. The same can be said about *Halo* sales rates.

These indicate that video games promote aggressive traits and societal violence, resulting in increases in crime incidents.

Additionally, video games are more strongly correlated to lvl 2 assault and homicide incidents in Canada. There are statistically weaker correlations between video games and violence when analyzing lvl 1 and lvl 3 assaults. Taking all of our findings into account, I suggest that video games would increase and promote aggression and violent behavior to players and push players to utilize weapons to either assault or kill others, reflecting the gameplay of violent games. Violent video games, in their strive to create a more realistic experience, would adversely affect players by desensitizing them to violent behavior. This effect, in turn, would cause players to become more violent because, to the player, the level of violence is not as major.

Limitations

As with all studies, there are many limitations to this research. Firstly, and most importantly, there is little to no demographic information in the crime data gathered. As stated previously, men tend to have more aggressive behavior when compared to women. According to Wölfer (n.d.), men are more aggressive especially to other males because they are competing for reproductive success, based on the sexual-selection theory (as cited in Calver, 2015). Additionally, boys and men with more traditional views of masculinity were more aggressive towards other-sex individuals based on the social-role theory (Wölfer, n.d., as cited in Calver, 2015). Males are also dominant in the video gaming industry. It cannot be 100% verified if video games are the cause of increased aggression or if male aggressive tendencies are truly the main factor.

Age of players is also not present in the study. When looking at crime rates, both adult and youth crime was added together in order to determine actual incident numbers for the

analyzed crimes. As stated by Moffitt's developmental taxonomy theory, it is normal for teens and young adults to commit crime, as it is seen as a "rite of passage" (Tibbetts and Piquero, 2021, p. 234) and is usually the result of peer pressure. Additionally, the risk of committing crime naturally lowers as an individual ages (Tibbetts and Piquero, 2021, p. 234). Therefore, numbers from these crime rates can be a result of being caught for committing these rites of passage.

Secondly, many factors can contribute to sudden increases and/or decreases in statistical data for both variables. For example, the increase in criminal activity in 2014 could be due to the drop in oil prices, resulting in major job losses in the oil and gas industry. Additionally, increases in game sales and decreases in crime rates in 2019 can be related to Covid-19 pandemic factors, such as stay-at-home mandates inhibiting opportunity, as described by routine activity theory. The study does not capture these other factors in any way.

Thirdly, video game unit sales data is based on collected data from the worldwide market, and not restricted to the Canadian market. This can mean that the study does not possess a strictly Canadian perspective. Unit sales for certain video games can be lower in Canada than in other countries and comparing worldwide sales data to only Canadian crime rates cannot accurately reflect on the effects of video game sales on crime rates.

Lastly, as stated by Ferguson (2015), the analysis of relatively shorter periods can indicate a correlation when, in reality, it is an ecological fallacy (p. 205). In his analysis of movie violence and societal violence, Ferguson (2015) noted that in the early and late 20th century, movie violence was associated with lower levels of societal violence, and in the mid-20th century, movie violence and societal violence "appeared to coincide" (p. 205). Ferguson (2015) states that "so long as scholars and policymakers took a relatively short view… it is

understandable that many considered movie violence and societal homicide to be correlated" (p. 205) when in reality, the two variables had similar trends. The same can be said about the current study. With its limited analytical scope, it is nearly impossible to determine if increases in video game sales truly influence rises in violent crime, or if the two variables currently just have similar trends, implying an ecological fallacy.

Future Research

Video games are still relatively new, and much is still needed to learn about the effects of video games on behavior. This study was just one of many attempts to explain such behavioral changes with the introduction of video games. In order to fully understand these effects, more research is needed.

Conclusion and Policy Implications

In conclusion, the study indicates that increases in video game sales are significantly correlated to increases in violent crime rates. The presence of video games can promote aggressive traits and increases in violent video game sales has the potential to increase incidents of assault and homicide. In this sense, video games would increase real-world violence by desensitizing players to violence and promoting harm and use of weapons, as reflected in video gameplay. Video games are a wide-spread entertainment industry, with more and more players joining every day.

Policies are already in place to prevent the sale of violent video games to minors aged under 17. In the United States, the banning of the rental and purchase of violent games to minors was rejected due to the violation of the right to free speech (*Video game law in Canada*, 2011).

However, Canadian law was able to restrict minors from obtaining violent video games through s. 1 of the Charter of Rights and Freedoms (*Video game law in Canada*, 2011).

Through this research, Canadian policy makers can learn about the potential risk factors posed by violent video games. Additionally, policy makers can utilize this research in order to create stronger restrictions for the rental/purchase of violent video games for minors to mitigate the risk factors related to video games.

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