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Violent Video Games and the MAM: Engagement, Attraction, and Effects

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Video game effects research has often been guided by the assumption that video games are more engaging than other forms of media (e.g., television, film); therefore creating the potential for stronger effects. This study drew from theoretical domains including the limited capacity model for motivated mediated message processing (LC4MP), excitation-transfer theory, and disposition theory to further study the process of engagement and its effect upon outcomes following violent video game play. This research advances a model with individual difference factors predicting engagement and effects outcomes and highlights engagement's influence in the process. This dissertation outlines a two-part study designed to test these assumptions. Part 1 used a survey design to assess individual difference variables associated with engagement and motivational activation. Part 2 used a quasi-experimental design with a control group and a violent video game treatment group to measure engagement and aggressive outcomes, and to study the predictive power of the individual difference predictor variables from Part 1. Willingness to accept rules and motivational activation were predictive of video game engagement, and engagement led to increased enjoyment following violent game play. Increased enjoyment predicted increased state aggression following violent game play. Motivational activation influenced engagement, state aggression, and frustration (which negatively affected enjoyment). The study suggests that individual difference factors such as motivational activation and acceptance of rules predict engagement, and that engagement directly affects enjoyment and indirectly affects aggression.

Violent Video Games and the MAM:

Engagement, Attraction, and Effects

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Chapter 1

Introduction

Video games have become more accessible and popular in recent years. The Entertainment Software Association (ESA) reported that the video game software industry grew by 10.6% from 2005-2009 while the U.S. economy grew by 1.4% during the same period (Siwek, 2010). The ESA's 2012 sales report (ESA, 2012) showed that 49% of U.S. homes own a gaming console, and that those homes usually have two. Despite the rise in popularity of PCs, online gaming, and handheld devices, gamers in those homes prefer to play on consoles. The video game titles that contain violence are overwhelmingly popular, and accounted for a large (if not the largest) portion of games sold in 2011. The ESA sales report also showed that the two highest-selling genres of 2011 were action (19.0%) and shooter (18.4%), meaning that over a third of all units sold featured varying degrees of violence. In fact, 9 of the top 20 highest selling games predominantly featured violence: 8 were rated for "Mature" audiences (*Call of Duty: Modern Warfare 3*, *Elder Scrolls V: Skyrim*, *Battlefield 3*, *Call of Duty: Black Ops*, *Gears of War 3*, *Assassin's Creed: Revelations, Mortal Kombat 2011*, and *L.A. Noire*) with *Batman: Arkham City* rated for "Teen" audiences.

Accordingly, the growth in popularity of video games has been paralleled by a recent "explosion in research on video games" (Prot, McDonald, Anderson, & Gentile, 2012). Much of the media effects research on video games operates under the assumption that video games have an increased potential to engage the user more than traditional forms of media. Video games are thought to hold attention (West, Stevens, Pun, & Pratt, 2008), provide immediate feedback and rewards (Buckley & Anderson, 2006), and require the interactive participation of the user in ways that differ from television and film (Lim & Reeves, 2010). Concerns about the engagement and strength of media effects take on increased importance when considering violent video games and aggressive outcomes.

Engagement is often identified as the factor that has the potential to strengthen the effects of video game exposure, yet it has been relatively understudied (Brockmyer, Fox, Curtiss, McBroom, Burkhart, & Pidruzny, 2009). Further, existing literature has done little to investigate the individual difference variables that contribute to one's capacity for engagement in video games.

The primary goal of this dissertation was to determine the effect of engagement on outcomes (enjoyment and aggression) related to video game play. The existing research paradigm for violent video games suggests that gamers take an active role in the action, experience increased engagement, and have a higher likelihood of experiencing negative effects such as increased aggression. This dissertation investigated that paradigm and modeled the engagement process. The current focus is on aggression and enjoyment as outcomes of interest, but it is expected that this program of research can be extended to investigate engagement's impact on other outcomes (e.g., learning, prosocial behavior, affective responses).

A secondary goal was to identify the individual difference factors that predispose one to become more or less engaged by video game play. If increased engagement does lead to an increase in problematic video game effects, then it would be beneficial to identify "at-risk" individuals with a greater propensity for engagement. This research identifies the individual difference factors that predict an individual's 1) attraction to playing certain types of video games, 2) capacity for processing video game messages, 3) tendency to become engaged in the game play experience, and 4) aggression-related outcomes following exposure to a violent video game.

The proposed engagement model was derived from existing media research. The model's structure included individual difference variables that were expected to directly and indirectly influence one's capacity to be engaged by video games, which in turn would affect the outcome variables of enjoyment and aggression. The structure drew from research on violent video games

and aggression (e.g., Anderson & Bushman, 2001; Buckley & Anderson, 2006; Farrar & Krcmar, 2006; Farrar, Krcmar, & Nowak, 2006), as well as findings regarding receptivity and engagement (Boyle, Connolly, Hainey, & Boyle, 2012; Brockmyer, Fox, Curtiss, McBroom, Burkhart, & Pidruzny, 2009; Buchanan, 2006; Buchanan & Sheridan, 2005). The limited capacity model for motivated mediated message processing (LC4MP) from Annie Lang and her colleagues (Lang, 2000; Lang, Kurita, Rubenking, & Potter, 2011; Lang, Shin, & Lee, 2005; Park, 2006; Shin, 2006) was used to inform expected relationships, with motivational activation as an important predictor of media preference and engagement. The model was also informed by media effects research on enjoyment (Fang, Chan, Brzenzinski, & Nair, 2008; Nabi & Krcmar, 2004; Ryan, Rigby, & Przybylski, 2006) and aggression (Anderson, 2004; Bushman, 1995; Smith, Lachlan, & Tamborini, 2003; Zillmann & Weaver, 2006).

This model was tested with a two-part experimental panel study. The first part used an online survey to explore individual difference variables related to receptivity towards engagement, motivational activation as a means to explain attraction to violence, and preference for video game genres and frequency of play. The second part used an experimental design to explore the influence of exposure to a violent video game on outcome variables related to aggression and enjoyment. Data from Part 1 (individual difference variables) was compared to Part 2 (engagement and outcome variables) to determine predictors of engagement and game play outcomes.

As individual difference variables were of interest to this dissertation study, traits associated with moral foundation theory (Haidt & Joseph, 2004) were also explored to assess their relationship with video game engagement. As media effects researchers have begun to explore the influence of morality on media preference and processes (e.g., Tamborini, Eden,

Bowman, Grizzard, & Lachlan, 2012), moral foundations were investigated apart from the dissertation's focus on the engagement model.

Structural equation modeling (SEM) was used to investigate the complex processes suggested in this dissertation. Capella (1980) stated that communication processes are complex in that often "the effects of one cause are the causes of other effects" (p. 60). He advocated the use of structural equation modeling (SEM) to detangle the web, especially when processes are thought to include feedback loops and spurious causes. In recursive models, with one-way causation and without spurious causes, researchers may use separate multiple regressions to test relationships and yield similar findings as those produced by SEM. However, nonrecursive models with feedback loops, spurious causes, and mutual causation do not lend themselves to separate regression tests. It was expected that the current processes would be nonrecursive, and necessitate the use of SEM with a two-step approach to analysis (Kline, 2010; Houghton & Jinkerson, 2007; Anderson & Gerbring, 1988) as opposed to significance testing or separate multiple regressions.

Importance of the Study

The 2012 school shooting in Newtown, CT has brought concerns regarding violence once again to the forefront of the national consciousness. Along with debate regarding topics such as mental illness and gun control, violent media has warranted renewed attention. Vice President Joe Biden gained attention for meeting with video game industry insiders and researchers in January of 2013 (LeJacq, 2013). House Minority Leader Nancy Pelosi made headlines in the following month by questioning the assumption that violent video games contribute to violence and calling for more scientific study in a Fox News interview with Christopher Wallace (Evangelista, 2013).

This dissertation is expected to contribute to the small but growing body of research that investigates concerns about the relative strength of video game effects as compared to traditional media. The investigation of engagement as the central determinant of these effects will allow researchers to determine the extent to which the engaging nature of games impacts outcomes - whether negative, positive, or neutral. This study not only explores the role that engagement plays, but it also seeks to explain the engagement process and predict one's capacity for engagement. Modeling this process can help to identify "at-risk" individuals who have a greater propensity for experiencing the negative effects of video games.

Further, the proposed model of engagement will aid in identifying processes that strengthen or dampen engagement and/or outcomes related to game play. Understanding the engagement process can provide useful information to help researchers, educators, and care-givers to develop media interventions. Isolating the processes that contribute to engagement and strengthen negative effects may facilitate interventions to disrupt the sequence to minimize harmful outcomes. Likewise, interventions may be developed to enhance positive outcomes associated with prosocial and educational media.

The following review of literature begins with an overview of video game engagement research. This review differentiates terms and adopts a view of engagement as influenced by Brockmyer et al. (2009). The following sections explain how related concepts contribute to the engagement process while introducing sections of the proposed model and corresponding hypotheses and research questions. The sections of the literature review and model are presented in sequence, building towards the completed model.

Chapter 2

Literature Review and Hypotheses

Engagement

Video games are becoming more engaging, require more active participation, and feature more interactivity and involvement than ever before (Nowak, Krcmar, & Farrar, 2008), and relationships have been found between more technologically advanced games (e.g., higher quality sound, graphics, and play control) and increased perception of presence and involvement (Ivory & Kalyanaraman, 2007). In turn, scholars have devoted more attention to engagement and related processes in recent years. A systematic literature review of video game engagement studies (Boyle, Connolly, Hainey, & Boyle, 2012) found that researchers have used the terms immersion, presence, and engagement in ways that sometimes appear to intersect. Although there is some confusion regarding the concepts and terms, video game scholars have begun to untangle the relationships in recent literature. The following discussion provides a brief summary of these related terms.

The current study uses the conceptualization of video game engagement from Brockmyer et al. (2009), wherein engagement is the degree to which an individual becomes involved in a game. The authors drew from theory and the lead author's earlier construct development research (Funk, Chan, Brouwer, & Curtiss, 2006) to describe the process of engagement. In this view, engagement occurs along a spectrum, with increased strength from immersion to presence to flow and then absorption. This description by Brockmyer and colleagues (2009) also clarifies the relationships between engagement and related variables by incorporating them in the process. These relationships are explained below.

The concept of immersion (like presence) has roots in virtual environments that typically presented 3D computer-generated worlds via head mounted displays. Typically, immersion has been conceptualized as a description of technological features (Mania & Chalmers, 2001). As a description of technology, it would be appropriate to say that the technology has the capacity to provide an immersive display. "Immersion can be an objective and quantifiable description of what any particular system does provide," (Slater & Wilbur, 1997). Therefore, individuals who are minimally involved in a video game would be likely to objectively recognize that the software and hardware provide a vivid display that allows the user to interact with the virtual world and shut out the physical environment. Immersion has also been described as a variable that influences game enjoyment (Jennett et al., 2008), with degrees of immersion occurring along a spectrum.

Witmer and Singer (1998) suggested that immersion is a prerequisite to presence. Their sense of immersion typically resulted from virtual environments and head-mounted displays, but they noted that immersion might be possible in books, films, or video games if individuals identified heavily with characters. In their explanation, immersion is "a psychological state characterized by perceiving oneself to be enveloped by, included in, and interacting with an environment that provides a continuous stream of stimuli and experiences" (p. 227). Although they argue against the notion that immersion is an objective description of technology, they contend that immersion is affected by perceptions of natural interaction and movement within the virtual environment, as well as the degree to which the technology isolates the individual. Those perceptions are somewhat filtered through subjective experience of the user, but it seems that they are still based primarily on technological features of the medium. The current research

adopts the view that immersion is mostly determined by the technological features of video games.

Presence differs from immersion in that presence seems to be marked by a slight shift in consciousness as the individual experiences the virtual world. While immersion is more objective, presence is both objective and subjective. Slater and Wilbur (1997) described the objective aspect as the extent to which an individual behaves in the virtual world as they would in reality. The subjective is the degree to which the individual has a sense of "being there" and that the virtual world is a "place". Presence has been described as focusing on feelings of actually being present in a game (e.g., Boyle, Connolly, Hainey, & Boyle, 2012; Brockmyer, Fox, Curtiss, McBroom, Burkhart, & Pidruzny, 2009; Witmer & Singer, 1998). Further, Slater and Wilbur (1997) reviewed findings of technological manipulations to increase immersion (higher screen resolution, better depiction of shadows and collision detection of virtual objects, better replication of real movements, etc.) lead to increased presence.

Descriptions of presence often seem to suggest that the player loses track of their physical environment and tends to feel that their actions in the virtual world are "natural." However, presence does not require an individual to lose awareness that they are playing a video game or maneuvering through a virtual environment. Witmer and Singer's oft-cited explication (1998) suggested that presence requires focus, involvement, and immersion - and claimed that individuals experiencing virtual environments can simultaneously attend to the virtual environment while attending to their physical environment. Lee (2004) suggested that presence does not require a feeling of transportation, and defined the term such that presence is a psychological state in which virtual objects are experienced as actual objects, and the virtuality of the experience melts away. Ryan, Rigby, and Przybylski (2006) similarly described presence as "...the sense that one is *within*

the game world, as opposed to experiencing oneself as a person outside the game..." (p. 350). Therefore, presence may be thought of as a liminal state wherein an individual is both aware of their physical surroundings while experiencing a sense of being in a virtual environment.

Scholars have also investigated presence in relation to Csikszentmihalyi's concept of flow (Csikszentmihalyi & LeFevre, 1989), which is marked by an altered state of consciousness. It has often been described by feelings of being "in the zone" where time slows down and an individual is able to stretch their abilities to successfully overcome challenges. This experience is intrinsically enjoyable, and it is often rare and fleeting. As such, it is expected that flow would be less common than presence (Brockmyer et al., 2009).

Csikszentmihalyi (1988) used flow to describe the feeling of optimal experience, which is likely to occur when challenge and skill are balanced. If one is not skilled enough in an activity, such as a first timer in a cycling class, then the high amount of challenge is likely to cause them anxiety and/or frustration. If one has a high degree of skill, but the beginner's cycling class provides insufficient challenge, then they are likely to be bored by the activity. When skill and challenge are balanced (and this often requires calibration as we become better at activities), then we are likely to enter a flow state. Typically clear goals and immediate feedback also contribute to a flow experience that is marked by focused concentration, loss of time, and intrinsic pleasure. The nature of this experience compels us to keep honing the skill and seeking increased challenge.

Some have argued that optimal experience and flow are unlikely to occur during video game play and media consumption, and have suggested that a special case of flow be tailored to fit mediated experiences. The concept of "media flow" relies heavily upon flow theory, but focuses more sharply on the specific state when skill and challenge are balanced. Bowman (2008) described media flow as the experience when one is engaged by a medium that they feel that have

control over, and they are intensely concentrating on the activity such that they lose track of time. Curiosity and intrinsic rewards motivate continued viewing or playing. In this manner, media flow seems more adaptable to the habitual or everyday experience of video game play than the demanding requisite of an optimal experience.

