THE MODERATING ROLE OF MEDIA INTERACTIVITY ON THE RELATIONSHIP BETWEEN VIDEO GAME VIOLENCE AND AGGRESSION AND THE MEDIATING MECHANISMS OF CHARACTER IDENTIFICATION AND SELF-CONCEPT

By

Jih-Hsuan Lin

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ABSTRACT

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This study proposed and tested a media interactivity model drawing upon recent theoretical arguments about character identification within the General Aggression Model (GAM). The model examined the moderating effect of media interactivity on the relationship between video game violence and short-term aggression. In addition, character identification and automatic self-concept were hypothesized as the mediating mechanisms of the effect of media interactivity on short-term aggression. As a part of this work, a scale designed to measure character identification was developed and tested. Drawing from the social cognitive theory, the Monadic Identification Scale consists of 15 items which loaded into four factors (Enactive Experiences, Goal Identification, Real Life Identification, and Outcome Identification) predicted by the theory.

A total of 169 male undergraduate students participated in the experiment, which had a 2 (media interactivity: play vs. watch) × 2 (violence: violent vs. non-violent) factorial design. The results showed that media interactivity and violence significantly affected participants' short-term aggressive affect. Media interactivity also had a main effect on systolic and diastolic blood pressure. A conditional moderating effect—in that participants who played the violent video game displayed greater aggressive affect and blood pressure than participants who watched the recorded violent game play—was also found. Moreover, Enactive Experiences Identification fully mediated the effect of media interactivity on aggressive affect, after controlling for the

Outcome Identification as a suppressor. Participants who played the video games exhibited a higher level of identification than recorded game play watchers, which led to higher aggressive affect.

An interaction effect between media interactivity and violence was found for automatic self-concept. Media interactivity enhanced both positive and negative effects, in which active video game players in violent and non-violent conditions associated themselves both with more aggressive and more peaceful concepts than those who watched the recorded game play. However, self-concept did not significantly mediate the interaction effect of media interactivity and violence on short-term aggression.

The current study extended existing literature and further demonstrated that media interactivity exhibited significant influence on media effects after controlling violence content. Future research should continue testing the proposed media interactivity model as well as the antecedents and consequences of the mediating mechanisms.

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TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

The Moderating Role of Media Interactivity on the Relationship Between Video Game Violence and Aggression and the Mediating Mechanisms of Character Identification and Self-concept

Chapter 1

Introduction

Does exposure to media violence increase short and long-term human aggression? Over the past few decades, media effect researchers have focused on studying and explaining this issue among various types of media, including television, film, lyrics in music, and video games. Despite continuing debates regarding the causal relationship, repeated empirical studies and meta-analyses have shown an association between exposure to media violence and the audience's aggression and violent behavior (Anderson et al., 2010; Barlett, Anderson, & Swing, 2009; Bushman & Huesmann, 2006; Huesmann, 1986; Kutner & Olson, 2008; Sherry, 2007; Sparks, Sparks, & Sparks, 2009). More recently, violent video game effects have been receiving growing concern from parents, researchers, educators, and policy makers. Exposure to video game violence has been found to increase players' short-term physiological arousal, aggressive thoughts, aggressive affect, and aggressive behavior as well as long-term aggressive personality and knowledge structure (Anderson et al., 2010; Bushman & Anderson, 2002).

With the rapid growth in the popularity of video games, researchers started to question whether the relative magnitudes of violence effects varied between video games and TV (Dill & Dill, 1998; Dominick, 1984). On one hand, arguments that suggested violent video games may have had weaker effects on people's aggression criticized the unrealistic graphics, abstract violence, and non-human characters in video games. However, recent research showed that technological advances such as better graphic and audio quality in video games did not moderate

the violence-aggression relationship (Barlett, Rodeheffer, Baldassaro, Hinkin, & Harris, 2008; Ivory & Kalyanaraman, 2007). In addition, based on the definition of violence as (Huesmann & Taylor, 2006), "visual portrayals of acts of physical aggression by one human against another" (p. 395), violence depicted in modern video games is not abstract and what appears on television can also be illustrated in video games, thus making the two media directly comparable.

On the other hand, arguments that suggest violent video games may have greater effects on players' aggression than video emphasize the element of interactivity in games. Growing evidence (Jalette, 2009; Lin, 2010; Polman, Castro, & Aken, 2008) showed that video game players subsequently displayed more aggression compared to participants who watched recorded game play or comparable movie scenes, indicating that interactivity, when defined as, "situations where real-time feedback is collected from the receivers of a communications channel and is used by the source to continually modify the message as it is being delivered to the receiver" (Straubhaar & LaRose, 1996, p. 12), in video games exerts stronger aggressive effects than passive video watching. Moreover, a meta-analysis of risk factors for aggressive behavior (Anderson, Gentile, & Buckley, 2007) showed that the effect size of video game violence was .30 compared to .17 for other media violence.

A question thus becomes: what are the underlying mechanisms that could explain the presence of incremental violent effects caused by media interactivity. One proposed mechanism is character identification. Researchers (Dill & Dill, 1998; Gentile & Anderson, 2003) suggested that interactive features in video games, such as the ability to control a character's action or character customization, allowed players to identify themselves with the characters and thereby increased aggression during and after the game. However, recent studies showed conflicting findings regarding media interactivity effects on character identification (Hefner, Klimmt, &

Vorderer, 2007; Lin, 2010; Peng, 2008; Peng, Lee, & Heeter, 2010).

Another potential mechanism is the automatic self-concept (i.e., temporary altered self-perceptions). Berkowitz (1990) suggested that the effects of violent media are often automatic, and media violence may influence one's behavior and thoughts through spontaneous association of one's self with aggressive traits and cognitions. Violent video game players would temporarily perceive themselves as aggressive persons after the game more than players who played non-violent games would (Uhlmann & Swanson, 2004). Fischer et al. (2009) found that players who played racing games perceived themselves as reckless drivers more than game play observers did. However, such self-alteration did not mediate the effects of racing games on risk-taking. Nonetheless, the underlying mechanisms that explain why media interactivity would influence the effects of video games remain unknown.

This study proposed and tested a media interactivity model drawing upon recent theoretical arguments of character identification and the General Aggression Model (GAM). Chapter two presents an extensive review of existing literature addressing the role of media interactivity on the relationship of violence and aggression. In addition, the author also reviewed the development of the construct of character identification, which is a hypothesized mediating mechanism. Furthermore, another potential mediating mechanism, automatic self-concept, is introduced. In order to understand the underlying mechanisms, a scale designed to measure character identification was developed and tested at the onset of the present study. Drawing from social cognitive theory (Bandura, 2001), the scale consisted of 15 items loading into four factors based on the theory. Second, an experiment was employed to examine the model and potential mediating mechanisms. These are presented in chapter three, the methods section. The results are presented in chapter four, followed by the discussion, given in chapter five.

Chapter 2

Literature Review

Violence and Aggression: General Aggression Model (GAM)

The General Aggression Model (GAM) (Anderson & Bushman, 2002; Anderson & Carnagey, 2004) is currently the most comprehensive theoretical framework designed to delineate how violent media influence people's aggression. The GAM integrated five main theories to explain the relationship of violent media exposure and human aggression. Audience members may become more aggressive through any one or combinations of several different routes. First, cognitive neoassociation theory (Berkowitz, 1989, 1990, 1993) assumed that aversive events produced negative affect, whereby cues from the aversive events would associate with the events as well as emotional and cognitive responses triggered by the events. When a particular violent concept or cue is activated, it will automatically activate associated violent concepts and scripts.

Second, according to social cognitive theory (Bandura, 2001), people learn aggressive-related thoughts and behaviors through past direct experiences (enactive learning) and through observing behaviors exhibited by others (observational learning). On that basis, they form expectations and beliefs that guide their later social behavior. This theory contributed to the model by explaining how individuals learn violence and plan aggressive behavior.

The third theory, script theory (Huesmann, 1986), posits that people learn situations and behavior from the mass media. Applying this concept to human aggression implies that individuals learn aggressive scripts from the media. When a person is exposed to repeated violent scenes from the media, the multiple rehearsals of the aggression scripts create more paths to existing concepts in memory as well as strengthen links between the concepts. Thus, when

playing violent video games, players repeatedly rehearse violent actions in order to achieve the goals in the game.

Fourth, excitation transfer theory (Zillmann, 1983) suggests that physiological arousal may be misattributed to other triggering events through slow dissipation. For example, people who play violent video games would display higher physiological arousal through heart rate and blood pressure and the excitation would be transferred to later aggressive responses toward someone or something, triggering the aversive emotions.

The fifth theory is social interaction theory (Tedeschi & Felson, 1994), which provides an explanation for using aggressive behavior as a way to obtain higher level (or ultimate) goals. For example, a person can use aggressive behavior to obtain resources or information from others. In the context of video games, a player can use violence to achieve the goal of "winning" the game.

Based on these five theories, the GAM predicted that situational factors (e.g. playing violent video games) and personal factors (e.g. aggressive personality and aggressive knowledge structure) would lead to aggressive outcomes (e.g. aggressive behavior decision process) through three inter-connected routes—aggressive affect, aggressive cognition, and physiological arousal. Past research has shown that, in the short term, violent video game players displayed more aggressive and negative affect after playing violent video games (Anderson & Bushman, 2001; Ivory & Kalyanaraman, 2007). For example, players in violent video games indicated higher scores of statements such as "I feel irritated" or "I feel furious" compared to players of non-violent video games. In addition, violent video game players exhibited higher proportions of aggressive cognitions than nonviolent video game players did (Anderson et al., 2004; Barlett, Harris, & Bruey, 2008; Eastin, 2006). Furthermore, violent video game players also showed stronger physiological arousal compared to non-violent video game players (Bushman &

Huesmann, 2006; Carnagey & Anderson, 2005).

In the long term, repetitive enactment of violent scripts and rehearsals of learning reinforces and biases knowledge structures toward violence. The short-term and long-term effects reinforce each other and strengthen players' aggressive personalities, which would produce biased aggressive perceptions and responses when situational factors trigger aggressive affect, cognition, and physiological arousal.

Theorizing Video Games vs. TV/Film/Video

Empirical studies have shown a robust violence-aggression relationship (Anderson et al., 2010; Barlett et al., 2009). With the rise in popularity of video games, researchers have become curious about whether video games exert lesser or greater influence of violent effects on aggression than other media. Interactivity was suggested as the fundamental factor that makes video games unique (Dill & Dill, 1998; Dominick, 1984; Gentile & Anderson, 2003; Jalett, 2009; Lin, 2010). Researchers often identified interactivity as the feature in which game players can control their characters representing themselves in games. Although interactivity remains an ambiguous concept (McMillan, 2002), in this study it "refers to situations where real-time feedback is collected from the receivers of a communications channel and is used by the source to continually modify the message as it is being delivered to the receiver" (Straubhaar & LaRose, 1996, p. 12). As McMillan (2002) suggested, this definition pointed out that interactive content not only allowed users to control the options, but also provided dynamic response to users' actions.

The above definition of interactivity is the most appropriate for the present study, as it fits video games very well. In video games, the game programs (representing the source) respond to players' (receivers') decisions and commands (real-time feedback) by, for example, allowing the

game character to pick up an object and use it to harm other characters in the game. In addition, the game program continually modifies its responses to game characters (messages) built upon players' past active decisions. For example, different plot lines develop if players choose to solve a problem using different strategies. The moral alignment (i.e., being a good hero or a bad "hero") fluctuates depending on how players achieve the goals. This interactive feature distinguishes video games from other media, such as film and literature. In video games, players actively control game characters through input commands and game programs modify the game content continually. In contrast, when watching videos, the audiences cannot input commands to influence characters' behavior. The audiences may be able to turn the video on and off, adjust the volume, or skip some sequences; however, they cannot provide inputs to modify the already fixed video content. According to this definition, video game playing is interactive, whilst video watching is not.

Social cognitive theory (SCT) (Bandura, 2001, 2007) is the framework most researchers employed to theorize differences between video games and other media (Favaro, 1983; Peng, 2008; Polman et al., 2008). Drawing upon the concepts of enactive learning (i.e., direct experiences) and observational learning (learning through experiences of others), Peng (2008) conceptualized video game playing as mediated enactive experiences and video watching as mediated observational experiences. Video games provide a mediated environment for players to freely and safely experience their behavior and its consequences. The behavior and its consequences are simulated and may be projected onto the game characters in video games. This is conceptualized as a mediated enactive experience, "a simulated direct experience in the mediated environment" (Peng, 2008, p. 650). In contrast, video watching is a non-interactive observation in a mediated context, thus it is conceptualized as a mediated observational

experience.

The above theoretical framework distinguished the construct of interactivity in the present study from previous media effects resaerch (Barlett, Harris, & Baldassaro, 2007; Huesmann & Taylor, 2006). While previous literature emphasized the effects of the amount of violence audiences were exposed to as the key causal factor, the present study argued that the enactive nature of the role assumed by the interactive player is the key to producing effects. As the theoretical framework indicated, mediated enactive experiences allow the player to experience the action for him/herself rather than the number of violent behaviors enacted in the game. In other words, in addition to the mere exposure to violence, the perspective (i.e., enactive or observational) of the experience of the violent acts in the video games is the key to intensify the violence-aggression relationship.

Empirical Studies Comparing Video Games vs. Other Media Effects

Several experiments attempted to compare the effects of violent video game playing and violent video watching on human aggression. Earlier experiments chose non-comparable violent content as stimuli that resulted in null effects of media modality on aggression. For example, Favaro (1983) randomly assigned college students to three conditions: an arcade video game, dart play, and television viewing. The stimuli in this experiment were: *Dig Dug* vs. *Tempest*, the final fight from *Rocky 1* vs. the rescue scene from *Superman II*, and throwing a dart to a human in the attempt to "knock off" the person vs. throwing a dart to stun a spaceship. The results showed that video game players displayed the lowest levels of subjective hostility compared to dart play and television viewing.

Another experiment (Silvern & Williamson, 1987) compared the effects of violent television watching (*Road Runner*), violent video game playing (*Space Invaders*), and violent

video game viewing (*Space Invaders*) on children's physical aggression, imaginative fantasy, and positive social interaction. Children aged four to six watched six minutes of the cartoon, and played or watched six minutes of the video game. The results indicated that aggression was displayed consistently across all three activities, and did not differ between television watching and video game playing, or between video game playing versus video game viewing.

The experiments discussed above did not match the content across media, a later experiment (Graybill, Strawniak, Hunter, & O'Leary, 1987) employed a two (violent vs. non-violent) by two (video game playing vs. video game watching) design to compare the aggressive effects. One hundred and thirty-seven second-to-six-graders either played or observed two violent (*Berzerk, Gangster Alley, and Boxing*)[1] or two non-violent video games (*Fast Food, Basketball, and Frogs and Files*). No main effects or interaction effects were found on children's short-term aggression. The authors suggested that the null effects could result from the presence of observers during video game play, which might have attenuated the violence manipulation, as children could have focused more on achieving a higher score than on the violent content.

Recent experiments chose comparable content to study media modality effects on aggression. However, the amount of violence across conditions was not controlled. Meyers (2002) compared the impacts of three types of media (television, video games, and television and video games) and two levels of violence (violent and non-violent) on third and sixth grade students' aggression levels. The video game stimuli included a wrestling game, *WCW vs. NW0 - Revenge*, as the violent video game and a basketball game, *NBA LIVE '99*, as the non-violent video game. Video clips were chosen from the television broadcast of the World Champion Wrestling (WCW) and the National Basketball Association (NBA) as the stimuli in the television conditions.

[1] The authors provided three violent and non-violent video games, and participants were randomly assigned to play two violent or two non-violent games from these choices.

Participants either played a video game for 15 minutes, or watched the video for seven and a half minutes and played a video game for another seven and a half minutes involving the same character shown on TV. The results showed a significant main effect of violence on children's aggression, but did not find any differences between media types. Meyers (2002) attributed the null effects of media modality to the different features in the experimental stimuli. For example, the television clips had cheering crowds and fireworks, which could be theorized as positive social reinforcement elements not found in video games.

The first experiment that found a significant difference between active playing versus passive watching of game play was conducted by Polman et al. (2008). The researchers employed a randomized 3-group between-subject design: 57 children aged 10 to 13 either played a violent video game (*Tekken*), or watched the same violent game play on a separate TV screen, or played a non-violent video game (*Crash Bandicoot*). This study used a peer nomination method to measure aggression, as children were asked to name other participants who displayed acts of physical, verbal, or relational aggression on the day after the experiment. The results showed that boys who played a violent video game showed more aggressive behavior than their peers who watched the game play, which was not observed in girls. However, playing either a violent or a non-violent video game did not cause any differences on boys' aggression. This may be attributable to the manipulation of the violence in games, as the goal of Crash Bandicoot is to defeat the enemy to save his girlfriend. Thus, the author's classification of "non-violent game" is questionable, as the game requires aggressive behavior to achieve the goal. Results also showed that there was no difference between boys who played a non-violent video game and boys who watched violent video game play. The authors suggested that the small sample size for boys (N = 18) might have result in the null effects on violence.

In another experiment, Jalette (2009) compared audience aggression using the violent and non-violent sections of the movie, *The Matrix* and the video game, *The Matrix*. In addition to the main effects of violence and media interactivity, a significant interaction effect between these two was found on hostility. Violent video game players displayed the most aggressive affect, and non-violent video game watchers displayed the lowest aggressive affect. However, the author did not control the differences across conditions regarding the depiction of real persons in the film compared to the digitally rendered characters in the game. The violence was also not controlled, resulting in the opportunity for game players to expose themselves to more violent acts than participants who watched the chosen film section. Thus, the difference between the amounts of violence across conditions may confound the effect with media interactivity, as identifying the variable causing the aggressive outcomes is rendered impossible. Violence needs to be controlled between playing versus watching in order to examine the effect of media interactivity. Moreover, the interaction effect only affected audiences' aggressive affect.

More recently, Lin (2010) matched the storyline, context, and amount of violence across three conditions. In this study, 102 male college students were randomly assigned to either play two sections from a violent video game (*X-men origins: Wolverine)*, watch recorded video game play, or watch the corresponding video clips from the movie *X-men origins: Wolverine*. The results showed that video game players displayed greater increase in aggressive affect, exhibited higher proportion of aggressive cognition, and showed stronger physiological arousal, compared to participants who either watched recorded game play or those who watched movie clips.

Whilst earlier experiments did not find the effects of media interactivity on aggression, recent experiments showed that active video game playing would exacerbate the violent effects on short-term aggression. However, they yielded inconsistent findings regarding whether video

game play would elicit greater aggressive responses than video watching. Moreover, it remains unknown whether media interactivity would moderate the violence-aggression relationship through all routes in the GAM. Therefore, the following hypotheses are proposed to examine the interaction effects on short-term aggression. The first set of hypotheses focus on the two main effects and interaction effect on aggressive affect.

H1a: Video game players (mediated enactive experience) will display more aggressive affect compared to participants who watch recorded game play (mediated observational experience).

H1b: Participants who play or watch a high-violence video game will display more aggressive affect compared to participants who play or watch a non-violent video game.

H1c: There will be a significant interaction effect of media interactivity and amount of violence on participants' aggressive affect. In other words, amongst participants in violent conditions, video game players will display larger aggressive affect than those who watch the corresponding recorded game play. Similarly, amongst participants in non-violent conditions, media interactivity will have no significant effect.

The second set of hypotheses focus on the two main effects and interaction effect on aggressive cognition.

H2a: Video game players will exhibit higher aggressive cognition compared to participants who watch recorded game play.

H2b: Participants who play or watch a high-violence video game will exhibit higher aggressive cognition compared to participants who play or watch a non-violent video game.

H2c: There will be a significant interaction effect of media interactivity and amount of violence on participants' aggressive cognitions. In other words, amongst participants in violent conditions, video game players will exhibit higher aggressive cognition than those who watch the

corresponding recorded game play. Similarly, amongst participants in non-violent conditions, media interactivity will have no significant effect.

