

Running Head: **THE CAUSES AND CONSEQUENCES OF PRESENCE**

The causes and consequences of presence: Considering the influence of violent video games on presence and aggression.

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Abstract

The level of presence, or immersion, individuals feel is very likely to influence the effect media has on them. This project examines the causes and consequences of presence in the context of violent video game play. In a between subjects design, 227 participants were randomly assigned to play either a violent or a non violent video game. The results are consistent with what would be predicted by social learning theory, and are consistent with previous presence research. Causal modeling analyses reveal two separate paths to presence: from individual differences and condition. The first path reveals that individual differences (previous game use and gender) predict presence. Those who frequently play video games reported higher levels of presence than those who play video games less frequently. Males play more games but, when game use was controlled for, felt less presence than women. The second path is related to perceived violence: those who perceived the game to be more violent felt more presence than those who perceived less violence in the game. Both of these paths were influenced by frustration with the game. Those who felt more presence felt more hostility, and were more verbally aggressive than those who felt lower levels of presence. Higher levels of presence led to increased physically aggressive intentions. Theoretical and practical implications are discussed.

Keywords--- Presence as immersion, video games, aggressive affect, violence, aggression, and social learning theory.

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Understanding the factors that influence the sense of presence and its potential influence on aggression may provide insight into the process of media effects generally. The sense of presence is generally defined in terms of the sense of involvement with and engagement in media. Research has shown that presence influences how people respond to, and are affected by, mediated stimuli (Kim & Biocca, 1997; Lombard & Ditton, 1997; Steuer, 1992). Therefore, understanding the causes and consequences of presence may help predict how and why people will respond to mediated stimuli, whether violent or not.

Exposure to mediated stimuli, and the sense of presence, can influence viewers' attitudes and behaviors. As with media effects generally, the sense of presence varies across contexts, and media, as well as from person to person and from one exposure to the next. Both the level of presence with the media (Lombard, 1995; Reeves, Detenber, & Steuer, 1993, May; Tamborini et al., 2004) and aggressive responses to mediated stimuli (Bushman, 1995, 1996) are influenced by individual differences (e.g., gender, media use), and features of the medium (e.g., screen size, interactivity, vividness, agency). These same factors influence media usage, and perceptions of appropriate behavior through the social learning process.

While individual responses to media depictions may vary, there is little doubt that violent media influences everyone to some extent. After 4 decades of research, scholars have concluded that exposure to media depictions of violence can cause aggressive behavior including the imitation of violent acts (Donnerstein, 1994; Paik & Comstock, 1994; Wilson et al., 1997). There is also evidence of desensitization, with those who see more violence having a greater

acceptance of, and tolerance for, violent behavior (Funk, Baldacci, Pasold, & Baumgardner, 2004; Thomas, Horton, Lippencott, & Drabman, 1977). As Anderson (2004) argued, the “scientific debate over whether media violence has an effect is over” (p.114). Research using experimental, longitudinal and cross sectional methods has concluded that exposure to violent television, film, and video games causes increased aggressive behaviors and attitudes and decreased prosocial behaviors among men, women, and children, (Anderson, 2004; Gentile, Lynch, Linder, & Walsh, 2004). In most, although not all cases, researchers have found stronger effects following exposure to video game violence as compared to exposure to television violence (Anderson & Bushman, 2001).

More importantly, changes in video games seem to be strengthening the effect of violent video games on users. Video games have become more realistic, engaging, and increasingly violent. They use more vivid and sophisticated graphics, including vividly depicted violence against human characters. They are also more engaging--requiring active participation in games made possible by interactivity and increasingly involving input devices such as head mounted displays and data gloves. These changes to video games have led to increased concern over the effects of exposure to, and interaction with, violence video games. Research has shown that the more current, technologically advanced violent games lead to higher levels of aggression in users as compared to video game players when compared to the much tamer games of a decade or more ago (Gentile et al., 2004; Sherry, 2001).