Absorption is also marked by an altered state of consciousness, such that an individual enters a state of total involvement where other attentional processes may stop and one's cognitions may be altered (Roche & McConkey, 1990). Absorption may be associated with anxiety and frustration, which differentiates it from flow and the enjoyment associated with the state. Roche and McConkey's (1990) review encapsulated absorption research and hypnotic, paranormal, daydreaming, and drug-induced experiences - but also reviewed absorption and media involvement. Of interest to aggression researchers, individuals that experienced high absorption attended more to stimuli, were more prone to imagining and fantasizing, desired affective engagement, and dissociated cognition. In this manner, absorption is thought to be an extreme degree of engagement that is likely rare, but may be of unique interest to video game and aggression researchers.

Other researchers have described the processes related to engagement in a similar fashion as Brockmyer et al. (2009), and identify them as factors that moderate media enjoyment. Bowman's (2008) review described presence as an antecedent of media flow. Similarly, Hoffman and Novak (1996) predicted that feelings of presence would predict perceptions of flow, and that flow would mediate the relationship between presence and enjoyment. Further, they contended that presence may increase flow, but that presence was not sufficient to produce a flow state. Weibel, Wissmath, Habegger, Steinver, and Groner (2008) tested the mediation relationship proposed by Hoffman and Novak and found support for flow as a mediator between presence and enjoyment.

Researchers have also described engagement as a process that occurs along a spectrum, often with presence as a component of the process. Boyle, Connolly, Hainey, and Boyle's (2012) review found that several engagement studies conceptualized presence as a narrow piece of the engagement process. Ryan, Rigby, and Przybylski (2006) found that presence predicted enjoyment of video game play as well as decisions to keep playing. Brockmyer et al. (2009) described the engagement process as increasing from presence to flow to absorption. This process of engagement is similar to the process of immersion described by Jennett et al. (2008). Jin (2011) similarly described presence as leading to flow, while Sherry (2004) described flow as leading towards greater engagement.

Brockmyer et al. (2009) described the importance of engagement in video game research, identifying the concept as the potential lynchpin for determining outcomes following video game exposure. Brockmyer and colleagues focused mainly on engagement's potential to moderate aggression-related outcomes, citing Farrar, Krcmar, and Nowak's (2006) findings that players who reported more involvement and immersion in a violent game reported more hostility and physical aggression. Further, engagement's capacity to alter consciousness, as in deep flow and absorption (Roche & McConkey, 1990), may lead to states in which individuals are open to cognitive and moral restructuring. Fox and Brockmyer (2013) suggested that states like these, with deep levels of engagement, could facilitate the learning of aggressive scripts. Apart from engagement's potential to determine aggression-related outcomes, engagement may also influence positive outcomes. In the Funk, Chan, Brouwer, and Curtiss (2006) study that led to the 2009 study, Brockmyer (then Funk) and colleagues found that both children and adults who reported deeper engagement in video game play also reported more enjoyment. Therefore, the current study was designed to

investigate engagement's role in moderating effects outcomes following exposure to a violent video game.

Drawing upon Brockmyer et al. (2009), this research offers a description of engagement as a state along a continuum. This state is characterized by varying degrees of committed involvement such that distractions become filtered out and continued participation is more sustainable as higher levels of engagement are achieved. Low levels of engagement are related to low involvement, attention, and fun, with immersion and then presence at the lower end of the spectrum. High levels of engagement are characterized by involved, focused, and fun game play experiences that are associated with enjoyment and satisfaction, with flow and then absorption at the high end. This research seeks to investigate factors that may predict one's capacity for engagement, and what makes one receptive to such experiences.

Receptivity and Enjoyment

Some individuals are likely to "get sucked into" games and play for hours at a time, while others don't find much appeal in manning the controls. The current research contends that individual difference factors are likely to make some individuals more *receptive* to video game engagement. Buchanan & Sheridan (2005) described three variables that contribute to a receptive attitude towards video game engagement: (1) the willing suspension of disbelief, or the extent to which players are willing to entertain the possibility of accepting the video game as plausible; (2) acceptance of the rules and dramatic possibilities of that world; and (3) openness to new experience. "Doubt and skepticism limit receptivity" (Buchanan, 2006, p. 17). If the player is not willing to accept the fantasy world, then their disbelief will create a barrier to entry that will prevent them from higher levels of engagement. Vorderer, Klimmt, and Ritterfeld (2004) also contended that willingness to suspend disbelief was an important variable in predicting one's

enjoyment of mediated experiences. This notion of receptivity shares commonality with the personality characteristics of playfulness and exploratory behavior that Bowman (2008) described as antecedents of media flow.

Given the predicted importance of engagement in determining the outcomes of video game play, the current study seeks to determine how suspension of disbelief, willingness to accept rules, and openness to new experiences affect engagement. Through the investigation of these variables, it may be possible to predict the likelihood that one would play video games. It follows that the strength of video game effects may be explained, in part, by these three variables.

Figure 1 presents hypothesized relationships relevant to suspension of disbelief, acceptance of rules, openness, and engagement as described above. Enjoyment is identified as one of the important outcome variables within the context of the proposed study - although the model may hold for different outcomes (e.g., learning as an outcome related to educational video game play). The model proposes that the three predictors and video game engagement directly influence enjoyment. Enjoyment is a latent variable comprised of cognitive, behavioral, and affective appraisals of game play.

The model predicts that arousal would influence enjoyment by way of excitation-transfer theory (Zillmann, 1971), which explains that residual arousal intensifies affective responses. If video game exposure stimulates a heightened level of arousal, then it would produce more intense feelings of enjoyment. Arousal is also linked to motivational activation and cognitive processes related to attention, as described in the following section). In this fashion, the interactions between the predictors, engagement, and arousal determine appraisals of enjoyment from video game play.

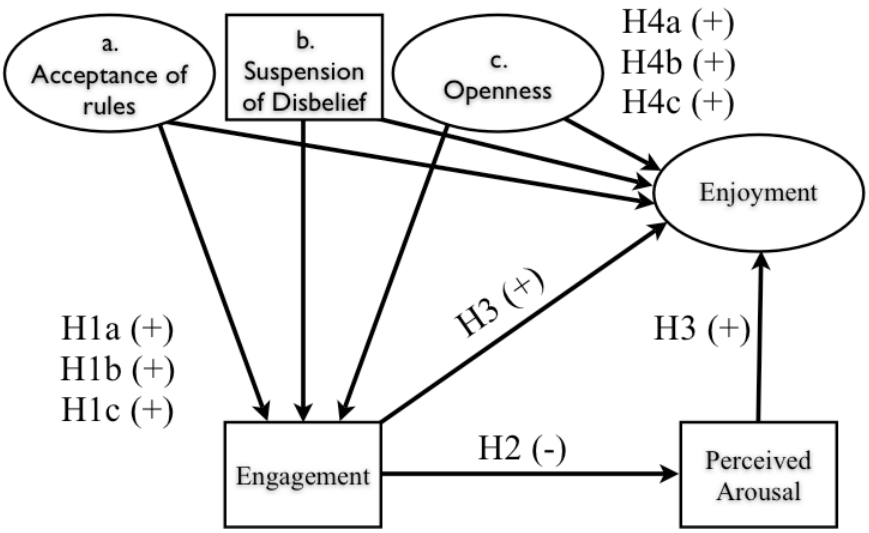

Figure 1. Model including Hypotheses 1-5.

This study tested the proposed model by investigating the relationships between several variables related to engagement. It was expected that acceptance of rules (H1a), suspension of disbelief (H1b), and openness to new experience (H1c) would be positively related to engagement. Engagement requires increased attention, which suggests that the individual has devoted cognitive resources to the encoding process (Lang, 2000; Park, 2006). Encoding has been associated with decreased arousal; Park found that heart rate slowed for individuals that were more attentive towards a video game stimuli. It is likely that individuals who experience high engagement during a gaming session would pay more attention to the stimuli, and experience a decrease in arousal (H2) as they encode the game information. Excitation-transfer theory explains how residual arousal intensifies affective responses (Zillmann, 1983), so it was expected that arousal would be positively related to enjoyment (H3). On their own, Hypotheses 2 and 3 predict counterintuitive relationships such that a highly engaged individual would experience less perceived arousal, which would dampen excitation-transfer and lead to a decreased appraisal of enjoyment. However, the

model accounts for other processes that affect enjoyment such that an engaged individual is still predicted to enjoy the experience (even with a predicted decrease in perceived arousal).

Individuals that are willing to accept video game rules (H4a), suspend disbelief (H4b), and open themselves up to new experiences (H4c) were expected to enjoy playing a video game, as they are likely to have higher cognitive, behavioral, and affective evaluations of game play. As operationalized here, the high end of the engagement spectrum accounts for a flow state that has been associated with deriving pleasure from the act of doing (Csikszentmihalyi, 1988). Considering the autotelic nature of highly engaged video game play, it is expected that engagement should be pleasurable (H5). Thus, there are two paths to enjoyment, and there may in fact be an antagonistic relationship between engagement, arousal, and enjoyment.

H1a: Acceptance of rules will be positively related to engagement.

H1b: Suspension of disbelief will be positively related to engagement.

H1c: Openness will be positively related to engagement.

H2: Engagement will be negatively related to arousal.

H3: Arousal will be positively related to enjoyment.

H4a: Acceptance of rules will be positively related to enjoyment.

H4b: Suspension of disbelief will be positively related to enjoyment.

H4c: Openness will be positively related to enjoyment.

H5: Engagement will be positively related to enjoyment.

The following section considers the influence of motivational activation as a determinant of the variables in the engagement process. Motivational activation has been used to investigate attraction to risky stimuli and unknown environments, and Lang and her colleagues studied resting motivational activation as a predictor of attraction to and avoidance of media. The current study

investigates motivational activation's role determining preference for types of video games and in influencing video game effects.

Motivational Activation and Arousal

Lang's limited capacity model of motivated mediated message processing (LC4MP) has been used to help explain what occurs in "the black box" when we process media messages (Lang, 2000; Lang, 2006; Park, 2006). LC4MP describes three cognitive processes: encoding, storage, and retrieval. Encoding involves translating the message from the environment into the brain. Storing involves linking new information to existing information nodes (e.g., the more links one can create between old and new, the more information is stored), as LC4MP assumes a general associative memory network (Lang, 2000). Retrieval involves reactivating a stored representation.

There are five main assumptions of LC4MP (Lang, 2006, p. S59), and the current research draws mainly from the first two. First, we have a limited cognitive capacity with which to process messages and we spread our resources between encoding, storing, and retrieving information. Thus, a video game player's ability to comprehend gaming messages is dependent upon their ability to manage those three subprocesses. Playing video games requires a complex and dynamic allocation of resources that determines how the messages are processed, allowing for different individuals to process and react to the same game in very different ways. Second, processing is influenced by the appetitive and aversive motivational systems. A gamer's motivational activation can influence automatic allocations of processing such that salient stimuli will take on more or less importance, impacting the resources devoted to the three subprocesses. Third, media is comprised of information of varying redundancy. In a video game, information may be supplied from multiple channels (audio, visual, tactile) and formats (e.g., character

dialogue, onscreen messages, characters, interactions, events). Fourth, human behavior and cognition are dynamic. Fifth, communication is the interaction between the motivated information processing system and the communication message. These last two assumptions would suggest that the player's motivational activation and cognitive processes are continuously influenced by the interactions between the player and the game.

The activation of the two motivational systems - appetitive and aversive - influence the allocation of resources to encoding, storage, and retrieval processes. The appetitive system draws the organism toward stimuli that are attractive or beneficial. Appetitive activation is associated with increased encoding and storage, as it benefits the organism to intake new information about the stimulus and environment and then retain the information for future encounters. Aversive activation is designed to protect the organism. At low levels of arousal, aversive activation is associated with encoding in order to identify threats. At higher levels of arousal, more resources are devoted to retrieval so the organism can decide whether to stay, fight, or flee. Some resources may be allocated to storage if this information is deemed useful for helping to avoid the threat in the future.

Approach and avoidance motivations have been identified as foundational to the study of personality (Elliot & Thrash, 2002). They are thought to represent inheritable biological determinants of personality, and appear to be stable across time. Motivation has also been a variable of interest regarding our choice and enjoyment of entertainment media. Vorderer, Klimmt, and Ritterfeld (2004) called for more clarification and understanding of media enjoyment, with motivation as a key determinant of the enjoyment process. Investigation of the appetitive and arousal systems are likely to prove useful in the study of motivations and media enjoyment.

Lang and her colleagues have developed the motivation activation measure to assess resting activation of the appetitive and aversive systems (Lang, Shin, & Lee, 2005; Park, 2006; Shin, 2006; Lang, Kurita, Rubenking, & Potter, 2011). MAM uses self-report ratings given by the respondent after seeing 35-40 still images individually. Images vary in terms of the valence and strength of affective reactions they have been demonstrated to elicit, as well as the arousal potential of the images. Participant ratings are then used to calculate two indices known as the appetitive system activation (ASA) and the defensive system activation (DSA) (note: earlier MAM literature refers to ASA as positivity offset [PO] and DSA as negativity bias [NB] - which were deemed confusing as PO and NB are terms associated with a competing theory). Both ASA and DSA have been shown to be normally distributed (Lang, Kurita, Rubenking, & Potter, 2011) and to be related to individual differences in risky decision making (Lang, Shin, & Lee, 2005; Shin, 2006).

Evidence from other media such as television content has found that ASA and DSA moderate the effect of arousing content on media enjoyment. Those who scored higher on a measure of ASA were more likely to enjoy arousing media content than viewers low in ASA (Potter, Lee, & Rubenking, 2011). However, limited research to date has explored the role of ASA and DSA in video game play (Park, 2006; Krcmar, Farrar, Jalette, & McGloin, 2012). Those high in DSA are more likely to avoid arousing content and find such content less enjoyable than those high in ASA (Lang, Shin, & Lee, 2005; Park, 2006; Potter, Lee, & Rubenking, 2011). Individuals with high resting ASA scores are more likely to attend to and explore novel stimuli, while individuals with high resting DSA scores are likely to shy away from such content (Lang, Shin, & Lee, 2005; Park, 2006).

Lang and colleagues' MAM research, along with Park's (2006) video game research inform the predictions for motivational activation in the current study. This past research has investigated the relationships between motivational activation and arousal. Lower arousal (measured by heart rate) has been found to be indicative of increased attention (Lang, 2006). Park (2006) noted that individuals with high DSA had faster heart rates while viewing negative and arousing images in the MAM instrument. Those with high ASA had slower heart rates while viewing similar images. Participants with high resting ASA were more likely to attend to negative and arousing images, begin taking in sensory information (encoding), and experience decreased heart rate. Encoding information about an arousing stimulus is advantageous to an organism that would like to experience the stimulation in the future (Lang, 2006). In the context of this video game study, it is expected that those with high resting ASA would attend to the novel stimuli in the video game and experience decreased arousal as they encode information for desirable future encounters.