The third set of hypotheses tests the two main effects and interaction effect on physiological arousal.

H3a: Video game players will display more physiological arousal including heart rate, systolic blood pressure (when the heart is contracting), and diastolic blood pressure (when the heart is resting) than participants who watch recorded game play would.

H3b: Participants who play or watch a high-violence video game will display more physiological arousal including heart rate, systolic blood pressure, and diastolic blood pressure than participants who play or watch a non-violent video game would.

H3c: There will be a significant interaction effect of media interactivity and amount of violence on participants' physiological arousal (heart rate and blood pressure). Thus, amongst participants in violent conditions, video game players will have higher physiological arousal than those who watch the corresponding recorded game play, whereas amongst participants in non-violent conditions, media interactivity would have no significant effect.

Underlying Mechanism One: Character Identification

In addition to investigating the interaction effects of media interactivity and the amount of violence on aggression, the second aim of the study is to investigate the underlying mechanisms that explain the effects of media interactivity on short-term aggression. The five underlying theories incorporated in GAM imply differing mechanisms. Moreover, several experiments showed that media interactivity could accentuate the violent effects on aggression. However, the question arises: Why do video games enhance the violent effects on aggressive outcomes more than video watching? In addition, what is the underlying mechanism to explain why interactivity

would enhance the effects?

Character identification has been employed as one mechanism to explain why such differences exist (Hefner et al., 2007; Klimmt, Hefner, & Vorderer, 2009; Peng et al., 2010). However, there are conflicting conceptual and operational definitions of identification in the literature (Bandura, 1969; Cohen, 2001; Leyens & Picus, 1973; Maccoby & Wilson, 1957). Moreover, recent empirical studies (Fischer et al., 2009; Fischer, Kastenmüller, & Greitemeyer, 2010; Lin, 2010; Peng, 2008; Peng et al., 2010) show inconsistent findings regarding character identification as a mediator of media modality, suggesting that its effects might be traced to varying conceptualizations of the construct. Given the evident lack of consensus, the question that will be first raised is—what is character identification? The following is a review of the development of the construct 'character identification' and its definition given by past researchers, who have attempted to define and measure the construct.

Initial concept. Character identification was first employed in empirical media studies[2] as a mechanism that could potentially explain the process that generated emotions in a mediated environment. It was defined as when the phenomenon that arises, "the viewer, in fantasy, puts himself in the place of a character and momentarily feels that what is happening to that character is happening to himself" (Maccoby & Wilson, 1957, p. 1). This definition, here termed "vicarious identification" to distinguish it from other conceptualizations, indicated that identification is a process in which viewers feel as if they are "becoming" the character and consequently start to experience what the character is experiencing. In a study conducted by Maccoby and Wilson (1957), 25 classrooms of seventh-graders watched 20-minute movie clips and a week later answered a series of questions regarding identification. Unfortunately, the

[2] A similar construct (i.e., audience participation) was employed in the film literature, although the term 'identification' was first coined in Maccoby and Wilson (1957).

"indirect" measures of identification the authors designed did not capture the essence of the definition. Three questions were used in the first study: (1) Which one of the two main characters did you like best? (2) Which of the two main characters would you like to be like? (3) Which of the two main characters do you feel is most like you? Thus, the three items measured viewers' attitudes, viewers' "wishful identification" (see Hoffner, 1996, cited below) and perceived similarity, respectively. In the second study, three items were used to measure identification: (1) Which character is most like you? ("similarity identification", after Feilitzen and Linné, 1975, referring to identification through similar characteristics of characters); (2) Which character would you like to be in real life? (wishful identification in real life); (3)Which part would you like to play in the movie? (wishful identification). While the last item seemed to measure character identification as defined by the authors, in current terms it actually measured audiences' wishful identification, which failed to measure the process of "putting oneself into the character's shoes," as called for in the original conceptual definition.

Identification in social learning theory. Bandura defined identification as, "the occurrence of similarity between the behavior of a model and another person under conditions where the model's behavior has served as the determinative cue for the matching responses" (Bandura, 1969, p. 217). According to social cognitive theory (Bandura, 1986), there are two types of learning. Enactive learning, also known as learning through direct experience, refers to learning through personal trial-and-error performances that are reinforced by rewarding and punishing results. On the other hand, observational learning allows individuals to learn behavior and consequences through watching behaviors of others. Observational learning can be economical and effective for learners, as leaning occurs based on model's experiences without suffering from costly or fatal consequences. Specifically, symbolic modeling provided by mass media, such as

TV, allows the viewers to expand their range of modeling experiences (Bandura, 2007). Observing models' behaviors provides audiences guides for later actions. For example, Bandura, Ross, and Ross (1961, 1963) showed that subjects who watched films with aggressive human and cartoon models demonstrated almost twice as much aggression as subjects who did not watch the aggressive film.

Bandura's (1969) definition of character identification was quite different from the one proposed by Maccoby and Wilson (1957). The former defined the term as the way the audience employed the models' behavior as a guide for later actions and produced matching responses in similar situations, whereas the latter described identification as the process of imagining being in the characters' place. Note that Bandura's conceptual definition differs from that of Maccoby and Wilson's (1957) in that the focus of the former is on identification that stimulates imitative behavior through both similarity with a character and correspondence between the character's situation and one's own. Imagining oneself in the place of a character does necessarily lead to imitation if the identification does not provide relevant information about the outcomes that the observer can expect in his or her own surroundings. At the operational level, Maccoby and Wilson examined perceived similarity with the character ("being like" them) but not the correspondence of the story setting with real world situation in which the behavior would likely take place. In the present study, Bandura's definition of identification is termed "behavioral identification," in order to differentiate from others.

A third line of research (Leyens & Picus, 1973; Perry & Perry, 1976; Turner & Berkowitz, 1972), popular during the 1970s, focused on the effects of identification, in which identification was an independent, manipulated variable in experiments. The method these authors employed to induce identification was more in line with the vicarious identification (Maccoby & Wilson,

1957). The concept of identification was furthered explained as, "covert role-taking" (Turner & Berkowitz, 1972, p.256) For example, the following is the identification manipulation employed to induce subjects to identify with the character, Dunne, in the movie *Champion* (Turner & Berkowitz, 1972):

> *[Imagine self as Dunne instructions]* You are to think of yourself as the character named Dunne, Kirk Douglas' opponent in the film. Try to place yourself in his shoes during the fight and react the way he would react to the fight.

However, the manipulation check items still focused on measuring how subjects felt toward the film's characters and the perceived similarity between the subjects and the character, conforming more to vicarious identification (Maccoby & Wilson, 1957). Nonetheless, the results showed that subjects who "identified" with the aggressor in the film displayed more aggression afterwards.

Wishful identification. Later, researchers (Feilitzen & Linné, 1975; Hoffner, 1996) extended previous experiments regarding character identification on TV and specified a new dimension of identification, wishful identification. It was defined as, "the desire to be like or behave in ways similar to the character" (Hoffner, 1996, p. 390). Studies (Hoffner, 1996; Hoffner & Buchanan, 2005) showed that subjects preferred to wishfully identify with same-sex, successful, and admirable characters. Another study (Konijn, 2007) applied this concept in video games and found that wishful identification with the violent character was positively related to aggressive behavior that was measured by noise blasts in a competitive reaction time task.

The items measuring wishful identification matched well with its definition: 1) *I'd like to do the kinds of things he or she does on the show; 2) he/she is the sort of person I want to be like myself; 3) I wish I could be more like him/her.* However, although Hoffner (1996) argued that this

construct was extended from the original identification definition (Maccoby & Wilson, 1957) and reflected the meaning of identification provided in literature, wishful identification is fundamentally different from the process of "putting yourself in others' shoes." It also highlighted the failure by previous studies to employ the appropriate measurements to capture the imaginative process.

Identification redefined. Whereas the measurements and definitions of identification in previous literature were inconsistent, Cohen (2001) attempted to integrate existing research and extended the definition of identification as, "an imaginative process through which an audience member assumes the identity, goals, and perspective of a character" (p. 261). When identifying with a character, audiences start to feel as though they are sharing that character's experiences, view the plot from the character's perspective, adopt the character's goals, and experience the emotional responses from the interactions of achieving the goals and events. In Cohen's theoretical paper, four dimensions were included to measure identification: empathy (i.e., sharing the feelings of the character), cognitive understanding (sharing the perspective of the character), motivation (sharing the goals of the character), and the loss of self-awareness during exposure to the text. Furthermore, the author suggested that, given that identification is fleeting and unstable, intensity and frequency of identification should be measured. Cohen (2001) proposed the following items to measure identification:

Empathy

1) While viewing the show I could feel the emotions character X portrayed.

2) When character X succeeded I felt joy, but when he or she failed, I was sad (with the character, not for them).

Cognitive understanding

3) During viewing, I felt I could really get inside character X's head.

4) I was able to understand the events in the program in a manner similar to that in which character X understood them.

5) I think I have a good understanding of character X.

6) I tend to understand the reasons why character X does what he or she does.

7) At key moments in the show, I felt I knew exactly what character X was going through.

Loss of self-awareness

8) While viewing program X, I felt as if I was part of the action.

9) While viewing program X, I forgot myself and was fully absorbed.

Motivation

10) While viewing the program, I wanted character X to succeed in achieving his or her goals.

This measurement was the closest in striving to capture the perceived "imaginative process" and the loss of the sense of being an audience. Three studies have employed this measurement to test the modality differences and yielded inconsistent results. Peng (2008) employed Cohen's measurement of identification ($\alpha = .87$) to compare audiences' levels of identification between video game playing and watching. The results indicated that game players displayed higher character identification and more self-efficacy for adopting a healthy diet compared to those who watched the video game. Identification also partially mediated the relationship between media modality and self-efficacy.

In another study, Peng et al. (2010) employed six items (items 1, 2, 3, 4, 7, and 10; $\alpha = .72$) of Cohen's measurements to compare the identification levels and willingness to provide humanitarian aid between participants partaking in three modes: video game playing, watching

the recorded game play, and reading text. The results showed that individuals who played the video game, Darfur is Dying (http://www.darfurisdying.com/), identified more with the character and were more willing to help the Darfurian people than the participants exposed to other two conditions were. However, identification only mediated the relationship between modes (game vs. text) and the willingness to help in study 1, and did not mediate the relationship between modes (game, recordings, or text) and willingness to help in study 2.

The inconsistencies of the mediation effect of media interactivity on behavioral intention through identification can be attributed to the inconsistencies of employing the measurements. None of the six items (items 1, 2, 3, 4, 7, and 10; $\alpha = .72$) employed in these two experiments (Peng et al., 2011) directly address the extent to which the character's behavior guides participant's own behavior. These items describe a dyadic relationship between the character and the audience, whereby the participants understand characters' feelings, emotions, and also desire characters to achieve the goals instead of their own goals. The items presume observational learning, instead of enactive learning.

More recently, Lin (2010) employed the same six items ($\alpha = .82$) from the study conducted by Peng et al. (2010) to test the effects of modality differences (playing video games, watching recorded game play, and watching movies) on character identification and audience aggression. The results showed that participants who played the game, *X-men origins: Wolverine,* displayed a significantly higher increase in aggressive affect, aggressive cognition, and blood pressure compared to participants who watched recorded game play and those who watched movie clips. However, character identification did not differ significantly among conditions. Interestingly, although the differences of identification across conditions did not reach significance, participants who watched the corresponding movie sections indicated higher identification than

those who played the game or watched the on-screen capture. In fact, participants who played the video game displayed the least identification among the three groups. The results further suggested that Cohen's identification scale measured the observational experiences rather than enactive experiences, as the movie condition focused on observing the plot, whereas video game players paid more attention on violent acts in order to achieve the goals instead of understanding the character's emotions and feelings. Therefore, in the present study, Cohen's identification is termed "observational identification," in order to differentiate itself from others.

Hefner et al. (2007) used similar measures of observational identification to explore whether or not video game playing would induce higher levels of character identification than video game watching. The results indicated that video game players displayed more character identification than video game watchers. The following are the scale items used in the study:

1. I almost had the feeling of actually being the character.
2. I literally had the feeling I was in the character's skin.
3. I sometimes completely forgot about myself because I was focusing so much on the game character's actions.
4. I had the feeling I was the game character more so than myself.
5. The game character's goals became my goals.
6. While playing the game, the game's world was more real to me than my "real reality."
7. I felt as if I was really participating in the shown/depicted happenings.
8. While I was playing the game, I forgot everything around me.

This scale focused on "feeling as being the character," which presumes enactive experiences. However, this approach was later criticized (Klimmt et al., 2009) for the presence of the word, "character" that denoted a dyadic relationship (e.g., character vs. me) rather than a

monadic relationship (e.g., I am the person in the game). In addition, the authors further pointed out that items 6, 7, and 8 actually measured the concept of presence instead of identification. In the present study, this scale is termed "dyadic identification." Table 1 lists all the nomenclature discussed in this study and the corresponding definitions of identification.

Table 1

Nomenclature Adopted in the Present Study, the Corresponding Definitions and Measures of Different Modes of Identification

Name	**Authors**	**Definition**
Vicarious identification	Maccoby and Wilson (1957)	"the viewer, in fantasy, puts himself in the place of a character and momentarily feels that what is happening to that character is happening to himself" (Maccoby & Wilson, 1957, p. 1).
Behavioral identification	Bandura (1969)	"the occurrence of similarity between the behavior of a model and another person under conditions where the model's behavior has served as the determinative cue for the matching responses" (Bandura, 1969, p. 217).
Similarity identification	Feilitzen and Linné (1975)	The similarity between characteristics of program characters and audience, such as sex, age, and personality.
Wishful identification	Feilitzen and Linné (1975); Hoffner (1996)	"the desire to be like or behave in ways similar to the character" (Hoffner, 1996, p. 390).
Observational identification	Cohen (2001)	"an imaginative process through which an audience member assumes the identity, goals, and perspective of a character" (Cohen, 2001, p. 261).
Dyadic identification	Hefner, Klimmt, and Vorderer (2007)	"is explicated in terms of players' altered self-perception during game play: When identifying with a character or role offered by the game, players change their self-concept by adopting relevant attributes of the character" (Hefner et al., 2007, p. 351)
Monadic identification	Lin (present study)	"video players' enactive experiences in a video game, in which they value the goal in the game, learn the rules and consequences of actions in the game, and may further apply the behavior in the real world in the future" (Lin, present study, p. 28)

Theorizing identification in video games. Klimmt et al. (2009) distinguished video game identification from character identification in non-interactive media. The authors defined video game identification as, "a temporal shift of players' self-perception through adoption of valued properties of the game character" (p. 351). In contrast to traditional dyadic identification in which the audience and the character are two different entities, video game identification is monadic through merging one's self with the game character by both adopting and creating character properties. The "degrees of freedom" approach was proposed to distinguish the concepts of dyadic identification, monadic identification, and role-play in the order from the least degree to the highest degree of identification. Klimmt and colleagues argued that when watching films or reading books, audiences observed another distinctive social entity. In contrast, video game players temporarily adopt certain character properties and step into characters' shoes. Therefore, video game identification was hypothesized as having a larger degree of freedom in terms of audiences' abilities of self-alteration, compared to conventional media, such as books or films.

However, the present goal is to understand the impact of media on behavior; thus, from that perspective, most of the previously cited conceptual and operational definitions are inadequate. For example, earlier conceptual definitions, e.g. vicarious identification (Maccoby & Wilson, 1957) captured the monadic essence whereby the measures focused on similarities between character and audience or wishful identification. In addition, the conceptual definitions of behavioral identification (Bandura, 1969), similarity identification (Feilitzen & Linné, 1975), and wishful identification (Hoffner, 1996) all focused on different perspectives through which the audience could either imitate the behavior, find the similar attributes, or desire to be like the character instead of capturing the "I am the one in the game" concept. Recent conceptual

definitions expanded from the observational (Cohen, 2001) to the monadic perspective (Klimmt et al., 2009). However, the measurements are limited in the presentation of the dyadic relationship between the media character and audience (e.g., "I think I have a good understanding of character X," or "I almost had the feeling of actually being the character").

New concepts and measures are needed to understand monadic identification (Klimmt et al., 2009). To address these limitations, social cognitive theory (Bandura, 1969) serves as a base for both monadic and dyadic identification processes. Enactive learning and observational learning provide two theoretical conceptual frameworks for identification, as audiences experience the consequences of their own behavior or learn the consequences through a character in mediated contexts. Based on social cognitive theory, video game identification refers to players' enactive experiences in a video game, in which they value the goal in the game, learn the rules and consequences of actions in the game, and may apply the behavior in the real world in the future. This conceptual definition encompasses both enactive and observational perspectives, and is thus termed "monadic identification" in this study.

Past studies have demonstrated inconsistent results on the impact of media modality on character identification, which will be explained in the following sections by dissecting the definitions and relating their inconsistencies and shortcomings to the inconsistencies in the observed results. Therefore, the following research question was proposed to focus the investigation of the effects of media interactivity on character identification.

RQ1: Will video game players display higher levels of monadic identification than participants who watch the recorded game play would?

Based on recent empirical findings (Peng, 2008; Peng et al., 2010), identification is conceptually plausible as a mediator that could explain potential differences in effect size

between game and video violence. Identification also fits GAM very well. When identifying with a character who is an aggressor, audiences would share experiences and emotions with the character, which would influence audiences' aggressive affect. However, Peng et al. (2010) did not examine aggressive behavior and it is likely that their definition of identification was flawed in that respect, as these partial items from observational identification (Cohen, 2001) only focused on the dimensions of emotions and cognitive understanding of characters. Thus, we might expect a different result when violence is involved, explaining Lin's (2010) null result. In addition, audiences would share the perspective of the character, which would induce aggressive cognition. Moreover, the active play and decision making during game play would induce higher physiological arousal, since players need to actively control the character to experience the story. Due to the inconsistent results reported in extant literature regarding the role of identification as a potential mediator between media interactivity and its effects, the following research question is proposed to further investigate this process.

RQ2: Does monadic identification mediate the effects of media interactivity on short-term aggression?

Underlying Mechanism Two: Automatic Self-Concept

Another potential mechanism that could explain why video games would induce more violent effects on aggression than non-interactive media is the automatic self-concept. Automatic self-concepts, "are manifest as actions or judgments that are under the control of automatically activated evaluation, without the performer's awareness of that causation" (Greenwald, McGhee, & Schwartz, 1998, p. 1464). That is, audiences infer personal qualities from observations of their own behavior that automatically, if temporarily, alter their conceptions of self. This stream of research is overlooked and understudied (Bem, 1972). Violent video game players would

temporarily perceive themselves as more aggressive following the session compared to those who play non-violent video games (Uhlmann & Swanson, 2004).

This process could mediate the effects of media interactivity on aggression. As theorized earlier, video game play is interactive, as players continually make decisions and control the characters. Moreover, interactivity increases self-relevance of events in the media world. For example, an enemy attacking a character is perceived at a more personal level by a game player (enactive experience) than by a video viewer (observational experience). Video game players would perceive more "I" involved in media events, whereas video viewers would simply observe another person involved in media events. The increased self-relevance of violent media events would induce higher levels of automatic self-perception for video game players than video viewers, given that players would act as active aggressors in video games, whereas viewers would be passive observers. Fischer et al. (2009) employed this mechanism to investigate whether playing a racing game would make players temporarily perceive themselves as reckless drivers, which was confirmed by the study findings.

Similarly, the present study proposed the hypotheses given below to investigate the effects of media interactivity on automatic self-perception. Due to the factorial design of the study (violence × media interactivity), the main effects of media interactivity and violence on short-term aggression cannot be parsed out from each other. That is to say, participants who play the highly violent video game would perceive themselves as more aggressive compared to those who watch the highly violent recorded game play. Similarly, participants who play the non-violent video games would associate their self-concepts more with non-violence than those who watch the non-violent recorded game play would. Therefore, an interaction effect of media interactivity and amount of violence on automatic self-concept is expected, such that video game

playing would enhance the automatic association between participants' selves with positive or negative effects based on the amount of violence.

