It’s in the Game: The effect of Competition and Cooperation on Anti-Social Behavior in Online Video Games

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ABSTRACT

Video games have been criticized for the amount of violence present in them and how this violence could affect aggression and anti-social behavior. Much of the literature on video games effects has focused primarily on the content of video games, but recent studies show that competition in video games could be a major influence on aggression. While competing against other players has been shown to increase aggression, there is less research on whether the mere presence of a competitive environment can influence aggression. The existing research has also primarily been performed using surveys and lab experiments. While these two approaches are very useful, they lack the ecological validity of methods like field experiments. This study examined how competitiveness, teamwork, and co-operation affect anti-social behavior in video games. A 2 (competition: high vs low) x 2 (cooperation: vs no cooperation) x 2 (team: teammates vs opponents) online field experiment on hostile speech was performed. In this study, it was found that players experience more hostile language from their teammates than they do opponents. However, neither the level of competition nor cooperation had an effect on hostile language. There was a significant interaction between player team and cooperation, with teammates being less hostile in the cooperation condition and enemies being more hostile in the cooperation condition. Implications for hostility in online video games and group dynamics within online games are discussed.
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Introduction

Video games are a very popular hobby in the United States, with 42% of Americans playing more than three hours a week and 80% of households owning a device used for playing video games (Entertainment Software Association, 2015). As with most new media technologies, the commercial boom of video games started a trend of research on the potential social harm of video games that has continued to this day (Ivory, 2016).

There are several reasons for the concerns that video games are negatively affecting players with much of that concern focused on “Triple A” games developed by major studios with large budgets (Steinberg, 2007; Wolf, 2007), usually played on a console or a personal computer and not more casual games usually found on smart phones and similar devices. One of these reasons is the fear that children could become addicted to video games (Kuss, 2013; Starcevic, 2012). Because of this concern, the American Psychiatric Association (2013) included “Internet Gaming Disorder” in The Diagnostic and Statistical Manual of Mental Disorders as a condition that should be researched more thoroughly to determine if it should be considered a disorder. There is also concern about the amount of violence in some video games. According to a content analysis of T-rated video games by Haninger, Ryan, and Thompson (2004), 98% of games targeted at teenagers involved some violence. There has been concern amongst researchers that violence in video games could have several negative effects on players (Anderson & Ford, 1986; Dominick, 1984). One of the potential negative effects is that seeing simulated violence in a game will desensitize players to real world violence (Funk, Buchman, Jenks, & Bechtoldt, 2003). Another concern is that the violence in video games will make people more aggressive or violent (Bushman & Anderson, 2002).

Research on the social effects of video games started in the 1980s with the rise of arcades and home video game consoles. The primary focus of this research has been on the potential negative effects
of video games (Anderson & Ford, 1986; Dominick, 1984). One of the main effects that researchers have been interested in is the effects of in-game violence on aggressiveness. Bandura (1961) theorized that aggression could be a behavior learned through observation. This theory, known as social learning theory, and later adapted as social cognitive theory, has been applied to the question of video games and aggression. A significant amount of research on the topic of video games and violence has looked at aggression as a behavior that is learned by playing violent video games. This is a dominant theory in the field and has been supported by a considerable amount of research (Anderson et al., 2004; Bushman & Anderson, 2002; Chory & Cicchirillo, 2007).

While the theory that aggression is a learned behavior has been widely studied, there has been some research that has gone against this viewpoint. Researchers have found results that contradict the idea that players learn aggressive behaviors from video games (Ferguson & Rueda, 2010; Markey & Markey, 2010; Scott, 1995). These findings have called into question the previous research and have led to a debate in the field. Because of this controversy, researchers have started looking for other potential explanations for this perceived increase in aggression. The possible effects of competition in games have opened as a new area of research. While this area is relatively new, there has been a considerable amount of evidence that shows that competition could play a larger role in the how video games affect players than violent content (Adachi & Willoughby, 2011a; 2013; Anderson & Morrow, 1995).

For most of their history, video games have been studied using surveys and lab experiments (Anderson & Morrow, 1995; Bushman & Anderson, 2002; Ferguson & Rueda, 2010). While these methods are useful, and the findings of these studies are important, other methods, like field experiments, can also be used to study this phenomenon. Field experiments are useful to researchers because of their ecological validity (Harrison & List, 2004). Ecological validity means the results of a study are more generalizable because they are as close as possible to the real world. Field experiments can be very
useful in video game research as online games allow researchers to observe players in their natural environment (Castronova, 2006; Elson, Breuer, & Quandt, 2014). Most people do not play video games in research labs on college campuses; they play them at home. Learning how video games affect players is important, and the results from lab experiments and surveys are vital to understanding these effects, but having students come to a research lab to play less than 30 minutes of a game then seeing how they behave may not be the most accurate way to test effects. Field experiments allow researchers to remove the unnatural feeling of playing video games in a lab setting and measure how players react to stimuli naturally. While some field experiments have been conducted to study video games (Holz Ivory, Fox, Waddell, & Ivory 2014; Kuznekoff & Rose, 2012; Waddell & Ivory, 2015), the topic of aggression has been mostly ignored, and this study fills this gap.

This study was an online field experiment examining how competition and cooperation in an online setting affect anti-social behavior in players. The design of this experiment was a 2 (competition: high vs. low) x 2 (cooperation: cooperation vs. no cooperation) x 2 (team: Teammates vs. opponents) design. The researcher played an online game called *League of Legends* (Riot Games, Inc 2009) with other players, by manipulating the level of competitiveness of the game mode played and the level of cooperation by the researcher character to examine these factors’ effects on anti-social behavior by teammates and opponents in an online game. For the purpose of this study, anti-social behavior was defined as hostility, which was measured using a scale adapted from the one used by Rude, Chrisman, Denmark, and Maestas (2012).

The game that was used for this experiment is *League of Legends (LoL)* (Riot Games Inc, 2009). *League of Legends* is a Multiplayer Online Battle Arena (MOBA) in which two teams of five players each compete against each other to destroy the other team’s base. *LoL* requires each player to work together with his team in order to win each match. Before a match, players are assigned a role and are
allowed to pick a character to play as during the match. Each character has a unique set of skills and powers, and because of this different characters are more suited for different roles in the game. During a match, players work together as a team to kill their opponents, capture objectives, and destroy the other team’s base. MOBA’s are very competitive games, and this is the ideal environment to investigate how competition affects players. This game allowed the researcher to manipulate both the level of competition and the amount of cooperation. In the following sections, relevant research on the history of video games research, video game competition, and online field experiments will be summarized. After the research has been reviewed the study’s design will be explained and the results of the experiment detailed. A discussion of the implications and limitations of the study will also be discussed, along with suggestions for future research.

**Literature Review**

**Early Video Games Research**

Video game effects became a recent topic of interest during the arcade boom of the 1980s when teenagers were flocking to arcades around the country. With many teenagers frequenting arcades, researchers were concerned with the effects that these arcade games would have on the players. Dominick (1984) was one of the first researchers to investigate the effects of arcade games on players. The researcher surveyed teenagers about their arcade, and television habits and then measured their aggression and self-esteem. The results showed significant correlations between the amount of time spent playing arcade games, television watched, and aggression, but these correlations disappeared when other factors were accounted for. This was the first in a line of studies that looked at how violent content in games affected violent and aggressive behavior.

While Dominick’s (1984) results were interesting, they were also inconclusive. One reason for this may be the usage of a survey instead more experimental methods. Surveys are very useful tools for
researchers, but they are not always the most appropriate method to study phenomena. The main issue with survey research has to do with the surveys themselves. Questions on a survey are often left up to the interpretation of the participant. This can cause inaccurate data as participants could have different understandings of the questions being asked (Schwarz, 1999). Anderson and Ford (1986) continued the research started by Dominick (1984) but used a lab experiment instead of surveys. To do this they conducted two experiments testing how violence in games could affect aggression, hostility, and anxiety. Experiment 1 was conducted to categorize different games on different dimensions to decide which games should be used for the second experiment. For experiment 2, the researchers assigned participants to play either a highly aggressive game, mildly aggressive game or no video game. After playing the game assigned, participants completed scales that measured their aggression, hostility, and depression. The results showed that participants who played highly aggressive games had increased hostility and anxiety compared to participants in the control condition. Participants who played the mildly aggressive game also had increased hostility but did not have increased anxiety.

Aside from potential negative effects, early video game researchers were interested in why children were playing video games. During the arcade boom, there was concern that children were spending too much time at arcades, Selnow (1984) was interested in what motivated children to spend so much time playing arcade games. To study this, the researcher administered a three-part survey asking about the uses and gratifications of arcade games to over 200 children. The first part of the study asked the children about their needs. The second part of the study asked the children about their arcade habits. The third part was only given to participants who said that they played arcade games sometimes, and it surveyed the children on potential gratifications of playing arcade games. The results show that the children preferred playing arcades to spending time with their friends and that they played arcade games to learn about people, experience action, have companionship with others, and to escape from the world. Looking at these results, it seems that, at least, part of the motivation for playing games is based on
socialization. Selnow (1987) conducted three more studies on the arcade habits of kids and teenagers. The findings of these studies were very similar to the findings of the earlier study (Selnow, 1984) and indicated that at least one of the reasons people played arcade games was for socialization.