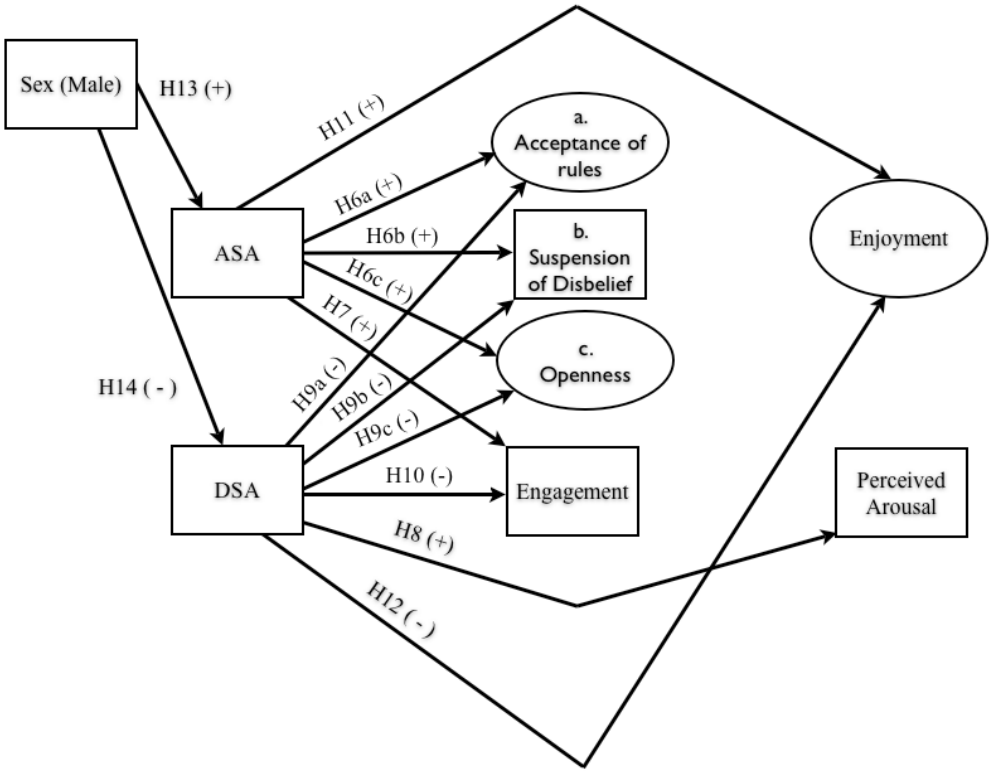

Figure 2. Model including Hypotheses 6-14.

Individuals with high ASA are likely to experience decreased arousal when encountering stimulating video game environments, with a slow increase in arousal that continues to grow as time goes on. This arousal was expected to be interpreted positively, relating to an experience of greater enjoyment. Park (2006) suggested that individuals with high ASA are more likely to be open to the use of new media like video games, so it was expected that ASA would predict acceptance of rules (H6a), suspension of disbelief (H6b), and openness (H6c). It was also expected that those with high ASA would experience more engagement while playing video games (H7). Those with high DSA were expected to tentatively explore the game's stimuli and experience arousal along a steep growth curve (H8) as they would view the game stimuli and environment as threatening. Individuals with high DSA were expected to avoid extreme forms of media such as violent video games, and it was predicted that high DSA would predict less

acceptance of rules (H9a), less suspension of disbelief (H9b), and less openness (H9c). In line with these predictions, it was expected that those with high DSA would withdraw from game experiences and report less engagement (H10).

Individuals with high resting ASA report consuming more violent media (Potter, Lee, & Rubenking, 2011), so it was expected that high ASA would predict more enjoyment of a violent video game (H11). Those with high resting DSA are more likely to avoid depictions of violence, and are less likely to enjoy video game violence (H12). Past research on sex differences and motivational activation (Bradley, Codispoti, Sabatinelli, & Lang, 2001) suggests that men score higher on ASA measures (specifically when responding to erotic imagery) while women score higher on DSA (H13 and H14). The following hypotheses are predicted:

H6a: ASA will be positively related to acceptance of rules.

H6b: ASA will be positively related to suspension of disbelief.

H6c: ASA will be positively related to openness.

H7: ASA will be positively related to engagement.

H8: DSA will be positively related to arousal.

H9a: DSA will be negatively related to acceptance of rules.

H9b: DSA will be negatively related to suspension of disbelief.

H9c: DSA will be negatively related to openness.

H10: DSA will be negatively related to engagement.

H11: ASA will be positively related to enjoyment.

H12: DSA will be negatively related to enjoyment.

H13: Male sex will be positively related to ASA.

H14: Male sex will be negatively related to DSA.

Aggression

Media researchers have long been concerned with studying the link between exposure to violent media and increased aggression. Violent video games have warranted special consideration due to the interactive nature of the medium and their vast popularity. Over two-thirds of the most popular video games in 1999 featured violent acts (Smith, Lachlan, & Tamborini, 2003). Meta-analyses of video game research to date have also supported an effect of violent game play on aggression (Anderson, 2004; Anderson & Bushman, 2001; Anderson et al., 2010; Sherry, 2001). Though the effect size seems somewhat small ($r \approx .20$) according to Cohen's classical benchmarks (Cohen, 1988), that effect size is in keeping with those found in meta-analyses from social psychology when studying behavior that "is extremely complex and has multiple causes" (Bushman, Rothstein, & Anderson, 2010, p. 184).

Many researchers have studied the link between violent video games and aggression, often investigating aggression by way of affect, behavior, and cognition as described by the General Aggression Model (or GAM) from Anderson and colleagues (e.g., Anderson & Dill, 2000; Anderson & Bushman, 2001; Carnagey, Anderson, & Bushman, 2007). Many violent game studies have compared a violent game treatment group to either a nonviolent control or a no-treatment control, and have found support for the short-term processes described in the GAM. Affective aggression (e.g., Ivory & Kalyanaraman, 2010), behavioral aggression (e.g., Cicchirillo & Chory-Assad, 2005), and state hostility (cognitive aggression) (e.g., Tamborini, Eastin, Skalski, Lachlan, Fediuk, & Brady, 2004) are typically greater in the treatments as compared to the control groups. In fact, a recent meta-analysis (Anderson et al., 2010) reported on the average effect sizes of exposure to violent video games with experimental designs: .29 for affective aggression, .21 for behavioral aggression, and .22 for state hostility.

Physiological and neurobiological studies have also suggested a link between exposure to violent video games and processes related to increased aggression. Violent game play has been associated with neural patterns related to aggressive behaviors, supported by Weber, Ritterfeld, and Mathiak's (2006) findings that violent game players had similar brain activity as adolescents with antisocial and aggressive disorders. Specifically, functional magnetic resonance imaging (*f*MRI) found that players had decreased activation in the rostral anterior cingulated cortex and the amygdala, with increased activation of the dorsal anterior cingulated cortex - a pattern that typically signals aggressive cognition and behavior. More recently, playing a violent video game led to decreased activity in prefrontal regions of the brain associated with cognitive inhibition, while there was no such decrease following the play of a nonviolent game (Hummer, Wang, Kronenberger, Mosier, Kalnin, Dunn, & Mathews, 2010). Decreased activity in that region of the brain is linked to an inability to regulate inappropriate behaviors.

Evidence suggests that a number of factors can moderate the influence of violent game play on aggressive outcomes, including individual differences. Experienced violent video game players are potentially at risk, as Gentile and Gentile (2008) found that "...students who played multiple violent games actually changed to have a greater hostile attribution bias, which also increased their aggressive behaviors over prior levels" (p. 137). High levels of trait aggression would facilitate more developed neural networks and association, leading one to respond to stimuli with aggression (Bushman, 1995). Those with high trait hostility have been found to engage in more unprovoked impulsive aggression (Zillmann & Weaver, 2006). Video game research has investigated these individual differences, but ASA and DSA have not been given much consideration beyond studies by Park (2006) and Krcmar, Farrar, Jalette, and McGloin

(2012). It was expected that ASA and DSA would affect perceived arousal from violent video game play, and may facilitate excitation-transfer to modify aggressive responses.

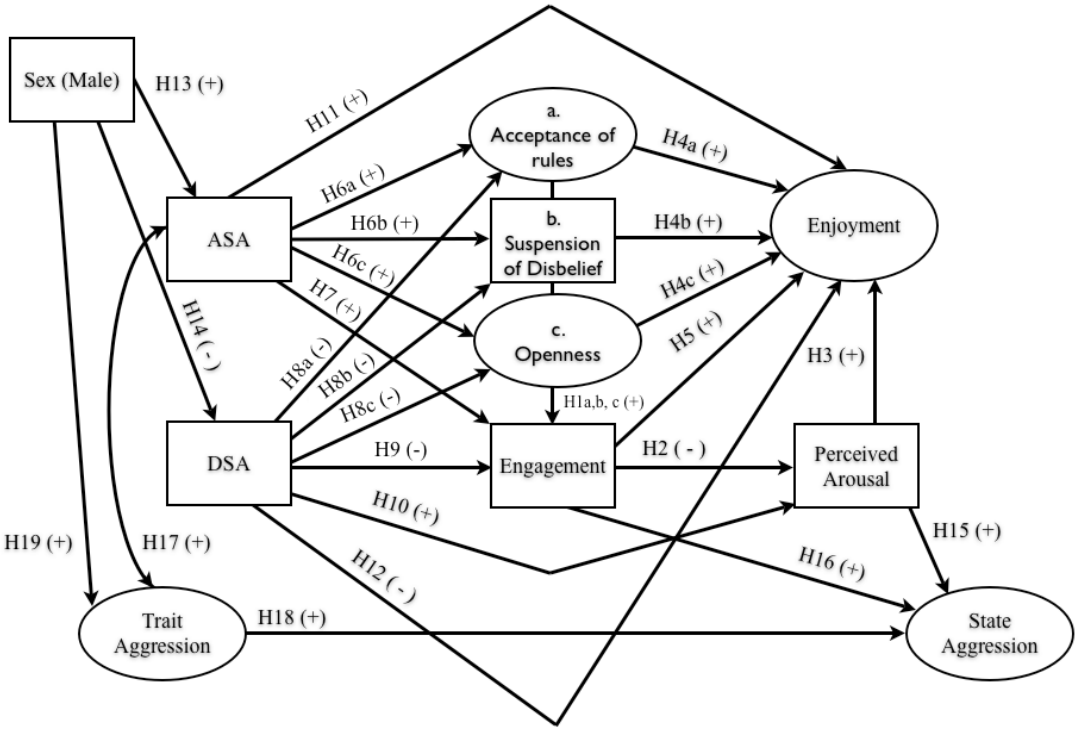

Figure 3. Completed model, including Hypotheses 15-19.

Excitation-transfer theory (Zillmann, 1971) argues that the arousal resulting from exposure to violent media may explain variance observed in aggressive responses following exposure to media violence. Specifically, exposure to violent stimuli can cause an increase in physiological arousal. Initially, a participant correctly associates the arousal with the source. However, as the arousal dissipates, awareness of residual arousal becomes dissociated from the original source - especially when an individual is presented with a series of arousing stimuli. If an individual perceives that their arousal is at a resting level although it is still elevated due to residual arousal from an unknown source, then excitation-transfer can occur and intensify the affective reaction to a subsequent arousing source - predicting increased state aggression (H15). As previously stated, individuals that become highly engaged by violent video games are thought

to experience a decrease in perceived arousal, and their enjoyment is unlikely to be increased by excitation-transfer. Likewise, their aggression is unlikely to be increased by excitation-transfer. Individuals with high DSA are likely to experience increased arousal, such that an increased aggressive response may be facilitated by excitation-transfer.

Although excitation-transfer is unlikely to yield increased aggression from highly engaged individuals, it is expected that engaged individuals are likely to report increased aggressive responses following play (H16). Considering the predicted relationship between engagement and attention, it is expected that engaged individuals have a higher likelihood of learning aggressive scripts and internalizing aggression as a valid response when compared to those reporting low engagement. Also, ASA has been shown to correlate with sensation seeking (Lang, Bradley, Sparks, & Lee, 2007), as the traits have been indicative of a tendency towards risky and extreme behavior. As such, it was expected that ASA and trait aggression would covary (H17).

Trait aggression has been identified as a variable of interest when studying aggression following violent game exposure. Jalette and Mundorf (2009) found that the trait hostility dimension of the Buss-Perry Aggression Questionnaire explained a significant but small amount of the variance in state hostility following violent game play. At times, trait hostility has not been a significant predictor of state hostility following game play, but the trait measure has predicted aggressive behavior after violent game exposure (e.g., Carnagey and Anderson, 2005; Anderson & Dill, 2000). The current study assessed trait aggression to control against third-variable explanations, and it was expected that those with high trait aggression would experience increased state aggression following violent game exposure (H18).

Trait aggression varies between men and women. Carnagey and Anderson (2005) found that males scored significantly higher on measures of trait physical aggression. A recent meta-analysis of argumentativeness and verbal aggression (Hamilton & Mineo, 2002) found that males scored higher on verbal aggressiveness than females. Further, Archer's meta-analytic review of sex differences in aggression (2004) found large sex differences for physical aggression and smaller differences for verbal aggression, with men scoring higher on both. In keeping with these findings, it was expected that male sex would predict trait aggression (H19).

H15: Perceived arousal will be positively related to state aggression.

H16: Engagement will be positively related to state aggression.

H17: ASA will covary with trait aggression.

H18: Trait aggression will be positively related to state aggression.

H19: Male sex will be positively related to trait aggression.

Krcmar et al. (2012) did find evidence of excitation-transfer operating differently for those with high DSA. Findings revealed that participants with high resting DSA reported more aggression following violent game play than those with high resting DSA that were in the no-treatment control. Those with high DSA in the control reported low levels of aggression, suggesting a predisposition to suppress aggression and avoid unnecessary risk. However, high DSA participants in the violent game condition had been exposed to arousing and violent content in the treatment. The activation of their defensive motivational system coupled with arousal may have led to an intensified affective response, explaining their high reported levels of aggression. Further, it has been demonstrated that individuals with high DSA had faster heart rates when they viewed negative and arousing images, suggesting increased physiological arousal (Park, 2006). Therefore, it was expected that individuals with high DSA would report greater perceived

arousal than those with high ASA (H20). That arousal may intensify affective responses to the game play, and facilitate an excitation-transfer that might lead high DSA individuals to report high state aggression. It is unclear whether this rationale would produce higher state aggression scores in high DSA individuals as opposed to those with high ASA (RQ1). For instance, Anderson and Bushman's General Aggression Model (2001) describes state aggression as a function of arousal, cognition, and affect - but the literature does not suggest which (if any) of the three has more influence.

The relationship between enjoyment and state aggression following media exposure is unclear. Enjoyment may produce positive affect that diminishes negative affect associated with aggression, or it may serve as a reinforcement for those who learn aggressive scripts from the violent game. As Vorderer, Klimmt, and Ritterfeld (2004) note, there is much to learn about enjoyment's role in entertainment media and processes, and the proposed study seeks to investigate enjoyment's role in the aggression process (RQ2).

H20: Arousal will be greater for high DSA individuals than high ASA individuals.

RQ1: Will high resting ASA predict more state aggression than high resting DSA?

RQ2: Will enjoyment predict higher or lower state aggression?

Arousal, excitation-transfer, ASA, and DSA have been suggested as indicators of affective response (e.g., aggression, enjoyment) and engagement. Zillmann's disposition theory offers explanations of affective response based on empathic responses, identification with characters, and moral judgments about character actions and intentions. In studying engagement, this research also seeks to draw from recent disposition research.