H4: There will be an interaction effect of media interactivity and the amount of violence on participants' automatic self-concept of aggression. More specifically, violent video game players will associate themselves with aggressive concepts more than participants who watch the recorded violent game play will. Similarly, non-violent video game players will associate themselves with peaceful concepts more than participants who watch the recorded non-violent game play.

Although Fischer et al. (2009) found that racing game players displayed more reckless self-concepts than video game watchers, the self-concepts did not mediate the effects of racing games on risk-taking tendency in a behavioral task. To date, no study has tested the role of this mechanism in explaining the relationship between media interactivity and aggression. In the current study, it is hypothesized that media interactivity interacts with the amount of violence and exerts the interaction effect on aggression and automatic self-concept. Therefore, the following research question is proposed to test the mediated moderation effects.

RQ3: Do participants' automatic self-concepts of aggression mediate the moderation effects of media interactivity and violence on short-term aggression?

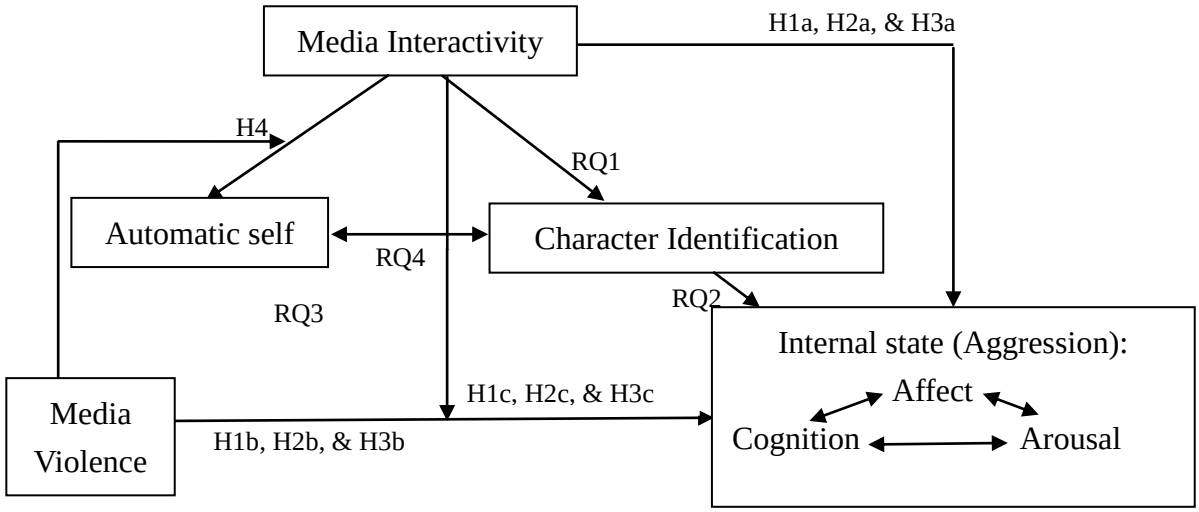
It is also possible that identification is associated with the automatic self-concept of aggression. Individuals who have stronger identification with media characters could experience greater effects on automatic self-concept. Self-relevance of violent media events would increase the depth of elaboration of aggression-related concepts, such as threat, desire for revenge, perception of a competitive situation, desire to maintain one's own self-esteem, etc., which all would imply a much greater cognitive association with the depicted violent conflict. At the same

time, self-relevance would also increase the emotional impact of media violence; thus, damage done to character, for instance, would also imply more personal damage to the player (with high levels of identification) compared to a viewer (with no/low identification). Moreover, frightening threats should result in more anxiety and anger in players than in viewers. Therefore, the following research question is proposed to explore this potential relationship.

RQ4: What is the relationship between character identification and automatic self-concept?

Figure 1 illustrates the proposed theoretical model.

Figure 1. A Proposed Media Interactivity Theoretical Model



Chapter 3

Method

There are two goals in this study. The first goal is to create and test the self-reported measurement of monadic identification, whereby the author created the scale items based on social cognitive theory. The items were constructed from a theoretical account (Bandura, 1986, pp. 106-141) of monadic identification to establish face validity. The scale ($\alpha = .92$) was first tested in a small pilot study in November 2010, and was again assessed in the main experiment in Jan 2011.

The scale consists of 16 items based on four dimensions in social cognitive theory. The first dimension, Enactive Experiences Identification, is one of the key construct in social cognitive theory as it is recognized as a learning mechanism. Moreover, learning from direct personal experience has great effects on one's behavior and decision making. Second dimension, Outcome Identification, is referred to in social cognitive theory as the ability to grasp how the action-behavior rule works. It is also essential for oneself to make an appropriate decision of action in order to obtain the desired goal. From cumulative experiences, one can anticipate the pattern of the effects of certain future behaviors. The third dimension, Goal Identification, refers to the need for a person to care about the goal or the results of his/her behavior in order to learn the reinforcement mechanism. The fourth and the final measure is Real Life Identification that, in social cognitive theory, refers to the propensity for one to decide his/her actions based on one's past experiences from oneself or from others. Based on this, Real Life Identification measures whether action and behavior experienced in the mediated environment would have impact on one's real life experience. Based on the above presented dimensions, 16 items were created, and an exploratory factor analysis was employed to further identify which item load into

which factor.

Experiment Design and Material

In addition to the scale development, the second goal of the study is to test the proposed media interactivity model. To test the proposed moderating relationship between media interactivity and the amount of violence, a 2 (media interactivity: playing the game vs. watch the recorded game play) × 2 (amount of violence: high vs. non/low) between-subject experimental design was employed. The conditions of viewing recorded game play provided rigorous control of equal violence between mediated enactive and observational experience using the same level of graphics.

The violent video game, *Grand Theft Auto 4 (GTA4),* was chosen for this experiment. It was rated M for mature by the Entertainment Software Rating Board (ESRB) for its bloodiness, intense violence, and strong language, and was suggested for players who are 17 years old and older. The game features a war veteran, Niko Bellic, who came to the United States to find the one who betrayed his army unit which resulted in death of most members in the unit. Persuaded by his cousin, Roman, Niko came to the "Liberty City" (which closely resembles the layout of New York City) to pursue the American dream while searching for the traitor. In contrast to previous studies using fantasy video games (Jalette, 2009; Lin, 2010), GTA4 features realistic violence and all actions and missions in the game could happen in the real-world setting. As Barlett and Rodeheffer (2009) indicated, playing a more realistic violent game[3] resulted in more aggressive feelings following the session, compared to playing non-realistic games.

[3] Realism was defined as "the probability of seeing an event in real life" (Barlett & Rodeheffer, 2009, p. 1), which is different from the graphical and technological advancement realism.

In violent conditions, participants either played or watched a mission in which Niko had to go to the top of a building and save Roman by eliminating all enemies on the way. The number of enemies is fixed, indicating that participants encountered the same number of violent scenes. During the process of saving Roman, Niko is allowed to use a variety of weapons including shotguns, pistols, and grenades. The building looked like an abandoned factory and there were several gas tanks. The enemies would shoot rapidly to make these tanks explode. After arriving at the top level of the building, Niko found that a criminal was holding Roman hostage, and Niko needed to aim at the criminal to shoot him dead. After saving Roman, Niko followed Roman downstairs and escaped from the arriving police by driving a truck back to where they lived. In non-violent conditions, Niko took a girl named Michelle out for their first date. He picked Michelle up and drove to a bowling alley to play a bowling game with Michelle. After the game, he gave Michelle a ride home. In both violent and non-violent conditions, a background story was provided, which is shown in the appendix.

Participants

A random sample of 5,000 domestic male undergraduate students from a large Midwestern University was obtained from the registrar's office. An invitation was sent via email to these students, and a reminder was sent two weeks later. A small portion of participants (12%) were also recruited from several large introductory communication courses because some of the existing participants missed the scheduled experiment, resulting in insufficient numbers required for the subsequent analysis. Participants were asked to fill out a short qualifying questionnaire regarding their game playing experiences and contact information. The game play survey included questions asking participants to rate how often they played each game on the list, what their perceived game skill was on each game, and their overall game play efficacy. Those who

had never played any video games or those who had never played GTA4 were excluded from this study. The purpose of excluding those who had never played GTA4 was twofold. First, most male participants had played GTA series before, and those who had never played were very few. Second, this game requires some skills regarding the familiarity of game control in order to proceed smoothly in the game without being distracted from learning the control commands. This phenomenon was shown in the pilot study, as some players who had never played the game were struggling through the game play because of the unfamiliarity with the controls, which led to their frustration. In order to make sure that participants at least had some basic sense of using the control of the game, only those who had played the game before were qualified for this study.

An *a priori* power calculation was performed to estimate the sample size through the software, G*power 3 (Faul, Erdfelder, Buchner, & Lang, 2009). Using the past data (Lin, 2010), the software calculated that the partial η^2 of 0.091 would generate an effect size of 0.316. This is the effect size of the effect of media interactivity on participants' aggressive affect. For this study, the software showed that to gain an estimated effect size of 0.316, α level of 0.05, and a power of 0.80 would require a total sample size of 114 ($F = 2.69$). Therefore, in order to get equal number of participants in each condition, a total sample size of 116 is required.

A total of 169 domestic male undergraduate students (of whom 89 played the game and 80 watched the capture; with 109 exposed to violent content[4] and 60 to non-violent) participated in this study, with a mean age of 21.60 years old (range from 19 to 31). The averaged self-rated game skill on GTA4 was 5.31 on a 9-point scale anchored by 1 (not very good at the game at all)

[4] Fifty-nine participants played the violent session (30 completed the entire mission, and 29 partially completed). Some successfully saved Roman but accidentally lost Roman, crashed the car, or carelessly pushed Roman downstairs afterwards. Some of them were killed during the mission.

and 9 (very good at the game).

Operational Measures

Dependent variables. Aggression was measured based on the three routes of the GAM: affect, cognition, and physiological arousal. The affective route was measured using the State Hostility Scale (Anderson, Deuser, & Deneve, 1995), which has been extensively tested and widely cited (Anderson, 1997; Anderson & Dill, 2000; Barlett, Rodeheffer, et al., 2008), with participants rating levels of agreement on a 7-point scale anchored by 1 (*strongly disagree*) and 7 (*strongly agree*). The cognitive route was measured with the Fragment Word Completion Task (Anderson, Carnagey, & Eubanks, 2003; Anderson et al., 2004), which contains a list of 98 word fragments. Fifty of the fragments can yield words that are clearly aggression-related. For example, "fi_ _t" can be completed as fight, first, or filet. Participants were given four minutes to complete as many words as they could. All words were coded by the author following the coding protocol provided by Anderson et al. (2004). The *accessibility of aggressive thoughts score* is the proportion of the number of completed aggressive words in the total number of completions. Physiological arousal was measured using Citizen Automatic Digital Blood Pressure Wrist Monitor (model #CH-657/01-657) for participants' blood pressure and heart rate (Bushman & Huesmann, 2006). The Polar FS2C Fitness Heart Rate Monitor and chest strap was also used to measure participants' average heart rates and maximum heart rates during the exposure to the stimuli.

Mediating variables. In addition to the newly developed identification scale, identification was also measured using the Observational Identification Scale (Cohen, 2001). Items included statements such as "*I almost had the feeling of actually being Niko"* and "*At key moments, I felt I*

knew exactly what Niko was going through." In addition, the first five items[5] of the Dyadic Identification Scale (Hefner et al., 2007) were also used. The Behavioral Identification Scale items were measured by a Likert scale anchored by 1 (*completely disagree*) and 7 (*completely agree*). In addition, participants rated the following three statements on a 7-point Likert scale anchored by (1) *strongly disagree* and (7) *strongly agree*: *I would react the same way that the character did in a real life situation*; *If I am ever in situations like the character's I would behave the same way he did; I couldn't act like the character did even if I wanted to*. The Wishful Identification Scale (Hoffner, 1996) was used to measure participants' level of wishful identification (α = .835, M = 3.01, SD = 1.47). Participants rated their responses on a Likert scale with 1 representing *strongly disagree* and 7 representing *strongly agree.*

To measure automatic aggressive self-concept, an implicit association test (IAT) (Greenwald et al., 1998) was employed. This is a test designed to measure differential association of two target concepts with an attribute. This has been successfully tested in the context of violence and aggression (Uhlmann & Swanson, 2004). Uhlmann and Swanson (2004) measured how aggressively or peacefully participants perceived themselves versus others. If participants perceived themselves more aggressive, they performed faster when they were asked to enter the same response key for highly associated categories (e.g., self + aggressive) than less associated categories (e.g., others + peaceful). A larger difference between these two categories indicated a higher association between self and aggression.

Following the standard procedure of IAT (Greenwald et al., 1998), there were seven categorization tasks in this study, consisting of two critical blocks and five practice blocks. In each block, the instructions asked participants to categorize words shown on screen into different

[5] The reason to exclude the last three items of the scale from Hefner et al (2007) is because that they are actually measuring presence rather than identification.

categories. For example, press the "q" key to categorize the word into the category shown on the top left corner or the "p" key for the category shown on the top right corner. To measure the implicit association of self and aggression, this study employed the same categories as Uhlmann and Swanson (2004): Self vs. Others and Aggressive vs. Peaceful. In the first practice block, participants were asked to categorize words into Self (i.e. I, me, mine, and myself; "q" key) or Others (e.g. others, them, him, and her; "p" key). In the second practice block, participants were asked to categorize words into Aggressive (i.e. aggressive, combative, hostile, and offensive; "q" key) or Peaceful (i.e. peaceful, gentle, tranquil, and quiet; "p" key). In the third practice block, participants were asked to press the "q" key for words representing either Aggressive or Self and the "p" key for words representing either Peaceful or Others. The fourth block was the critical block, and had the same instructions used in the third block. The fifth block requested participants to categorize words into either Peaceful or Aggressive. Contrary to the second block, the instructions asked participants to switch response keys for these two categories. In the sixth practice block, participants were asked to press the "q" key for words representing either Peaceful or Self and the "p" key for words representing either Aggressive or Others. This instruction was the same for the seventh block, the second critical IAT block. This study used a professional software, E-prime, to run the IAT.

Manipulation check. To check the manipulation of violence and interactivity, participants were asked to rate the following four statements on a 7-point semantic differential: *a) How violent was the content of the section? (1-no violent content, 7-very violent content), b) How violent was the graphics of the section? (1-no violent graphics, 7-very violent graphics), c) How interactive were you? (1-not interactive at all, 7-very interactive),* and *d) How interactive was the section? (1-not interactive at all, 7-very interactive*). The first two items were adopted from

the video game rating scale (Anderson & Dill, 2000; Anderson & Morrow, 1995), and the other two items were developed for this study.

Character control (Lewis et al., 2008) was employed as an indicator for the manipulation of media interactivity, as players should perceive higher control of the character than those who watched the recorded game play. This scale consists of four items and was measured using a 7-point scale anchored by 1 (*strongly disagree*) to 7 (*strongly agree*). Items include statements such as "During playing the game, I controlled my character" and "During playing the game, my character did what I wanted him to do." Game rating was measured using Anderson's game rating scale. Participants rated the game on how difficult, enjoyable, frustrating, exciting their experience was, and how fast the action was on a 7-point scale anchored by 1 (not very) to 7 (very).

Control variables. Social desirability could be an issue when measuring participants' character identification because people usually don't want to identify with socially unacceptable behavior and characters (Hoffner, 1996; Hoffner & Buchanan, 2005). Therefore, social desirability was measured to control participant's tendency of reporting more socially acceptable answers. The short version of Marlowe-Crowne social desirability scale originally modified by Strahan and Gerbasi (1972) and further shortened by Fischer and Fick (1993) was used. Participants were asked to read seven statements and rate each statement is true or false to reflect their personality. The full scale is shown in the appendix. Each statement can be answered in a more socially desirable way. To analyze the data, each statement was assigned a score, one or zero, with one indicating the more socially desirable alternative, thus yielding higher score for participants who answered in a more socially desirable way.

As frustration is a well-established determinant of aggression (Berkowitz, 1989; Lin, 2010;

Williams & Clippinger, 2002), another control variable was frustration, which could result from participants not being able to play the game due to lack of ability or from experiencing difficulty with the game design. The frustration scale is adopted from Lin (2010), which was originally modified from Peters, O'Connor, and Rudolf's (1980) 3-item scale. Participants rated the following three statements using a 7-point Likert anchored by 1 (*strongly disagree*) to 7 (*strongly agree*): *It was a very frustrated experience; Being frustrated comes with the content; Overall, I experienced very little frustration*. Other control variables (Anderson & Dill, 2000; Peng, Liu, & Mou, 2008) included trait aggression measured using the Buss and Perry Aggression Questionnaire (Buss & Perry, 1992), and enjoyment (Spence & Helmreich, 1983). All the scales are listed in the appendix.

Procedure

Participants first scheduled their time using online scheduling software Genbook.com, and were invited to a laboratory with no windows, furnished with two cubicles divided by a screen. The lab space allowed up to two participants to partake in the experiment at the same time. Each participant was escorted to their isolated cubicle and was given their own computer and headset. The computers were equipped with the software, E-prime. Upon arrival to the laboratory, participants signed a consent form. After a cool down period, their heart rate and blood pressure were measured for baseline arousal. They were then randomly assigned to one of the four conditions. They filled out a pretest questionnaire measuring their trait aggression, and state aggression. Before exposure to stimuli, they were instructed to wear a chest heart rate monitor strap to measure heart rate during the experiment. Prior to commencing the experiment, all participants read a paragraph providing the background story (shown in the appendix). As the goal was to complete the assigned missions in the game so that everyone experienced similar

stories, there was no time limitation. As Lin (2010) indicated, the content is the key to influencing the amount of violence, rather than the exposure time. Immediately after the stimulus, heart rate and blood pressure were measured again, followed by the posttest questionnaire measuring dependent, mediating, and control variables. Each participant received an honorarium of $10 and was debriefed.

Chapter 4

Results

Pilot study

A total of 56 male undergraduate students recruited from a large introductory communication course participated in the pilot test. The pilot study mainly tested the Monadic Identification Scale and the game stimuli. T-tests showed that the ratings for these two missions were not significantly different regarding all of the five indicators (measuring difficulty, enjoyment, frustration, excitement, and action pacing, as perceived by the participants) as all the p-values were greater than .05. This indicated that these two missions were equivalent on all these five dimensions.

In addition, participants who were exposed to violent content conditions indicated significantly higher ratings of violence in the content (M = 5.7, SD = 1.22) compared to participants who were in the non-violent conditions (M = 3.01, SD = 1.79), t (54) = 5.78, p < .001. Moreover, participants in the violent conditions perceived the graphics as being more violent (M = 4.63, SD = 1.38) than those in the non-violent conditions did (M = 2.88, SD = 1.82), t (54) = 4.01, p < .001. In terms of interactivity, participants who played the game rated themselves (M = 5.7, SD = 1.3) as significantly more interactive compared to those who watched the game (M = 3.30, SD = 1.94), t (54) = 4.38, p < .001. Moreover, players rated the game section as significantly more interactive (M = 5.00, SD = 1.13) than video game watchers (M = 3.56, SD = 2.03), t (54) = 3.32, p < .001. Thus, the pilot results showed that the game stimuli manipulation was successful.

Main Study

No significant differences were found in game social desirability, enjoyment, or frustration

ratings between participants who played the game and those who watched the recorded game play. The same was true when those who were exposed to violent content conditions and those who were in the non-violent conditions were compared.