Research has conclusively shown that exposure to violent stimuli, whether mediated or not, influences people. However, there are still unanswered questions about how different people respond to games and how those unique responses might influence people's perceptions of acceptable behavior, or social learning, and how this might in turn affect outcomes. Being able to

predict when, and to what extent, media will influence people is of critical importance particularly when considering media violence. In this study, we examine the predictions social learning theory would make about the causes and consequences of presence in a specific context. We use causal modeling techniques to explore how individual difference variables (e.g., gender, video game use) influence people's responses to an experimental manipulation (i.e. presence or absence of violence in a video game) in terms of their sense of presence and the subsequent levels of aggression. We specifically examine whether a person's level of presence can predict levels of aggressive outcomes including resentment, hostility, and verbal aggression and physically aggressive intentions.

Learning and modeling from the media: Social Cognitive Theory

Both the extant literature on mediated violence and early social learning theory argue that behaviors that are rewarded are more likely to be imitated by an observer than behaviors that are punished or unrewarded (Berkowitz & Rawlings, 1963). Thus, it suggests that observing even media depictions of behavior that is rewarded makes those behaviors seem more attractive than behaviors that are ignored, or punished. Social learning theory initially proposed that learning would occur through modeling and imitation (Bandura, 1973).

Social cognitive theory (SCT) (Bandura, 1992) has grown out of Bandura's earliest work on social learning theory (Bandura, 1973). Social cognitive theory focuses more on the cognitive, vicarious and self-reflective processing of information (Bandura, 2002). This change in focus is due to the belief that behavior is not influenced directly, but that observed events influence people's cognitive processes and the cognitive processing influence behavior. Social Cognitive Theory maintains that it is the cognitive process that largely determines the information people view and how observed events will be interpreted, used, and "whether they leave a lasting effect,

what emotional impact and motivating power they will have, and how the information they convey will be organized for future use,” (Bandura, 2002, p. 122). Furthermore, it is the cognitive interpretation and experience of that witnessed event that would lead people to act in ways that create desirable outcomes, avoid negative outcomes, and utilize information about the consequences of others’ actions in making their decisions about how to act, and what behaviors to imitate (Bandura, 2001). Therefore, both the rewarded event being witnessed, and the cognitive experience of the observer would influence the likelihood of imitation.

SCT has been shown to predict people’s reactions to mediated violence. Early research on television violence found that when media depict a character being rewarded, or even not punished, for aggressive behaviors, viewers were more likely to imitate the behaviors (Geen & Stonner, 1973). This is particularly relevant in the case of video games, where players are often rewarded for aggressive behavior. By acting aggressively, players earn points, move up to the next level and may ultimately win the game. By rewarding the aggressive and violent actions of video game players, it may promote the perception that violence is useful, appropriate and even a good way of dealing with conflict (Krahe & Moller, 2004).

The interactive nature of video games means that these aggressive actions influence the outcome of the game, as well as what the player sees. Furthermore, the interactivity of video games requires players to engage in the game to attain the skills required to read the output devices and to quickly react and manipulate the input devices provided with the interface (Jansz, 2005). In accord with social cognitive theory, this level of interactivity and engagement is the cognitive experience of the game that may explain why exposure to video game violence results in higher levels of aggression than exposure to television violence (Anderson & Bushman, 2001).

The interactive nature of video games also requires active participation and a higher level of presence, or involvement (Tamborini et al., 2004). This active participation and increased presence may make it even more likely that people will imitate and repeat the behaviors they learned and practiced when playing the game. In the case of violent video games, this could increase aggression.

Hostility moderates aggressive reactions to violence

The majority of research to date has examined the effect of media violence on verbal and physical aggression, though outcomes such as aggressive affect or hostility have also been explored. Research has shown that violent video game play can influence aggressive cognitions or thoughts and has been found to increase hostility (Anderson & Dill., 2000; Kirsh, 1998; Tamborini et al., 2004). Meta-analyses on violent video game research have also revealed an effect of game play on levels of aggressive cognitions and hostility (Anderson & Bushman, 2001; Sherry, 2001). Therefore, it is fairly clear that aggressive cognitions and hostility are affected by exposure to media violence.