Nonetheless, much of the early research on video game effects was primarily focused on how playing arcade games affected children and teenagers (Anderson & Ford, 1986; Dominick, 1984; Selnow, 1984). The results of these early studies found that increased exposure to violent content in video games increased aggression in young people. Additionally, Selnow (1984) discovered that one of the primary motivations for playing these video games was socialization. The findings of these early studies set the tone for future research on the effects of video games as many researchers choose to focus on how video games relate to aggression.

**Aggression and the GAM**

Research on video games has focused primarily on how they affect aggressive thoughts, feelings, and behavior (Anderson & Ford 1986; Dominick, 1984). One of the more popular conceptual models of aggression applied to the research on the effects of violent video games is the General Aggression Model (GAM). The GAM is a model that was adapted from previous aggression research (Anderson, Deuser, & DeNeve, 1995; Anderson & Dill, 2000; Bandura, 1973, 1983). Anderson and Bushman (2002) helped establish the GAM as an effective tool for researching the effects of violent video games on aggression. The GAM is used as a theoretical backdrop for research on aggression as it relates to episodes of potential aggressive behavior. The GAM describes three stages for each episode: person and situation inputs, present internal states, outcomes of appraisal and decision making (DeWall, Anderson, & Bushman, 2011). The model states that when a person encounters a situation, they respond to it using personal factors like gender, beliefs, and personality, and situational factors like discomfort and frustration. This response to the events then influences the person’s current internal state, including
attributes such as thoughts, feelings, and psychological arousal. After this, the person behaves based on his responses to the situation after it has been subjected to the other two steps. According to this model, playing a violent video game can lead to aggression by changing the way a person responds to situations, which could change their behavior.

One example of a study using the GAM was conducted by Bushman and Anderson (2002) where they used the GAM to investigate whether playing violent video games would increase hostile expectations. The researchers randomly assigned each participant to play either a violent or non-violent video game. After playing the game, participants were given three stories. These stories were ambiguous in nature, and they all ended by asking the participant to finish the story. The participants were asked to give twenty possibilities for what the character in the story would say, think, and do. The responses measured the participants’ expectations of the character’s aggressive behaviors, thoughts, and feelings. They found that participants who had played violent games were more likely to expect the character to do something aggressive, think something aggressive, or feel aggressive.

Another example is the study done by Hollingdale and Greitemeyer (2014) who used the GAM to see how violent video games affected aggressive behavior in online and offline games. The researchers brought participants into their lab and asked them to play either a violent or non-violent video game for thirty minutes. Participants either played offline against computer controlled enemies or online against other players. To measure aggression, participants were given information about different hot sauces and were asked to give determine how much hot sauce the next participant would have to sample. The results found that participants who played the violent game administered more hot sauce than those who played the neutral game. It was also found that participants who played online were more aggressive than those who played offline after playing the neutral game, but they were less aggressive after playing the violent game. It should be noted that participants that played the game online were not allowed to converse with
the other players in the game. Not allowing participants to communicate with other players is a problem, because one of the major appeals of playing video games online is the human interaction (Baek, Song, & Seo, 2004), and by removing the ability to communicate with other players, the researchers fail to reproduce the real experience of playing an online video game.

Additionally, Anderson and Dill (2000) performed two studies examining the effects of violent video games on aggression. Study 1 was a survey consisting of six scales measuring irritability, trait aggression, delinquency, video game usage, world view, and their academic achievement. The results of this study showed that both exposure to violent video games and aggressive personality traits were related to aggressive behavior and nonaggressive delinquency. Study 2 was a lab experiment examining the effects of playing violent video games on aggressive thoughts, aggressive affect, and aggressive behavior. Participants were brought into the lab for two separate sessions. In the first session, participants played a violent video game, completed affective and worldview measures, then played the game again. During the second session played the game again and then completed a measure of aggressive behavior. The measure used for this study was the Competitive Reaction Time Task (CRTT). The CRTT has the participant compete in a reaction time task against another player. If the participant reacts slower than his opponent, he will experience a noise blast. Participants are told the intensity of the blast is set by the other player, but it is actually set by the computer. This task defines aggression as the strength and duration of the noise blasts the participant chooses to send to the other player. The results showed that participants who played the violent game exhibited more aggressive behavior than those who played the non-violent game.

The GAM is a popular model in video game effects research. Researchers using the GAM frequently find significant relationships between exposure to violent video games and increased aggression (Anderson & Dill, 2000; Bushman & Anderson, 2002; Hollingdale & Greitemeyer, 2014).
These findings have partially created a consensus amongst some academics that violent content in video games can increase aggressive behaviors in players (Bushman, Gollwitzer, & Cruz, 2015). But while some researchers believe this relationship to be very strong and consistent, this is not the belief held by some in the field (Ivory, Markey, Elson, Colwell, Ferguson, Griffiths, Savage, & Williams, 2015).

**Contradictory evidence**

While many studies have found that violent content in video games may have an effect on aggression in players not all of the research has come to the same conclusion (Anderson & Ford, 1986; Bushman & Anderson, 2002). Some researchers have been critical of the methods and results of studies that have found relationships between violent video game exposure and aggression, and many of these researchers have found contradictory results (Ferguson & Rueda, 2010; Ferguson, Rueda, Cruz, Ferguson, Fritz, & Smith 2008).

Research on the effects of violent video games is important, and there is a debate in the field about how violent video games affect players. The notion that playing violent video games can cause aggression is widespread with Bushman and Anderson (2001) comparing the relationship to that of smoking causing lung cancer. This idea is not shared by all video game researchers, and there has been some debate about the level of a consensus in the field (Bushman, Gollwitzer, & Cruz, 2015; Ivory et al. 2015). Because of this debate it is vital to discuss studies that go against the prevailing narrative that violence in video games can increase violent behavior.

Scott (1995) was one of several researchers to do a study that highlighted some of the inconsistencies in video game research. He performed an experiment with college students in which he had them play one of three games: a non-violent game, a moderately violent game, or a highly aggressive game. Scott (1995) asked participants to self-report their aggression before and after playing a video game. He found no significant relationship between the overall change in aggressiveness and the
aggressiveness of the game played. Scott (1995) did not find a linear pattern in level of aggressiveness as moderately aggressive games lowered aggressive feelings and highly aggressive games only slightly increased levels of aggression.

Recently there have been researchers who have critiqued the theories and methods used in previous video game research. Ferguson and Rueda (2010) compared two of the prevailing theories used in video game aggression research, to test their validity. The researchers looked at social learning theory and the catharsis hypothesis. Social learning states that people learn violent behaviors from exposure to violent media and the catharsis hypothesis asserts that aggression is a fundamental human drive and that humans can be primed for aggression from other sources (Anderson & Bushman, 2002; Lorenz, 1963). Neither the social learning hypothesis nor the catharsis hypothesis were supported, as the researchers did not find any evidence of exposure to video games affecting aggressive behavior. The lack of evidence found in this study calls into question the previous research on the topic and suggests that video games may not be affecting aggression at all.

Another issue with the learned behavior model of violent video game research is its narrow focus. By focusing only on violent content researchers ignore any other factors that could have an effect. For example, different aspects of a person’s personality could mediate the effects of violent games. Markey and Markey (2010) were interested in seeing what role personality played in the effects of violent video games. The researchers used the five-factor model of personality, which is a model that is frequently used in academic research. The five-factor model measures five dimensions of personality: extroversion, openness, agreeableness, neuroticism, and conscientiousness. The researchers then applied this model to previous research on violent video games that looked at how psychoticism and trait aggression mediated the effects of violent video games. The results showed that participants that were the most adversely affected by video games measured high on neuroticism and low on both agreeableness and
conscientiousness. These results show that only looking at violent content in games is not enough and that researchers should also focus on other variables that could be having an effect.

The potential issue of publication bias in the field is one that concerned Ferguson (2007a). This concern prompted Ferguson (2007a) to conduct a meta-analysis of peer-reviewed research on the effects of violent video games. Publication bias happens when papers that find statistically significant results are published more often than studies that do not find significant results. Ferguson (2007a) performed a meta-analysis of 25 studies that had been published between the years 1995 and 2005. This meta-analysis found evidence of a strong publication bias for both experimental and non-experimental studies that measured aggression. These results show that the current body of research that is available may not be representative of the research that has been performed because systematic biases in the publication process prevent researchers from publishing studies with null findings, or even submitting them for publication, in an example of a well-known and well-documented phenomenon known as the “file-drawer” effect. (Rosenthal, 1979).