Monadic Identification Scale. An exploratory factor analysis (principal axis analysis)[6] was employed to construct and demonstrate the relationships between the proposed factors in the identification scale using statistical software, SPSS 19. The underlying structure of items and factors were not identified. Therefore, exploratory factor analysis is appropriate to identify the underlying structure of each factor and item by allowing all items to load on all factors (Kim & Mueller, 1978). Four factors were extracted from the newly developed Monadic Identification Scale based on the criteria of eigenvalues larger than one (see Table 2). The scree test (as an alternative method of deciding how many factors should be retained in the factor analysis) also confirmed that there were four factors in this scale because the line in the scree plot (see Figure 2) started to flatten out from the fifth factor. The initial analysis showed that the four factors accounts for 67.43% of the variance.

Whilst orthogonal rotation methods assume that factors are uncorrelated, oblique rotation methods are recommended in social science to allow factors to correlate with each other (Costello & Osborne, 2005). Using the direct oblimin rotation with Kaiser normalization method, the 16 items loaded into four factors constructed based on the theory. Five items loaded into Enactive Experience Identification including "*I felt that I was the person in the game,*" "*It seemed as if I was performing actions in the game environment myself,*" "*It seemed as if it was me making the decisions in the game,*" "*The actions reflected my thoughts in the game,*" and "*My actions were affected by their outcomes in the game.*"

[6] Past literature (Costello & Osborne, 2005; Fort, MacCallum, & Tait, 1986) has indicated that principal axis analysis is recommended rather than principal component analysis.

Second, four items loaded into Outcome Identification consisting of "*I saw a pattern of the outcomes of the actions in the game,*" "*I understood how to achieve the goals in the game,*" "*I understood the rationale of actions performed in the game,*" and "*I carefully noted the effects of the actions in the game environment*."

Third, four items loaded into Goal Identification including "*The actions in the game are important to me,*" "*The responses of the actions in the game are important to me,*" "*I cared about the feedback from other characters in the game,"* and "*I value the goals in the game highly*." However, the item, "I cared about the feedback from other characters in the game," loaded into two factors[7] and was thus removed. The communality score of this item was also below 0.4, which further confirmed the need to remove it from the list (Fort, MacCallum, & Tait, 1986).

Finally, measures whether action and behavior experienced in the mediated environment would have impact on one's real life experience. Three items are included in Real Life Identification: "*What happened in the game reminded me my past experiences,*" "*I felt that I could perform the actions I saw in the game,*" and "*The goals in the game are important in my own life*."

The completed scale consisted of 15 items ($\alpha = .86$), which accounted for four factors. Table 3 shows a complete pattern matrix[8], illustrating the factor loading for the identification scale. Table 4 further shows the correlations between the factors, which indicate that factors were

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[7] This is based on the item loading, which is .32 or higher on two or more factors (Tabachnick & Fidell, 2001).

[8] Pattern matrix is recommended when oblique rotation is used (Ford, MacCallum, & Tait, 19886, p. 311).

not highly correlated with each other.

Table 2

Initial Eigenvalues of Factors and Sums of Squared Loadings of Rotated Factors

	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings[a]
Factor	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total
1	5.463	34.141	34.141	5.097	31.857	31.857	3.891
2	2.126	13.289	47.429	1.725	10.784	42.641	3.845
3	1.947	12.167	59.597	1.487	9.291	51.932	2.205
4	1.254	7.837	67.434	.879	5.496	57.428	2.354
5	.837	5.234	72.668				
6	.712	4.447	77.115				
7	.679	4.241	81.356				
8	.599	3.744	85.100				
9	.492	3.075	88.175				
10	.421	2.634	90.809				
11	.353	2.209	93.017				
12	.326	2.040	95.058				
13	.291	1.821	96.879				
14	.218	1.366	98.245				
15	.194	1.210	99.455				
16	.087	.545	100.000				

Note. Extraction Method: Principal Axis Factoring.

a. When factors are correlated, sums of squared loadings cannot be added to obtain a total variance.

Figure 2. The Scree Plot of Factors in the Identification Scale

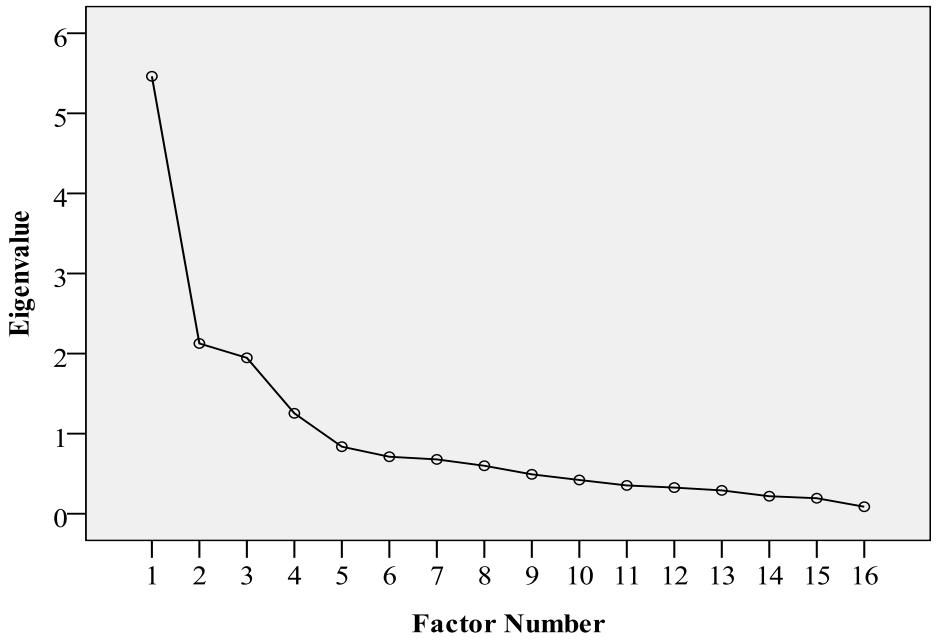


Table 3

The Pattern Matrix of Factor Loadings for Exploratory Factor Analysis with Direct Oblimin Rotation of Character Identification Scales

Items	Factors			
	1	2	3	4
Factor 1: Goal Identification (α = .92)				
I value the goals in the game highly	**.71**	-.06	.04	.15
The actions in the game are important to me	**.97**	-.01	.01	-.04
The responses of the actions in the game are important to me	**.86**	-.09	.02	.02
Factor 2: Enactive Experience Identification (α = .97)				
I felt that I was the person in the game	-.02	**-.74**	.06	-.05
It seemed as if I was performing actions in the game environment myself	-.11	**-.89**	.11	-.12
It seemed as if it was me making the decisions in the game	.10	**-.79**	-.16	-.001
The actions reflected my thoughts in the game	.14	**-.66**	-.05	.07
My actions were affected by their outcomes in the game	.16	**-.62**	-.03	.12
Factor 3: Real Life Identification (α = .74)				
The goals in the game are important in my own life (removed)	**.32**	-.02	**.51**	.03
I cared about the feedback from other characters in the game	.27	-.14	**.45**	.05
I felt that I could perform the actions I saw in the game	.003	.07	**.65**	-.01
What happened in the game reminded me my past experiences	-.11	-.02	**.85**	-.01
Factor 4: Outcome Identification (α = .70 after removing the item marked with * below)				
I understood the rationale of actions performed in the game*	-.09	-.29	.10	**.44**

Table 3 (cont'd)

I carefully noted the effects of the actions in the game environment	.10	-.04	.07	**.52**
I understood how to achieve the goals in the game	.01	.16	.02	**.70**
I saw a pattern of the outcomes of the actions in the game	.05	.02	-.15	**.73**

Note. Principal axis factoring using direct oblimin rotation with Kaiser normalization was used.
*The Cronbach's alpha is .65 with four items and increases to .70 after dropping this item.

Table 4

Component Correlation Matrix between Factors

Component	Play : *M* (*SD*)	Watch : *M* (*SD*)	1	2	3
1 Importance Identification	3.91 (1.62)	2.98 (1.48)			
2 Enactive Experience Identification	4.26 (1.18)	2.38 (1.07)	-.416		
3 Rea Life Identification	2.63 (1.30)	2.77 (1.39)	.276	-.206	
4 Outcome Identification	5.64 (1.03)	5.72 (.94)	.407	-.207	.112

Note. Rotation Method: Oblimin with Kaiser Normalization

A set of Pearson bivariate correlation tests was conducted to assess the correlations between players' perceived game skill related to GTA4 and the Monadic Identification Scale as well as the four subscales. The results showed that perceived GTA4 skill had significant weak and correlations with Monadic Identification Scale ($r = .22$, $p < .05$), Enactive Experiences Identification subscale ($r = .24$, $p < .01$), and with Goal Identification subscale ($r = .18$, $p < .05$). Perceived GTA4 skill did not significantly correlate to Real Life Identification subscale ($r = .01$, *ns*) or with Outcome Identification subscale ($r = .08$, *ns*). The weak correlations could serve as an indication of convergent validity in which those skillful players would have more enactive experiences and goal identification and thus more monadic identification. The correlations were not strong enough to presume that monadic identification was merely a function of the amount of skill in playing the game. Moreover, the non-significant correlations indicated that the perceived GTA4 skill did not influence players' outcome identification and real life identification.

Media Interactivity, Violence, Interaction Effect, and Aggressive Affect

The first set of hypotheses investigated the two main effects and their interaction effects on audience's post-stimulus aggressive affect. A 2 × 2 (media interactivity × violence) factorial ANCOVA was calculated to examine the effects of main effects and interaction effects on post-stimulus aggressive affect, with pre-stimulus aggressive affect, $F(1, 162) = 73.14$, $p < .001$, frustration, $F(1, 162) = 46.77$, $p = .085$, and social desirability, $F(1, 162) = 10.54$, $p < .001$, as significant covariates. Trait aggression was not a significant covariate, $F(1, 162) = 3.00$, $p = .09$, and was removed from the model. In contrast, the corrected model was significant, $F(6, 162) = 20.81$, $\eta^2 = .39$, $p < .001$.

H1a posited that video game players would display more aggressive affect compared to participants who watched recorded game play. The main effect of media interactivity was significant on post-stimulus aggressive affect, $F(1, 162) = 7.84$, $\eta^2 = .05$, $p < .01$. Participants who played the video game displayed higher post-stimulus aggressive affect ($M = 2.17$, $SD = .83$, $N = 89$) compared to those who watched the recorded clips ($M = 1.89$, $SD = .63$, $N = 80$). Based on the results, H1a was supported. Table 5 shows the descriptive data, whilst Figure 3 illustrates the directions.

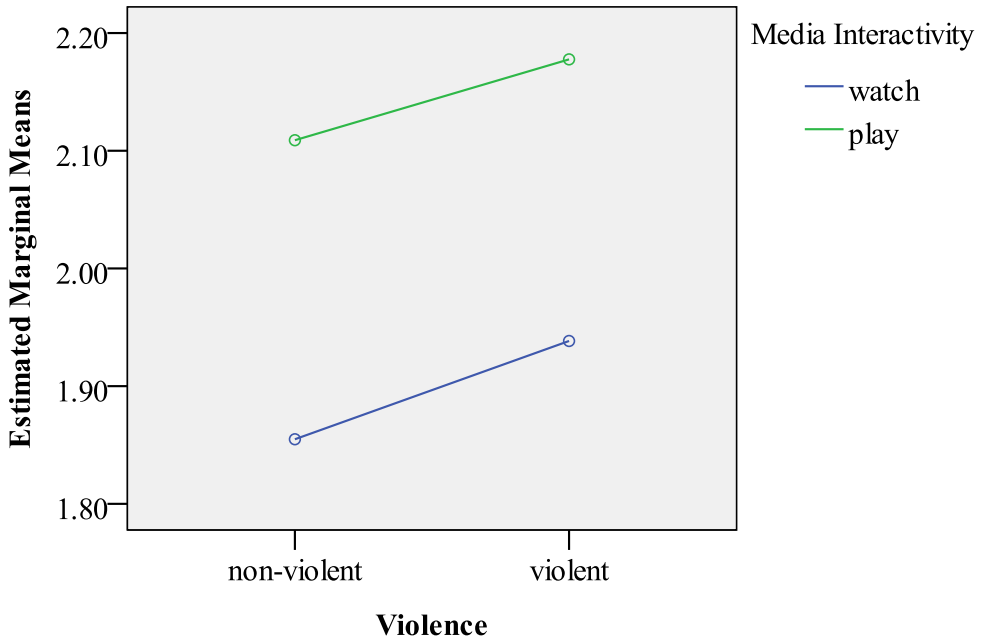
Table 5

Cell Means of Pre and Post-stimulus Aggressive Affect Between Play vs. Watch Groups

	Play vs. watch	Mean	Std. Deviation	*N*
Pre	Watch	1.7543	.59018	80
	Play	1.7914	.52909	89
	Total	1.7739	.55747	169
Post	Watch	1.8910	.63335	80
	Play	2.1689	.83029	89
	Total	2.0374	.75438	169

Figure 3. Estimated Marginal Means of Post Aggressive Affect Between Play and Watch Groups

For interpretation of the references to color in this and all other figures, the reader is referred to the electronic version of this dissertation.



Note. The covariates appearing in the model were evaluated by the following values: pre-stimulus aggressive affect = 1.77, frustration = 3.32, and social desirability = .37.

H1b stated that participants in violent conditions would display more aggressive affect than participants in non-violent conditions. The ANCOVA results showed that the main effect of violence was significant on post-stimulus aggressive affect, $F(1, 162) = 5.66$, $\eta^2 = .03$, $p < .05$. Participants who were exposed to violent content displayed higher post-stimulus aggressive affect ($M = 2.14$, $SD = .79$, $N = 109$) compared to those who watched the recorded clips ($M = 1.85$, $SD = .66$, $N = 60$), thus H1b was supported. Figure 3 shows the direction.

H1c focused on the interaction effects between media interactivity and violence on post-stimulus aggressive affect. ANCOVA results showed that the interaction effect was not

significant, $F(1, 162) = 0$, $\eta^2 = 0$, $p = .99$. Again, the direction of the interaction effect is shown in Figure 3.

Given that the lines shown in the Figure 3 are almost parallel, two additional ANCOVAs were conducted among those who were in the high violence conditions and those in the non-violent conditions, respectively. In the first group (N =109), an ANCOVA was calculated to examine the effects of media interactivity on post-stimulus aggressive affect. Pre-stimulus aggressive affect, $F(1, 104) = 50.01$, $\eta^2 = .33$, $p < .001$, frustration, $F(1, 104) = 29.16$, $\eta^2 = .22$, $p < .001$, and social desirability, $F(1, 104) = 4.81$, $\eta^2 = .04$, $p < .05$, were significant covariates in the model. The corrected model was also significant, $F(4, 109) = 25.39$, $\eta^2 = .50$, $p < .001$. Results showed that among those in the violent conditions, video game players ($M = 2.25$, $SE = .08$, N =59) displayed significantly higher aggressive affect than those in the non-violent conditions did ($M = 2.01$, $SE = .08$, N =50), $F(1, 104) = 4.75$, $\eta^2 = .04$, $p < .05$.

Among those in the non-violent conditions, another ANCOVA was calculated to examine the effects of media interactivity on post-stimulus aggressive affect. Social desirability was not a significant covariate, $F(1, 55) = 2.26$, $\eta^2 = .04$, $p = .14$, and was thus removed from the model. The corrected model was significant, $F(1, 56) = 18.69$, $\eta^2 = .50$, $p < .001$, with pre-stimulus aggressive affect, $F(1, 56) = 34.25$, $\eta^2 = .38$, $p < .001$, and frustration, $F(1, 56) = 15.02$, $\eta^2 = .21$, $p < .001$, as significant covariates. Results showed that media interactivity had a marginally significant effect on post-stimulus aggressive affect, $F(1, 56) = 3.92$, $\eta^2 = .07$, $p = .052$. Among participants exposed to non-violent conditions, video game players ($M = 1.97$, $SE = .09$, $N = 30$)

displayed similar (marginally significant) aggressive affect to that of participants exposed to the non-violent conditions (M = 1.73, SE = .09, N = 30).

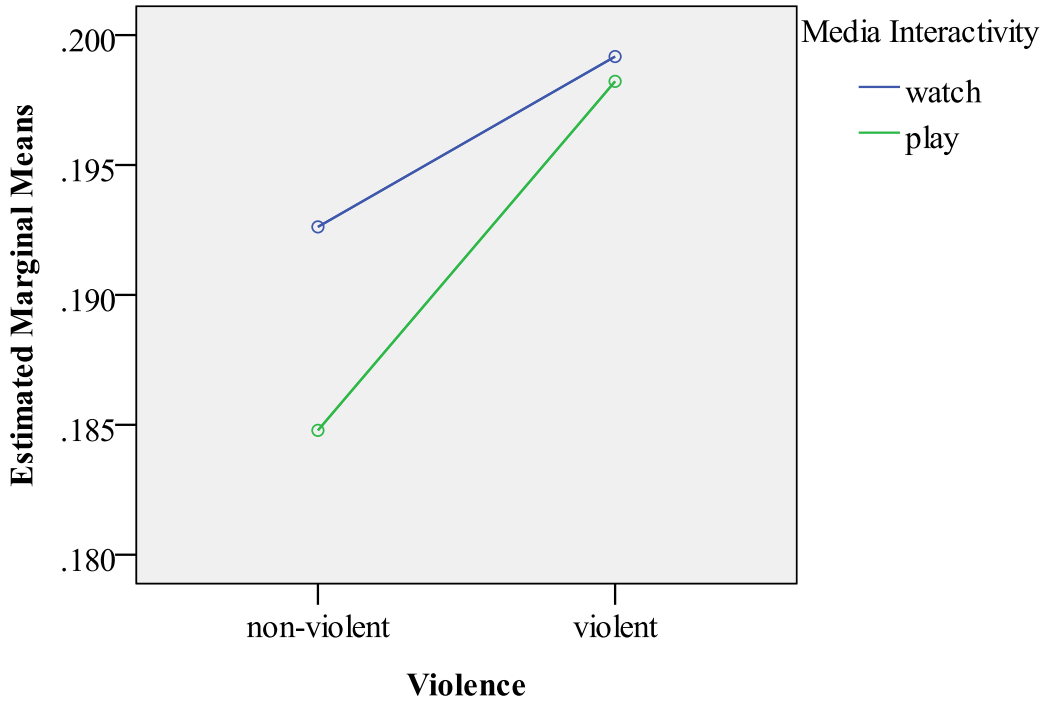
The above tests indicated that, when covariates were controlled for, media interactivity significantly increased the post-stimulus aggressive affect among participants exposed to violent conditions, whereas it had marginally significant effect on aggressive affect among those partaking in the non-violent conditions. The simple main effect analyses reflected the hypothesized interaction effect, which was not supported by the ANCOVA results, which indicated that the interaction effect was not significant.

Media Interactivity, Violence, Interaction Effects, and Aggressive Cognition

The second set of hypotheses focused on the two main effects and their interaction effects on aggressive cognition. A 2 × 2 (media interactivity × violence) factorial ANCOVA was calculated to examine the impact of main effects and interaction effects on post-stimulus aggressive cognition. Frustration, $F(1, 153) = 2.31$, $\eta^2 = .02$, $p = .13$, social desirability, $F(1, 162) = 3.40$, $\eta^2 = .02$, $p = .07$, and trait aggression, $F(1, 153) = 3.29$, $\eta^2 = .02$, $p = .07$, were not significant covariates and were removed from the model. The revised corrected model was not significant, $F(3, 164) = .52$, $\eta^2 = .01$, $p = .67$.