Disposition Theory and Moral Foundation Theory

Disposition theory describes audiences as making moral judgments about mediated characters which influence reactions to dramatic events in the narrative and therefore enjoyment of the outcomes (Raney, 2003; Zillmann & Bryant, 1975). Audiences make inferences about a character and their motives when judging the appropriateness of outcomes. In the context of violent media, disposition theory posits that we approve of violence when characters that we view as liked and morally justified enact violence to punish disliked and immoral characters.

There have been recent efforts by noted media effects scholars to investigate the role of moral foundations in forming dispositions towards mediated characters (Tamborini, Eden, Bowman, Grizzard, & Lachlan, 2012; Tamborini, Weber, Eden, Bowman, & Grizzard, 2010). These efforts have used moral foundations theory (Haidt & Joseph, 2004; 2008) to investigate individual differences in moral evaluations as predictors of disposition and enjoyment. Moral foundations theory offers 5 dimensions of morality (harm, fairness, ingroup, authority, and purity) that have been shown to vary amongst individuals. The Moral Foundations Questionnaire (Graham et al., 2011) lists statements related to 5 moral systems, and asks participants to indicate their level of endorsement for each statement. Tamborini et al. (2012) found that individuals scoring high on the harm salience factor of the Moral Foundations Questionnaire were more sensitive to graphic violence and predicted less enjoyment of a film that contained graphic violence. Individuals that scored high on the fairness salience factor predicted higher enjoyment of a film that featured justified violence.

The current research used a violent video game that featured Batman, a media character known for justified violence. Therefore, the 5 salience dimensions from moral foundations theory were investigated to determine their possible relationships with engagement. As the video game stimuli *Batman: Arkham City* encourages the player to enact justified violence to defeat

one-dimensional villains, it was expected that individuals who score high on fairness salience would enjoy the gameplay more.

RQ3: How will the 5 dimensions of moral foundation theory relate to engagement?

H21: Fairness salience scores will be positively related to enjoyment.

Chapter 3

Methods

Design

This study used a two-part panel study to test the proposed model. Part 1 used an online survey to measure motivational activation (ASA and DSA), several individual difference variables relevant to engagement and enjoyment, as well as video game play frequency and preferences. Participants from a large introductory class were given the opportunity to complete the survey for Part 1 from home for course credit. Those that completed the survey were invited to earn additional credit by completing Part 2, the experimental portion, in the research lab on a different day. Part 2 used a 2 (treatment vs. control) X 2 (sex) design with engagement as the variable of interest and enjoyment and aggression as dependent variables.

Participants were undergraduate students enrolled in an introductory communication course at a large public university in the northeast during 2013. These participants were expected to have normal distributions of ASA and DSA, in accordance with past research on college samples (Lang, Kurita, Rubenking, & Potter, 2011). A target sample size of 500 was estimated for Part 1, with an estimated 200 participants to be retained for Part 2. This procedure and these estimates were influenced by a previous study (Krcmar, Farrar, Jalette, & McGloin, 2012) that recruited and retained similar numbers of participants across both parts.

Participants

There were 467 participants that completed Part 1 of the study, with 50.3% females (N = 235), 48.8% males (N = 228), and 0.9% (N = 4) who claimed that they did not identify with females or males (see Table A). Participant ages ranged from 18-29, with a mean of 19.16 years of age (SD = 1.30) (see Table B). Most of the sample, 56.1%, identified as first year college

students (*N* = 262), followed by 29.6% sophomores (*N* =138), 10.3% juniors (*N* = 48), and 4.1% seniors (*N* = 19) (see Table C).

The majority of the sample, 74.7%, identified as white (*N* = 349), with 10.5% Asian (*N* = 49), 6.6% Hispanic (*N* = 31), and 4.9% African American participants (*N* = 23). There was 1.7% of the sample (*N* = 8) that identified as Other, with 5 commenting that they identified as multiracial and 3 separate individuals identifying as Caribbean, Middle Eastern, and Native American. Another 0.9% chose not to identify with any groups (*N* = 4) (see Table D).

The participants reported playing video games for between 1 - 2 days on average in the week before the study (*SD* = 2.01), with a range from 0 days to all 7 days. Roughly half of the sample, 52% (*N* = 243) indicated that they didn't play in the week prior (see Table E). Those that reported playing in the last week reported on average that they played for 3 days a week (*SD* = 1.92). The mean amount of hours of play per day with gaming in the prior week was 1.5 hours (*SD* = 1.96), with a range from 0 hours to more than 6 hours. There were 51.2% of the participants that reported 0 hours of play in the last week (*N* = 239), and roughly one-third of the sample, 31.5%, reported playing from 30 minutes – 2 hours each day (*N* = 147) (see Table F). Those that reported playing in the last week indicated that they played for 2 hours each day that they gamed (*SD* = 1.80)

ASA ranged from -2.29 to 8.00 (*M* = 2.18, *SD* = 1.76), while DSA ranged from -2.29 to 7.14 (*M* = 3.06, *SD* = 1.66). Previous media studies (Lang Bradley, Sparks, & Lee, 2007; Potter, Lee, & Rubenking, 2011) have used ASA and DSA as biological bases to predict media usage and effects. Therefore, the current study tested hypotheses using ASA and DSA scores. Median splits were performed on ASA (*Mdn* = 2.00) and DSA (*Mdn* = 3.14) such that participants could be coded as high or low on each index, as had been suggested by Lang, Shin, and Lee (2005).

This allowed for posthoc testing in which participants where coded as risk takers (high ASA, low DSA), risk avoiders (low ASA, high DSA), inactives (low ASA, low DSA), and coactives (high ASA, high DSA). In the event that main effects were not found for ASA or DSA, the four groupings were used for posthoc testing. It was expected that each group would contain roughly 25% of the sample (Lang, Kurita, Rubenking, & Potter, 2011). The risk takers made up 23.6% (N = 110) of the sample, with 25.7% (N = 120) risk avoiders, 24.8% (N = 116) inactives, and 25.9% (N = 121) coactives. The distribution in the current study was similar to the 22% - 28% distribution reported by Lang, Kurita, Rubenking, and Potter (2011).

There were 154 participants from Study 1 that continued to participate in Study 2, making for a retention rate of 32.98%. There were 55.2% of participants (N = 85) randomly assigned to the treatment condition and 44.8% (N = 69) assigned to the control. Analysis of variance (ANOVA) tests were used to determine if there were significant differences between those participants who completed Part 1, those assigned to the treatment in Part 2, and those assigned to the control in Part 3. There were no significant differences between groups for sex, age, class year, ethnicity, and neither the amount of days nor the amount of hours spent playing video games in the last week. Further, there were no significant differences for ASA or DSA between groups.

Procedure

Students were invited to participate in Part 1 of the study through the online course management system for their introductory course. The invitation contained a link to the online survey, which asked the participants to provide the last 4 digits of their cell phone numbers as an identifier code which could be used to match their responses should they continue to Part 2 of the study. The survey took participants approximately 27 minutes to complete. Upon completion of

the survey, participants were thanked and debriefed, and provided with a link to a separate website that would capture participant names (to award course credit) and emails (to allow recruitment for Part 2). This separation of the survey website and the information website ensured anonymity of individual responses.

Email invitations to Part 2 of the study were sent to those participants that completed Part 1, providing a link to an online scheduling application (SignUpGenius.com) that allowed participants to book time in the lab, while also giving participants the option to reschedule and/or receive automated reminders via text or email. Participants who came to the lab were randomly assigned to either a control (no game stimulus) or treatment (violent video game stimulus) condition. Participants in the control condition were directed to complete a series of questionnaires using a computer in the lab, and told that they would then play a video game using the lab's 42-inch HD LCD television and the PlayStation 3 system connected via HDMI to allow for 1080p resolution. The distance between the television and the player was held constant, as was the audio volume. Previous research in the lab has suggested that both the control and treatment should play the same game in order to remove confounds relating to a participant experiencing disappointment or annoyance had they expected to play a game in a gaming study.

The control participants provided their unique identifier code and responded to a series of instruments that measured arousal and mood, including the state aggression items of interest. Upon completion of this portion of Part 2 (which took approximately 10 minutes), the survey application directed participants to a separate website to record their names for course credit. Then, trained research assistants described the video game, provided instructions for the game, described the control functions and provided a reference diagram in the participants' field of

vision, and asked the participants to play for 12 minutes. Following play, control participants were debriefed and thanked for their time.

The treatment participants were directed to play the game first, and told that they would later complete a series of questionnaires using the computer. The participants were provided with the same information about the game as the control participants, were asked to play for 12 minutes, and then directed to use the computer to input their unique identifier code and complete the questionnaires. The treatment questionnaires contained the identical measures as the control, with the addition of short measures of perceptions of game play (including the Game Engagement Questionnaire). This set of instruments took between 15-20 minutes to complete, and then participants were debriefed and thanked for their time.

Game Stimulus

The current study was also designed to investigate motivational activation's impact on the effects of violent video game play. As such, part of the criteria for stimulus selection was the inclusion of realistic human-on-human violence. Video games with fantastical plots and environments that featured violence against nonhuman characters (e.g., monsters, robots, aliens) may not activate approach or aversive motivational systems in the same way as more realistic games that replicate the real world (to varying degrees). Another criteria was a balanced skill level, since participant would range from non-gamers to habitual gamers and all shades in between. A stimulus game needed to contain a certain amount of scaffolding to train and guide the beginning player without proving tedious or bogging down the more experienced player. The third criteria for stimulus selection was generalizability, such that the study would use a popular commercial game that impacts a sizeable real world demographic.

The researchers began with a sample of the highest selling games 2012 and play-tested them with research assistants to select an appropriate 12-minute segment and to gauge the level of challenge. *Batman: Arkham City* for the PlayStation3 was selected as the stimulus because it met 3 criteria of interest (realistic human-on-human violence, in game training, and generalizability). Beyond its sales figures, the game had features were salient to the current study.

Arkham City featured human-on-human violence in realistic settings, a simplified control scheme, and a third person perspective that new players tend to find more comfortable than a first person perspective (seeing through the character's eyes is often disorienting for non-gamers). It also displayed instructions for the player at the top of the screen and flashed pictures of the buttons that the player should press. Further, the Batman character is one was easily identified and known for his use of justified violence. *Arkham City* featured arousing and violent game play with an interesting story. Pretesting revealed that inexperienced players sometimes struggled with processing the in-game directions during the relevant segment, so a uniform script was devised that trained research assistants will read to offer scripted clarifications for some of the more challenging prompts.

Arkham City shipped enough units in the first week of its release to be grouped amongst the fastest selling games of all time (Fritz, 2011). The game was the seventh highest-selling title of 2011, but the highest ranking within its action-adventure genre (Magrino, 2012). In other words, the only games that sold more units in 2011 were two *Call of Duty* titles and *Battlefield 3* (first-person war simulations), *Just Dance 3* (family dance game), *Skyrim* (fantasy role-playing game), and *Madden NFL 12* (sports simulation).

The opening sequence of *Arkham City* introduces Gotham City as a police state with criminals running the streets, and provides a steady mix of stimuli that were expected to provoke both appetitive and defensive activation throughout game play. Batman's alter ego Bruce Wayne allowed himself to be imprisoned so that he could gain access to the city. The game communicated this storyline during an active play sequence where the gamer navigated Bruce Wayne through prisoner intake whilst in handcuffs. The gamer could only avoid the attacks of crooked police and criminals while moving ahead, priming the aversive system in a similar fashion to Park's (2006) manipulations. Park manipulated a video game to prime aversive activation by removing the ability to fight back against attackers. Players in his aversive manipulation had to avoid attackers and choose "flight", much like the players in the current study had to do early on. Indeed, Park found that the flee manipulation elicited aversive activation (by way of both high startle responses and higher reports of negative emotion).

Within a few minutes, Bruce broke free of the chains and could fight back against his attackers in a manner that should have activated both the appetitive and defensive systems at the same time. Park included a similar manipulation where players were able to fight their attackers while also avoiding their attacks. He found evidence that the fight and flight manipulation activated both motivational systems (by way of less startle responses and higher reports of both positive and negative emotion). Schneider, Lang, Shin, and Bradley (2004) manipulated the presence or absence of story in first-person shooter games, where players engaged in hunting enemies and attacking them while avoiding harm themselves. The inclusion of narrative was found to make the experience more enjoyable. Park suggested that the story gave the players license to explore their environments, increasing appetitive activation. It was expected that

Arkham City game drew from Batman's narrative while requiring players to attack and avoid attacks in a manner that would facilitate activation of both the appetitive and approach systems.

Once the attackers were defeated, Bruce ascended a tower in a climbing puzzle, in which the gamer processed information to find the best route and means of scaling a building. This segment took a few minutes as the players climbed, jumped ducked, and shimmied along edges to reach the building's apex and the Batman costume (stored atop the roof for safe-keeping). As this segment required exploration and problem-solving, it was expected to activate the appetitive system. Again, Park included a similar manipulation in his study that allowed players to search for and gather objects without fear of attack. Indeed, he found evidence that the "gathering" manipulation activated the appetitive system (by way of less startle responses and increased positive emotion).

The final sequence in the *Arkham City* stimuli had the gamer control Batman as he jumped from the rooftop into a large street fight (again, activating both the aversive and appetitive systems at the same time). This pattern of expected aversive activation, both aversive and appetitive activation, appetitive activation, and both aversive and appetitive again was selected to provide participants with stimuli that had high potential for engagement and arousal. Pretesting confirmed that nearly all participants were able to experience all four segments within the 12-minute session. It was expected that the few participants that failed to experience all four segments would have completed the first three, and would have been exposed to a variation of aversive and appetitive stimuli that would warrant their inclusion in the data set. Instructions were provided to the research assistants in the events that a participant experienced a marked lack of progress in their game play (e.g., repeated failure, inability to work the controls, or failure to experience at least the first three segments), but such a situation did not arise in practice.

Part 1 Measures

This study used an extensive set of measures for Part 1. The participants completed these measures via the QuestionPro.com online survey site. The complete set of measures is included in Appendix A.

Preference for violent games. Participants were asked to read short descriptions of 10 fictional video games and rate how much they agreed with a statement declaring their desire to play the game along a 7-point scale from 1 (strongly disagree) to 7 (strongly agree). The game descriptions used by Krcmar, Farrar, Jalette, and McGloin (2012), were created in pairs such one game was intended to be violent while another game with similar content was intended to be nonviolent. The grouping of the 5 violent games were reliable (α = .93), as were the 5 nonviolent games (α = .82),

Demographics. Participants were asked to indicate their biological sex as female or male, along with an option if they did not want to say. They were also asked to indicate their age, as well as their year of college. Participants were also asked to indicate their ethnicity, along with the option to report that they did not want to say.

Video game skill. Three items from the 9-item measure used by Skalski, Tamborini, Shelton, Buncher, and Lindmark (2011) were used to assess game skill along a 7-point scale from strongly disagree to strongly agree. The items read, "I am a good video game player," "I know a lot about video games," and "A lot of my free time is spent playing video games." The measure was reliable (α = .93).