Furthermore, affective hostility mediates the relationship between exposure to violent video games and aggressiveness (Gentile et al., 2004). Therefore, it is important to include measures of hostility in a complete model that explores the effect of video game play on aggression, and, as we explore here, presence.

Presence and the Suspension of Disbelief

In simplistic terms, the sense of presence may be thought of as a way of considering the level of involvement with the medium. Although the concept of presence is multidimensional, we use the term here as associated with immersion, or a sense of being ‘in’ the medium. This dimension of presence is also sometimes called telepresence (Heeter, 1992; Kim & Biocca,

1997; Lombard & Ditton, 1997; Steuer, 1992). The International Society for Presence Research (ISPR, 2000) defines presence, an abbreviated term for ‘telepresence,’ as “a psychological state or subjective perception in which even though part or all of an individual's current experience is generated by and/or filtered through human-made technology, part or all of the individual's perception fails to accurately acknowledge the role of the technology in the experience.” If, as some researchers have argued (Lombard & Ditton, 1997), presence can only occur when it is brought about by technology, then the ‘tele’ in telepresence becomes unnecessary (Lee, 2004). Therefore, here, we use the term presence.

The sense of presence then can also be operationalized in terms of the extent to which one is able, or chooses, to suspend awareness that the source of stimuli is mediated. This is often called a willing suspension of disbelief. This suspension of disbelief can be conscious or not. When disbelief is suspended, a person is engaging their senses (hearing, sight) and focusing on receiving stimuli coming from a mediated environment, (virtual reality, television, radio, video game, etc). This focus on the mediated stimuli comes at the expense of information, or stimuli, coming from natural, or unmediated sources (honking cars, people in the room, etc). The suspension of disbelief also requires that the person accept the stimuli from the mediated source as being “real” to some extent.

Although presence is traditionally associated with research in virtual reality (Slater, Usoh, & Steed, 1994; Steuer, 1992), the sense of presence is important and relevant to understanding effects of all media (Kim & Biocca, 1997; Lombard & Ditton, 1997; Steuer, 1992). For example, even television related variables such as screen size (Lombard, 1995; Lombard & Ditton, 1997; Reeves et al., 1993, May) influence presence, as do level of

interactivity of a medium, and avatar anthropomorphism in a game (Biocca & Nowak, 2002; Kim & Biocca, 1997; Nowak, 2004).

Presence or a sense of being “in” the mediated environment is also likely to increase when one is familiar with the medium. In the case of video games, it is clear that presence is enhanced once the initial frustration of learning the game is passed and a player can fully engage in the challenge of the game itself (Tamborini et al., 2004). It would be difficult to suspend disbelief, or to feel present, while one is frustrated by the experience, or while one is focused on learning the rules or trying to understand how to make the interface work. Therefore, we predict that those who have more experience playing video games will feel less frustration than those with less video game experience.

The level of frustration will also likely predict presence in that people who feel less frustrated by the video game experience will feel more presence than those who feel more frustrated by the video game. Finally, some individuals are more prone to feeling present with media than others (Kim & Biocca, 1997). For example, interest in the message or environment has been shown to increase a sense of presence and people’s willing suspension of disbelief (Slater & Usoh., 1993). Also, males and females have been shown to differ both in terms of how they experience presence (Lombard, Reich, Grabe, Bracken, & Ditton, 2000) and how they respond to violent content (Gunter, 1985). These factors will likely influence the social learning process, as discussed in the next section.

The cognitive experience of game play and presence.

Social cognitive theory would argue that the cognitive experience of the game by the user would influence any emotional and behavioral outcomes of game play. Just as individuals differ

in their hostile or aggressive reactions to media, there will be individual differences in players' cognitive experiences, and their feelings of presence.

The two factors known to be individual differences predicting presence and likely their cognitive experiences are gender, and experience with the medium, though in the case of video games, these two factors have been shown to be highly correlated. Gender is likely to be correlated with frequency of game play in general, and also the reaction to, and perception of, the violent stimuli. These factors, in turn, are likely to affect feelings of presence during game play.