Another problem with the research is that some of the measures of aggression, such as the CRTT, may be invalid. The CRTT has come under fire recently as some researchers have criticized it for being unstandardized (Adachi & Willoughby, 2011a; Elson, Mohseni, Breuer, Scharkow, & Quandt, 2014). While the CRTT has been frequently used, the ways in which it has been implemented have not been consistent. When a researcher uses the CRTT, the researcher does not have to adhere to a standard, which means that the test could be different every time it is used. Researchers often change the number of games played by the participant, what order the games are played in, how often they win or lose, and the intensity of the noise blasts. The CRTT has also been measured inconsistently, with many researchers changing how aggression is measured depending on the study (Anderson & Dill, 2000; Bartholow, Sestir, & Davis, 2005; Carnagey & Anderson, 2005). These inconsistencies in measurement and
implementation can drastically change the results, leading to inaccurate conclusions, which casts doubt on the validity of the studies using it.

Another problem with research on violent video games is the operationalization of variables like aggressive behavior. Markey, Markey, and French (2015) reported that when aggression is operationalized in a lab setting, it is either done with small acts of aggression such as noise blasts in the CRTT or done with self-assessment questionnaires. The criticism of these measures is that they do not have any real world applications. Blasting noise in someone’s ear or filling in stories with more violent words is not qualitatively similar to being aggressive or violent towards someone else in real life. These measures are not generalizable to everyday life, and, therefore, do not measure how people will behave outside of the lab setting.

Another concern about whether the research on effects of violent video games has serious real-world implications is the state of trends regarding video game play and crime rates over time. As video game sales have increased over the years, the number of violent crimes has decreased (Ferguson & Kilburn, 2009). While this negative correlation between violent video games sales and violent crime does not provide conclusive evidence for effects, it does somewhat alleviate concerns about the real-world harms of violent games.

Another problem with research on the effects of video games and aggression is the use of the GAM. Researchers have continued to use the GAM as a model for their research on video games and aggression (Anderson et al., 2004; Chory & Cicchirillo, 2007; Gentile et al., 2004). While this model has been very popular, there have been some researchers who have criticized it. Ferguson and Dyck (2012) mentioned several flaws with the model. The major criticism that they had with the GAM is that it makes several assumptions that could be false. Ferguson and Dyck (2012) claimed that the GAM assumes that: aggression is always a negative emotion, humans cannot tell the difference between what is real and what
is fiction, aggression is mainly learned, aggression is mainly a cognitive process, and that aggression is an automatic process. In their opinion, the GAM is also flawed because the model does not allow for falsification, because if no results are found, the model dismisses them as a type-2 error and because the model makes no predictions that could be proven to be false. The GAM is widely used in video game research, despite the criticism from other researchers (Anderson et al., 2004; Chory & Cicchirillo, 2007; Ferguson & Dyck, 2012; Gentile et al., 2004). The continued use of the GAM and the criticisms of its usage are one more example of the extent of debate in the field of video game effects research.

At times this debate has become heated, with researchers openly criticizing those that disagree with them, for example, Bushman and Huesmann (2013) wrote a paper criticizing a previous paper conducted by Elson and Ferguson (2013). Elson and Ferguson (2014) replied with a letter of their own defending their work and themselves. Some researchers have identified issues with the way that video game research has been conducted and presented over the years; some of these issues are limitations in methodology and the personal bias of the researchers and publishers (Elson & Ferguson, 2013, 2014; Ferguson, 2007a). Scholars argue that while there has been some evidence of a relationship between exposure to violent games and aggression, this evidence is not as strong as it may seem to some, because researchers may be overstating their findings and because studies with no findings are being ignored by publishers.

The criticisms of previous research on the effects of violent video game on aggression highlight the controversy in the field. Criticisms of the measures used, accusations of publication bias, and the narrow focus of the field are just a few of the issues facing the field of video game effects research (Ferguson & Dyck, 2012; Ferguson 2007a; Markey & Markey, 2010; Markey, Markey, & French, 2015). The controversy in this field has led to a fierce debate with some researchers publicly criticizing their peers for disagreeing with them (Bushman & Huesmann, 2013; Elson & Ferguson, 2014). Because there
is a lack of consensus in the field about aggression, it is important to examine the existing research as a whole to gain an understanding of what has and has not been found.

**Meta-Analyses of Video Game Research**

Several meta-analyses examining violent video game research have been conducted over the years. Anderson and Bushman (2001) performed a meta-analysis that reviewed 35 published research reports examining how exposure to violent video games affected aggressive behavior, aggressive cognition, aggressive affect, physiological arousal, and prosocial behavior. The results of this analysis showed that increased exposure to violent video games increased aggressive behavior, cognition, and affect while it decreased pro-social behaviors. Anderson (2004) conducted a second meta-analysis that looked at the same five outcome variables used in the original analysis (Anderson & Bushman, 2001). This analysis was done to address criticisms of the first one by accounting for methodological issues in the studies sampled. The results of this analysis were similar to those of the first one, showing that exposure to violent video games increased aggression. The American Psychological Association (APA) created a task force to investigate the effects of violent video games on aggression and other behaviors (American Psychological Association, 2015). This task force performed a meta-analysis of studies published between the years 2009 and 2013 for the potential effects of exposure to violent video games. The results showed a strong relationship between exposure to violent video games and increased aggression. Anderson et al. (2010) conducted another meta-analysis of 136 studies on the effects of violent video games conducted before 2008. This meta-analysis also found significant evidence of a relationship between exposure to violent video games and aggression.

While the findings of these analyses may seem decisive, they may not tell the complete story. Sherry (2001) conducted a meta-analysis of 25 studies examining the effects of violent games. While the analysis found support for a relationship between exposure to violent games and aggression, the
relationship had a small effect size, and this relationship was mediated by the length of exposure, with more exposure decreasing aggression. Greitemeyer and Mügge (2014) also conducted a meta-analysis of 98 independent studies that found a small relationship between exposure to violent games and aggressive behavior. It was also found that exposure to prosocial video games increased prosocial behavior. Additionally, a meta-analysis consisting of 17 studies performed by Ferguson (2007b) found that exposure to violent video games did not increase aggressive behavior, but it did increase visuospatial cognition. Ferguson and Kilburn (2009) also performed a meta-analysis of 25 studies that failed to find a significant relationship between exposure to violent video games and aggressive behavior.

The inconsistent findings of meta-analyses examining the effects of exposure to violent video games highlight some of the debate in the field (Elson & Ferguson, 2014). Following the analysis performed by Anderson et al. (2010), there was a string of comments published in a series of articles from researchers who were critical of the analysis and researchers who defended it (Ferguson & Kilburn, 2010; Bushman, Rothstein & Anderson, 2010). Ferguson and Kilburn (2010) claimed that the meta-analysis was flawed because of the inclusion of irrelevant and unpublished studies, as well as the usage of unreliable methods for their analysis. Bushman, Rothstein, and Anderson (2010) defended the analysis claiming that there were no issues with the studies selected and that the methods used for the analysis were valid. Additionally, following the analysis done by the APA (2015), Ferguson (2015) wrote an open letter criticizing the report for ignoring a large portion of the research, and for making claims that he felt could not be supported by the current body of research. This open letter has now been signed by more than 200 video game researchers from around the world.

While several meta-analyses have found consistent evidence of a relationship between playing violent content and aggression, other meta-analyses have supported this effect (Anderson et. al. 2010; Ferguson, 2007b). The findings of these meta-analyses show how inconclusive the current state of video
game effects research is. One avenue toward resolving this impasse regarding potential effects of violent content is to explore alternate mechanisms for purported effects of violence on aggression that may reconcile the discrepancy between the various study findings. For example, an emerging program of research suggests that competition may be a factor responsible for many effects on aggression previously attributed to media violence.

**Competition**

Research on the effects of video games on aggression has yielded inconsistent results. Much of the research has focused on aggression as a learned behavior, and while many researchers believe there is a strong relationship between violent games, and aggression, some of the research does not bear this out (Ferguson; 2007b; Ferguson & Rueda, 2010; Scott 1995). The inconsistencies in this research have led many researchers to turn their focus from violent content and onto other potential aspects of videogames that may cause aggression.

Violent content in video games has been the subject of a considerable amount of research, but violent content may not be the only factor that could be affecting aggression. Elson, Breuer, Ivory, and Quandt (2014) argue that by focusing only on the content of games, researchers are ignoring many of the factors that make games unique from other types of media. Elson et al. (2014) specifically mention game mechanics and playing context as unique factors in video games. *Game mechanics* are the rules that define how players interact with the game, mechanics are what make video games interactive and are one of the defining characteristics of the medium. Game mechanics are important in defining video games, as the interactivity that these mechanics provide are what separate games from other forms of media.

*Playing context* is the environment that the game is played in. Context can be affected by many factors, including the gaming platform, the method of controlling the game, and whether it is being played alone or with others. The social context of gameplay is a factor because many people play video games with
others both cooperatively and competitively. These cooperative and competitive contexts are a distinct feature of video games that separate them from other forms of media.