Frequency of video game play. Two items were used to assess frequency of video game play as adopted from previous studies (Farrar, Krcmar, & Nowak, 2006; Krcmar, Farrar, Jalette, & McGloin, 2012; Krcmar & Lachlan, 2009). One item asked participants how many days they

played video games in the past week, ranging from 0-7 days. The second item asked players to think back to the last week and indicate how many hours per day they played video games on average. Options included, “0”, “30 minutes,” “1 hour,” “2 hours,” “3 hours,” “4 hours,” “5 hours,” and “6 or more hours.”

Frequency of violent and nonviolent video game play. Participants indicated how often (1 = never, 7 = always) they played each of 11 genres of video games (with 2 or 3 exemplar titles per genre), as adopted from previous studies (Farrar, Krcmar, & Nowak, 2006; Krcmar, Farrar, Jalette, & McGloin, 2012; Krcmar & Lachlan, 2009). The 7 genres containing violence were grouped together (combat action, realistic combat role-playing, 3D realistic shooters, combat adventure, combat arcade, sports, and war simulation) to form an index of violent video game play (α = .90, M = 2.39, SD = 1.42). The 3 nonviolent genres (puzzle, realistic simulation, and family) were grouped to form an index of nonviolent video game play (α = .76, M = 2.49, SD = 1.27).

Sensation seeking. Participants completed two measures of sensation seeking: a 2-item measure (Slater, 2003) as well as a 4-item measure (Stephenson, Hoyle, Palmgreen, & Slater, 2003) that have been used in MAM studies by A. Lang and colleagues (e.g., Kurita, Potter, & Lang, 2007; Lang, Kurita, Rubenking, & Potter, 2011) to allow for multiple-indicator measurement (Anderson & Gerbring, 1988; Anderson, Gerbring, & Hunter, 1987). The 2-item measure asked participants to use a 7-point Likert scale (1 = never, 7 = always) to respond to, “How often do you do dangerous things for fun,” and “How often do you do exciting things even if they are dangerous?” (α = .93, M = 3.73, SD = 1.35). The 4-item measure asked participants to use a 7-point Likert scale (1 = strongly disagree, 7 = strongly agree) to respond to items like,

"I would like to explore strange places," and "I like to do frightening things" (α = .84, M = 4.90, SD = 1.20).

Acceptance of rules. Acceptance of game rules was assessed with Yee's (2006) measures of motivations for playing video games: the 4-item measure of mechanics (α = .82) and the 4-item measure of role-playing motivations (α = .89). Players interested in game mechanics have an interest in understanding the game environment in order to maximize their performance, and indicated their responses from 1-7 (1 = not at all, 7 = very) to items such as, "How important is it for you to know as much about the controls and game rules as possible?" An interest in role-playing within games was linked to investigating the character's background story, taking on the persona of their characters, and playing in a fashion that perpetuates the character's narrative. Participants indicated their responses from 1-7 (1 = not at all, 7 = very) to items such as, "How often does the character's role or personality influence the choices you make?"

Openness to new experience. Openness was assessed with two openness measures that had acceptable reliability. Participants completed Goldberg's (1992) 10-item Trait Descriptive Adjectives measure of The Big Five Personality Inventory (α = .82) which asked participants to rate how they see themselves along a 7-point semantic differential scale with items like, "unintelligent/intelligent," "imperceptive/perceptive," and "unrefined/refined." The 10-item intellectual openness measure (α = .76) from Goldberg et al. (2006) asked participants to rate their agreement along a 7-point scale (1 = strongly disagree, 7 = strongly agree) to items like, "I prefer variety to routine," "I am not interested in abstract ideas," and "I am open to change."

Trait aggression. Trait aggression was assessed with the 29-item Buss and Perry (1992) trait aggression questionnaire (α = .93) in Part 1. Although Part 2 used the Farrar and Krcmar (2006) measure of state aggression that was derived from the Buss and Perry trait measure, the

differences in wording and the separation of time between Part 1 and Part 2 of the study was expected to alleviate concerns of pre-test/post-test sensitization problems. The trait measure contained items like "I often find myself disagreeing with people," "I have trouble controlling my temper," and "Some of my friends think I'm a hothead." Participants rate how characteristic the statements are of themselves along a 7-point scale (1 = extremely uncharacteristic, 7 = extremely characteristic).

Moral foundations. The Moral Foundations Questionnaire (MFQ) devised by Graham, Nosek, Haidt, Iyer, Koleva, and Ditto (2011) was used to tap into moral judgments associated with disposition theory. The five moral foundations from the MFQ have ranged from α = .66 to α = .85 in work by Haidt and colleagues (Koleva, Graham, Iyer, Ditto, & Haidt, 2012; Graham, Nosek, Haidt, Iyer, Koleva, & Ditto, 2011). In the current study, the whole 30-item MFQ had high reliability (α = .89). However, the individual dimensions had reliability towards the lower threshold of acceptability; authority (α = .63), ingroup (α = .68), purity (α = .69), fair (α = .69), and harm (α = .70).

miniMAM. This study used the "miniMAM" as described by Kurita, Potter, and Lang (2007). The miniMAM consists of 35 images which participants view one at a time. These images have been extensively pilot tested (Kurita, Potter & Lang, 2007) and found to elicit emotional reactions consistent with appetitive (ASA) and defensive (DSA) arousal. Participants view each image and respond to items that measure arousal, positive affective response, and negative affective response that ranged from 1 (*not at all aroused/positive/negative*) to 9 (*extremely aroused/positive/negative*).

The 35 images from the miniMAM have been adapted from the 715 images in the International Affective Pictures System (IAPS) measure from P. Lang, Greenwald, Bradley, and

Hamm (1993), and were specifically selected due to their capacity to elicit various levels of arousal as well as positive and negative affective responses. For example, the image of a fire hydrant generally elicits a low level of arousal, some positive affect, and a low negative affect while the image of a dead cow generally elicits a moderate amount of arousal, low positive affect, and some negative affect. Assessing the strength of positive responses using the formula provided by Kurita, Potter, and Lang (2011) yields ASA, while assessing the strength of negative responses yields DSA.

Part 2 Measures

Participants used a PC in the video game lab to complete measures on the QuestionPro.com online survey site. The control group manipulation required participants to complete the appropriate measures prior to video game exposure, while the treatment group manipulation required participants to complete the appropriate measures following video game exposure. The complete set of measures is included in Appendix B.

Perceived state arousal. Perceived arousal was measured with the 7-item scale developed by Anderson, Deuser, and DeNeve (1995). The measure contained items like, "Right now I feel revved up," "Right now I feel awake," and "Right now I feel serene" (reverse-coded). The responses ranged from 1-7 (1 = strongly disagree, 7 = strongly agree) and the scale had acceptable reliability ($\alpha = .78$, $M = 4.10$, $SD = .83$).

State aggression. The state aggression measure was Farrar and Krcmar's (2006) 14-item modified version of the Buss-Perry Aggression questionnaire (1992) that was designed to assess state rather than trait aggression. The instrument begins with a short vignette that reads: "Imagine that you leave this building when you're done completing this survey. Someone bumps into you, spilling your drink and the contents of your backpack. Please indicate how you would

react by choosing the number that most closely corresponds with your answer." The items have a 7-point scale (1 = extremely uncharacteristic of me, 7 = extremely characteristic of me. Five items were grouped together to indicate intent to verbally aggress (α = .91, M = 3.42, SD = 1.44), with items such as, "I would tell this person openly that I disagree with him or her," "I would find myself disagreeing with this person," and "This person would say that I'm somewhat argumentative." Four items were grouped to indicate intent to physically aggress (α = .83, M = 3.74, SD = 1.55), with items such as, "If this person hit me, I would hit back," "If I had to resort to violence against this person to protect my rights, I would," and "If this person pushed me far enough, we would come to blows."

State hostility. A word completion task (Anderson, Carnagey, & Eubanks, 2003) was used as a measure of state hostility (cognitive aggression). The current study used the procedure described by Anderson, Carnagey, Flanagan, Benjamin, Eubanks, and Valentine (2004) to instruct participants that they would see a list of incomplete words, and that they would be given 3 minutes to complete as many words as they could be replacing a blank space with a letter (e.g., K-I-_-_ could be completed as K-I-S-S or K-I-C-K). The current study used the first 50 words from the measure's full 98 (which are provided on Anderson's personal website, http://www.psychology.iastate.edu/faculty/caa/Scales/WordComp.pdf). Since the measure was completed on the QuestionPro.com survey site, all word responses were captured and automatically sorted according to the categories described on Anderson's website (neutral, ambiguous, aggressive, and non-words),

Enjoyment. Consistent with Nabi and Krcmar's (2004) tripartite model of enjoyment, the current study assessed enjoyment via three paths. Fang, Chan, Brzenzinski, and Nair's (2008) measure was used to assess affective, behavioral, and cognitive enjoyment – but the authors

reported poor reliability for the cognitive factor (α = .60). Therefore, the current study used Sweeney and Soutar's (2001) PERVAL measure of perceived value to measure cognitive enjoyment.

Affective and behavioral enjoyment. Fang, Chan, Brzenzinski, and Nair's (2008) measure of enjoyment is based on Nabi and Krcmar's model, and taps into affective, behavioral, and cognitive aspects of enjoyment. Fang and colleagues have used their measure in different video game studies (Fang, Chan, Brzenzinski, & Nair, 2008; Fang & Zhao, 2009; Fang & Zhao, 2010; Fang & Zhu, 2011) and have reported consistently low reliability scores ($\alpha \approx .60$) for cognitive enjoyment. All three factors used a 7-point scale to indicate agreement with the statement for each item (1 = strongly disagree, 7 = strongly agree).

The current study used 5 items used to assess affective enjoyment (α = .83), with items such as, "I felt happy when playing this game," "I felt exhausted when playing this game," and "I felt miserable when playing this game" (the latter items were reverse-coded). Three items were used to assess behavioral enjoyment (α = .86), including, "I would talk to myself when playing this game," "I would make loud comments even if nobody is around when playing this game," and "I would swear when playing this game." Cognitive enjoyment was measured with 3 items (α = .69), including, "Playing this game or interacting with its character(s) makes me more intelligent," "The activities in this game or the actions of its character(s) are respectable," and "The activities in this game or the actions of its character(s) are decent."

Cognitive enjoyment. Sweeney and Soutar's (2001) PERVAL measure of perceived value was also used to assess cognitive enjoyment. The authors differentiated *perceived value* from *satisfaction* (e.g., enjoyment), primarily on the grounds that perceived value occurs at several stages of the purchase process while satisfaction is construed as a summative evaluation

at the end. The current study used the PERVAL scale as a summative measure (following exposure to the stimulus game), therefore constraining the evaluation to the end stage. The PERVAL scale has been used to study intent to purchase virtual items in social networking video games (Kim, Gupta, & Koh, 2011) and to study enjoyment, value, and intent to purchase entertainment media such as ringtones (Turel, Serenko, & Bontis, 2010). The 5 PERVAL items asked participants to rate the game's quality using a 7-point scale (1 = very unsatisfied, 7 = very satisfied), with items such as, "This game has consistent quality," "This game is well made," and "This game has an acceptable standard of quality." The scale had high reliability (α = .82, M = 5.15, SD = 1.08).

Suspension of disbelief. Suspension of disbelief was assessed with the 6 suspension of disbelief items (α = .91) from the MEC Spatial Presence Questionnaire (Vorderer et al., 2004), which were designed as posttest measures. The measure used a 5-point Likert scale (1 = I do not agree at all, 5 = I fully agree), with statements such as, "I didn't really pay attention to the existence of errors or inconsistencies in the game," "I took a critical viewpoint of the game presentation," "It was important for me whether the game contained errors or contradictions." The measure had high reliability (α = .91, M = 3.72, SD = .85).

Game Engagement Questionnaire. Engagement was measured with the Game Engagement Questionnaire (GEQ) from Brockmyer et al. (2009). The GEQ is a 19-item measure developed to measure engagement along 4 dimensions of increasing strength. The original measure asked participants to indicate their agreement with a statement on a 3-point scale (*no, maybe, yes*). The easiest items to agree with were in the immersion dimension (e.g., *I really get into the game*), followed by the presence dimension (e.g., *My thoughts go fast*), the flow dimension (e.g., *I feel like I can't stop playing*) and the absorption dimension (e.g., *I lose track of*

where I am). The current study used a 7-point scale (1 = strongly disagree, 7 = strongly agree) to avoid range restriction. The wording of items was modified to use past tense verbs (e.g., *The game feels real* became *The game felt real*) to use the GEQ as a state measure to assess perceptions following a video game playing session. The modified GEQ had high reliability (α = .86, M = 3.91, SD = .86).

Video game ratings. Video game ratings were used as manipulations checks with 12 items that were similar to those described by Anderson and colleagues (e.g., Anderson, Carnagey, Flanagan, Benjamin, Eubanks, & Valentine, 2004; Anderson & Dill, 2000). Participants were asked to use a 7-point semantic differential scale indicate their perceptions of the video game as “easy/difficult,” “very boring/engaging,” and “not enjoyable/enjoyable.”

Chapter 4

Results

Data Reduction

All exploratory factor analyses (EFA) used varimax rotation unless otherwise noted. The EFA tests were used to investigate loadings of items from groupings of items that had not received much attention in the way of theoretical predictions. Items that loaded at least .60 on one factor with a secondary loading of below .40 on another factor were retained, while items that violated the .60 - .40 criterion were eliminated (McCroskey & Young, 1979) – but only for the purposes of EFA investigations. Hunter (1980, p. 236) warned that setting arbitrary values for high and low loadings in EFA would produce factors that do not appear to be correlated. That procedure assumes uncorrelated factors, and the analysis would not inform the researcher if these factors were, in fact, correlated. As the current study assumes that correlations between factors do exist, all factors were subjected to confirmatory factor analysis (guided by theory and literature) before deciding which items to retain for structural equation modeling.

Video game skill. The 3 items from Skalski, Tamborini, Shelton, Buncher, and Lindmark (2011) were subjected to an exploratory factor analysis that found a one-component solution. All of the items loaded together with Eigenvalues greater than one and accounted for 87.74% of the variance in scores. Factor loadings for the EFA can be found in Table G along with the correlation matrix (Table H).

Frequency of violent and nonviolent video game play. The 11 genres of video games (Farrar, Krcmar, & Nowak, 2006; Krcmar, Farrar, Jalette, & McGloin, 2012; Krcmar & Lachlan, 2009) were tested with an EFA. Items that violated the .60 - .40 criterion with high loadings on multiple constructs were eliminated until a 2-component solution that explained 66.95% of the

variance was returned (see Table I for EFA factor loadings and Table J for the correlation matrix). The first factor included 7 items associated with violent titles and accounted for 44.30% of the variance. The 3 items in the second nonviolent factor accounted for 22.65% of the variance.

The items from the EFA were analyzed with a generalized least squares CFA. Since the nonviolent factor had less than 3 indicators, it would create a Heywood case (Chen, Bollen, Paxton, Curran, & Kirby, 2001; Kline, 2011) with negative variance. Without retaining that factor, only the violent factor would have been retained. Therefore, the EFA findings were ignored in favor of running new CFA was run with all 12 genre items. There were 10 items retained for the 1-factor violent game CFA model (α = .92). The standardized regression weights for each item ranged from .50 to .91 (see Table K). The item correlations are provided in Table L.