While various factors are likely to affect the frequency of game play, on average, males play video games for greater duration and with greater frequency than their female counterparts (Roberts, Foehr, & Rideout, 2005). This increased frequency represents a fairly large investment of time in games, which should increase skill with the games over time. As with any learned activity, practice improves skill, which increases enjoyment, and acts as its own reinforcement. Perhaps in part due to this greater experience and enjoyment, men play more games and are therefore likely to experience a greater sense of presence than women following exposure to violent games. This is consistent with Wilfred's (2004) examination of the effectiveness of VR based simulation training, which revealed that males felt more presence than women following a game based interaction in a virtual environment, although he did not control for previous experience with VR technology. Previous game experience has been shown to lead to increased presence with video games (Tamborini et al., 2004). We predict that those who play games more frequently will feel more presence than those who engage in less frequent game use. While gaming experience and presence may partially predict and explain the level of a person's aggression, we must consider other factors as well.

The influence of the cognitive process has implications for how people interpret and react to the violent stimuli. For example, it is possible that those who perceive violence as less severe are more likely to accept violence and believe that these behaviors are more normative, than those who perceive violence as more severe. If this is true, then social learning would predict that those who perceive aggression as more normative would behave more aggressively after exposure to violence, though they would not necessarily interpret their behavior as aggressive. Consistent with this, individual interpretations of violent stimulus have been found to affect aggressive outcomes (Krcmar & Cooke, 2001)

Again, individual differences are relevant in this process. Men have been shown to perceive depicted violence as less severe (Gunter, 1985) and to be more aggressive after playing a violent video game (Bartholow & Anderson, 2002) than women, although men are more aggressive than women, in general (Huesmann, 1986). Overall, then, it would seem that men are more likely than women to enjoy the game, to feel less frustration, and to experience a greater sense of presence when playing a violent game than women.

Because game play is largely a cognitive experience where players' experiences occur between the screen and the mind, it is important to explore how the cognitive experience of this event affects outcomes. Because males play more often and generally have more experience in game play, not only is play less frustrating, but their greater experience allows them an opportunity for greater immersion, or presence, in the game. Here, social cognitive theory would argue that *perceptions* of violence and *perceptions* of presence in the game are likely to result in greater hostility and greater aggression. In fact, player perceptions of the game have been better predictors of hostile and aggressive outcomes than the features of the game itself (Potter, Pashupati, Pekurny, Hoffman, & Davis, 2002).

In this project, we will also examine the extent to which presence may moderate the relationship between perceptions of violence and aggressive affect. If we extend the predictions of SCT to this context, then we would predict that when a player experiences both vicarious action from the game and experiences the cognitive perception that the game is violent, the resulting play experience would result in a greater sense of presence. Therefore, we predict that participants' perception of the level of violence in the video game will lead to increased presence, and that sense of presence will in turn lead to increased aggression.

Furthermore, men and women are likely to perceive differing levels of violence (Gunter, 1985), resulting in different responses to the stimuli with those who perceive more violence (i.e., men), experiencing more presence. Overall, then sex of the participant and game play will lead to greater perceived violence and greater perceived violence will lead to greater presence. Finally, it is the experience of presence that will result in overall increases in aggression, such as hostility and verbal aggression because it is not game play itself, but the cognitive *experience* of game play via presence that influences players' outcomes.

There has been little empirical testing of the effect of increased presence on learning or outcome variables, such as aggression. As Wilfred, (2004) pointed out, "There is much more focus on the technology of virtual reality than there is evaluation of its impact on learning. The efficacy of the VR systems developed, and what factors mediate this effectiveness are seldom studied." In this project, we examine the predictions outlined above with a causal model of the relationship between gender, game use, presence and aggression to shed further light on the causal relationship between these variables.

Methodology

This study uses an experimental design and causal modeling techniques to examine the causes and consequences of presence in the context of violent video games. Participants were randomly assigned to play either a violent or non-violent game before responding to a number of questionnaire items.