Many researchers have chosen to focus primarily on the content of video games, but the social context in which they are played could be a key factor in how games affect players. The social context of video games, specifically the competitive nature of games, has been extensively researched (Adachi & Willoughby, 2011a; Anderson & Morrow, 1995; Schmierbach, 2010). Playing video games with others is popular, with 56% of gamers saying they play games with others and 54% saying they do so weekly (Entertainment Software Associations, 2015). The competitive nature of most video games is an important factor that is often overlooked when discussing their effects.

There has been a long history of research linking competition and aggression, but Anderson and Morrow (1995) were the first to relate that to video game research. Anderson and Morrow (1995) performed two experiments. The first experiment examined the differences in perceptions of cooperative and competitive situations. The results of the first study showed that people view competitive situations as being more aggressive and cooperative situations as less aggressive. Study two applied the findings of study one to see if the perceptions of aggression and competition affected behavior. The researchers had participants play a video game and gave them instructions that were either cooperative or competitive in nature. Participants who were given more competitive instructions were significantly more aggressive than those who received the cooperative instructions. These findings indicated that competition may have an effect on aggression levels and that this effect can be applied to video games.

While Anderson and Morrow (1995) found evidence that competition can affect aggression, Adachi and Willoughby (2011a) were among the first to suggest that there may be a relationship between the competitive nature of video games and levels of aggression. Adachi and Willoughby (2011a) performed two experiments on the effects of violence and competition on aggression. The first compared
violent games to non-violent games to see if there was a difference in their ability to influence aggressive 
behavior. Study one found no difference between violent and non-violent games, suggesting that violent 
content is not enough to affect aggressive behavior. The second study was done to examine how video 
game competitiveness affected aggressive behavior and to see if there was an interaction between 
competitiveness and violence that would affect aggression. Study two found that participants that played 
competitive games exhibited more aggressive behavior than those in the non-violent conditions, but no 
difference was found between violent and non-violent conditions. These findings are evidence that 
vviolent content alone may not be enough to produce aggressive behavior.

Many researchers have done similar research on the effects of competition and video games and 
have found similar results (Ewoldsen, Eno, Velez, Guadagno, & DeCoster, 2012; Schmierbach, 2012; 
Velez & Ewoldsen, 2013). The effect of competition on aggressive and anti-social behaviors has been 
established by the previous research. The emergence of competition as a factor when studying the effects 
of games on aggression is an important development, as it highlights how the field of video game 
research needs to expand to encompass factors more than just violent content.

Competition is built into most video games. Whether the player is competing against other 
players or competing against the game itself, most games have some competitive element. Since most 
video games have elements of competition in them, it is possible that these games create an environment 
for players that is inherently competitive. There have been several studies that have looked at how the 
competitive elements in video games affect players, but it is also important to discuss how competition 
and competitive environments in the real world can affect people in general (Adachi & Willoughby, 
2011a; Anderson & Morrow, 1995).

The competitive elements of video games, especially multiplayer games, can create a gaming 
environment that is very competitive in nature. Many online multiplayer video games have some sort of
ranking or grading system that shows how skilled each player is. These ranking systems allow players to compare themselves to others, and being ranked highly is seen as a status symbol (Microsoft Research. n.d.). Ascending these rankings is very important to many players. This focus on being highly ranked creates a highly competitive environment within these games (Sherry, Lucas, Greenberg, & Lachlan, 2006).

Many researchers have been interested in competitive environments and the effects that they may have on people (Harrison et al., 2001; Wittchen, Krimmel, Kohler, & Hertel, 2012). To understand how competitive environments could potentially put stress on people, Harrison et al. (2001) brought participants into a research lab and measured their blood pressure. After having their blood pressure measured, participants completed a questionnaire testing their competitiveness. Participants then played a competitive racing game and had their blood pressure taken again. The results showed that participants who played the competitive racing game had higher blood pressure than those in the other conditions.

Wittchen, Krimmel, Kohler, and Hertel (2002) were also interested in how competition affected stress. These researchers performed a study that tested how different types of competition (interpersonal vs. intergroup) affected the performance and stress levels of male and female participants. This study measured stress as cardiovascular activity and was measured using blood pressure monitors. The researchers had the participants play a simple computer game twice. Before the second time they played, half of the participants were told that they were going to be competing with others. The results showed that participants in the competition condition had increased effort, and experienced more stress than those in the no competition condition. The results of these two studies show how competition can affect a person’s levels of stress (Harrison et al., 2001; Wittchen, Krimmel, Kohler, & Hertel, 2002).

This increase in stress is important, but more important is the effect that this increased stress has on people in these environments. Stress has been related to many negative behaviors including
aggression and anger (Agnew, 2001). This relation can be partially explained by Agnew’s (1992) General Strain Theory (GST). GST states that strain or stressors can increase negative feelings like aggression (Agnew, 2001). Agnew (1992) claimed that there are three things that can increase strain or stress: failure or expected failure to achieve a goal, removal or anticipated removal of positive stimuli, and addition or expected addition of negative stimuli (Agnew, 1992). The first of these stressors can easily be applied to online multiplayer video games. Players have goals, such as increasing their ranking on the online leaderboards, and failing or expecting to fail in increasing one’s rank causes stress, which can lead to negative emotions and anti-social behaviors like aggression (Sherry, Lucas, Greenberg, & Lachlan, 2006).

Based on this existing research on competition, stress, and anti-social behavior (Agnew, 1992, 2001; Wittchen, Krimmel, Kohler, & Hertel, 2002), it is expected that highly competitive environments will elicit more hostility than environments with low competition. Hostility was measured as it is a specific measurable act of aggression as opposed to other measures of aggression that may not accurately measure aggression (Elson, Mohseni, Breuer, Scharkow, & Quandt, 2014). Because of this, the following hypothesis and research questions are proposed.

**H1:** Players will exhibit more hostility in a high competition environment than in a low competition environment.

**RQ1:** Will players exhibit more hostility to teammates or opponents?

**RQ2:** Does the amount of cooperation exhibited from teammates affect the amount of hostility displayed by a player?

**Field Experiments**
Conducting research with human participants is complicated. Researchers need to have enough control over the environment to test their variables, but not so much control that the participants start behaving in a way that they would not under normal circumstances. This need for balance can create many problems with the validity of an experiment. While traditional experimental research is very important to the advancement of the field, it is also important to measure variables through other methods. Field experiments allow researchers to look at how people react to stimuli in a natural setting while still allowing the researcher to manipulate variables. One reason field experiments are valuable is their ecological validity, which means that results of field studies are more generalizable. Results that are not generalizable do not reflect the reality of the world, so having generalizable results are important to understanding the effects of violent video games. Lab experiments in the social sciences have been essential in expanding and growing the field, but lab results may not always be valid. When lab experiments have been replicated in the field, the results have been different than those in the original lab experiments (Anderson, Lindsay, & Bushman, 1999; Mitchell, 2012). For this reason, it is vital to conduct field experiments in the social sciences to validate and extend laboratory findings.

Experimental research on video game effects has been conducted primarily in the lab (Castronova, 2006). While laboratory research is essential, it is not the only way of conducting research. This is especially true in a field that is as complicated as video game research. Elson, Breuer, and Quandt (2014) believe that field studies are “the next logical step” in video game effects research. Field experiments are a natural fit for video game research, as the online multiplayer components of many games allow researchers to manipulate stimuli and observe responses in a natural environment. Researchers can play online with other players who are usually playing at home in a natural environment, and they can manipulate their characters, behaviors, skill levels, etc. to see how other players respond. Castronova (2006) compared large online games to petri dishes and supercolliders, in the sense that these
tools helped revolutionize research in their fields by allowing researchers to observe phenomena in natural settings just as online games do.

Field experiments in online games have only recently become viable. New technologies and an increase in the number of people playing online allow researchers to conduct effective field experiments (Castronova, 2006; NPD Group, 2013). Many video games have online multiplayer options that allow people to play the game with players from around the world, and this development allows researchers the opportunity to do field research in games. One of the first field experiments in video games was done by Kuznekoff and Rose (2012). This study’s purpose was to determine the reactions of gamers to male and female voices. To do this, the researchers played an online with other players, during which they would play recorded messages from a male or female player. They found an obvious pattern of female players receiving a significant amount of derogatory, sexist language.

Another field study on video games was done by Holz Ivory, Fox, Waddell, and Ivory (2014). They investigated sex role stereotyping in online games, specifically in first person shooters (FPS). An experimenter played online against other players, as either a male or female player. Skill was also manipulated by with the experimenter playing well or poorly depending on the condition. During the game, the experimenters would play either a positive, negative or no recorded message to other players using the game’s chat channel. It was found that participants were more likely to accept friend requests from female players than from male characters. Additionally, friend requests from male players were accepted more when the player was rude and female friend requests were accepted more when the player was polite or silent.

Building upon the previous studies looking at how players treat players depending on gender, Waddell and Ivory (2015) looked at how avatar attractiveness, sex and the sex of the player affected their treatment online. The researchers performed an experiment in which an experimenter played a massively
multiplayer online role-playing game (MMORPG) as either a male or female character of varying attractiveness. The experimenter also claimed to be either a male or a female character or did not report sex at all. While playing, they asked other players for help with a task in the game and measured how many other players would help them with the task. They found that attractive characters received more help than unattractive characters and that female users received less help than male users when using cross-gendered characters.