Acceptance of rules. Yee's (2006) 4-item measure of mechanics and 4-item measure of role-playing motivations were subjected to an exploratory factor analysis that found a one-component solution. All of the items loaded together with Eigenvalues greater than one and accounted for 63.61% in the variance of scores. Factor loadings for the EFA can be found in Table M along with the correlation matrix (Table N).

The items were then subjected to a confirmatory factor analysis (CFA) in AMOS 21. The model had a good fit, χ^2 (20, N = 85) = 25.78, p = .17, with CFI = .84, RMSEA = .06, and GFI = .92. All of the items were significantly correlated with the acceptance of rules factor, making for a scale with high alpha reliability (α = .92). The standardized regression weights for each item ranged from .58 to .89 (see Table O), suggesting that it would be appropriate to combine the mechanics and role-playing motivations into one factor. Pearson Correlations for the acceptance

of rules items are provided in Table P, with the correlation between the mechanics and role-playing motivations in Table Q.

Openness to new experience. Goldberg's (1992) 10-item Trait Descriptive Adjectives measure of The Big Five Personality Inventory and the 10-item intellectual openness measure from Goldberg et al. (2006) were subjected to an EFA with varimax rotation. Items that violated the .60 - .40 criterion with high loadings on multiple constructs were eliminated until a 4-component solution that explained 78.19% of the variance was returned (see Table R for EFA factor loadings). The first factor included 4 items associated with abstraction and accounted for 27.90% of the variance. The 2 items in the second factor related to creativity and accounted for 20.36% of the variance, while 3 items related to flexibility explained 17.69% of the variance. There was 1 item in the fourth factor, refined taste, which accounted for 12.23% of the variance.

The items from the EFA's 4 components of openness were analyzed with a generalized least squares CFA. The 3 factors with less than 3 indicators each created a Heywood case (Chen, Bollen, Paxton, Curran, & Kirby, 2001; Kline, 2011) with negative variance. Without retaining those 3 factors, only the openness to abstract factor would have been retained (dropping 16 of the 20 original items). Therefore, the EFA findings were ignored in favor of running new CFA was run with all 10 openness items and all 10 intellectual openness items. Openness item 2 created a Heywood case, and intellectual openness item 6 failed to have a significant loading. Those items were dropped, leaving 9 openness items and 9 intellectual openness items in the CFA model. The model suggested that it would be appropriate to combine the 18 items as one factor (α = .84). The standardized regression weights for each item ranged from .41 to .83 (see Table S). The item correlations are provided in Table T with the correlation of the two factors in Table U.

Trait aggression. The EFA for the Buss and Perry (1992) trait aggression questionnaire returned a 6-factor solution that was similar to the 4 factors (physical aggression, verbal aggression, anger, and hostility) reported by the original authors. Items that failed to meet the .60 - .40 criterion were eliminated until a solution that explained 73.37% of the variance was returned (see Table V for factor loadings). The first 4 factors from the EFA mirror those from Buss and Perry (1992). The first factor included 4 items associated with hostility and accounted for 16.95% of the variance. The 5 items in the second factor related to verbal aggression and accounted for 16.39% of the variance, while the 4 items in the third factor related to physical aggression and accounted for 15.95% of the variance. The fourth factor contained 2 items relating to suspicion that accounted for 10.16% of the variance, while the fifth factor contained 2 items relating to hitting someone back in retaliation that accounted for 7.44% of the variance. The final factor contained a single indicator item related to being even-tempered, and accounted for 6.48% of the variance.

The items from the EFA's 6 components of trait aggression were analyzed with a generalized least squares CFA. The factors with a less than 3 indicators (suspicion, retaliation, and even-temper) created Heywood cases of negative variance, and were eliminated from the EFA. The 4-item physical aggression factor also created a Heywood case, and was eliminated. The resulting model had 2 components (hostility and verbal aggression).

The model suggested by EFA would have eliminated all but 9 items out of 29. A new CFA was conducted, using the 4 factors suggested by Buss and Perry (1992). One of the 9 physical aggression items created a Heywood case, and another had a poor loading; both were eliminated from the model. There were 5 of the 8 items from the hostility factor that had poor loadings, and their elimination led to negative variance from the resulting factor. Therefore, the

hostility factor was eliminated, leaving a 3 factor solution. Many of fit indices for this model suggested a reasonable fit, χ^2 (161, N = 85) = 122.57, p = .99, with CFI = 1.00, RMSEA = .00, and GFI = .85, although the SRMR indicated poor fit (SRMR = .18). The 19 items from the 3 components had high reliability (α = .91). The standardized regression weights for each item ranged from .42 to .91 (see Table W). The correlated trait aggression items are provided in Table X with the correlated factors in Table Y.

State aggression. The 14 state aggression items from Farrar and Krcmar (2006) were subjected to an EFA with varimax rotation. Items with poor factor loadings and those that violated the .60 - .40 criterion were eliminated until a 2-component solution that explained 67.84% of the variance was returned (see Table Z for factor loadings). The first factor, verbal aggression, included 5 items and accounted for 38.70% of the variance. The 4 items in the second factor, physical aggression, accounted for 29.14% of the variance.

The aggression items were analyzed with a generalized least squares CFA, which confirmed the EFA solution with reasonable fit, χ^2 (25, N = 85) = 33.48, p = .12, with CFI = .86, RMSEA = .06, GFI = .91, and SRMR = .07. Alternative CFA models that held more of the physical aggression items were tested, but the additional items did not load well with the physical aggression factor and the reduced solutions had poor fit compared to the initial CFA model. The model suggested that it would be appropriate to group the 5 verbal aggression items as one component with high reliability (α = .90), as well as grouping the 4 physical aggression items as one component with high reliability (α = .79). The standardized regression weights for each item ranged from .42 to .92 (see Table AA). The correlations for the state aggression items (Table AB) and factors (Table AC) are provided in the appendix.

Enjoyment. An EFA of the 11 enjoyment items from Fang, Chan, Brzenzinski, and Nair (2008) and the 5 items from Sweeney and Soutar's (2001) PERVAL measure found a 4 component solution with Eigenvalues greater than 1. One of the enjoyment items violated the .60 -.40 rule by loading high on multiple factors, so it was removed – resulting in a solution that explained 70.24% of the variance. Four items associated with affective enjoyment loaded together on one component that accounted for 21.08% of the variance. Four items related to perceived value as a cognitive indicator of enjoyment loaded together to explain 19.81% of the variance. The 3 items related to behavioral enjoyment accounted for 16.46% of the variance explained. The fourth component, cognitive enjoyment, was comprised of 3 items that explained 12.89% of the variance. See Table AD for factor loadings.

The enjoyment and perceived value items were analyzed with a generalized least squares CFA. The behavioral enjoyment items were negatively correlated with the other enjoyment items. Fang (X. Fang, personal communication, April 29, 2013) had indicated that the items were not to be reverse-coded, but the item wording (e.g., "I would swear when playing this game") and their negative loading suggested otherwise. Disregarding the EFA, all of the enjoyment items were tested in a new CFA along with the perceived value items in order to test for a second-order enjoyment factor. Therefore, the 3 behavioral enjoyment items did not load with the others, so they were removed. The remaining items provided a CFA model with affective enjoyment, cognitive enjoyment, perceived value predicting a second-order enjoyment factor. The model had a reasonable fit indices, χ^2 (61, N = 85) = 74.70, p = .11, with CFI = .78, RMSEA = .05, and GFI = .86, although the SRMR was not ideal (SRMR = .15). The model suggested that it would be appropriate to group the 13 items together as enjoyment, which had high reliability (α = .87). The standardized regression weights for each item ranged from .37 to .94 (see Table

AE). The item correlations (Table AF) and first-order factor correlations (Table AG) are provided in the appendix.

Suspension of disbelief. The 6 suspension of disbelief items from the MEC Spatial Presence Questionnaire (Vorderer et al., 2004) were subjected to an EFA that returned a 1-factor solution and explained 70.93% of the variance (see Table AH). The items were analyzed with a generalized least squares CFA, which confirmed the EFA solution. The CFA model had a reasonable fit, χ^2 (7, N = 85) = 5.82, p = .56, with CFI = 1.00, RMSEA = .00, and GFI = .98. The model suggested that it would be appropriate to group the 6 suspension of disbelief items as one component with high reliability (α = .91). The standardized regression weights for each item ranged from .61 to .93 (see Table AI). The item correlations for suspension of disbelief are provided in Table AJ of the appendix.

Game engagement. The 19 engagement items from the Game Engagement Questionnaire (Brockmyer et al., 2009) were subjected to an EFA. The original authors used Rasch validation to find that the items fit into four categories (immersion, presence, flow, and absorption). Items with poor primary loadings and those that failed to meet the .60 - .40 criteria were eliminated, and the EFA of the remaining 15 items returned a 4-factor solution that explained 62.30% of the variance (see Table AK). The first factor explained 29.00% of the variance and contained 5 items that corresponded to presence (e.g., Things seemed to happen almost automatically), with items that were similar to the grouping described by Brockmyer et al. (2009). The second factor explained 15.90% of the variance and contained 5 items that related to a higher sense of flow as described by the original authors (e.g., If someone was talking to me, I didn't hear them). The third factor explained 9.19% of the variance and contained 3 items that related to a lower sense of flow as described by the authors (e.g., I felt like I just couldn't stop

playing). These high flow and low flow factors replaced the flow and immersion groupings from the original work. The fourth factor explained 8.21% of the variance and contained 2 items related to absorption (e.g., I felt scared), just as in the original work.

A CFA was used to validate the EFA results. The 2-item absorption factor was problematic (it detracted from the fit of the model and one item failed to predict the factor), as factors with less than three items are often inappropriate for inclusion in CFA. The remaining 3 factors from the EFA (presence, high flow, and low flow) returned a model with excellent fit, χ^2 (62, N = 85) = 63.42, p = .43, with CFI = 1.02, RMSEA = .02, GFI = .88, and SRMR = .11. The 5 presence items loaded together with high reliability (α = .80). An item was removed from the high flow factor due to poor loading, leaving 5 items (α = .73). The 3 low flow items loaded together (α = .74) as well. The item loadings ranged from .35 - .84 (see Table AL). These results led to the creation of a higher order factor called engagement with high loadings (presence = .98, high flow = .52, and low flow = .68) and high reliability (α = .82). Alternative CFA models were tested in lieu of the suggestion offered by the EFA. All engagement items were loaded into the model, but returned a poorer fit than the original model. Therefore, the CFA validation of the EFA was retained. The item correlations (Table AM) and factor correlations (AN) are provided in the appendix.

Treatment and Control Comparisons

The primary goal of this dissertation did not involve treatment and control group comparisons, although several relationships were investigated post hoc. Generally, the treatment group with violent video game exposure was expected to exhibit more aggression than the control group. Separate linear regressions with the aggression variables failed to find main effects for condition at the .05 level of acceptance. The predictive effect for condition on

verbally aggressive intentions was significant for a one-tailed test, $\beta = .14$, t (152) = 1.73, p = .09. Condition did not explain much of the proportion of variance in verbal aggression scores, R = .14, F (1,152) = 3.00, p = .09. Similarly, the predictive effect for condition on physically aggressive intentions was significant for a one-tailed test, $\beta = .14$, t (152) = 1.75, p = .08). Condition did not explain much of the proportion of variance in physical aggression scores, R = .14, F (1,152) = 3.05, p = .08. Condition was not predictive of state hostility, $\beta = .04$, t (152) = .44, p = .66) and did not explain variance, R = .04, F (1,152) = .19, p = .08. While condition did not seem affect state hostility (cognitive aggression), participants that played the violent game had more verbally aggressive intentions (M = 3.60, SD = 1.37) than those who did not (M = 3.20, SD = 1.51). Likewise, those that played the violent game had more physically aggressive intentions (M = 3.93, SD = 1.45) than those who did not (M = 3.50, SD = 1.60).

Linear regression also found a main effect for condition on arousal, $\beta = .48$, t (152) = 6.70, $p < .00$). Condition explained a significant amount of variance in arousal, R = .48, F (1, 152) = 44.93, $p < .00$. Participants that played the violent game reported more arousal (M = 4.45, SD = .75) than those who did not (M = 3.66, SD = .70).

Hypothesis Testing for the Treatment Condition

The data reduction techniques did not find support for some of the expected higher order structures. As such, unsubstantiated higher order factors were replaced by their factors. There was a second-order factor predicting interest in game play mechanics and role-playing motivations and it was termed acceptance of rules. Although affective, behavioral, and cognitive enjoyment could be grouped under a higher order enjoyment factor, hypothesized relationships with enjoyment based on the review of literature varied greatly. Therefore, the three separate factors replaced enjoyment in the model in order to better investigate the hypothesized paths for

enjoyment. Likewise, state hostility (cognitive aggression), verbal aggression, and physical aggression were not predicted by a higher order aggression factor – so the three replaced aggression in the predicted model (see Figure 4).

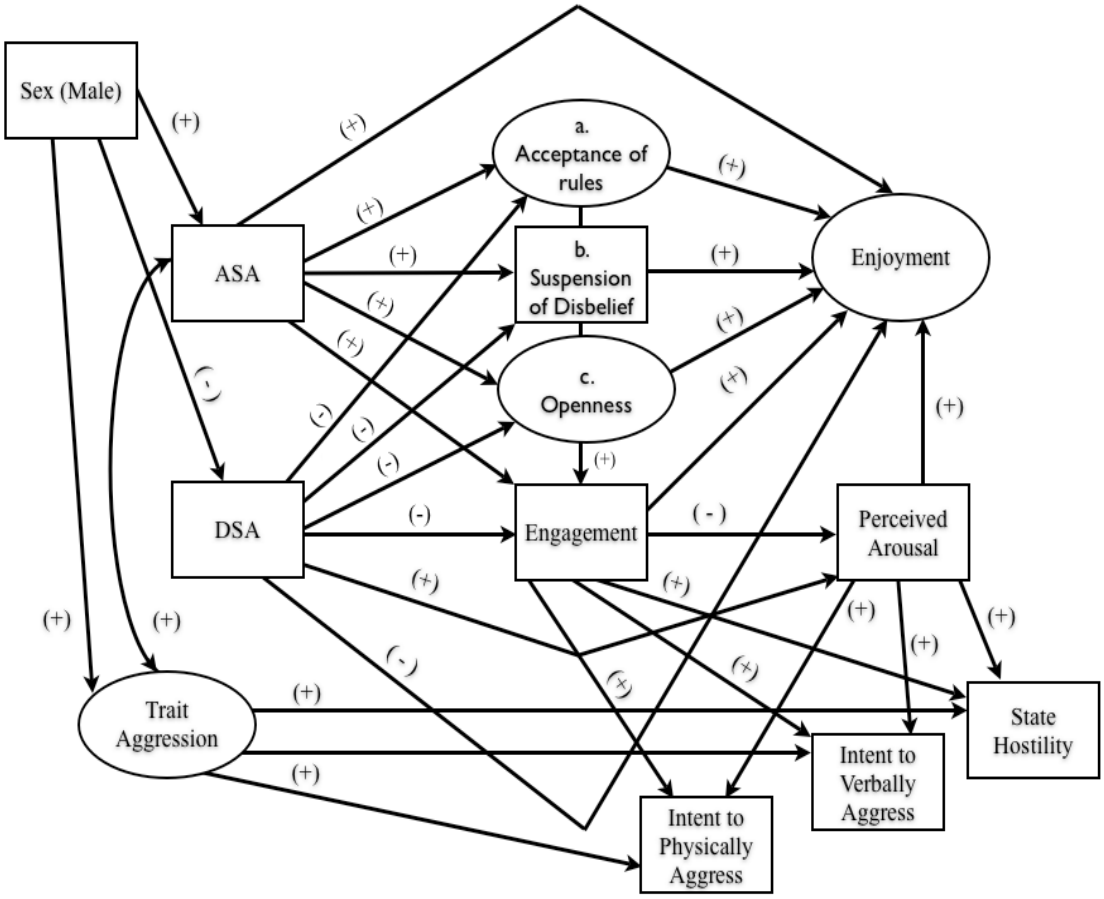

Figure 4. Revised predicted model.