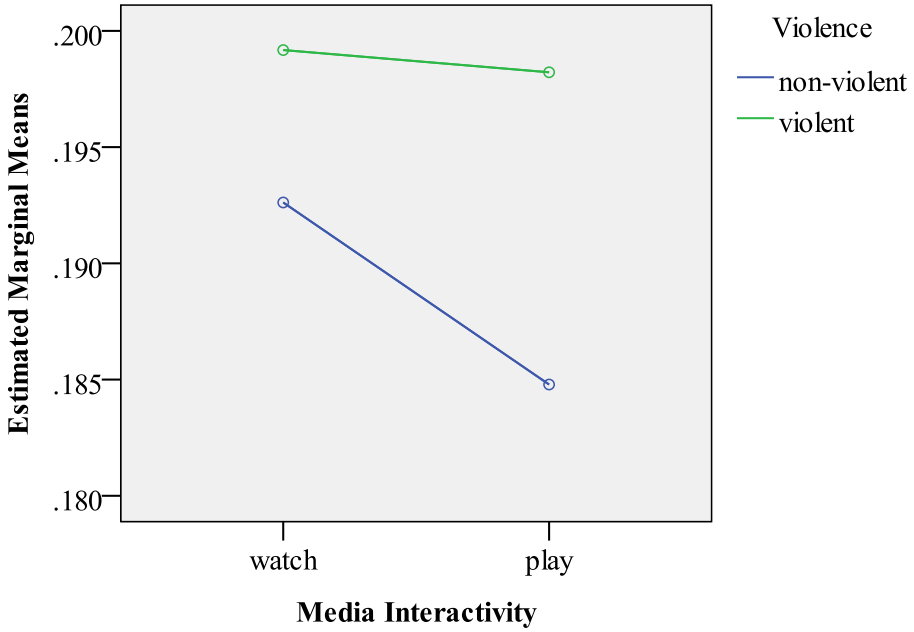
H2a examined the effect of media interactivity on aggressive cognition. Results from the factorial ANCOVA showed that the main effect of media interactivity did not have a significant impact on aggressive cognition, $F(1, 164) = .24$, $\eta^2 = .001$, $p = .62$. Players' aggressive cognition (M = .192, SE = .01, N = 88) did not differ significantly from video game watchers (M = .196, SE = .01, N = 80). Therefore, H2a was not supported. The patterns are shown in Figure 4.

Figure 4. Estimated Marginal Means of Aggressive Cognition Between Play and Watch Groups



H2b investigated the effect of violence on aggressive cognition, and the ANCOVA results showed that the main effect of violence did not significantly affect aggressive cognition, $F(1, 164) = .1.25$, $\eta^2 = .01$, $p = .27$. Participants exposed to violent conditions ($M = .20$, $SE = .01$, $N = 108$) did not differ in terms of aggressive cognition from those in the non-violent conditions ($M = .19$, $SE = .01$, $N = 60$). H2b was not supported either. Figure 5 shows the patterns.

Figure 5. Estimated Marginal Means of Aggressive Cognition Between Violent and Non-violent Groups



H2c focused on the interaction effects between media interactivity and violence on aggressive cognition. The ANCOVA results showed that the interaction effect was not significant, $F(1, 164) = .15$, $\eta^2 = .001$, $p = .70$. Thus, based on these findings, H2c was not supported.

Media Interactivity, Violence, Interaction Effect, and Physiological Arousal

The third set of hypotheses focused on the two main effects and their interaction impact on physiological arousal. A MANCOVA was calculated to examine the impact of media interactivity, violence, and their interaction effects on physiological arousal, including post-stimulus systolic blood pressure, diastolic blood pressure, heart rate, during-game averaged and maximum heart rate (controlling for pre-stimulus systolic and diastolic blood pressure), as well as pre-stimulus heart rate. Employing a MANCOVA was appropriate because these three indicators of physiological arousal were all interconnected (shown in Table 6). The detailed statistic information is presented in Table 7.

Table 6

Pearson Bivariate Correlations Between Physiological Arousal Measures

	1	2	3	4	5
1. Post-stimulus systolic blood pressure	1				
2. Post-stimulus diastolic blood pressure	.78**	1			
3. Post-stimulus heart rate	.24**	.30**	1		
4. During-stimulus averaged heart rate	.31**	.39**	.84**	1	
5. During-stimulus maximum heart rate	.31**	.39**	.73**	.86**	1

Note. **correlations are significant at .01 level.

Table 7

Results of MANCOVA Regarding Effects of Media Interactivity, Violence, and Their Interaction Effects on Physiological Arousal

Predictors	Dependent Variable	*df*	*F*	Sig.	Partial Eta Squared
Corrected Model	Post Systolic BP	6	47.297	.000	.644
	Post Diastolic BP	6	44.229	.000	.628
	Post HR	6	40.796	.000	.609
	During-game Avg HR	6	67.022	.000	.719
	During-game Max HR	6	31.377	.000	.545
Pre-stimulus Systolic BP	Post Systolic BP	1	54.742	.000	.259
	Post Diastolic BP	1	.015	.904	.000
	Post HR	1	.797	.373	.005
	During-game Avg HR	1	2.751	.099	.017
	During-game Max HR	1	.862	.355	.005
Pre-stimulus Diastolic BP	Post Systolic BP	1	4.866	.029	.030
	Post Diastolic BP	1	76.099	.000	.326
	Post HR	1	.501	.480	.003
	During-game Avg HR	1	7.670	.006	.047
	During-game Max HR	1	3.139	.078	.020
Pre-stimulus HR	Post Systolic BP	1	2.275	.134	.014
	Post Diastolic BP	1	4.362	.038	.027
	Post HR	1	226.764	.000	.591
	During-game Avg HR	1	344.942	.000	.687
	During-game Max HR	1	159.736	.000	.504
Media Interactivity (Play vs. Watch)	Post Systolic BP	1	6.177	.014	.038
	Post Diastolic BP	1	5.737	.018	.035
	Post HR	1	.198	.657	.001
	During-game Avg HR	1	.038	.846	.000
	During-game Max HR	1	.592	.443	.004

Table 7 (cont'd)

Violence	Post Systolic BP	1	.459	.499	.003
	Post Diastolic BP	1	.783	.378	.005
	Post HR	1	.201	.654	.001
	During-game Avg HR	1	.022	.882	.000
	During-game Max HR	1	3.991	.047	.025
Media Interactivity	Post Systolic BP	1	.899	.344	.006
x Violence	Post Diastolic BP	1	1.943	.165	.012
	Post HR	1	.178	.673	.001
	During-game Avg HR	1	.667	.415	.004
	During-game Max HR	1	.095	.758	.001
Error		157			
Total		164			
Corrected Total		163			

Notes. Post = post-stimulus, BP = blood pressure, HR = heart rate, Avg = averaged, Max = maximum

H3a examined the effects of media interactivity on physiological arousal, and the results indicated that media interactivity significantly increased post-stimulus systolic blood pressure, $F(1, 157) = 6.18$, $\eta^2 = .04$, $p < .05$, and post-stimulus diastolic blood pressure, $F(1, 157) = 5.74$, $\eta^2 = .04$, $p < .05$. However, media interactivity did not have any influence on post-stimulus heart rate, $F(1, 157) = .20$, $\eta^2 = .001$, $p = .66$, during-game averaged, $F(1, 157) = .04$, $\eta^2 = .00$, $p = .85$, and maximum heart rates, $F(1, 157) = .59$, $\eta^2 = .004$, $p = .43$. H3a was partially supported. Table 8 shows the raw data for pre and post-stimulus physiological arousal.

Table 8

The Effects of Media Interactivity on Means and Standard Deviations of Pre and Post Physiological Data between Groups

		Pre-stimulus			Post-stimulus		
	IV	Mean	*SD*	*N*	Mean	*SD*	*N*
Systolic BP[a]	Watch	122.60	11.28	80	117.10	10.92	80
	Play	127.87	12.04	86	138.70	129.58	86
	Total	125.33	11.94	166	128.29	93.94	166
Diastolic BP[b]	Watch	78.05	10.67	80	74.40	9.97	80
	Play	82.08	10.71	86	81.22	11.53	86
	Total	80.14	10.84	166	77.93	11.30	166
HR	Watch	75.18	14.10	80	74.49	12.89	80
	Play	79.21	15.04	87	76.29	13.14	87
	Total	77.28	14.69	167	75.43	13.01	167
Avg HR	Watch				76.18	11.49	78
	Play				79.19	12.01	89
Max HR	Watch				94.18	12.10	78
	Play				95.49	13.18	89

Note. BP = blood pressure. a. The difference between watch and play on systolic BP is significant at .05 level. b. The difference between watch and play on diastolic BP is significant at .001 level.

H3b hypothesized that participants in violent conditions would display higher physiological arousal compared to participants who play or watch a low-violence video game. Results from the MANCOVA showed that the amount of violence did not affect participants' physiological arousal (see Table 7), thus H3b was not supported. Table 9 shows the means and standard deviations of the physiological data.

Table 9

The Effects of Violence on Means and Standard Deviations of Pre and Post Physiological Data between Groups

		Pre-stimulus			Post-stimulus		
	Violence	Mean	*SD*	N	Mean	*SD*	*N*
Systolic BP	Low	125.27	13.23	59	120.20	13.47	59
	High	125.36	11.23	107	121.64	11.62	107
	Total	125.33	11.94	166	121.13	12.28	166
Diastolic BP	Low	79.47	10.73	59	76.63	11.80	59
	High	80.50	10.94	107	78.65	11.01	107
	Total	80.14	10.84	166	77.93	11.30	166
HR	Low	77.63	14.99	59	76.17	12.52	59
	High	77.08	14.60	108	75.02	13.31	108
	Total	77.28	14.69	167	75.43	13.01	167
Avg HR	Low				77.93	12.14	59
	High				77.70	11.71	108
Max HR	Low				93.08	12.36	59
	High				95.86	12.78	108

H3c investigated the interaction effect between media interactivity and violence on participants' physiological arousal. MANCOVA results showed that the interaction effect was not significant on any indicator of the physiological arousal (see Table 5). Therefore, H3c was not supported.

Character Identification

RQ1 asked whether video game players would display higher levels of monadic identification compared to participants who watched the recorded game play. A one-way between-subject ANOVA was calculated to examine effects of media interactivity (play vs. watch) on participants' monadic identification (full scale). The main effect of media interactivity on monadic identification was significant, $F(1, 167) = 31.99$, $p < .001$. The planned comparison test indicated that video game players ($M = 4.12$, $SD = .92$) had significantly higher levels of monadic identification than recorded game play watchers did ($M = 3.35$, $SD = .83$), $t = 6.83$, p

<.001.

Given that there are four subscales within the full monadic identification scale, additional ANOVAs were conducted to test the effect of media interactivity on these four subscales separately, with the results presented in Table 9. The results showed that media interactivity had significant effects on Enactive Experience Identification and Goal Identification subscales but not on Real Life Identification and Outcome Identification. Players indicated significantly stronger Enactive Experience Identification (M = 4.26, SD = 1.18) than video game watchers did (M = 2.38, SD = 1.07), $F(1, 167) = 116.85$, $p < .001$, and indicated significantly higher levels of Goal Identification (M = 3.91, SD = 1.62) compared to video game watchers (M = 2.98, SD = 1.48), $F(1, 167) = 15.07$, $p < .001$. There was no difference between video game players (M = 2.63, SD = 1.31) and video game watchers (M = 2.77, SD = 1.39) regarding Real Life Identification, $F(1, 167) = .40$, *ns*. In addition, there was no difference regarding Outcome Identification between video game players (M = 5.64, SD = 1.03) and video game watchers (M = 5.72, SD = .94), $F(1, 167) = .23$, *ns.*

This study also measured other types of character identification and character control. Significant differences were found between video game players and watchers on Observational Identification Scale (Cohen, 2001), Dyadic Identification Scale (Hefner et al., 2007), and Character Control Scale (Lewis et al., 2008) but not Wishful Identification Scale (Hoffner, 1996) and Behavioral Identification Scale (Lin, 2010). The results are reported in Table 10.

Table 10

Descriptive Data and ANOVA Results for Different Types of Identification Scales

		N	Mean	*SD*	*SE*	Minimum	Maximum	F-value
Monadic ID full scale (α =.86)	Watch	80	3.35	.83	.09	1.88	5.50	
	Play	89	4.12	.92	.10	1.94	5.94	
	Total	169	3.76	.96	.07	1.88	5.94	31.99***
Enactive Experience ID subscale (α = .97)	Watch	80	2.38	1.07	.12	1.00	5.20	
	Play	89	4.26	1.18	.13	1.00	7.00	
	Total	169	3.37	1.47	.11	1.00	7.00	116.85***
Goal ID subscale (α = .92)	Watch	80	2.98	1.48	.17	1.00	7.00	
	Play	89	3.91	1.62	.17	1.00	7.00	
	Total	169	3.47	1.62	.13	1.00	7.00	15.07***
Real Life ID subscale (α = .74)	Watch	80	2.77	1.39	.16	1.00	6.75	
	Play	89	2.63	1.31	.14	1.00	6.25	
	Total	169	2.70	1.34	.10	1.00	6.75	.40
Outcome ID subscale (α = .70)	Watch	80	5.72	.94	.10	3.33	7.00	
	Play	89	5.64	1.03	.11	3.00	7.00	
	Total	169	5.68	.98	.08	3.00	7.00	.23
Observational ID (Cohen, 2001) (α = .90)	Watch	80	3.68	1.22	.14	1.00	6.40	
	Play	89	4.354	1.14	.12	1.20	6.80	
	Total	169	4.03	1.22	.09	1.00	6.80	13.36***
Dyadic ID (Hefner et al., 2009) (α = .89)	Watch	80	1.92	1.07	.12	1.00	5.40	
	Play	89	2.98	1.34	.14	1.00	6.80	
	Total	169	2.48	1.33	.10	1.00	6.80	31.84***
Character Control (α= .93)	Watch	80	1.89	1.03	.12	1.00	5.67	
	Play	89	5.75	1.12	.12	2.00	7.00	
	Total	169	3.92	2.21	.17	1.00	7.00	535.03***
Behavioral ID (Lin, 2010) (α= .78)	Watch	80	2.88	1.45	.16	1.00	6.33	
	Play	89	2.78	1.29	.14	1.00	6.33	
	Total	169	2.82	1.36	.10	1.00	6.33	.22
Wishful ID (Hoffner, 1996) (α= .80)	Watch	80	2.01	1.05	.12	1.00	4.67	
	Play	89	1.90	.96	.10	1.00	4.67	
	Total	169	1.95	1.00	.08	1.00	4.67	.47

Note. *SD* = standard deviation, *SE* = standard error, *** = $p < .001$, ID = identification

RQ2 further asked whether character identification would mediate the effect of media interactivity on short-term aggression, including aggressive affect, cognition, and physiological arousal. Results from previous section indicated that media interactivity only had significant main effect on aggressive affect and blood pressure. Therefore, the following mediation analyses

were focused on the effect of monadic identification on the relationship between media interactivity with aggressive affect and blood pressure. Results also showed that media interactivity significantly predicted only two of the subscales of character identification—Enactive Experiences and Importance of Goal. However, as the Pearson bivariate correlation in Table 11 shows, only Enactive Experiences Identification subscale and Outcome Identification subscale had significant correlations with the post-stimulus aggressive affect. The correlations showed that Enactive Experience Identification could be a mediator between the effects of media interactivity on aggressive affect. Therefore, in order to answer RQ2, the following analyses focused on the single subscale, Enactive Experience Identification, as the mediator. In addition to this subscale, a potential suppressor effect of Outcome Identification subscale on the relationship of the Enactive Experiences and aggressive affect is shown in Table 11. In the following section, the author first tested the indirect effect of Enactive Experiences, and then identified as well as tested the role of Outcome Identification as a suppressor in this meditational model.

Table 11

Correlations Between Monadic Identification Subscales, Media Interactivity, and Aggressive Affect

	1	2	3	4	5	6	7
1 Enactive Experience ID subscale	1						
2 Goal ID subscale	.48**	1			.		
3 Real Life ID subscale	.24**	.39**	1				
4 Outcome ID subscale	**.17***	.40**	.13	1	.		
5 Monadic Identification Full scale	.79**	.79**	.64**	.48**	1		
6 Media interactivity (IV)	**.64****	**.29****	-.05	-.04	.40**	1	
7 Post-stimulus aggressive affect (DV)	**.19***	.06	.001	**-.22****	.06	.18*	1

Notes. ** $p < .01$, * $p < .05$. IV = independent variable, DV = dependent variable, ID = identification

Based on recent literature and simulation data (Hayes, 2009; Mackinnon et al., 2004; Preacher & Hayes, 2008; Williams & Mackinnon, 2008), bootstrapping appeared to be the best

choice to test indirect effects in modern statistics compared to the traditional causal step strategy (Baron & Kenny, 1986) and the Sobel Test (Sobel, 1982). It allowed multiple mediators in the model and could detect significant indirect effects better than traditional methods. "The product-of-coefficients strategy is useful only when the assumption of normality of the sampling distribution of the indirect effect can be reasonably met, as when large samples are available or when the effects are large" (Preacher & Hayes, 2008, p. 886). Due to the criterion of large sample size, bootstrapping had been recommended as the best method to test the indirect effect at any case (Preacher & Hayes, 2008).

An SPSS macro (Preacher& Hayes, 2008) was used to test the indirect effect of media interactivity through Enactive Experience Identification on post-stimulus aggressive affect. The bootstrapping resample was set to 1000. Results showed that the total and direct effects (standardized coefficients) of media interactivity on aggressive affect were .18 (*SE* = .08), $p < .05$, and .11 (*SE* = .10), $p = .16$, respectively. The difference between the total and direct effect is the total indirect effect through the mediator (Enactive Experience Identification), with a point estimate of .08 (*SE* = .05) and a 95% biased corrected (BC) bootstrap confidence interval (CI) of -.05 and .21. These results indicated that the total effect of media interactivity on aggressive affect was significant. The direct effect became insignificant after including the mediator into the model. However, the indirect effect was not significant, as the 95% BC bootstrap CI contained zero, which did not reject the null hypothesis. Table 12 shows the SPSS macro output of the path model with standardized coefficients.

Table 12

Test of Indirect Effect of Media Interactivity on Aggressive Affect through Enactive Experiences

Paths	***b****	***SE***	**t-value**	**p-value**
IV to M	.64	.06	10.81	.00
Direct effects of M on DV	.12	.10	1.20	.23
Total effect of IV on DV	.18	.08	2.43	.02
Direct effect of IV on DV	.11	.10	1.09	.28
Bootstrap results	**Data**	**Boot**	**Bias**	**SE**
Indirect Effects of IV on DV through M	.08	.08	-.003	.06
Biased Corrected 95% CI	-.05 (lower)	.21 (upper)		

Note. *b** = standardized regression coefficient, IV = media interactivity, M = Enactive Experiences, DV = aggressive affect, *SE* = standard error, Model R^2 = .04, Adj. R^2 = .03, F (2, 166) = 3.46, $p < .05$

Given that the indirect effect of Enactive Experience Identification was not significant with regards to the relationship between media interactivity and aggressive affect, a suppressor was identified from the correlations between Enactive Experience Identification, aggressive affect, and Outcome Identification (see Table 10). In a model of two predictors (*X1* and *X2*) and one dependent variable (*Y*), suppression is present when either the correlation (*r*yx1 or *r*yx2) is less than the product of the other and *r*12, or when *r*12 is negative (Cohen et al., 2003). The criteria used in this study are listed below:

rY1 < *rY2* × *r12* (1) [*rY1* = .19*, *rY2* = -.22**, *r12* = .17*]

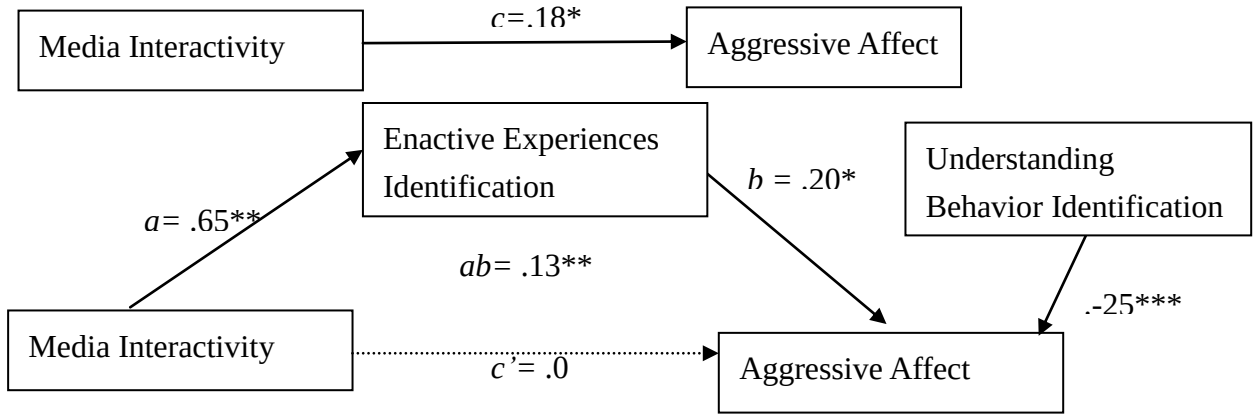
rY2 < *rYl* × *r12* (2) [*rY2* = -.22**, *rY1* = .19*, *r12* = .17*

Assuming the mediator (Enactive Experience Identification) is *X1* and Outcome Identification is *X2*, the data met the second equation, in which the correlation between *X2* and DV was negative (-.22, $p < .01$). This indicated that X_2 (Outcome Identification) was a suppressor on the relationship between Enactive Experiences and aggressive affect. Therefore, another meditational analysis was conducted, with the Outcome Identification subscale introduced as a suppressor in the model.