Participants

Participants in this study were 227 undergraduate students (109 males, 117 females, one subject did not report gender) enrolled in lower division Communication courses at a large East Coast University. Participants received extra credit for taking part in this research.

Stimulus Materials

For the purposes of this research, violence is defined using the operational definition from the National Television Violence Study (NTVS): “any overt depiction of a credible threat of physical force or the actual use of such force intended to physically harm an animate being or group of beings” (Smith et al., 1998, p. 30). So, in order to qualify as a violent game for this research, the main character in the game had to demonstrate actual intent to physically harm others. The violent game used for this study is Hitman II, Silent Assassin. This game received an Entertainment Software Rating Board (ESRB) rating of “M” for Mature. The nonviolent control game is Tony Hawk, Pro Skater3. Tony Hawk received an ESRB rating of “T” for teen.

Measurement Instruments

All scales were tested for internal consistency and parallelism through confirmatory factor analysis using the software CFA (Hamilton & Hunter, 1997).

Demographic variables. Subjects indicated their gender, age, year in school and race.

Game Use was measured with a 5 item likert-type scale on a 7 point metric (Standardized Alpha = .84). Participants were asked to indicate how frequently they play different types of video games.

Perceived Violence was measured with a 3 item likert type scale with a 7 point metric (Standardized Alpha = .85). Participants were asked to think about the game they played and rate it in terms of violent content.

Frustration with the game was measured with a 2 item scale (easy/difficult, or frustrating/not frustrating) with a 7 point metric (Standardized Alpha = .77).

Presence as immersion, or the extent to which participants felt that they were “inside” the video game (Lombard & Ditton, 1999; Nowak & Biocca, 2003), was measured with a 5 item likert type scale with a 7 point metric (Standardized Alpha = .89).

Hostility was measured using 8 items (Anderson, Deuser, & DeNeve, 1995). These were likert type items on a 4 point metric (Standardized alpha = .92).

Aggression. Finally, aggressiveness was measured by using a modified version of the Buss-Perry version of the aggression questionnaire (Buss & Perry, 1992). The items in this study were slightly reworded to reflect state rather than trait aggression. Before responding to these items, participants were asked to: “Imagine that you leave this building when you’re done completing this survey. Someone bumps into you, spilling your drink and the contents of your backpack.” They were then asked to rate whether each potential reaction was “0” (extremely uncharacteristic of me) to “6” (extremely characteristic of me). This reworded version of the Buss Perry aggression scale has been found to be reliable, and to more accurately tap participants’ responses to an aggressive prime (Farrar & Krcmar, 2006). Confirmatory factor analysis tests revealed three separate dimensions on this scale, including resentment, verbal

aggression and physically aggressive intentions. Items and the construct they measured are detailed below.

Resentment was measured with 5 aggression items (Standardized alpha = .88). These items included ‘this person always seems to get the breaks,’ ‘I think this person talks about me behind my back,’ ‘I would be suspicious of this person being overly friendly.’

Verbal Aggression was measured with 5 aggression items (standard alpha = .89). They included ‘I would tell this person openly that I disagree with him or her,’ and ‘this person would say that I’m somewhat argumentative.’

Physically Aggressive Intentions was measured with 5 aggression items (standard alpha = .88). They included ‘given enough provocation, I would hit this person,’ and ‘if this person hit me, I would hit back.’

Procedure

Male and female undergraduates were randomly assigned to play either the nonviolent control game or the violent game for 12 minutes. All games were played on a Sony PlayStation II gaming console hooked up to a 13-inch color television monitor. Participants filled out a post-test immediately after playing.

Results

To test the relationship between these variables, a causal modeling technique was employed using Path Version 5.0. Correlations between measures indicate fairly good discriminant validity, as Table 1 shows.

Insert Table 1 here.