The revised model was tested in AMOS 21 using generalized least squares, selecting only for those participants that had completed Part 1 of the study and had been in the treatment condition of Part 2. As previously described, the control participants did not complete measures related to video game play (engagement and enjoyment) because they completed their measurement instrument prior to playing the video game. In other words, control participants were not provided an opportunity to respond to instruments for suspension of disbelief, engagement, enjoyment, aggression, or video game manipulation ratings because the items asked

them to evaluate a game play experience that had not occurred. Therefore, the tests of this dissertation's central hypotheses could not include control group responses. Hypothesized paths with low standardized regression weights ($b < .15$) and p values above .15 were deleted from the model. The resulting model demonstrated good fit, χ^2 (54, N = 85) = 46.18, p = .77, with CFI = 1.00, RMSEA = .00, GFI = .92, and SRMR = .08. This reduced model (Figure 5) was retained (see Table AO for the Pearson's correlations matrix).

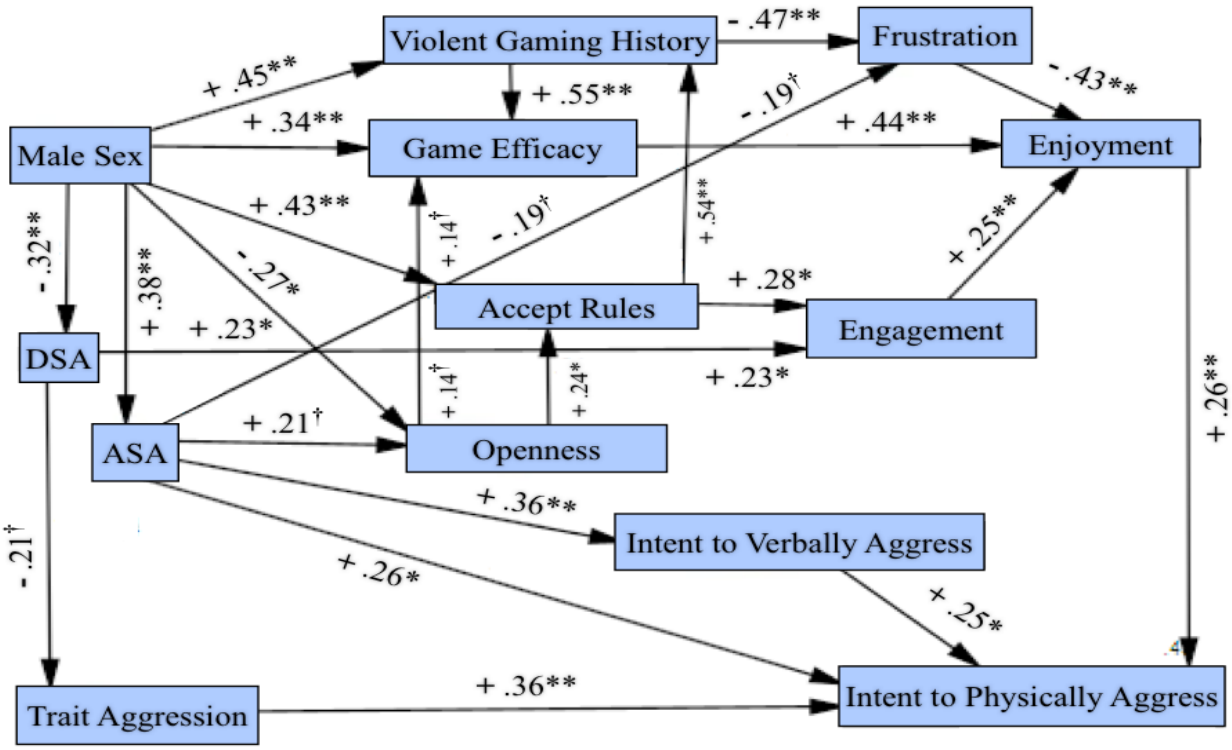

Figure 5. Final reduced model. χ^2 (54, N = 85) = 46.18, p = .77 (comparative fit index [CFI] = 1.00, root mean square error of approximation [RMSEA] = .00, and standardized root mean square residual [SRMR] = .08. Significant standardized regression coefficients are indicated by superscript notations ($^{\dagger}p \leq .10$, $*p < .05$. $**p < .01$).

Receptivity and enjoyment. Openness to new experience and acceptance of rules were expected to be predicted by three variables related to receptivity. Hypothesis 1 predicted that (a)

acceptance of rules, (b) suspension of disbelief, and (c) openness would be positively related to engagement. Acceptance of rules (β = .28, p < .05) predicted engagement, but suspension of disbelief (β = -.04, p = .73), and openness (β = -.05, p = .71) did not have significant effects on engagement. Hypothesis 1 was partially supported.

Hypothesis 2 predicted that engagement would be negatively related to arousal. However, engagement had a fairly strong positive relationship with arousal (β = .40, p < .005). This was in direct contradiction to the prediction, and Hypotheses 2 was unsupported. Hypothesis 3 predicted a positive relationship between arousal and enjoyment, in line with the expected affect-intensifying effect of excitation-transfer. However, the expected path between arousal and enjoyment (β = .00, p = .99), did not demonstrate significant effects and was eliminated from the model. Therefore, Hypothesis 3 was unsupported, as arousal did not intensify enjoyment. Since arousal failed to predict other variables in the model, it was eliminated to produce a more parsimonious solution with a better fit (SRMR = .12 as compared to the reduced model's SRMR = .08).

Hypothesis 4 predicted that (a) acceptance of rules, (b) suspension of disbelief, and (c) openness would be positively would be positively related to enjoyment. These three variables did not predict enjoyment in the model. The paths between enjoyment and acceptance of rules (β = .03, p = .72), suspension of disbelief (β = -.01, p = .94), and openness (β = .02, p = .79) were eliminated from the model as Hypothesis 4 was not supported. The fifth hypothesis predicted that engagement would be positively related to enjoyment. The reduced model did account for a path between engagement and enjoyment (β = .25, p < .001), supporting Hypothesis 5.

Motivational activation and arousal. Hypothesis 6 predicted that ASA would positively relate to (a) acceptance of rules, (b) suspension of disbelief, and (c) openness. The relationships between ASA and openness was supported (β = .21, p = .10), but the relationships for acceptance

of rules (β = -.07, p = .57) and suspension of disbelief (β = .13, p = .28) were not significant. Hypothesis 6c was supported. Hypothesis 7, with ASA predicting engagement, was not supported (β = .10, p = .40). Hypothesis 8 predicted that DSA would be positively related to arousal. However, the path analysis did not find a significant relationship between DSA and arousal (β = .19, p = .24), and was also unsupported.

Hypothesis 9 predicted that DSA would be negatively related to (a) acceptance of rules, (b) suspension of disbelief, and (c) openness. The paths from DSA to acceptance of rules (β = .02, p = .84), suspension of disbelief (β = .05, p = .68), and openness (β = .14, p = .22) were eliminated. Hypothesis 9 was not supported. Hypothesis 10 predicted that DSA would negatively affect engagement. This hypothesis was unsupported, as DSA's influence on engagement was positive (β = .23, $p < .05$), contrary to the original prediction.

Hypotheses 11 and 12, respectively, predicted that ASA would predict enjoyment and that DSA would negatively affect enjoyment. Neither the path from ASA to enjoyment (β = -.09, p = .26), nor the path from DSA to enjoyment (β = .03, p = .74) approached significance. These hypotheses were not supported, and the paths from ASA and DSA to enjoyment were dropped from the final model.

Biological sex was expected to affect ASA and DSA such that being male would positively relate to ASA (Hypothesis 13) and negatively relate to DSA (Hypothesis 14). Being male did predict ASA scores (β = .38, $p < .001$) and negatively predict DSA scores (β = -.32, $p <$ .005). As the relationship between sex and motivational activation has been further investigated in previous research (Bradley, Codispoti, Sabatinelli, & Lang, 2001; Kurita, Potter, & Lang, 2007), a posthoc one-way ANOVA was used to further investigate these hypotheses. Sex was used as the independent variable, with effect-coded independent variables for each group (risk

takers, risk avoiders, inactives, and coactives). There were no significant differences between men and women for inactives (low ASA, low DSA) and coactives (high ASA, high DSA). However, there were significant differences between the sexes for risk takers, $F(2, 463) = 19.26$, $p < .01$, and risk avoiders, $F(2, 463) = 24.86$, $p < .01$ such that men were more likely to be risk takers while women were more likely to be risk avoiders. The reduced model found support for Hypotheses 13 and 14, and the ANOVA results for risk takers and risk avoiders demonstrated support for the influence of sex on resting motivational activation.

Aggression. Hypothesis 15 predicted a positive relationship between arousal and the higher order state aggression factor, but CFA did not find support for state aggression as a higher order factor predicting intent to verbally aggress, intent to physically aggress, and state hostility. The higher order aggression construct was replaced by the three individual constructs in the model. Arousal did not predict intent to verbally aggress ($\beta = .03$, $p = .82$) or intent to physically aggress ($\beta = .04$, $p = .73$). However, arousal did predict state hostility ($\beta = .25$, $p = .08$). Taken together, these relationships provided evidence to consider partial support for Hypothesis 15. Hypothesis 16 predicted that engagement would be positively related to the higher order state aggression factor. Following game play, engagement did not predict intent to verbally aggress ($\beta = .15$, $p = .22$) or intent to physically aggress ($\beta = .01$, $p = .90$). Contrary to the hypothesis, engagement negatively predicted state hostility ($\beta = -.22$, $p = .07$). Therefore, Hypothesis 16 was unsupported. Since arousal and state hostility did not relate to other variables in the model, the variables were eliminated in the reduced model, accommodating a better fit (SRMR = .12 as compared to the reduced model SRMR = .08).

The model did not support the prediction that ASA would covary with trait aggression (Hypothesis 17). There was no significant relationship between the error terms of the two

variables (β = -.10, p = .40), and its inclusion in the model detracted from the overall model fit. Hypothesis 18 predicted that trait aggression would be positively related to state aggression.. Trait aggression did not predict intent to verbally aggress (β = .14, p = .24) or state hostility (β = .09, p = .48), but it did predict intent to physically aggress (β = .36, p < .001), demonstrating partial support for Hypothesis 18.

The hypothesized link between sex and trait aggression (Hypothesis 19) was not supported in the reduced model (β = .00, p = .97). Hypothesis 20, which predicted that arousal would be greater for high DSA individuals than for high ASA individuals, could not be tested within the model. Testing with linear regressions found that neither ASA (β = .03, p = .75) nor DSA (β = .05, p = .55) were predictive of arousal. Similarly, Park (2006) failed to find main effects for ASA or DSA on variables of interest following video game exposure. This relationship was further explored by considering the interactions of ASA and DSA by using the 4 motivational activation groups described by Lang, Shin, and Lee (2005). A one-way analysis of variance (ANOVA) test was used to compare arousal scores between the 4 motivational activation groups (risk takers, risk avoiders, inactives, and coactives). The analysis did not find a significant overall difference between the four groups, $F(3, 81) = .19$, p = .14. However, LSD posthoc analysis found that risk avoiders (with high DSA) (M = 4.77, SD = .64) did have slightly higher arousal means than risk takers (with high ASA) (M = 4.26, SD = .64), p < .05. Park's (2006) posthoc analyses with the 4 motivational activation groups also found that media effects differences were significant mainly in comparisons of risk takers and risk avoiders. Hypothesis 20 was partially supported.

Research Question 1 asked if high resting ASA would predict more state aggression than high resting DSA. There were paths between ASA and both intent to verbally (β = .36, p < .005)

and physically aggress (β = .26, p < .05) in the model, but the path between ASA and state hostility (β = .07, p = .59) was eliminated. The paths between DSA and intent to verbally aggress (β = -.07, p = .58), intent to physically aggress (β = -.09, p = .32), and state hostility (β = .00, p = .99) were not significant. One-way analysis of variance (ANOVA) tests were used to compare intent to verbally aggress, intent to physically aggress, and state hostility scores between the 4 motivational activation groups. The overall test for intent to verbally aggress was not significant $F(3, 81) = 1.13$, p = .34. There were no significant differences between the four motivational groups.

The overall test for intent to physically aggress was significant $F(3, 81) = 4.84$, p < .01. Risk takers (M = 4.77) with high resting ASA and low resting DSA had higher intent to physically aggress scores than risk avoiders (M = 3.61, p < .005), inactives (M = 3.47, p < .05), and coactives (M = 3.59, p < .05). The overall test for state hostility was not significant $F(3, 81)$ = .70, p = .56, and there were no significant differences between motivational groups. Considering the model findings and the posthoc tests for intent to physically aggress, there was evidence to suggest that high resting ASA predicted state aggression better than high resting DSA.

Research Question 2 asked how enjoyment would relate to state aggression. The reduced model found evidence that enjoyment predicted intent to physically aggress (β = .26, p = .005). Variables were entered into the model to determine if an unspecified path or variable might be driving the changes in enjoyment and aggression.

The gaming efficacy and violent gaming history variables were entered as predictors of one's reactions to violent gaming. It stands to reason that one's belief that they are good at video games and their experience playing violent games would influence their game play experience.

The posttest measures included manipulation checks about the game stimulus, including a single item to measure frustration. Frustration has been linked to enjoyment (Anderson & Ford, 1986) and aggression (Dill & Anderson, 1995; Williams, 2009) following video game play, and it was entered into the model as a predictor of the outcome variables in keeping with theory.

Being male predicted more gaming efficacy ($\beta = .34$, $p < .001$) and an increased frequency in violent game play ($\beta = .45$, $p < .001$). Acceptance of rules predicted frequency of violent game play ($\beta = .54$, $p < .001$), which in turn predicted game efficacy ($\beta = .55$, $p < .001$). Openness also predicted game efficacy ($\beta = .14$, $p < .10$). Frequency of violent game play negatively predicted frustration ($\beta = -.47$, $p < .001$), which directly influenced enjoyment ($\beta = -.43$, $p < .001$). ASA also negatively predicted frustration ($\beta = -.19$, $p = .08$) following video game play. Although this relationship was not hypothesized, it stands to reason that those with high ASA would tend to experience less frustration while playing a violent game – especially when considering the current study's association between frustration and enjoyment. However, the reduced model did not find that individuals with high ASA played more violent games, nor did ASA relate to the feeling of having more skill to help negate obstacles and avoid frustration. Considering that ASA scores have been related to increased preference for violent games (Potter, Lee, & Rubenking, 2011) and increased enjoyment of video game play (Park, 2006), it keeps with theory that high ASA would negatively predict frustration.