A significant full mediation model was found after adding the Outcome Identification

subscale as a significant covariate. The bootstrapping results showed that the total and direct effects (standardized coefficients) of media interactivity on aggressive affect were .18 (*SE* = .07), $p < .05$, and .05 (*SE* = .10), $p = .64$, respectively. The partial effect of the suppressor (Outcome Identification) on aggressive affect was -.25 (*SE* = .08), $p < .001$. The difference between the total and direct effect was the total indirect effect through the mediator (Enactive Experience Identification), with a point estimate of .12 (*SE* = .07) and a 95% BC bootstrap CI of .02 and .29. These results indicated that, with a significant control variable in the model, the total effect of media interactivity on aggressive affect was significant. However, the direct effect became insignificant after introducing the mediator into the model. In addition, the significant indirect effect fully mediated the effects of media interactivity on aggressive affect, as the 95% BC bootstrap CI did not contain zero, which rejected the null hypothesis. Figure 6 illustrates the path model, indicating that the directions of the *a* and *b* paths are consistent with the interpretation that, after controlling Outcome Identification, higher media interactivity leads to greater Enactive Experiences, which, in turn, leads to greater aggressive affect.

Figure 6. Path Models of the Indirect Effect of Media Interactivity on Aggressive Affect through Character Identification Controlling for Effect Observation



Note. *$p < .05$, **$p < .01$, ***$p < .001$, Model $R^2 = .11$, Adj.$R^2 = .09$, F (3, 165) = 6.71, $p < .001$;

Contrasting the revised model with the previous model showed that the control variable

(Outcome Identification) increased the explanatory power of the predictor (Enactive Experiences Identification) on the dependent variable (aggressive affect). The suppressor effect had again been demonstrated based on Conger's guide (1974). "A suppressor variable is defined to be a variable which increases the predictive validity of another variable (or set of variables) by its inclusion in a regression equation. This variable is a suppressor only for those variables whose regression weights are increased" (Conger, 1974, p. 37). In the first model without the control variable, the standardized indirect effect was .08. In the second model, including the control variable, the standardized regression weight was increased to .13 and became significant. Based on the criterion, Outcome Identification was a suppressor in this model.

The relationship between the suppressor and the mediator is interesting because these two variables have a positive correlation with each other, but have opposite correlations with the dependent variable. The possibility of multicollinearity between these two variables was excluded based on examination of VIF (variance inflation factor) and tolerance. Multicollinearity is present if VIF is larger than 10 and/or tolerance less than .10 (Cohen, 2003, p. 422). However, in the present study, the VIF was 1.60, and the tolerance was .63, indicating that multicollinearity was not present and could be excluded as a potential cause of the reversal in the directions of the regression coefficients.

Such relationship then can be explained by the negative suppressor effect, in which the standardized regression coefficient of the control variable on the dependent variable was negative (-.28). Negative suppressors, "remove irrelevant predictive variance in spite of their relationship to the criteria" (Conger, 1974, p. 42). In other words, Outcome Identification significantly predicted aggressive affect but also removed irrelevant predictive variance of aggressive affect in order to increase the predictive power of Enactive Experience Identification.

Regarding the mediating effects of Enactive Experience Identification on blood pressure, bootstrapping results with a resample of 1,000 showed that the total and direct effects (standardized coefficients) of media interactivity on systolic blood pressure were .31 (*SE* = .07), $p < .001$, and .28 (*SE* = .10), $p < .001$, respectively. The difference between the total and direct effect was the total indirect effect through the mediator (Enactive Experience Identification), with a point estimate of .03 (*SE* = .01) and a 95% BC bootstrap CI of -.08 and .16. Regarding the effect on diastolic BP, results showed that the total and direct effects (standardized coefficients) of media interactivity on systolic blood pressure are .30 (*SE* = .07), $p < .001$, and .23 (*SE* = .09), $p < .05$, respectively. The difference between the total and direct effect was the total indirect effect through Enactive Experiences Identification, with a point estimate of .07 (*SE* = .07) and a 95% biased corrected (BC) bootstrap CI of -.06 and .21. Both analyses showed that Enactive Experience Identification did not significantly mediate the effects of media interactivity on both systolic and diastolic blood pressure.[9]

This section tested the role of Enactive Experience Identification as a mediator of the effect of media interactivity on aggressive affect, cognition, and physiological arousal. As previous literature review suggested, existing measurements presented limited operational capabilities to measure the concept of monadic identification, which could be the reason for inconsistent findings regarding whether character identification (i.e., observational identification and dyadic identification) mediated the relationship between media interactivity and media effects. Therefore, in the next section, observational identification and dyadic identification were also tested as mediators in the media interactivity model.

Other Types of Character Identification as Mediators

[9] The mediation model was not significant even adding Outcome Identification as a control variable.

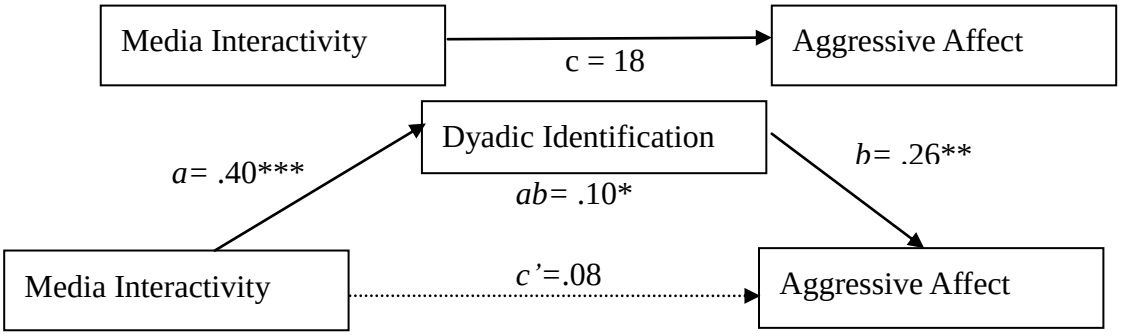
Observational identification. Using the same macro (Preacher & Hayes, 2008), the bootstrapping results showed that the total and direct effects (standardized coefficients) of media interactivity on aggressive affect were .18 (*SE* = .08), $p < .05$, and .16 (*SE* = .08), $p < .05$, respectively. The total indirect effect through observational identification (Cohen, 2001) had a point estimate of .02 (*SE* = .02) and a 95% BC bootstrap CI of -.01 and .08. The model has a R^2 of .04, adjusted R^2 of .03, F (2, 166) = 3.57, $p < .05$. The results indicated that the indirect effect was not significant because the BC 95% CI contained zero, which did not reject the null hypothesis. In addition, the direct effect of media interactivity on aggressive affect was still significant after adding the mediator into the model. Therefore, observational identification did not significantly mediate the effect of media interactivity on aggressive affect.

However, a suppressor effect was also found in this model. A significant full mediation of observational identification was found on the effects of media interactivity on aggressive affect. The bootstrapping results showed that the total and direct effects (standardized coefficients) of media interactivity on aggressive affect were .18 (*SE* = .07), $p < .05$, and .12 (*SE* = .07), $p = .13$, respectively. The partial effect of the suppressor (Outcome Identification) on aggressive affect was .12 (*SE* = .08), $p < .001$. The total indirect effect through observational identification (Cohen, 2001) had a point estimate of .06 (*SE* = .03) and a 95% BC bootstrap CI of .02 and .13. The model has a R^2 of .11, adjusted R^2 of .10, F (3, 165) = 7.08, $p < .001$. The results indicated that, after controlling Outcome Identification, higher media interactivity increased higher observational identification, which resulted in greater aggressive affect.

Dyadic identification. Bootstrapping results showed that the total and direct effects (standardized coefficients) of media interactivity on aggressive affect were .18 (*SE* = .08), p < .05, and .08 (*SE* = .08), $p = .32$, respectively. The difference between the total and direct effect

was the total indirect effect through the mediator (dyadic identification), with a point estimate of .11 (*SE* = .05) and a 95% BC bootstrap CI of .03 and .22. The model has a R^2 of .09, adjusted R^2 of .08, F (2, 166) = 8.37, $p < .001$. These results indicated that the direct effect became insignificant after adding the mediator into the model. In addition, the significant indirect effect fully mediated the effects of media interactivity on aggressive affect because the 95% BC bootstrap CI did not contain zero, which rejected the null hypothesis. Figure 7 illustrates the path model, indicating that the directions of the *a* and *b* paths were consistent with the interpretation that higher media interactivity led to greater dyadic identification, which, in turn, led to greater aggressive affect.

Figure 7. Path Model of the Effects of Media Interactivity on Aggressive Affect through Dyadic Identification



Note. *$p < .05$, **$p < .01$, ***$p < .001$, Model R^2= .09, Adj.R^2= .08, F (2, 166) = 8.37, $p < .001$.

Comparing Identification Scales

Given that the three identification scales discussed above fully mediated the effect of media interactivity on aggressive affect, additional exploratory factor analyses were conducted to compare the newly developed Enactive Experiences Identification subscale with Observational Identification Scale (Cohen, 2001) and Dyadic Identification Scale (Hefner et al., 2009). The principal axis analysis showed that two factors were extracted based on the criterion that eigenvalues were greater than one when analyzing Enactive Experiences Identification subscale

and Observational Identification Scale (Cohen, 2001) together. The first factor explained 46.98% of the total variance, and consisted of all five items from Enactive Experiences Identification subscale and two items from the Observational Identification Scale (Cohen, 2001), which are shown in Table 13. The remaining items in Observational Identification Scale (Cohen, 2001) were loaded into the second factor, which explained 15.53% of the variance. This indicated that the two items from Observational Identification Scale were overlapping with Enactive Experiences Identification subscale.

Table 13

The Pattern Matrix of Principal Axis Factoring of Enactive Experiences Subscale and Observational Identification Scale Using Oblimin Rotation with Kaiser Normalization

Enactive Experience Identification subscale (developed for this study)	**Factor 1**	**Factor 2**
1. I felt that I was the person in the game	**.812**	-.066
2. It seemed as if I was performing actions in the game environment myself	**.884**	-.153
3. It seemed as if it was me making the decisions in the game	**.777**	-.086
6. The actions reflected my thoughts in the game	**.659**	.081
9. My actions were affected by their outcomes in the game	**.662**	.065
Observational Identification Scale (Cohen, 2001)		
1. While playing the game, I felt as if I was part of the action	**.816**	.068
2. While playing the game, I forgot myself and was fully absorbed	**.662**	.096
3. I was able to understand the events in the game in a manner similar to that in which the Niko understood them	.044	**.700**
4. I think I have a good understanding of Niko	-.210	**.897**
5. I tend to understand the reasons why Niko did what he did	-.117	**.757**
6. While playing the game I could feel the emotions Niko portrayed	.356	**.605**
7. During the game, I felt I could really get inside the Niko's head	.299	**.671**
8. At key moments in the game, I felt I knew exactly what Niko was going through	.279	**.612**
9. While playing the game, I wanted Niko to succeed in achieving his or her goals	.343	.453
10. When the Niko succeeded I felt joy, but when he failed, I was sad	.439	.270

Another principal axis factoring analysis was conducted to compare the Enactive Experiences subscale and the Dyadic Identification Scale (Hefner et al., 2009). Table 14 shows

the pattern matrix using the direct Oblimin rotation with Kaiser Normalization method. The results showed that the Enactive Experiences subscale and the Dyadic Identification Scale were separate factors, which explained 57.98% and 12.69% of the variance, respectively. These demonstrated that the newly developed scale was different from the Dyadic Identification Scale.

Table 14

The Pattern Matrix of Principal Axis Factoring of Enactive Experiences Subscale and Dyadic Identification Scale

Enactive Experience Identification subscale	**Factor 1**	**Factor 2**
1. I felt that I was the person in the game	.319	**.484**
2. It seemed as if I was performing actions in the game environment myself	.282	**.601**
3. It seemed as if it was me making the decisions in the game	-.095	**.891**
6. The actions reflected my thoughts in the game	-.008	**.744**
9. My actions were affected by their outcomes in the game	.003	**.737**
Dyadic Identification Scale (Hefner et al., 2009)		
1. I almost had the feeling of actually being Niko	**.796**	.064
2. I literally had the feeling I was in Niko's skin	**.900**	-.039
3. I sometimes completely forgot about myself because I was focusing so much on Niko's actions	**.707**	.143
4. I had the feeling I was Niko more so than myself	**.988**	-.117
5. Niko's goals became my goals	**.445**	.310

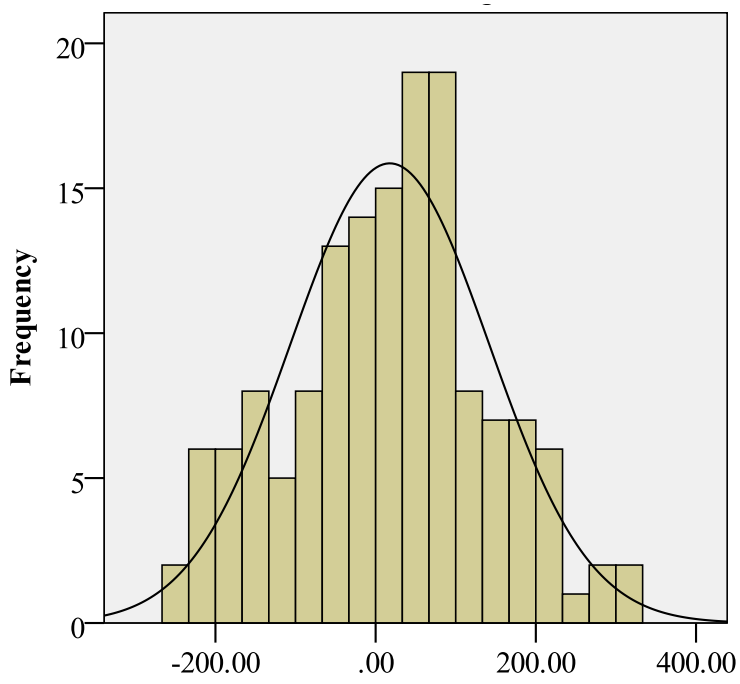
Note. Oblimin with Kaiser Normalization was the rotation method.

Violence, Self-concept, and Aggression

The fourth set of hypotheses focused on examining the role of self-concept, measured using the IAT, on the relationship between violence and aggression. In order to analyze self-concept, data from IAT was prepared following established procedures (Greenwald et al., 1998; Uhlmann & Swanson, 2004). The hypotheses were tested using only the two critical data collection blocks of IAT, whereas practice blocks were discarded. In addition, data was analyzed among the correct answers, which allowed the reaction speed data for incorrect answers to be filtered out.

Furthermore, based on Uhlmann and Swanson (2004), latencies less than 300 ms[10] and greater than 3000 ms were recoded into 300 ms and 3000 ms respectively in order to correct for anticipatory responses and temporary inattention. Finally, followed the procedure in previous literature, participants with overly long average latencies (greater than 1000 ms) were omitted from analysis.[11] The data was normally distributed based on the histogram shown in Figure 8. Therefore, the data was not log-transformed.

Figure 8. The Histogram of the Scores of Implicit Association Test



Notes. Mean = 17.65, SD = 124.10, N = 148

Participants' IAT effects were calculated by subtracting their mean latency on the Self = Peaceful critical IAT block from their mean latency on the Self = Aggressive critical IAT block and were interpreted in accordance with the notion that the more negative (or less positive) a

[10] No data less then 300 ms was found in the correct answers, thus no data was recoded into 300ms.

[11] A total of 21 cases were dropped from the analysis based on this criterion. The total sample size became 148.

person's IAT score, the greater their association of aggression with self.

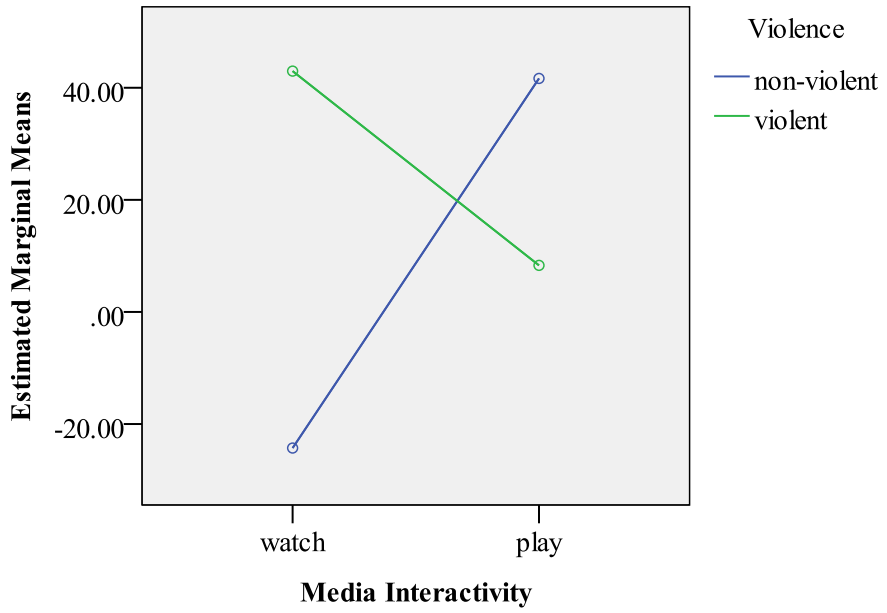
H4 hypothesized that there would be an interaction effect of media interactivity and violence on participants' automatic self-concept (aggressive or peaceful). In other words, violent video game players would associate themselves more with aggressiveness than violent video game watchers. Similarly, non-violent video game players would perceive themselves as more peaceful than non- or low-violent video game watchers. A two-way between-subject ANOVA was calculated to examine media interactivity (play vs. watch) and violence (high vs. low) on participants' post-stimulus self-concept. Results showed that the interaction effect of media interactivity and violence was significant, $F(1, 144) = 5.63$ $p < .05$, $\eta^2 = .04$. The descriptive data in Table 15 shows the hypothesized direction, and Figure 9 illustrates the interaction effect on automatic self-concept. The Levene's test indicated that the error variance of the dependent variable was equal across groups, $F(3, 144) = 2.03$, *ns*, which supported the ANCOVA homogeneity of variance assumption. No significant main effects were found. The corrected model had a partial $ή^2$ value of .04, $F(3, 144) = 2.18$, *ns*. Thus, H4 was thus supported.