The model shown in Figure 1 contains only significant structural coefficients at $p < .01$, with no significant missing paths indicating that all variables with direct relationships have paths

in this model. The overall goodness-of-fit of this model, as measured by the Root Mean Square Error of Approximation (RMSEA), is .05, matching the desirable value of .05 or less and far from the unacceptable value of .10 or greater. The overall model chi-square is 11.83 with 24 d.f., which does not differ significantly from the predicted model, $p = .98$. This is well above the desirable significance level of .05 or greater. Finally, no reproduced errors were above .10. On balance, the structure of the final model appears to be a good fit with the observed data. This section will first discuss the separate paths to presence and then discuss the impact of presence on aggression.

Insert Figure 1 here.

This model shows several significant paths to presence including the level of violence perceived in the game, the level of frustration resulting from play, overall game use, biological sex and the manipulated variable of game type. Specifically, males play significantly more video games than females, were less frustrated from game play, and, interestingly, felt *less* presence than females. The direct path from biological sex to presence shows that, all things being equal, females felt more presence than males. However, both females, and those who play video games less frequently, felt the game was more frustrating, and *frustration* reduced presence. In addition, those who play games more frequently in general, felt more presence. In addition, the effect of the *manipulated* variable (playing violent or non-violent game) on presence was negative. Instead, the effect of playing the violent game on presence was mediated by perceptions that the game was violent. Lastly, regarding the predicted effect of biological sex, there was no link from gender to perceived violence and no difference between men and women in terms of their perceptions of the level of violence in the game.

In addition to the significant links between both measured and manipulated variables on presence, presence was significantly related to several aggression measures. Presence directly predicts hostility, which predicts resentment, which predicts verbal aggression and physically aggressive intentions. Also, presence directly increases verbal aggression, which increases physical aggression. There were also significant direct paths from biological sex to verbally and physically aggressive intentions, with males demonstrating more verbally and physically aggressive intentions than women. This was true regardless of previous game use, level of frustration, or which game they played (violent or nonviolent).

Discussion

This limited test of video games and aggression seems to suggest that both overall game use and the experimental manipulation of game play have an influence on the aggression measures. However, as with the research by Gentile, et al (2004), in this study there was no direct link between game use and aggression. Instead, how gaming is experienced ultimately affects aggressive outcomes.

The first way that playing computer games can be experienced is cognitively. Note that playing the violent game during the experiment had a direct influence on only one variable (which will be discussed below). Instead, *perceiving* the game as violent served to increase feelings of involvement in or presence with the game. Furthermore, overall game play did not influence aggression on its own. Instead, those who play games seem better able to become involved and experience presence as the result of play. Again, the cognitive experience of the game outweighs the direct influence of play. Certainly, the important role of individual perceptions has been underlined in other media research (Potter, Pashupati, Pekurny, Hoffman, & Davis, 2002). This cognitive experience can then influence hostility which serves to increase

verbal and physical aggression. However, the role of cognition in presence, and ultimately aggression, is clear.

The second way that playing computer games can be experienced is affectively. In this study, we found that frequent game play allowed players to experience less frustration when playing the game during the experiment. Less frustration in turn lead to a greater sense of presence. Similarly, playing the violent game during the experiment (as compared to the nonviolent control game) resulted in greater perceived violence but also resulted in more frustration. Again, the affective experience of frustration interfered with experiences of presence.

In the end, it appears that game play, especially violent game play can result in increases in aggression only when a sense of presence or immersion in the game is achieved. What enables a sense of presence during the game experience is a familiarity with game play, such as is more common among males. On the other hand, if feelings of frustration arise, perhaps due to a lack of familiarity with game play, presence is not achieved. However, when presence is achieved, hostility tends to increase, which may lead to increases in verbal and physical aggression. These findings are consistent with social cognitive theory (Bandura, 2002) in that the symbolic experience of game play, in part as indicated by presence, affects outcomes.