These studies show that field experiments can be used effectively in video game research (Holz Ivory, Fox, Waddell, & Ivory 2014; Kuznekoff & Rose, 2012; Waddell & Ivory 2015). By using field experiments, these researchers were able to find results that are ecologically valid as they come from in the game world itself and not from a lab. These studies provide a groundwork for future field experiments in video games and prove that these experiments can result in meaningful and significant results that contribute to the field as a whole.

**Method**

This study attempted to expand on the existing research (Adachi & Willoughby, 2011a; Anderson & Morrow, 1995; Schmierbach, 2012; Velez & Ewoldsen, 2013) by measuring whether competition in video games increases anti-social behaviors in an online environment. By studying real gamers, who are playing games that they choose to play, in an environment of their choosing, we get the closest possible look at how these games affect people. While the ecological validity is a major factor in deciding to do a field experiment of this nature, it is not the only reason to do so. Doing a field experiment in an online game allows the researcher to examine how both the presence and actions of other players affect a player.
For this study, a modified version of the Jacobvitz (as cited in as cited in Rude, Chrisman, Denmark, & Maestas, 2012) hostility scale was used to measure anti-social behavior. This scale was created to measure hostile behavior in family relationships. This scale defines several behaviors and actions that are considered to be hostile to a person. Behaviors include hurtful comments, judgmental or critical comments, mocking or derisive behavior, patronizing comments or behavior, shaming, and defensiveness (see appendix). The measure is effective because it operationalizes specific behaviors that are hostile in a real world setting. Doing this is more generalizable than seeing how much noise was blasted into someone’s ear or what words someone thought of first. Measuring actual behavior in a real world setting is one of the purposes of doing a field experiment, and this measure allows me to do that.

This study was a 2 (competition: high vs. low) x 2 (cooperation: cooperation vs. no cooperation) x 2 (team: teammates vs. opponents) design measuring the effects of these variables on player hostility in an online video game.

Participants

All participants ($N = 501$) for this study were users of the commercially popular online game *League of Legends* (Riot Games, Inc 2009) encountered during field experiment sessions. The researcher played 57 games with a total of 513 participants. Of this original 513, three participants were excluded for leaving the game before five minutes had passed and not returning. One game including an additional nine participants were excluded because the researcher was not able to play as one of the characters chosen for this study. As a result, only 56 games and 501 participants were included in the analyses. Participants were not aware of their participation in this study and were not debriefed regarding the objectives of the experiment. This was done to maintain the natural quality of the field experiment. No personally identifying information was collected during this field experiment. The Institutional Review
Board at Virginia Tech approved the omission of informed consent for participants because the experimental manipulations were unobtrusive and was a minimal risk to participants.

**Virtual Field Setting**

_League of Legends_ was selected as the game to be used for this study because of its popularity and its large user base. In 2014, _LoL_ had over 67 million players every month and is according to Forbes (2014) the most popular game in the world beating out _Worlds of Warcraft_ and all of the _Call of Duty_ games combined (Riot Games, 2014). _LoL_ is an online multiplayer game that features two teams of five who compete against each other to destroy the other team’s base. This game provides an appropriate field setting for the experiment because of the number of players and the competitive nature of the game.

**Independent Variables**

**Level of competition.** The level of competition was manipulated by playing matches in one of two game modes, ranked and normal. The ranked mode in _LoL_ has a ranking system which players try to ascend to reach new levels and place higher on leader boards. This ranked mode sorts players into leagues based on their skill level. Each league belongs to one of seven ranked tiers: bronze, silver, gold, platinum, diamond, master, and challenger. Each tier has five numbered divisions that rank players within that tier, and whenever a player reaches a new tier he starts in division five within that tier and move upwards to division one. Once a player gets to division one, he has the ability to ascend into the next tier. Advancement is based on the number of _League points_ (LP) a player has. A player earns LP by winning matches and can earn more LP by performing well in a match. When a player loses a match, he loses LP, and if a player loses too much LP, he can be demoted to the division or tier below them. The ranked mode will be used as the highly competitive environment, as players in ranked are more invested in winning, because if they lose a match it could decrease their ranking. Increasing one’s rank in _LoL_ is important. Players receive rewards at the end of each year based on their ranking, with higher ranked
players receiving better rewards. The normal mode in *LoL* does not have this ranking system and is played more for fun and practice than for trying to rank up. The normal mode was used as the less competitive environment for this thesis, as it is less about winning and ranking up and more about just having fun. The ranked and normal modes are identical in every way, with the exception of the level of competition, which helps keep the two conditions consistent with each other.

**Cooperation.** In ranked and normal matches players must work together as a team to complete the objective of destroying the other team’s base. There are five positions that a player can fill: top, jungle, mid lane, support, and AD carry. These five positions determine a player’s role in the game and which characters the player can play as. When joining a match, a player either volunteers for the position of his choice or fills in a position that has not been taken. Each role has its own unique play style and responsibilities to the team as a whole. Properly playing the role is essential to winning games.

Ranked and normal matches of *LoL* are always played on the same map. This map consists of two bases connected by three paths called “lanes,” which are separated by an area called the jungle. Both bases contain a nexus that is protected by two towers and a platform where players can buy items and respawn after they die. Each of the three lanes has six towers, three for each team. These towers are capable of shooting opponents and are meant as protection against enemies. At both ends of each lane is an inhibitor protected by a tower. The inhibitor is a fairly weak structure, that when destroyed, allows players to attack and destroy the opposing team’s nexus. At the beginning of each game, both nexuses spawn minions that travel down all three lanes, meet in the middle of each lane, and fight each other. Minions are weak computer controlled characters that assist players in completing objectives like destroying towers. Killing opposing team’s minions gives the player gold which he can use to buy items to increase his power in the game. The area between the lanes is called the jungle. The jungle consists of
neutral monsters that award gold and special abilities to the player that kills them. These abilities are known as buffs, and these buffs temporarily make characters stronger.

At the start of each game, the players go to the lane designated by the position that they are playing. Top goes to the top lane, jungle goes to the jungle, mid goes to the middle lane, and both support and the AD carry go to the bottom (bot) lane. It is the goal of each lane to destroy the enemy’s towers while protecting their own, while at the same time also killing the other team’s minions to get gold. While each lane is doing that, the player in the jungle, known as the jungler, kills monsters in his jungle to get gold and special buffs which make him more powerful, before going to help the three lanes. Each position has its own role: top laners are traditionally tanks who soak up damage and protect their teammates, mid laners use their abilities or spells to deal a large amount of damage to enemies very quickly, AD carries deal damage to enemies slower than mid laners but are able to sustain that damage for much longer which lets them attack the enemy more consistently, supports protect and heal other players. Junglers are hybrids who mix characteristics from two or more of the other roles. Each role is played differently, and has different responsibilities, but they are all vital to winning matches in LoL.

The researcher manipulated cooperation through warding. Warding is when players place “wards” on the map. These wards allow your team to see areas of the game map that they would not be able to see otherwise. This is important as it allows players to see what the other team is doing in the jungle and between the lanes. Warding is considered by players to be vital in winning games, and it is highly encouraged. While warding is seen as a vital component, it is only required for supports and junglers. All players on a team are encouraged to ward, and it is seen as good teamwork to ward, but it is not necessary for everyone. Cooperation was manipulated by warding extensively. The researcher warded at least five teams in the teamwork condition but did not ward at all in the no teamwork condition. The researcher played randomly played as either a top or mid laner, for whom warding is not a
responsibility. If a support or jungler were used instead, the lack of warding in the moderate cooperation condition would be seen as a failure to play the role correctly, which would anger the team. Warding as a top or mid laner is not necessary, so the lack of warding was not egregious enough to anger other players.

**Player team.** The researcher and the participants were randomly assigned to one of two teams by the game itself so no additional manipulation would be required. Data was collected from both groups by recording the game’s chat function, which allows players to type messages to their team or everyone.

**Dependent Variable**

**Hostility.** During *League of Legends* matches, players are allowed to type messages to both with their team, and the opposing team using an in-game chat feature. These chats were recorded using a third party screen recording software called Open Broadcaster Software (OBS) (Open Broadcaster Software, 2012). These recorded chats were coded for hostility from both teammates and enemies using Jacobvitz’s (2005) and Rude, Chriman, Denmark, and Maestas’s (2012) definition, and they were measured using Rude, Chrisman, Denmark, & Maestas’s (2012) Hostility Individual-Level scale. This scale lists nine behavioral indices of hostility. This study only used the six of these indices; sarcastic comments, judgmental or critical comments, patronizing or condescending comments, shaming, and mocking. These were used because they can be measured as verbal behaviors (see appendix). Additionally, “Trolling,” which is when players intentionally play poorly to hurt their own team, was measured as hostility as well. Hostility was coded as a single act of hostility written in the chat. Each player was coded as a single unit who will either act hostilely to others or will not act hostilely depending on the messages typed in the chat. Players who did not type messages were coded as not exhibiting hostility.