Table 15

Descriptive Data of Participants' Automatic Self-Concept

		Raw data		
	IV	Mean	SD	N
Watch	Non- violent	-24.28	126.92	29
	Violent	42.97	98.34	46
	Total	16.97	114.29	75
Play	Non-violent	41.67	145.74	22
	Violent	8.31	129.14	51
	Total	18.36	134.22	73
Total	Non-violent	4.16	137.95	51
	Violent	24.75	116.28	97
	Total	17.65	124.10	148

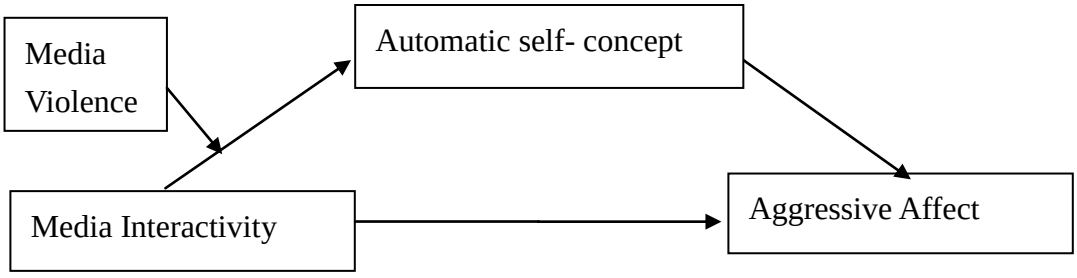
Figure 9. Estimated Marginal Means of Self-Concept



Note. The higher the means, the positive value indicates higher association of peaceful with self, and the negative value indicates stronger association of aggressive with self.

RQ3 asked whether participants' automatic self-concept of aggression would mediate the interaction effect of media interactivity and amount of violence on short-term aggression. This is the second type of model among the five mediated moderation models (Preacher, Rucker, & Hayes, 2007), as shown in Figure 10.

Figure 10. The Mediated Moderation Model



Using the SPSS macro (Preacher et al., 2007), the bootstrapping results showed two models: the mediator variable model (the effects of IVs on mediator) and the dependent variable model (the effects of IVs and mediator on DV). In the mediator variable model, the direct effect (standardized coefficients) of the interaction (media interactivity × violence) on the mediator

(automatic self-concept) was -.19 (*SE* = .08), $p < .05$. In the dependent variable model, the direct effect of the mediator (automatic self-concept) on DV (aggressive affect) was .15 (*SE* = .07), p < .05. Finally, the interaction effects of two IVs (media interactivity × violence) on the DV (aggressive affect) was .04 (*SE* = .08), $p = .64$.

Regarding the indirect effects, among those who were exposed to the violent conditions, the indirect effect of the interaction (media interactivity × violence) on DV (aggressive affect) through the mediator (automatic self-concept) had a point estimate of -.03 (*SE = .02*), $z = -1.2$, $p = .23$ and a 95% BC bootstrap CI of -.10 and -.001. Among those who were exposed to non- or low-violent conditions, the indirect effect of the interaction (media interactivity × violence) on DV (aggressive affect) through the mediator (automatic self-concept) had a point estimate of .0006 (*SE* = .01), $z = .05$, $p = .96$ and a 95% BC bootstrap CI of -.03 and .03. These results indicated that the indirect impact of the interaction effect on aggressive affect through the proposed mediator (automatic self-concept) was not significant in either violent or non-violent conditions (see Table 16).

Table 16

Test of Indirect Effect of Media Interactivity and Violence on Aggressive Affect through Automatic Self-Concept (Bootstrap resample = 1000)

Mediator Variable Model	***b****	***SE***	**t-value**	***p* > |t|**
IV1 to M	.004	.08	.05	.96
IV2 to M	.06	.08	.66	.51
IV1 × IV2 on M	-.19	.08	-2.36	.02
Dependent Variable Model	***b****	***SE***	**t-value**	***p* > |t|**
M to DV	.15	.07	2.04	.04
IV1 to DV	.13	.07	1.78	.08
IV2 to DV	.21	.07	2.83	.01
IV1 × IV2 on DV	.04	.08	.47	.64
Indirect Effects	***b****	***SE***	**z-value**	***p* > |z|**
Non- or Low-Violence condition	.0006 (-.03 to .03)	.01	.05	.96
High Violence condition	-.03 (-10 to -.001)	.03	-1.2	.23

Note: IV1 = media interactivity, IV2 = Violence level, M = automatic self-concept, DV = aggressive affect, ***b**** = standardized regression coefficient, *SE* = standard error

Lastly, RQ4 explored the relationship between Monadic Identification Scale and automatic concept. The Pearson bivariate correlations showed that Monadic Identification had a low but weak and significant correlation with self-concept, $r = -.25$, $p < .05$, indicating that the higher the Monadic Identification, the greater aggressive self-concept.

Chapter 5

Discussion

This study proposed and tested a media interactivity model, drawing upon recent theoretical arguments of character identification and the General Aggression Model (GAM). To aid understanding of the mechanisms underlying media interactivity, the author first developed and tested a scale (i.e., Monadic Identification Scale) to measure identification. Drawing from the social cognitive theory, the scale consisted of 15 items loading into four factors based on the theory. Second, an experiment was employed to examine the model and two proposed mediating mechanisms.

The results indicated that media interactivity (play vs. watch) affected participants' short-term aggression in terms of aggressive affect and blood pressure, both of which were raised in video game players after the stimulus, compared to participants who watched the recorded game play. These findings were consistent with previous literature.

In addition, results showed that the amount of violence (violent vs. non-violent) had a significant effect on participants' post-stimulus aggressive affect. Those in the violent conditions displayed higher aggressive affect than those in the non-violent conditions did. This again showed the effect of violence on participants' short-term aggression, consistent with previous literature.

Moreover, the findings suggest that in violent conditions, video game players showed higher aggressive affect than those who watched recorded game play, whereas this phenomenon was not demonstrated in non-violent conditions. This indicated that, when violence was present, media interactivity exacerbated the effects of violence on aggressive affect, which was a new finding.

However, aggressive cognition and heart rate were unaffected by media interactivity and violence in this study. Regarding the null effects on aggressive cognition, one explanation is that the measure (word completion task) has become unreliable because some participants have shown signs of knowing the purpose of the measurement. For example, one participant (who played the violent video game) purposefully skipped all the word fragments that could be completed as violent or non-violent and completed all the non-violent word fragments (generating a null proportion). The phenomenon was specifically obvious in violent conditions compared to non- or low-violent conditions, as participants were susceptible to the purpose of the study. However, this effect could have been caused by the measurement method execution, as participants were given four minutes to complete a paper version of the test. Therefore, participants could spend different amounts of time on each word fragments and freely skip any items. This perhaps could be remedied by using the computer program to control the time on each word fragment so participants could respond based on their first reaction.

Regarding the null effects of media interactivity on heart rate (HR) (post-stimulus HR, during-game averaged HR, and during-game maximum HR), the results were consistent with previous literature (Lin, 2010) which showed the null effects on post-stimulus HR. This could be attributed to the game being sedentary, as it did not require physical activity. Participants all sat on a chair to either play or watch the video game. Therefore, the heart rates were similar. However, significant differences were found on blood pressure, whereby game players displayed higher blood pressure than video game watchers. This could demonstrate that active role-taking in video games required more attention and enough pressure to pump the blood to the body to "press the controller." The significant differences between playing versus watching on blood pressure were consistent with previous research (Bushman & Huesmann, 2006; Lin, 2010).

The hypothesized interaction effect of media interactivity and violence on participants' post-stimulus short-term aggression was not significant. Results showed that when controlling violence, participants who played the violent video game displayed significant greater aggressive affect compared to those who watched the violent recorded game play. However, there were no significant differences between those who played the non-violent video game and those who watched the non-violent recorded game play in terms of aggressive affect. This is to be expected, as given that violence was absent in the content, media interactivity should not enhance the "violence" effect on aggressive affect, as there was no "effect" to be enhanced. Therefore, the originally proposed hypothesis could be flawed regarding the conditional effect of media interactivity. The results indicated a conditional effect in that when violence was present, media interactivity accentuated the violent effect on aggressive affect. On the other hand, when violence was absent, media interactivity did not have significant influence on participants' aggressive affect. The conditional moderating role of media interactivity on violence and aggression was demonstrated in this study but was inconsistent with previous studies (Graybill et al., 1987; Jalette, 2009). Graybill et al. (1987) did not find any main effect or interaction effect, whilst Jalette (2009) found a significant interaction effect of media interactivity and violence on aggression. This finding could be due to the content employed in Jalette's (2009) experiment did not have equivalent amount of violence in active (play) and passive (watch) game conditions. Thus, video game players might have been exposed to higher amount of violence than those who watched the recorded game play. The present study controlled the violence between play and watch conditions and demonstrated the conditional moderating effects of media interactivity on aggressive affect. Given the inconsistent findings, clearly more empirical studies are needed to identify the robust effect of media interactivity on violence and aggression.

In addition to testing the effects of media interactivity and violence on post-stimulus aggression, two proposed mediating mechanisms—character identification and automatic self-concept—were also tested as a part of the present study. The author developed the Monadic Identification Scale based on social cognitive theory, which was well integrated with GAM. The exploratory factor analysis using principle axis factor analysis indicated that the items loaded into four factors, which is consistent with the theory. Media interactivity had significant effects on the full scale, but had significant effects on two subscales only (Enactive Experiences Identification and Goal Identification) in which video game players indicated higher degree of identification than video game watchers did. The null effects on Outcome Identification and Real Life Identification were not surprising and could be explained by the theory. According to the social cognitive theory, people observe the effects of either through their past direct experiences or other people's behavior to learn the rules. Therefore, participants in both play and watch conditions should be able to understand the effects of the behavior by experiencing "their actions" and by observing other players' in-game behavior. The results showed that those who watched the video game play even displayed higher levels of Outcome Identification than video game players, although the differences were not significant. This further implied that observational learning allowed participants to note the pattern of the effects of behaviors more efficiently than enactive experiences since "standers-by see more than gamesters," as the proverb goes. Game players had to focus on how to achieve the goals and made decisions quickly in order to proceed in the game. Observers looked at the game play from an outsider's perspective and could examine the details without worrying about achieving the goals in the game. Similarly, there was no difference between players and watchers regarding the Real Life Identification subscale. Regardless of the violence and realism in the plot (either saving your cousin or going on a date),

playing the game or watching the game could not influence whether the mission reminded participants of their past experiences or the ability to perform the behavior in real life (self-efficacy). Instead, their real life experiences and/or their motivations should be the bigger factors for Real Life Identification.

The role of Outcome Identification was significant. Specifically, results showed that media interactivity affected the after-stimulus aggression through Enactive Experience Identification, after controlling for the effect of Outcome Identification on aggressive affect. As the model suggested, after controlling for Outcome Identification as a suppressor, Enactive Experience Identification fully mediated the relationship between media interactivity and aggressive affect. In other words, participants who played the video games had higher Enactive Experience Identification, which led to higher aggressive affect after exposure to the stimulus, controlling for participants' Outcome Identification. The suppressor had a positive correlation with the mediator, but had a negative correlation with the aggressive affect, which was in the opposite direction. Thus, the findings suggest that the opposite correlations suppressed the mediation. After identifying the suppressor effect, the suppressor explained the irrelevant variance and enhanced the full mediation effect of media interactivity on aggressive affect through Enactive Experience Identification. To the author's best knowledge, this finding was new to the field of violence and aggression studies, as past literature has not reported on the significant full mediation.

Thus, the question is, why does the suppressor effect of Outcome Identification on aggressive affect have to be controlled for in order to achieve a significant full mediation? The results showed a negative correlation between Outcome Identification and aggressive affect, indicating that those who had lower understanding of the rules and effects of behaviors in games

had greater aggressive affect (e.g., players: I don't know why I cannot finish this; watchers: I have no idea why this player is still struggling with this task). Similarly, those who had higher understanding of the rules displayed relatively lower level of aggressive affect (e.g., players: knowing the rules helps me get the goal/ I know I have to do this, but I am just not competent of executing it; watchers: the rules and effects are clear. In order to achieve this goal, these actions could achieve it.) These potential thoughts "suppressed" the significant full mediation effect of Enactive Experience Identification on media interactivity and aggressive affect. After controlling for it, full mediation was found, indicating that participants who played the video games perceived higher level of Enactive Experience Identification, which thus led to greater aggressive affect.

From purely theoretical perspective, outcome expectation is a key determinant of player/observer's behavior and emotions in the social cognitive theory. For those who observed and understood the effects of behavior, outcomes were expected; thus, they would not have strong aggressive affects to either aggressively try to understand the rules or be upset about the unexpected outcomes. On the contrary, those who did not quite understand the rules of reaching the goals would eagerly test out different behaviors for the effects. In addition, the unexpected outcomes would trigger stronger aggressive affect. The interaction of identifying with outcomes and enactive experiences thus produce stronger effects on aggressive affect than enactive experiences alone.

Results also suggested that Outcome Identification could further explain the inconsistent findings of the mediation effect of character identification in previous studies. In addition to Monadic Identification, other identification scales were also tested as mediators in the model developed in the present study. Observational identification (Cohen, 2001) was not a significant

mediator. However, after introducing Outcome Identification as a control variable into the model, Observational Identification also fully mediated the relationship between media interactivity and aggressive affect. Because Observational Identification Scale focused on measuring participants' observation and understanding of the character in a video program, rather than an interactive video game, the scale did not fully incorporate enactive experiences identification from the perspective of monadic identification. A video game player could achieve the goal and understand the effects of behaviors and game rules very well without understanding what the character was thinking or without sharing the character's emotions. By controlling the irrelevant variance of Outcome Identification on aggressive affect, Observational Identification mediated the effect of media interactivity on aggressive affect. This further implied that Outcome Identification was an important construct to be considered when investigating the mediation role of enactive or observational identification on media interactivity and aggression. The suppressor effect had not been identified in extant literature, and this could further explain the inconsistency of the mediation effect of character identification in previous studies.

The results from the exploratory factor analysis indicated that two items from Observational Identification Scale (Cohen, 2001) measuring enactive experiences loaded onto Enactive Experience Identification subscale developed for this study. This demonstrated that Observational Identification Scale overlapped with Enactive Experience Identification subscale. In addition, the scale focused on observational experiences and did not reflect the degree of freedom of being "the one in the game." Therefore, the results suggested that for future research examining interactive media, Observational Identification Scale is not sufficient to capture the "monadic relationship" because of the limitation of the design for observational media.

On the contrary, Dyadic Identification (Hefner et al., 2009) showed a fully mediation

between media interactivity and aggressive affect, without controlling Outcome Identification. The results of the exploratory factor analysis also showed that this scale was a distinct factor from Enactive Experience Identification subscale in Monadic Identification Scale. Monadic Identification Scale developed from this study was different from Dyadic Identification Scale in several aspects. First, Dyadic Identification Scale consisting of four items focused only on enactive experiences and the fifth item measured the perceived importance of goals, which overlapped with the Goal Identification subscale in Monadic Identification Scale developed for this study. Second, as the designers of Dyadic Identification Scale themselves criticized (Klimmt et al., 2010), these items were phrased as measuring the dyadic relationship (self and character) and did not reflect the monadic relationship. In contrast, Monadic Identification Scale was designed to reflect the monadic relationship by avoiding including the character's name or the idea of character in the description of the items. Thus, although the meanings of the items were similar, the frame of reference was different. Third, as the results in this study showed, Enactive Experience Identification subscale had higher reliability than Dyadic Identification Scale. Fourth, Monadic Identification Scale from this study addressed these limitations, by including four factors based on the social cognitive theory, which was part of the GAM. As a result, the scale was better aligned with video game research. In addition, the results identified the important suppressor effect of Outcome Identification, which shed new light on the inconsistent findings regarding the meditational role of identification on media interactivity and media effects.

In addition to character identification, the other proposed mediating mechanism was automatic self-concept, indicating that participants would temporarily associate themselves with some of the character's attributes more than other attributes. Moreover, a significant interaction effect of media interactivity and violence was found on automatic self-concept. Violent video

game players associated themselves more with a more aggressive self-concept than those who watched the violent recorded video game. Similarly, non-violent video game players associated themselves more with a peaceful self-concept than those who watched the non-violent recorded video game. This indicated that media interactivity enhanced the attributes of the character (an aggressor or a peaceful role) on audiences, and influenced the magnitude of self-concept regarding the media effects, whether the effect was positive or negative. In addition, the results provided evidence to support the theoretical argument (Klimmt et al., 2009) that players adopted certain attributes from the characters, and the degree of such adoption would be stronger for those who actively played the video games than for those who watched the games.

Self-concept had significant positive effects on aggressive affect. The higher degree participants associated themselves with aggressive concepts, the stronger aggressive affects they displayed. However, the indirect effect of the interaction effect (media interactivity × violence) on aggressive affect through automatic self-concept was not significant. This could be caused by the insignificant interaction total effect (media interactivity × violence) on aggressive affect, although this relationship was not required to establish the proposed mediated moderation model. In addition, the significance level of the effects of self-concept on aggressive affect was near the .05 level, which also contributed to the non-significant indirect effect. Future studies should keep testing this proposed mechanism in order to broaden the understanding of this underlying structure by manipulating the contrast of amount of violence (non-violent vs. super violent) in media content.

As the correlation between monadic identification and self-concept was positive, it indicated that the more the participants perceived themselves as the in-game characters (in terms of all four factors), the more they associated themselves with the characters' attributes. The

results implied that these two mechanisms might not be rival. Instead, they were correlated and could even be the same construct presented in different forms of measurements. Another possibility is that there could be a causal relationship between these two mechanisms, as Monadic Identification caused automatic self-concept. As the present study treated these two mechanisms as mediators, thereby establishing significant positive correlations, the current design could not establish the causal link. Future research is needed to explore such a relationship.

The study contributed to the literature by addressing several shortcomings identified in the previous studies. First, an experimental design incorporating both violent and non-violent conditions from the same video game was employed to investigate the interaction effects of media interactivity and levels of violence on aggressive outcomes. Past research in this field was limited in examining the effects of media interactivity by several shortcomings, including using only violent conditions, different types of games, or providing different characters for audiences to identify with. In contrast, the present study examined the violent and non-violent mission from the same game with the same character. The pilot results showed that the manipulation was successful in terms of violence and stimulants in games, including difficulty, frustration, excitement, enjoyable feeling, and pace of the action. In addition, contrary to previous fantasy game choices in existing literature (Jalette, 2009; Lin, 2010), the game chosen for this study featured a realistic plot, providing higher external validity and greater range of variances and effects on character identification as well as short-term aggression.

Second, the newly developed scale, thoroughly incorporating both enactive and observational experiences, was tested in this study. It differed from previous character identification scales (i.e., Observational Identification Scale and Dyadic Identification Scale), as

it was designed to measure participants' identification with the character in both mediated enactive and observational experiences. Cohen's (2001) Observational Identification Scale was mainly designed for audience who watch a video, TV, or a movie. Recent research (Hefner et al., 2009; Lewis et al., 2008) expanded the context to video game playing. However, all extant scales measuring character identification were still employing the dyadic (e.g., ego and character) relationship (Klimmt et al., 2009), which lacked the breadth to measure the possible monadic relationship (e.g., ego in the game). In this study, the newly developed scale addressed these shortcomings in existing scales and was designed based on four critical dimensions in social cognitive theory.

In addition, the role of Outcome Identification had suppressor effects on the relationship of Enactive Experience Identification subscale and aggressive affect. A similar suppressor effect was found on the effect of Observational Identification on aggressive affect. This finding contributed to the extant body of knowledge in this field and explained the potentially conflicting results reported from the previous studies regarding the meditational role of identification on the relationship of media interactivity and media effects. Nonetheless, more empirical studies are needed to test the effects of this suppressor role. For example, researchers could manipulate the reinforcement schedule and mechanisms. Participants who are assigned to the high Outcome Identification conditions could thus be playing or watching a video game with fixed reinforcement schedule and fixed rewarding mechanisms. In this case, participants will easily grasp the rules of the game. In contrast, participants in the low Outcome Identification conditions would be playing or watching a video game with random reinforcement schedule and random rewarding mechanisms. By manipulating the behavior-effect rules, researchers could further study how Outcome Identification interacts with media interactivity and Enactive Experience

Identification on media effects.