Despite support for social cognitive theory, there are some anomalous findings in the model. Specifically, those who perceived greater violence in the game experienced less hostility. Perhaps when players perceived the game as violent, but did not experience greater presence, they did not engage as much with the content and played the game as a way to pass time. So, it is not that exposure to violence reduced hostility but that without presence, hostility was not increased as much. Essentially, the lower level of presence may have resulted in lower levels of

affective hostility. This argument is supported in part because when presence did not mediate the link between game play and hostility, the path was negative. In other words, aggression results from true involvement in the violent game (i.e., presence) and not from game play as a means to pass time. This argument is consistent with a uses and gratifications approach to media (Rubin, 1981) that argues that the way media are used influences resulting outcomes.

Furthermore, it is important to recognize that the previous game use measure in this study did not specifically measure violent video game usage. This may explain why there is not a separate path directly from game usage to aggression. Future research should measure violent video game play separately to test whether those who play more violent video games are more aggressive than those who play other video games following a short exposure to violent stimuli. This would allow for the distinction between familiarity with the medium, and aggressive priming, as the cause of increased presence and aggression.

Conclusion

Social cognitive theory is specifically relevant to understanding and predicting reactions to video game violence. This perspective recognizes people can learn, and will imitate, modeled behavior that they experience directly, or through mediated sources (Paik & Comstock, 1994). It maintains that the cognitive experience of the observer influences any outcomes that will result (Bandura, 2002).

In terms of the cognitive experience, we predicted that people who were not frequent game players may have to allocate more cognitive resources to figuring out the rules of the game, or to learning how to work the interface. It is likely that experience with games would allow a person to experience more presence with the medium, become more involved in the story line and be less frustrated by the experience of game play. For those with less experience with

games, the need to learn the game may well increase frustration, and consistently remind the participant that the experience is mediated, which reduces presence.

In examining how people react to, and interpret, media the presence literature can provide important theoretical information. Learning more about the factors that influence presence can help researchers predict when, and to what extent, an individual will be affected by exposure to violent media. In terms of our predictions about the consequences of presence, our main predictions were supported. Essentially, the *perceptions* of violence and *perceptions* of presence result in greater hostility and greater aggression.

The cognitive process also influenced presence in that there is a very strong effect of perceived violence on presence. Those who perceived the game as more violent felt a greater sense of presence, and they felt more resentment directly associated with perceived violence. However, contrary to what we predicted, those who perceived more violence felt moderately less hostility. Essentially, the level of frustration and presence is predicted by the perception of violence and not necessarily by condition. More importantly, those who perceived more violence in the game they played were more aggressive than those who perceived less violence in the game they played. The notion that the cognitive experience of violence is more influential than actual exposure to violence is consistent with social cognitive theory.

The results from this study, as well as previous studies, show significant effects on hostility and aggression as a result of playing a game for very small amounts of time-particularly when they are present, or engaged. These results suggest that the over time use of video games may prime users to quickly experience aggressive affect and perhaps engage in aggressive behaviors when they encounter violence or unpleasant stimuli, whether mediated or not. This is particularly true when presence is increased. Also, as Anderson (2004) suggested, there is a need

for more longitudinal studies, as well as a need to educate the public about the potential effects of exposure to violent media and particularly the effects of playing violent video games. As suggested by Sherry's (2001) meta-analysis, the effect of video games on people's aggression is likely to continue to increase.

Video games are becoming more vivid, are being presented on larger screens, including surround sound, engaging characters, and compelling storylines, all of which have been shown to increase presence, which these data show increases aggression. Since we know that increased presence increases aggressive affect, we can look to things that increase presence (both individual differences and features of the media) for cues about how to predict the causes and consequences of exposure to violent media. Understanding the causes and consequences of presence may contribute to our understanding of who will be most affected by media violence and under what conditions.