**Supplementary Measures**
Performance. Performance was measured by recording the number of kills, deaths, and assists the research had during each mach. A large number of kills and assists was an indicator of good performance while a large number of deaths was an indicator of poor performance. This measure was used as a manipulation check to examine whether the participant played better depending on the condition.

Procedure

The researcher signed into the game and used a random number generator to determine whether to play a ranked or normal match. Once the game type was chosen, the random number generator was used again to decide which cooperation condition the game would be. Once the condition had been decided, the researcher joined a match and was randomly assigned by the game to be either a top or mid lane. The researcher randomly chose one of three characters when assigned to the top lane, and used the same character for every game when were assigned to mid lane. The reason for this is that the three top lane characters are quite popular in the game and this could lead to the characters being picked by the other team, or banned which would keep the researcher from playing as the same character in each condition. The three top lane characters were picked for their similar playstyles, and because the researcher is equally skilled at playing each of the characters. The mid lane character was chosen because the researcher was as at the same skill level for this champion as he was for the three top champions. Only one mid lane character was chosen because this character is less popular so it did not get banned or picked by other players, and because there were no other characters that fit this role that the researcher was equally skilled at playing. The researcher played as consistently as possible across conditions, and characters. After selecting the character to be played, the game started. For each match the researcher was paired with players of a similar experience in skill level, this is done by the game to ensure that
matches are as fair as possible. In the high cooperation condition the researcher placed at least five wards throughout the course of the match. For the moderate cooperation condition, no wards were placed.

Each match was recorded using OBS, and saved onto an external hard drive. This was repeated until the researcher played with 500 participants. Each game included nine participants, four allies and five enemies. Participants who left the game before five minutes had passed and did not return were not counted as participants. The researcher played 57 matches, which took approximately 31 hours of data collection. Each match took approximately 31 minutes to complete. Each player was coded separately for whether or not the player exhibited any hostile behavior to allies or enemies. The chat logs of each recorded match were coded by one primary coder and one secondary coder, who coded approximately 10% of the total sample to insure reliability. Reliability was measured using Cohen’s kappa (κ = .725, agreement % = 90.0). After the initial round of coding, the coder was retrained and coded a new sample, this second round of coding resulted in (κ = .93, agreement % = 98.41).

Results

Descriptive Statistics

Total Hostility

The total number of games that had hostility was measured. Twenty-nine of the fifty-six games played included hostility which means that 51.786% of the games played had hostility in them. Additionally, the total number of participants that were hostile was measured. Sixty-nine of the 501 participants were hostile which means that only 13.772% of players were hostile.
Manipulation Checks

Cooperation.

To ensure that the cooperation manipulation was effective, the number of times the player warded in each game was recorded. There was a significant difference in the number of times warded, $\chi^2 (N = 56) = 79, p < .001, w = 1.19$ with the researcher warding significantly more in the cooperation condition than in the no cooperation condition. This difference suggests that the cooperation manipulation was effective.

In order to ensure consistency between conditions, the researcher’s performance was measured. Performance was gauged using three different measures: number of kills, number of deaths, and number of assists. There was no significant difference in the number of kills, $\chi^2 (1, N = 56) = 3.06, p = .08, w = .24$ and deaths, $\chi^2 (1, N = 56) = 2.61, p = .11, w = .22$. There was a significant difference in the number of assists, $\chi^2 (1, N = 56) = 11.16, p < .001, w = .45$ with the researcher getting more assists in the low cooperation condition.

To ensure consistency between the characters and positions played, the amount of hostility exhibited when playing each was recorded. There was no significant difference in the amount of hostility when playing mid lane, $(M = 1.40, SD = 1.40)$ and top lane, $(M = 1.17, SD = 1.63)$; $t(29) = .50, p = .62$. Additionally, there was not significant difference in the amount of hostility exhibited when the researcher played as the four different characters, $F(3,51) = 1.02, p = .39$.

To ensure that game length was not correlated with the amount of hostility exhibited, the length of each game was recorded. There was no significant correlation between game length and hostility $r(54) = .04, p = .77$. This shows that the amount of hostility exhibited was not correlated by the length of each match.
Main Effect of Competition on Hostility

Hypotheses and research questions were tested using the generalized linear model approach to categorical outcomes, with the Pearson $\chi^2$ test used to determine significance. $H_1$ predicted that players in the more competitive environment would exhibit more hostility than those in the less competitive environment. The main effect of competition on hostility was not significant, $\chi^2 (1, N = 501) = 3.08, p = .08, w = .09$. In the highly competitive environment, 17.01% of participants exhibited hostility, and 10.77% of participants in the less competitive environment exhibited hostility. Therefore, $H_1$ was not supported.

Main Effect of Player Team on Hostility

RQ$_1$ asked whether teammates would exhibit more hostility than opponents. The main effect of player team on hostility was significant, $\chi^2 (1, N = 501) = 20.82, p < .001, w = .20$. As shown in Figure 1, 21.08% of players on the researcher’s team exhibited hostility while only 7.91% of players on the opposing team exhibited hostility. As a result, the answer to R$_1$ is that teammates exhibit more hostility than opponents.

Main Effect of Cooperation on Hostility

The main effect of cooperation on hostility was not significant $\chi^2 (1, N = 501) = 2.51, p = .11 w = .07$. In the high cooperation condition 14.94% of participants exhibited hostility, while 12.50% exhibited hostility in the moderate cooperation condition.

Interaction Effect of Cooperation and Player Team on Hostility
RQ2 asked whether there would be an interaction between level of cooperation and participant team on the amount of hostility exhibited. The two-way interaction between cooperation and player team on hostility was significant $\chi^2 (1, N = 501) = 5.59, p = .02, w = .11$. As shown in Figure 2, in the high cooperation condition, 18.97% of teammates were hostile, and 11.72% of players on the opposing team were hostile. By comparison, in the no cooperation condition, 23.36% of teammates were hostile, and 3.76% enemies were hostile.

**Interaction Effect of Competition and Player team on Hostility**

The two-way interaction between competition and player team on hostility was not significant $\chi^2 (1, N = 501) = .09, p = .76, w = .01$. In the highly competitive environment, 25.00% of teammates were hostile, and 17.39% of enemies were hostile. By comparison, in the less competitive environment, 10.53% of teammates were hostile, and 5.52% of enemies were hostile.

**Interaction Effect of Competition and Cooperation on Hostility**

The two-way interaction between competition and cooperation on hostility was not significant $\chi^2 (1, N = 501) = .16, p = .69, w = .02$. In the highly competitive environment, 17.46% of participants exhibited hostility in the high cooperation condition, and 12.59% of participants exhibited hostility in the moderate cooperation condition. In the less competitive environment 16.52% of participants exhibited hostility in the high cooperation condition, and 8.80% exhibited hostility in the moderate cooperation condition.

**Interaction Effect of Competition, Cooperation, and Player Team on Hostility**

The three-way interaction between competition, cooperation, and player team on hostility was not significant $\chi^2 (1, N = 501) = .57 p = .45, w = .03$. When the research played as a helpful teammate in the highly competitive environment, 19.64% of participants on the researcher’s team exhibited hostility, and
15.71% of participants on the opposing team exhibited hostility. When the researcher played as an unhelpful teammate in the highly competitive environment, 30.77% of participants on the researcher’s team exhibited hostility, and 4.76% of participants on the opposing team exhibited hostility. By comparison, when the researcher played as a helpful teammate in the less competitive environment, 18.33% of participants on the researcher’s team exhibited hostility, and 8.00% of participants on the opposing team exhibited hostility. When the researcher played as an unhelpful teammate in the less competitive environment, 16.36% of participants on the researcher’s team exhibited hostility, and 2.86% of participants on the opposing team exhibited hostility.

**Discussion**

The present study was an online field experiment that examined the effect of competition, cooperation, and player team on the amount of hostility exhibited by players in an online video game in order to understand how competition in video games affected players. Unlike many studies that have examined the relationship between competition in video games and anti-social behaviors (Schmierbach, 2012; Ewoldsen, et al., 2012) in a laboratory setting, the current experiment examined how competition in video games affected anti-social behavior in a naturalistic, online game-based environment. This study also measured how cooperation, competition level, and player team affected anti-social behavior in the same environment. As a result, this study provides an increased understanding of the environments and contexts of online competitive video games and how these environments affect players.

This study found that players on the same team as the researcher were more hostile than players on the opposing team. This result is contrary to much of the existing research on cooperation in video games, which shows that playing with others increases prosocial behaviors (Adachi, Hodson,
Willoughby, & Zanette, 2015; Velez, 2015; Velez, & Ewoldsen, 2013). Based on the results of the present study, it appears that cooperative settings in video games may not always be a positive force.