Third, this study contributed to the GAM by examining the underlying mechanisms—character identification and automatic self-concept—to explain the effects of media interactivity on the relationship of media violence and audiences' short-term aggression in the mediated contexts. GAM predicted that exposure to media violence would lead to audiences' short-term aggression. This study further demonstrated the role of media interactivity in the GAM through social cognitive theory, which GAM had integrated in. In the mediated contexts, media interactivity enhanced the violence effects on aggression via character identification and self-concepts. More empirical studies are thus needed to establish the robust processes.

There were also several limitations in this study. First, those who haven't played the game used in experiments were excluded from participation. Therefore, the results could not be generalized to the population that does not play the game. Second, the study was limited by the budget; therefore, the equipment measuring physiological responses could not provide detailed nuances that would establish the link between the media content and participants' physiological responses. Future research could address this limitation by focusing on measuring continuous and detailed physiological data by, for example, using software that can record the heart rate data, skin conductance measurements, and muscle movements. In addition, other indicators of physiological arousal were needed for testing the effects of media interactivity. As results from this study showed, heart rates did not differ amongst participants assigned to video game playing and video game watching. This finding also needs to be further investigated, as no previous studies regarding media interactivity measured heart rates.

Furthermore, this study focused on investigating the effects of media interactivity and violence on short-term aggression and did not include any behavioral measures. Previous

research has validated the causal link between short-term aggressive cognition and aggressive behavior (Anderson & Morrow, 1995; Carnagey & Anderson, 2005). In addition, Kutner and Olson (2008) showed that young boys and girls who often played any Mature-rated video game had three to four times higher risk of displaying aggressive behaviors, including getting into fights, beating up someone, or had conflicts with teachers. Although the link of media violence and aggressive behavior has been demonstrated through previous empirical studies, future studies should design behavioral measures targeting adults to test the violence effects.

Fourth, this study only recruited male students for this study, as the character in the game was male. Very few studies have explored whether the effects of media interactivity on media effects would also apply to female audience. Future study should further explore this domain and address the understudied gender effect. Fifth, the number of participants in violent conditions (N = 109) was higher than that in non-violent conditions (N = 60). The unequal cell sizes should be taken into account when interpreting the results. However, the issue was remedied by the analyses of ANCOVA because ANCOVA treated subjects as repeated samples. In contrast to the unweighted means in ANOVA, ANCOVA weighted the means with covariates and sample size, thereby mitigated the unequal cell size problems (Keppel & Wickens, 2004).

Finally, the current study focused on examining the role of media interactivity on violence-aggression relationship. Future studies should explore whether the amount of violent behavior generated by each video game player would further influence the effect of violent content on short-term aggression. Specifically, the effect of different violent behaviors enacted by the video game players on short-term aggression might be important to explore in future research. A content analysis, e.g. counting shots or kills or types of violent acts, should be nuanced by consideration of factors similar to those known to trigger behavioral effects when

observational learning is involved, such as the National Television Violence studies (University of California, S.B., University of North Carolina, C.H., University of Texas, A., & University of Wisconsin, M., 1997).

As interactivity has become more prevalent in the media used in everyday life, understanding the underlying mechanisms of the influences of interactivity could help educators design effective violence prevention and literacy programs; offer design principles for game developers for avoiding or attenuating violent effects; and provide policy makers guidelines on how to create content ratings for parents. The findings from this study could also be applied to education and health communication games, intended to lead to positive effects. More empirical studies are needed to establish the robust results in different contexts. Future research should also continue testing the proposed media interactivity model and exploring the antecedents and consequences of the mediating mechanisms.

APPENDIX

APPENDIX

Background story—violent condition

Niko Bellic, a veteran of the Balkan War, who is haunted by the betrayal of his army unit by one of its members which led to the death of all but 3 members. After the war, he decided to track down the traitor. Ten years later, Niko leaves Eastern Europe to escape the anger of his employer, Ray Bulgarin. Eventually, under persuasion from his cousin Roman, Niko comes to Liberty City, where he hopes to pursue the American Dream as well as Florian Cravic, the man he believes to be the traitor.

Today, Niko is going to receive a phone call that his cousin, Roman, has been kidnapped. He is now well-armed and is equipped with various weapons (including a pistol, a shot gun, grenades…etc) to rescue Roman. Please imagine you are Niko and you are now going to save your cousin. You have a red car waiting outside of your apartment. Get in the car, and you will receive a phone call regarding the instructions.

Background story—non-violent condition

Niko Bellic, a veteran of the Balkan War, who is haunted by the betrayal of his army unit by one of its members which led to the death of all but 3 members. After the war, he decided to track down the traitor. Ten years later, Niko leaves Eastern Europe to escape the anger of his employer, Ray Bulgarin. Eventually, under persuasion from his cousin Roman, Niko comes to Liberty City, where he hopes to pursue the American Dream as well as Florian Cravic, the man he believes to be the traitor.

One day, Roman's girlfriend introduced her friend, Michelle, to Niko. Today is the first time Niko meets Michelle. They are going on a first date. Niko wants to impress this girl and shows her his best side. Now imagine you are Niko and are having a date with Michelle. Please do your best to impress her—this means to behave well, follow the traffic rules and do not attract the police. There is a car waiting outside of your apartment. Once you get in the car, the GPS will tell you where Michelle is.

Pretest Questionnaire

Page 1

Thank you for your interest in this study. We would like you to complete this questionnaire. You will use a code to represent yourself in this survey, and you will use the same code later in the post-test survey. Please use the code you received when you entered the lab. If you don't know your code, please ask for assistance.

Code: _____

Page 2

We are now measuring your heart rate and blood pressure.

Q1: What is your blood pressure (high versus low)?

High: _____

Low: _____

Q2: What is your heart rate?

Heart rate: _____

Page 3 (State Hostility Scale, Anderson, Deuser, & Deneve, 1995)
Please indicate the extent to which you agree or disagree with each of the following mood statements. Use the following 7 point rating scale. 1 indicates strongly disagree and 7 indicates strongly agree.

I feel furious	1 Strongly Disagree	2	3	4	5	6	7 Strongly Agree
I feel like I'm about to explode	1 Strongly Disagree	2	3	4	5	6	7 Strongly Agree
I feel friendly	1 Strongly Disagree	2	3	4	5	6	7 Strongly Agree
I feel aggravated	1 Strongly Disagree	2	3	4	5	6	7 Strongly Agree
I feel understanding	1 Strongly Disagree	2	3	4	5	6	7 Strongly Agree
I feel amiable	1 Strongly Disagree	2	3	4	5	6	7 Strongly Agree
I feel stormy	1 Strongly Disagree	2	3	4	5	6	7 Strongly Agree
I feel mad	1 Strongly Disagree	2	3	4	5	6	7 Strongly Agree
I feel polite	1 Strongly Disagree	2	3	4	5	6	7 Strongly Agree
I feel mean	1 Strongly Disagree	2	3	4	5	6	7 Strongly Agree
I feel discontented	1 Strongly Disagree	2	3	4	5	6	7 Strongly Agree
I feel bitter	1 Strongly Disagree	2	3	4	5	6	7 Strongly Agree
I feel like banging on a table	1 Strongly Disagree	2	3	4	5	6	7 Strongly Agree
I feel burned up	1 Strongly Disagree	2	3	4	5	6	7 Strongly Agree
I feel irritated	1 Strongly Disagree	2	3	4	5	6	7 Strongly Agree
I feel like yelling at somebody	1 Strongly Disagree	2	3	4	5	6	7 Strongly Agree
I feel frustrated	1 Strongly Disagree	2	3	4	5	6	7 Strongly Agree
I feel cooperative	1 Strongly Disagree	2	3	4	5	6	7 Strongly Agree
I feel kindly	1 Strongly Disagree	2	3	4	5	6	7 Strongly Agree
I feel like swearing	1 Strongly Disagree	2	3	4	5	6	7 Strongly Agree
I feel unsociable.	1 Strongly Disagree	2	3	4	5	6	7 Strongly Agree
I feel cruel	1 Strongly Disagree	2	3	4	5	6	7 Strongly Agree
I feel outraged	1 Strongly Disagree	2	3	4	5	6	7 Strongly Agree
I feel good-natured	1 Strongly Disagree	2	3	4	5	6	7 Strongly Agree
I feel agreeable	1 Strongly Disagree	2	3	4	5	6	7 Strongly Agree
I feel disagreeable	1 Strongly Disagree	2	3	4	5	6	7 Strongly Agree
I feel angry	1 Strongly Disagree	2	3	4	5	6	7 Strongly Agree
I feel enraged	1 Strongly Disagree	2	3	4	5	6	7 Strongly Agree
I feel offended	1 Strongly Disagree	2	3	4	5	6	7 Strongly Agree
I feel sympathetic	1 Strongly Disagree	2	3	4	5	6	7 Strongly Agree
I feel disgusted	1 Strongly Disagree	2	3	4	5	6	7 Strongly Agree
I feel tame	1 Strongly Disagree	2	3	4	5	6	7 Strongly Agree

Page 4 (Trait Aggression- Buss and Perry Aggression Questionnaire, 1992)
Please rate each of the following items in terms of how characteristic they are of you. Use the following scale for answering these items. Strongly disagree 1 2 3 4 5 6 7 Strongly Agree

1. Once in a while I can't control the urge to strike another person.
2. Given enough provocation, I may hit another person.
3. If somebody hits me, I hit back.
4. I get into fights a little more than the average person.
5. If I have to resort to violence to protect my rights, I will.
6. There are people who pushed me so far that we came to blows.
7. I can think of no good reason for ever hitting a person.
8. I have threatened people I know.
9. I have become so mad that I have broken things.
10. I tell my friends openly when I disagree with them.
11. I often find myself disagreeing with people.
12. When people annoy me, I may tell them what I think of them.
13. I can't help getting into arguments when people disagree with me.
14. My friends say that I'm somewhat argumentative.
15. I flare up quickly but get over it quickly.
16. When frustrated, I let my irritation show.
17. I sometimes feel like a powder keg ready to explode.
18. I am an even-tempered person.
19. Some of my friends think I'm a hothead.
20. Sometimes I fly off the handle for no good reason.
21. I have trouble controlling my temper.
22. I am sometimes eaten up with jealousy.
23. At times I feel I have gotten a raw deal out of life.
24. Other people always seem to get the breaks.
25. I wonder why sometimes I feel so bitter about things.
26. I know that "friends" talk about me behind my back.
27. I am suspicious of overly friendly strangers.
28. I sometimes feel that people are laughing at me behind me back.
29. When people are especially nice, I wonder what they want.

Page 5 Game skills

Q: On a weekly basis, how many hours do you spend playing games (including console games played on Xbox, PlayStation or Wii, computer games, casual games on the web, games played on portable devices such as PSP or Nintendo DS, etc)?

1. 0 hour
2. Less than an hour
3. 1-5 hours
4. 6-10 hours
5. 11-20 hours
6. 21-40 hours
7. More than 40 hours

Q: How many years have you played video/computer games?

1. Never
2. Less than 2 years
3. 2 years to less than 4 years

4. 4 years to less than 6 years
5. 6 years to less than 8 years
6. 8 years to less than 10 years
7. More than 10 years

Q: On a scale from 1 to 7, what is the game play skill level do you think you have on the following games?

	Have never played the game before	1 Not very good at the game at all	2	3	4	5	6	7 Very good at the game
Call of Duty								
Counter Strike								
Doom								
Final Fantasy								
Grand Theft Auto 4								
Mario Brothers								
X-men Wolverine								
World of Warcraft								

Posttest Questionnaire

Page 1

Please enter your represented code to complete this survey. If you have troubles finding your code, please ask for assistance.

Code : _____

Page 2

We are measuring your heart rate and blood pressure now.

Q1: What is your blood pressure (high versus low)?

High: _____

Low: _____

Q2: What is your heart rate?

Heart rate: _____

Page 3 (State Hostility Scale, Anderson, Deuser, & Deneve, 1995)

Page 4 Identification (1 indicates strongly disagree, and 7 indicates strongly agree)

1 The actions in the game are important to me.
2. The responses of the actions in the game are important to me.
3. I value the goals in the game highly.
4. What happened in the game reminded me my past experiences.
5. I felt that I could perform the actions I saw in the game.
6. The goals in the game are important in my own life.
7. I cared about the feedback from other characters in the game. (cross-loaded, delete)
8. I saw a pattern of the outcomes of the actions in the game.
9. I understood how to achieve the goals in the game.
10. I understood the rationale of actions performed in the game.

11. I carefully noted the effects of the actions in the game environment.
12. It seemed like I was performing actions in the game environment myself.
13. I felt I was the person in the game.
14. It seemed like it was me making the decisions in the game.
15. The actions reflected my thoughts in the game.
16. My actions were affected by their outcomes in the game.

Page 5 Word completion task

Word Completion Task (to measure aggressive cognition)

You are now looking at a list of words with letters missing. Your task is to fill in the blanks to make complete words. You have 4 minutes to complete as many words as you can.

1. b _ h _ _ _	2. i n _ _ r e	3. e x _ e _ _	4. m u _ _ e r
5. p r _ _ e	6. s p e a _	7. f l i _ _ e r	8. e x p l _ _ e
9. w _ _ m	10. k i _ _	11. t _ p _	12. h _ r _
13. a _ t _ r	14. c h o _ e	15. s _ m p _ _	16. a t t _ c _
17. c _ m p _ _ t	18. d e s _ _ _ _	19. s h _ l _	20. s h o _ t
21. r _ p _ _ t	22. s t r _ _ e	23. l _ _ e	24. b _ r n
25. s t _ r _ o	26. p _ _ s o n	27. p _ s t _ r	28. m _ _ g l e
29. b l _ n d	30. s n _ r e	31. b _ e	32. h _ t
33. g _ _ p e	34. s m _ c k	35. s m _ _ e	36. k n _ _ _
37. t _ n e	38. s _ _ b	39. s h _ r _	40. d r _ _ n
41. p _ _ n e	42. a n g _ _	43. f l _ _ t	44. f i _ _ t
45. p _ c k	46. h a _ e	47. a _ t	48. c _ t
49. w _ n	50. a _ e	51. _ r y	52. w a _
53. f _ m _	54. s l _ p	55. b _ _ k	56. r _ p e
57. f o _ e _ t	58. o f f _ _ _	59. l _ _ o n	60. c r _ _ l
61. c _ e _ t e	62. s t _ r _ y	63. m _ t c _	64. f _ r _ _
65. t _ _ t e	66. n _ _ t _	67. w _ _ d _ w	68. w _ _ k e d
69. v i s _ _ n	70. e n _ a g e	71. s c r _ _ n	72. h _ t r _ d
73. t _ l _ p h _ _ _	74. d i s _ _ s _ e d	75. c _ n t _ _ l	76. p r o v _ _ e
77. p _ n b _ l l	78. o u t _ _ _ e	79. c _ l l	80. r _ d e
81. m _ n _ g e	82. i n s _ _ _	83. s _ d _	84. b _ _ t
85. b r _ _ z e	86. r e v _ _ t	87. c o o _	88. s _ _ y
89. d _ _ r	90. s m _ c k	91. f r _ _ t	92. _ u n c h
93. s h _ r e	94. a _ u s e	95. c l _ _ r	96. h _ n t
97. w _ t _ r	98. s _ a s h		

Page 6 Cohen Identification (Cohen, 2001)

Please indicate the extent to which you agree or disagree with each of the following mood statements. Use the following 7 point rating scale. 1 indicates strongly disagree and 7 indicates strongly agree.

1. While playing the game/viewing the game play, I felt as if I was part of the action.
2. While playing the game/viewing the game play, I forgot myself and was fully absorbed.
3. I was able to understand the events in the program in a manner similar to that in which the game character understood them.

4. I think I have a good understanding of the game character.
5. I tend to understand the reasons why the game character does what he or she does.
6. While viewing program I could feel the emotions the game character portrayed.
7. During viewing, I felt I could really get inside the game character's head.
8. At key moments in the video, I felt I knew exactly what the game character was going through.
9. While viewing the program, I wanted the game character to succeed in achieving his or her goals.
10. When the game character succeeded I felt joy, but when he or she failed, I was sad.
11. I almost had the feeling of actually being the character.
12. I literally had the feeling I was in the character's skin.
13. I sometimes completely forgot about myself because I was focusing so much on the game character's actions.
14. I had the feeling I was the game character more so than myself.
15. The game character's goals became my goals.

Page 7 Guidance for Future Behavior Scale (Lin, 2010)

Please rate the following statements using 1 to 7. For example, 1 is associated with the statement on the left side, and 7 is associated with the statement on the right side.

Strongly disagree	1	2	3	4	5	6	7	Strongly agree
I would react the same way that the character did in a real life situation								
If I am ever in situations like the character's I would behave the same way he did								
I couldn't act like the character did even if I wanted to (reverse coded)								

Wishful Identification Scale (Hoffner, 1996)

Please rate the following statements using 1 to 7. For example, 1 is associated with the statement on the left side, and 7 is associated with the statement on the right side.

Strongly disagree	1	2	3	4	5	6	7	Strongly agree
I'd like to do the kinds of things the character does in the game/video.								
The game character is the sort of person I want to me like myself.								
I wish I could be more like the game character.								

IAT (Implicit Association Test)

Page 8 Manipulation check, Frustration (Lin, 2010) & Enjoyment

Please indicate the extent to which you perceive the game content you engaged on the following statements. Use the following 7 point rating scale.

1. How violent was the content of the section?

No violent content 1 2 3 4 5 6 7 very violent content

2. How violent was the graphics of the section?
No violent graphics 1 2 3 4 5 6 7 very violent graphics
3. How interactive were you?
Not interactive at all 1 2 3 4 5 6 7 Very interactive
4. How interactive was the section?
Not interactive at all 1 2 3 4 5 6 7 Very interactive

Please indicate the extent to which you agree or disagree with each of the following mood statements. Use the following 7 point rating scale. 1 indicates strongly disagree and 7 indicates strongly agree.

	Strongly disagree	1	2	3	4	5	6	7	Strongly agree
It was a very frustrated experience.									
Being frustrated comes with the content									
Overall, I experienced very little frustration.									

Please indicate the extent to which you agree or disagree with each of the following mood statements. Use the following 7 point rating scale. 1 indicates strongly disagree and 7 indicates strongly agree.

	Strongly disagree	1	2	3	4	5	6	7	Strongly agree
I enjoyed playing/watching the game.									
I would spend more time playing/watching the game if I had the opportunity.									
The game playing/watching was NOT very interesting to me.									
I would recommend playing/watching the game to a friend.									
The game playing/watching was fun.									

Social Desirability Scale (short-form) (Fischer & Fick, 1993)
Listed below are a number of statements concerning personal attitudes and traits. Read each item and decide whether the statement is true or false as it pertains to your personally. It's best to go with your first judgment and not spend too long mulling over any one question.
1. I like to gossip at times. (F) True/False
2. There have been occasions when I took advantage of someone. (F) True/False
3. I'm always willing to admit it when I make a mistake. (T) True/False
4. I sometimes try to get even rather than forgive and forget. (F) True/False
5. At times I have really insisted on having things my own way. (F) True/False
6. I have never been irked when people expressed ideas very different from my own. (T) True/False
7. I have never deliberately said something that hurt someone's feelings. (T) True/False

Page 9 Demographics
Q: In which year were you born? Ex. 1988
A: _____

Q: Which year of school are you in?
Freshman
Sophomore
Junior
Senior
Graduate student

Q: You are welcome to write down any thoughts you have for this experiment (optional).
_____

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