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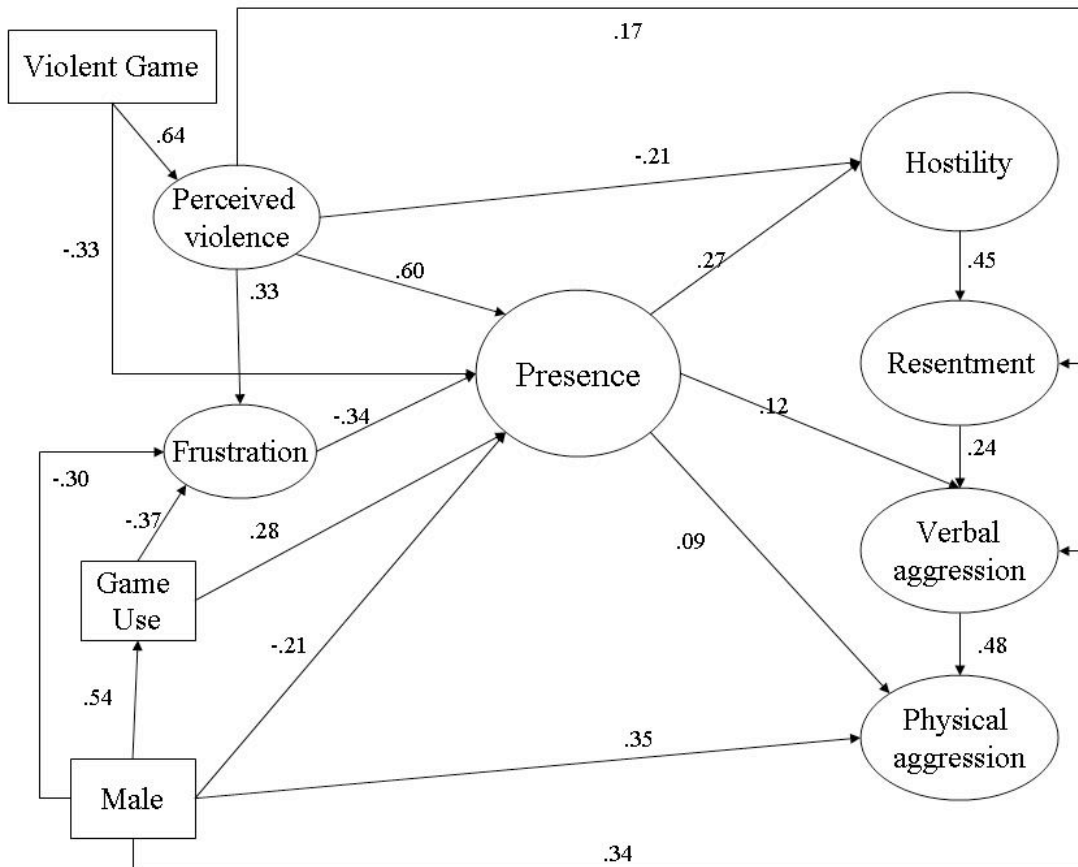
Table 1. Pearson Correlations Among Variables

	<i>Violent condition</i>	<i>Male gender</i>	<i>Game use</i>	<i>Frustration</i>	<i>Perceived violence</i>	<i>Presence</i>	<i>Hostility</i>	<i>Resentment</i>	<i>Verbal aggression</i>
<i>Male gender</i>	-0.01								
<i>Game use</i>	0.04	0.49**							
<i>Frustration</i>	0.13**	-0.44**	-0.43**						
<i>Perceived violence</i>	0.59**	-0.01	-0.01	0.27**					
<i>Presence</i>	0.02	0.10	0.28**	-0.19**	0.24**				
<i>Hostility</i>	-0.11	0.10	0.12	-0.13	-0.12	0.19**			
<i>Resentment</i>	-0.03	0.04	0.10	-0.03	0.09	0.19**	0.38**		
<i>Verbal aggression</i>	-0.04	0.35**	0.23**	-0.13	0.08	0.18**	0.18**	0.24**	
<i>Physical aggression</i>	0.01	0.49**	0.32**	-0.26**	0.06	0.19**	0.17**	0.18**	0.55**

* $p < .05$

** $p < .01$

Figure 1: Path Model revealing the causal relationship between the variables.



Overall goodness-of-fit of model: RMSE .05. Chisquare = 5.90 at d.f. 24, $p = 0.99$.