A field experiment was conducted in order to expand the field and to examine how players might react differently in a natural environment than they would in a traditional lab experiment. The lab experiments that have been performed on cooperation in video games have consistently found decreases in antisocial behaviors and increases in prosocial behaviors (Adachi, Hodson, Willoughby, & Zanette, 2015; Velez, 2015; Velez, & Ewoldsen, 2013). A limitation of these studies are that they did not recreate the environment that online gamers play in, which may limit their external validity. That is not to say that these studies are wrong or completely invalid; they just are not accurately measuring how real gamers react to real video games.

People who play video games online are choosing to do so, and many of these players put in a considerable amount of time and effort into these online games. This investment in the game cannot be replicated in a research lab, but it plays a large factor in the way that participants play video games and interact with others in that game. Elson et al. (2014) mentioned context as an important factor that should be taken into account when doing video game effects research, but recreating the playing context of a video game can be difficult in a research lab. By being a field experiment, the present study was able to capture the differences between the context of a playing a game in a lab study and playing online with other players.

It is important to note that the difference in hostility between teammates and opponents could be an artifact of the nature of communication in the game. While players are allowed to communicate with players on both teams communicating with teammates is much more frequent than communicating with players on the other team. This is because communicating strategies with your teammates in the game is needed in order to be successful. Existing research has postulated that opponents are the more likely
source of negativity while playing online, but the present study found the opposite (Velez, 2015; Velez, & Ewoldsen, 2013).

The likely reason for this is that teammates have more opportunity and reason to be hostile to their teammates than they do to enemies. Players chat more with their teammates, which means they are more likely to disagree and be hostile to them just because they are around them more. Additionally, players are more invested in the level of play from their teammates, than they are from their opponents. If a teammate plays poorly, he is hurting your chance to win, but if an enemy plays well, a player may feel that there is nothing he can do about it, and therefore he may be less hostile. As an example, if person is a football fan and his favorite team allows the opposing team to score, the fan doesn’t get angry at the opposing team for scoring; he gets angry at his favorite team for allowing the other team to score.

By putting the focus on how players interact with enemies and assuming that these interactions are what cause hostility, researchers are potentially ignoring a major factor in interpersonal interactions in online games. This would be similar to only researching interpersonal violence from strangers. While it sounds like someone would be more likely to be attacked by a stranger, people are much more likely to be assaulted by those that are the closest to them. This same principle can apply to interactions in online, games as the results of this study show that teammates are much more hostile than enemies.

Additionally, this study found no difference in the amount of hostility in a highly competitive environment versus a low competitive environment. This finding does not support the findings of previous studies that have found increases in antisocial behaviors with increased competition in video games. (Adachi & Willoughby, 2011a; Schmierbach 2012). However, unlike these previous studies, this study did not feature a no competition condition, so it is possible that differing levels of competition do not affect antisocial behaviors, but an absence of competition may decrease antisocial behaviors.
Alternatively, the lack of difference between the two environments could be because the environments were too similar. Ranked and normal matches may not differ enough in their level of competitiveness to find a difference between the two groups. It is possible that players in the less competitive environment experienced a similar amount of competitiveness. This lack of difference is likely due to the serious nature of the game. Players who play these types of online games do not usually play them casually. Games like LoL attract gamers who take games very seriously and who often play for hours every day. Despite the ranked mode having an increased incentive to winning matches, these gamers may take matches in both game types equally as seriously. These types of online game have very dedicated fan bases and it is possible that this could have affected the level of competition in the two game modes.

Implications

**Theoretical contribution.** The effect of competition on antisocial behavior has recently become a topic of interest among video game effects. This area of research has yielded many studies that have found evidence of competition increasing antisocial behaviors researchers (Adachi & Willoughby, 2001a; Ewoldsen et al., 2012; Schmierbach, 2012). The present study was the first to look at the competitive environments in highly competitive online multiplayer games. The results of the study found that a highly competitive environment did not have significantly more hostility than a less competitive environment. Based on these results, it seems that the level of competition may not be related to antisocial behaviors in online multiplayer games.

The present investigation also found that players exhibit more hostility to teammates than to enemies. To explain this finding, it is important to understand the player dynamics within these highly competitive online games. Players are highly invested in winning matches so that they can increase in rank in the game. This high level of investment in the game could cause players to get angrier at
teammates because their success is more closely tied to the performance of teammates than it is to enemies. This finding seems to go against the prevailing idea that playing with teammates can increase prosocial behavior and decrease antisocial behavior (Velez, 2015; Velez & Ewoldsen, 2013). In the current study, it is likely that participants were more hostile to teammates than to enemies because they had more opportunity and reason to be hostile to teammates.

**Practical contribution.** The results of this study suggest that individuals respond to other players in games, depending on their context within that game. Teammates were more hostile than enemies, but this hostility was moderated by the level of cooperation exhibited by the researcher. The findings of this study imply that the way a person plays and who he plays with can greatly affect his experience playing the game. Given that many gamers play video games for socialization, it is likely that the behavior of these players is greatly changing their experiences with these games (Baek, Song, & Seo, 2004; Selnow, 1987).

**Limitations**

Several limitations are important to highlight when interpreting the results of the present study. First, it is possible that the highly competitive environment and the less competitive environment may not have differed in the level of competition. While it was thought that the ranking system in the ranked game mode would make that environment more competitive than the normal mode, it is possible that players care about winning just as much in both modes. Given that this study was designed with the intention of capturing differences between two environments, the potential lack of difference between these two environments could have caused the lack of findings.

Secondly, the current study did not collect identifying information of participants in this study. This was done in order to ensure the naturalistic nature of the virtual field setting and to minimize the intrusiveness of the researcher. Because of this, it is important to consider that these results may not be
representative of the general population, as we do not know the demographic breakdown of the participants in this video game. There is no current demographic data for *League of Legends* players, so it is difficult to estimate the demographics of the participants and this leads to problems with generalizability.

Thirdly, the difference between the amount of hostility from teammates and enemies could be attributed to the frequency of communication between the two groups. During gameplay, players talk much more to their teammates than they do to their enemies for several reasons. This difference in the amount of communication between the two groups could be responsible for the difference in hostility as well. Players do not have as much opportunity to be hostile to the other team, because their communication is mostly contained to their teammates and they rarely feel the need to be hostile to opponents in the chat. In this study, hostility was the only measure of interaction between players, so it is difficult to determine if the difference in groups is due to differences in the amount of communication between these groups. Future studies should investigate not only how often players communicate with both allies and enemies, but also, the nature of these interactions.

Finally, the generalizability of this study also suffers because of the nature of the game played. It may be difficult to generalize the current study’s results, because the video game that was used for the study caters to a specific subculture of very serious and dedicated gamers who spend much of their time playing online games. These gamers are very different than casual gamers, and those who do not play video games at all, and while the results of this study offer a glimpse at how these gamers interact with others, the generalizability of these results is questionable. With much of the current research finding evidence of competition increasing antisocial behaviors, the results of this study may be due to the nature of the gaming environment used and not a byproduct of competition in general (Adachi & Willoughby, 2001a; Ewoldsen et al., 2012; Schmierbach, 2012).
The interaction between the amount of cooperation and hostility from teammates and enemies could also be explained by the specific gaming environment used for this project. Previous studies have found that cooperation in video games leads to increases in prosocial behaviors and decreases in antisocial behaviors, but the findings of this study contradict this (Velez, 2015; Velez & Ewoldsen, 2013). The environment of this game may not be generalizable to other games in the same genre, or to the world as a whole.

**Future Research**

Future research on the effects of competition and cooperation in online video games can take several potential directions based on this study. For example, previous research on the effects of cooperation in video games have found that cooperating with teammates can increase prosocial behaviors (Velez, 2015). The present study did not measure how cooperation and cooperation could affect prosocial behaviors in players. As a result, it is possible that along with decreasing hostility, increased cooperation may have increased prosocial behaviors in participants. Therefore, additional research should be done examining how increased cooperation may lead to positive behaviors from players in highly competitive online video games.

Aside from the positive effects of cooperation, future investigations should focus on the interactions between members of opposing teams. While the current study only coded for hostility between the two groups, there is room to look more in depth at the interactions between teams in online games. In the game chosen for this investigation, players do not chat with players on the opposing team as much as they do with their teammates, but this may not be true for other online games. It is possible that inter-team interactions could be significantly different than intra-team interactions in a variety of ways. While there has been some research on how teams interact with each other in online settings, this research has not yet expanded to examine how opposing teams interact with each other in online settings.
Future research should examine how opposed groups interact with each other in online games, and how these interactions may affect players.

Additionally, further research should be done on the nature of hostility in online games. Future studies should be done on how hostility is initiated and how it grows during matches. It is possible that hostility in online games may stem from a single incident of hostility and snowball from there. Hostility could also be related to player characteristics such as gender and skill level, or to the state of the game or match being played. This study offers a glimpse at how players interact with each other in online games and more research should be done looking more closely at both the causes and effects of these interactions.

Finally, this study did not collect data from newer or more inexperienced players. Due to the matchmaking system, the participants in this study were all of similar skill levels and experience. Differentiating between players who may be new to the game and those who have invested a great deal of time and effort into learning the game’s mechanics and strategies could important. For example, newer players may be less hostile to others because they are not as invested into the game as more experienced players are. Similarly, players who are more skilled and experienced than the researcher may be even more invested in the game and therefore could be more hostile to other players. Future research could manipulate the skill of the players that the researcher plays with in order to examine how skill level and investment, affect players.

Conclusion

Despite several limitations and the potential for additional refinement, the results of the present study suggest that players are more hostile to their teammates than they are to players on the opposing team. Additionally, the amount of cooperation exhibited from a player can affect the amount of hostility
that he experiences from both teammates and enemies. It also appears, however, that the level of competition in an online video game may not have an effect on hostility shown by players. While the level of competition does not affect hostility, the way that players play the game does. The results of this study show that while the level of competition may not affect hostility in online games, interactions with other players may affect hostility. While this result was unexpected it may lead to many new opportunities for research in the area.
References


cognition, and arousal: Tests of a general model of affective aggression. *Personality and Social

doi:10.1177/0146167286124002

Anderson, C. A., Lindsay, J. J., & Bushman, B. J. (1999). Research in the psychological laboratory:
Truth or triviality? *Current Directions in Psychological Science, 8*, 3–9. doi: 10.1111/1467-
8721.00002

competitive versus cooperative instructions on aggressive behavior in video games. *Personality

Violent video game effects on aggression, empathy, and prosocial behavior in eastern and
doi:10.1037/a0018251


doi:10.1037/h0040672


Ferguson, C. J., (2013) Scholars’ open statement to the APA task force on violent media, [open letter].

Christopher Ferguson. Retrieved from

doi:10.1016/j.avb.2012.02.007


doi:10.1177/0093854807311719

doi:10.1027/1016-9040/a000010


Ivory, J. D., Markey, P. M., Elson, M., Colwell, J., Ferguson, C. J., Griffiths, M. D., Savage, J., Williams, K. D. (2015). Manufacturing consensus in a diverse field of scholarly opinions: A


Appendix A: Definitions

Hostility individual-Level Scale (Jacobvitz, 2005; Rude, Chrisman, Denmark, & Maestas, 2012)

**Definition:** Hostility involves active strategies that create a distance with other people. Individuals exhibiting a pattern of hostility are critical of others, as well as acting in a harmful way. Hostility may be overt, such as blaming others. It may also be more covert or embedded in the conversation, which can have more of an impact on the interaction.

**Indices of hostility**

1. Hostile, sarcastic or hurtful comments
2. Judgmental or critical comments
3. Cynical comments
4. Patronizing or condescending comments
5. Shaming or punitive comments
6. Impatient, derisive, or mocking comments
Appendix B: Code Book

Codebook for Hostility in Online video games

Instructions:

You will be coding videos of matches from an online video game for hostility. You will be provided recordings of these games through email. Each video will contain 9 participants, 4 on the researcher’s team and 5 on the opposing team. You will be coding directly into a form provided for you in Excel.

Section one: Players

Each game will feature 4 players on the researcher’s team and 5 players on the enemy team. Each video will start with the loading screen that will feature the players from both teams organized by team on the top and bottom of the screen. The researcher’s screen name is dpm106 so the players listed beside this player are on the researcher’s team and those on the other half of the screen are the opposing team. You will record each players screen name and designate it as either on the researcher’s team or the opposing team.

1. Player team
   1. Researcher team
   2. Opposing team

Section two: The Game

The games will be organized into groups based on condition. When you receive them they will be labeled appropriately and you will need to code them as they are labeled. You will need to mark the competition level and the type of assistance for each player.

2. Competitiveness
   1. High competition
2. Low competition
3. Assistance
   1. Helpful
   2. Unhelpful

Section 3: Hostility

You will watch the chat log in the bottom left corner of each video and code the messages that player’s type. Each time a player types a message it accompanied by their screen name. You will be coding for hostility from any player in the game towards any other player in the game. If a player is hostile in the chat during the game, you will code them as exhibiting hostility (1). If a player is not hostile during the game you will code them as not exhibiting hostility (0)

4. Hostility is defined as the following behaviors.

<table>
<thead>
<tr>
<th>Hostility type</th>
<th>Description/Definition</th>
<th>Include if</th>
<th>Do NOT include if…</th>
</tr>
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<tbody>
<tr>
<td>Sarcastic</td>
<td>Ironic comment meant to hurt or mock other players.</td>
<td>Comment is explicitly sarcastic and mocking.</td>
<td>The sarcasm is ambiguous or the players actions unknown.</td>
</tr>
<tr>
<td>Judgmental or critical</td>
<td>Comment that explicitly calls out a players abilities or decision making in the game.</td>
<td>Comment is explicitly judgmental or critical of the player’s skill or</td>
<td>The comment is ambiguous or the commenter is trying to give the player advice.</td>
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<tr>
<td>Comments</td>
<td></td>
<td>a decision/decisions made in an aggressive manner. (e.g. Why did you fight</td>
<td>(e.g. why are you building damage? You should try building health instead, you should wait for help from teammates before attacking, etc.)</td>
</tr>
<tr>
<td>Patronizing or condescending</td>
<td>Comments from player exhibiting a sense of superiority meant to belittle player</td>
<td>The comment is explicitly patronizing or condescending to another player.</td>
<td>The comment is ambiguous or the commenter is actually trying to compliment other player.</td>
</tr>
<tr>
<td>comments</td>
<td></td>
<td>(e.g. That was pretty good for a noob. I am surprised you are doing so well girls usually suck at this game, etc.)</td>
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<tr>
<th>Shaming</th>
<th>Comments shaming another player for their performance</th>
<th>The comment is explicitly shaming another player for their performance (e.g. I can’t believe you did that you should quit the game, you are so bad uninstall the game, etc.)</th>
<th>The comment is ambiguous.</th>
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<tr>
<td>Mocking</td>
<td>Making fun of other player for any reason</td>
<td>The comment is explicitly mocking another player for any reason (Wow you suck, that is a stupid name, I was with your mom last night, etc.)</td>
<td>The comment is ambiguous or not directed at another player or players</td>
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<tr>
<td>Trolling</td>
<td>Player intentionally playing poorly to hurt their own team</td>
<td>Player explicitly states that they will be trolling or feeding, or if the player talks in a way that explicitly shows that they are trolling. (e.g. Mid or feed, this bot sucks I’m just going to feed, what happens if I stand under this tower, etc.)</td>
<td>The comment or comments are ambiguous or the player is unintentionally playing poorly.</td>
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MEMORANDUM

DATE: March 21, 2016

TO: James Dee Ivory, David Parsons McLean

FROM: Virginia Tech Institutional Review Board (FWA00000572, expires January 29, 2021)

PROTOCOL TITLE: It's in the game: The effect of Competition, and Teamwork on Anti-social behavior in Online

IRB NUMBER: 16-137

Effective March 21, 2016, the Virginia Tech Institution Review Board (IRB) Chair, David M Moore, approved the New Application request for the above-mentioned research protocol.

This approval provides permission to begin the human subject activities outlined in the IRB-approved protocol and supporting documents.

Plans to deviate from the approved protocol and/or supporting documents must be submitted to the IRB as an amendment request and approved by the IRB prior to the implementation of any changes, regardless of how minor, except where necessary to eliminate apparent immediate hazards to the subjects. Report within 5 business days to the IRB any injuries or other unanticipated or adverse events involving risks or harms to human research subjects or others.

All investigators (listed above) are required to comply with the researcher requirements outlined at:

http://www.irb.vt.edu/pages/responsibilities.htm

(Please review responsibilities before the commencement of your research.)

PROTOCOL INFORMATION:

Approved As: Expedited, under 45 CFR 46.110 category(ies) 6,7

Protocol Approval Date: March 21, 2016

Protocol Expiration Date: March 20, 2017

Continuing Review Due Date*: March 6, 2017

*Date a Continuing Review application is due to the IRB office if human subject activities covered under this protocol, including data analysis, are to continue beyond the Protocol Expiration Date.

FEDERALLY FUNDED RESEARCH REQUIREMENTS:

Per federal regulations, 45 CFR 46.103(f), the IRB is required to compare all federally funded grant proposals/work statements to the IRB protocol(s) which cover the human research activities included in the proposal / work statement before funds are released. Note that this requirement does not apply.
to Exempt and Interim IRB protocols, or grants for which VT is not the primary awardee.

The table on the following page indicates whether grant proposals are related to this IRB protocol, and which of the listed proposals, if any, have been compared to this IRB protocol, if required.

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* Date this proposal number was compared, assessed as not requiring comparison, or comparison information was revised.

If this IRB protocol is to cover any other grant proposals, please contact the IRB office (irbadmin@vt.edu) immediately.
Figure 1. Main Effect of Player team on Hostility

![Bar chart showing the main effect of player team on hostility.](chart1)

Figure 2. Cooperation X Player team on Hostility.

![Line graph showing the interaction between cooperation and player team on hostility.](chart2)