Disposition theory and moral foundation theory. Research Question 3 asked how the 5 dimensions of moral foundations theory would relate to engagement. The 5 dimensions (authority, fairness, harm, purity, and in group) were considered in the reduced model, but there were no significant paths from the moral foundations factors to any of the other variables in the model. The model findings did not suggest a relationship between any of the 5 factors and

engagement. Analysis of variance tests with each of the 5 factors predicting engagement failed to return any significant relationships, suggesting that moral foundations did not relate to engagement (see Table AP).

Hypothesis 21 predicted that the fairness dimension of moral foundations theory would predict enjoyment. There were no paths between fairness and enjoyment. Analysis of variance tests with all 5 factors predicting enjoyment failed to return any significant relationships (see Table AQ), providing a lack of support for Hypothesis 21.

Alternative models. Given the past research on ASA x DSA interactions by Lang, Shin, and Lee (2005) and the current study's posthoc testing for motivational activation, alternative models were tested to investigate the ASA x DSA interaction groups. The interactions were coded according to riskiness, such that inactives were coded as 1, risk avoiders as 2, coactives as 3, and risk takers as 4. The treatment-only model was modified to allow for testing both the treatment and control conditions, and the riskiness variable was added in place of the separate ASA and DSA variables. This meant that the variables unique to the experimental treatment group (suspension of disbelief, frustration, engagement, and enjoyment) were eliminated to allow for modeling both the treatment and control with condition as an exogenous variable.

Condition had a large effect on perceived arousal (β = -.45, p < .001) such that the video game treatment group reported more perceived arousal than the no-treatment control, with that arousal in turn affecting state hostility. The resulting alternative model retained a similar structure as the treatment model, while demonstrating that condition had a main effect on arousal (β = -.45, p < .001) such that the treatment game condition increased arousal while the control condition decreased arousal. Sex predicted riskiness (β = .40, p < .005) in this model (as sex had predicted ASA and DSA in the treatment-only model). Here, riskiness predicted trait aggression

as expected (β = .24, p < .005), as well as negatively predicting acceptance of rules (β = -.18, p < .05). While riskiness did not predict a history of violent video game play or state aggression, it did predict trait aggression in the expected direction (β = .24, p < .005). Overall, the treatment and control model (see Figure 6) demonstrated good fit, χ^2 (39, N = 154) = 35.83, p = .62, with CFI = 1.00, RMSEA = .00, GFI = .96, and SRMR = .08.

Condition did not appear to affect state aggression in this case, apart from the indirect relationship from condition to state hostility by way of arousal. The treatment and control model suggests that the exogenous sex variable predicts ASA and DSA (riskiness), which in turn affects trait aggression and then state aggression. Further, the model also replicates the structure of the treatment-only model in that both find openness predicting acceptance of rules, with acceptance of rules and male sex predicting a history of violent gaming. The treatment and control model strengthens the case for the relationships predicted by the treatment-only model of primary interest to the current study.

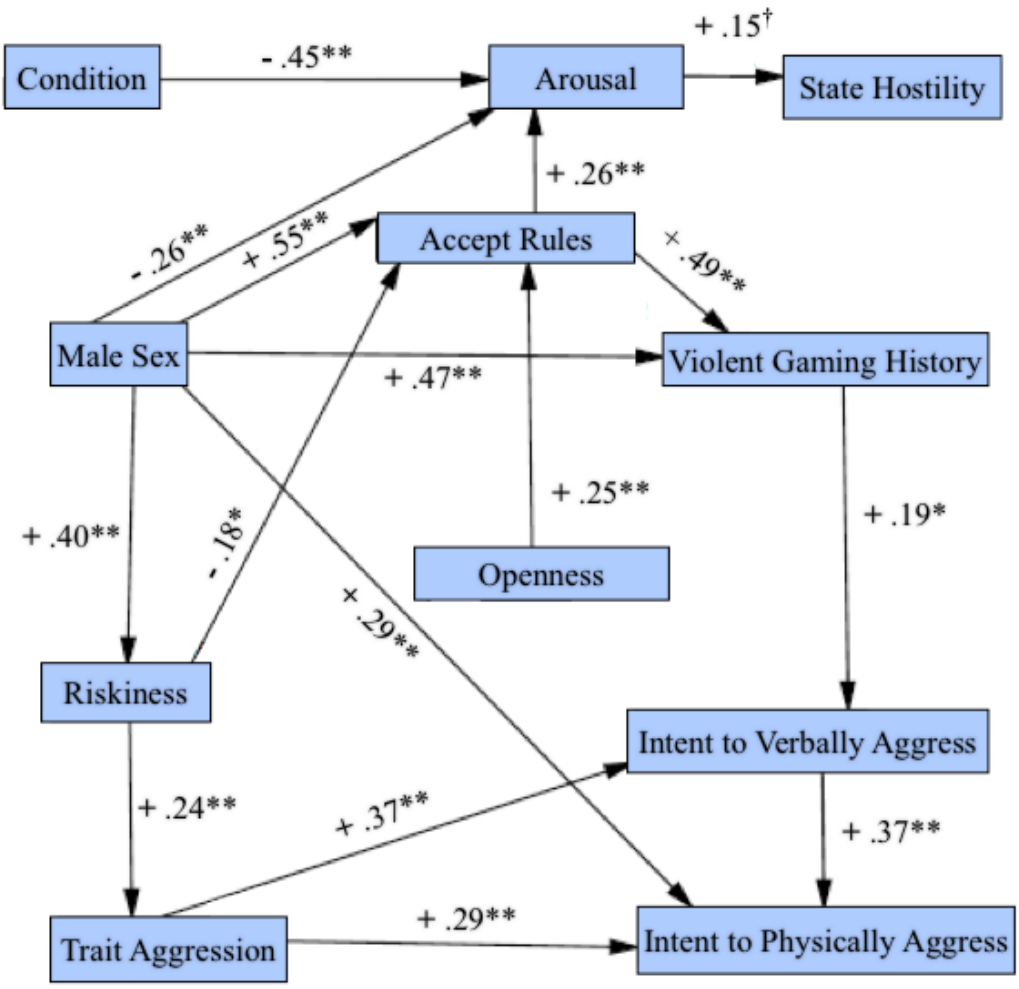

Figure 6. Alternative model for both treatment and control groups. χ^2 (39, N = 154) = 35.83, p = .62 (comparative fit index [CFI] = 1.00, root mean square error of approximation [RMSEA] = .00, and standardized root mean square residual [SRMR] = .08. Significant standardized regression coefficients are indicated by superscript notations ($^{\dagger}p \leq .10$, $*p \leq .05$. $**p < .005$).

Another alternative model was tested, investigating the same ASA x DSA interaction (riskiness) in just the treatment group. The riskiness variable was added to the reduced treatment-only model, replacing the separate ASA and DSA variables. The resulting alternative model (see Figure 7) retained a similar structure as the treatment model, and had a similar fit but for a poor SRMR, χ^2 (47, N = 85) = 46.19, p = .51, with CFI = 1.00, RMSEA = .00, GFI = .91, and SRMR

= .10. The original model supported a path between DSA and engagement (β = .23, p < .05) and ASA and intent to physically aggress (β = .26, p < .05) that were not retained by accounting for ASA and DSA with riskiness. The alternative model's use of the riskiness variable meant the elimination of those two paths without any additional explanation of the variables of interest. The alternative model's poor fit (SRMR = .10) and lack of additional explanatory power or parsimony led to the decision to retain the original treatment-only model (SRMR = .08).

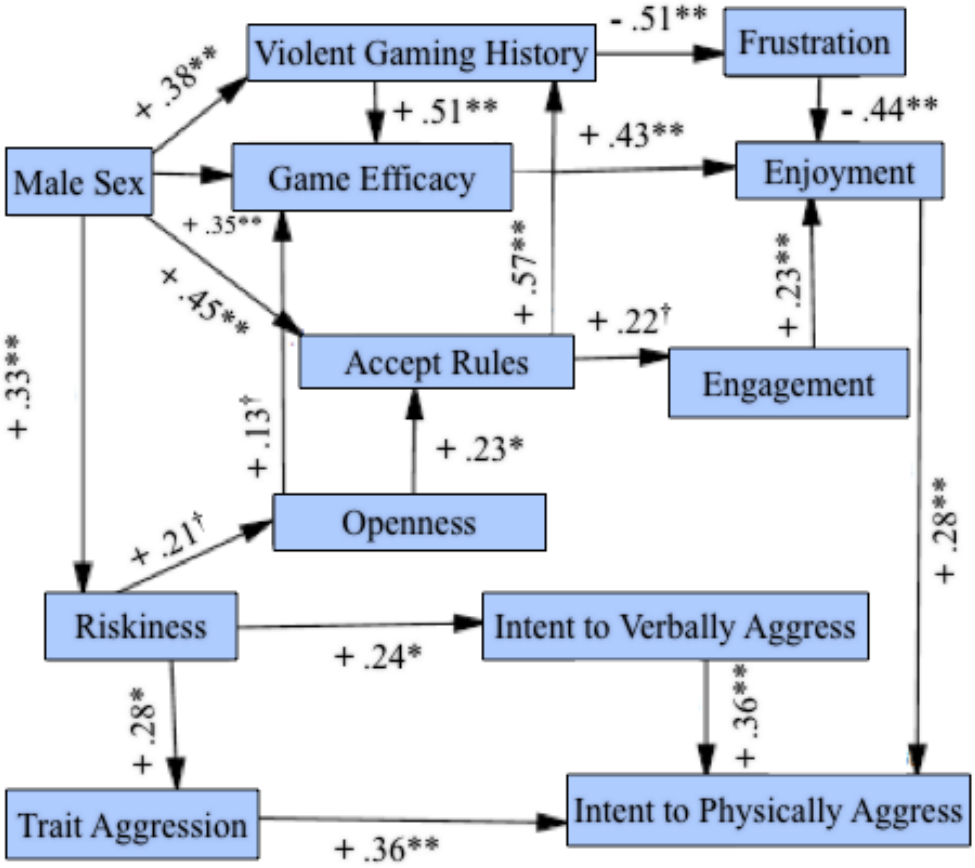

Figure 7. Alternative treatment model. χ^2 (47, N = 85) = 46.19, p = .51 (comparative fit index [CFI] = 1.00, root mean square error of approximation [RMSEA] = .00, and standardized root mean square residual [SRMR] = .10. Significant standardized regression coefficients are indicated by superscript notations ($^{\dagger}p \leq .10$, $^{*}p \leq .05$. $^{**}p < .005$).

Chapter 5

Discussion

The primary goal of this dissertation was to determine engagement's effects on enjoyment and aggression as outcomes following video game play, investigating the assumption that video games exposure leads to stronger effects than traditional media by way of engaging the user. Game players that experienced more engagement experienced more enjoyment. Interestingly, more engaged players also experienced more state hostility. However, engagement did not directly affect intent to verbally or physically aggress. Rather, there was an indirect relationship such that players that were more engaged experienced more enjoyment, which was related to an increased intent to physically aggress. The evidence supported the assumption that video game engagement strengthens media effects (both directly and indirectly) for both aggression and enjoyment.

The secondary goal of this study was to investigate individual difference variables as predictors of video game engagement. Trait measures of motivational activation, as indicated by ASA and DSA scores, had mixed influence on engagement (contrary to expectations). ASA was not predictive of engagement, but DSA was. The study also investigated acceptance of rules, openness to new experiences, and suspension of disbelief as variables related to receptivity towards video game engagement. Players that were more accepting of rules experienced more engagement, but openness and suspension of disbelief did not appear to directly predict engagement. The results do support continued efforts to account for individual difference variables when studying media effects, as trait measures of motivational activation, openness, and aggression directly predicted game efficacy, frustration, engagement, and state aggression.

Further, sex, motivational activation, and openness all had indirect effects on the outcome variables of enjoyment and state aggression.

Summary of Findings

Receptivity and enjoyment. Acceptance of video game rules and openness to new experience were expected to indicate one's willingness to be receptive to a video game experience. Participants from the treatment condition that were more accepting of rules were more engaged by the video game session. It stands to reason that a willingness to adopt the roles and storylines of video game characters as well as a willingness to understand the rules and physics of the game would be prerequisite to video game engagement, much like a willingness to learn the rules of a sport would affect a willingness to watch or participate in it.

However, the relationship between openness to new experience and engagement was not significant. Openness, as measured here, had no effect on engagement. The openness measures (Goldberg, 1992; Goldberg et al., 2006) contained several items related to sophisticated thinking and cultured experiences. It may be possible that these measures of openness indicated interest in more diverse experiences than offered by typical video games, or that these scales in particularly tap into openness to "higher cultured" pursuits that are at odds with receptivity to video games.

Gamers that were more engaged perceived themselves to be more aroused, contrary to the expectation that engaged players feel less aroused. Increased engagement was expected to trigger autonomic responses associated with decreased physiological arousal such as decreased heart rate (Lang & Yegiyan, 2012), and that participants would perceive the decrease and self-report their findings. It was also expected that increased arousal would intensify affective responses (Zillmann, 1971) such that aroused participants would report more enjoyment and more

aggression following engaging video game play. There was some support for this prediction as the more aroused gamers experienced increased state hostility (but not other outcomes).

Acceptance of rules directly influenced engagement. Those reporting increased suspension of disbelief were expected to report more enjoyment (Vorderer, Klimmt, Ritterfeld, 2004), but the current study failed to find a relationship between suspension of disbelief and enjoyment. Two possible explanations warrant consideration. First, Vorderer and Hartmann expressed concerns regarding the nature of the measure (P. Vorderer & T. Hartmann, personal communication, December 11, 2009). There was some ambiguity with wording such that the items might tap into the degree to which one had to work to suspend disbelief as opposed to the outcome level of disbelief attained.

The prediction that increased engagement would lead to increased enjoyment was of particular interest to the study. Evidence of such a relationship would confirm that video games could strengthen media effects through engagement. Players that were more engaged did experience increased enjoyment. This finding supports previous links between engagement and enjoyment (Boyle, Connolly, Hainey, & Boyle, 2012; Brockmyer, Fox, Curtiss, McBroom, & Burkhart, 2009)

Motivational activation and arousal. Overall, motivational activation did not have the expected direct effects on the outcome variables of enjoyment. However, increased resting ASA did predict increased intent to both verbally and physically aggress, demonstrating support for the importance of motivational activation in exploring reactions to media violence. Although DSA did not directly influence state aggression, those with high DSA reported more engagement, refuting the predictions that high DSA individuals would be more likely to disengage from violent game play experiences. As for ASA, those with high ASA were more

likely to be open to new experience. Potter, Lee, and Rubenking (2011) found that individuals with high ASA were open to more arousing and unpredictable forms of media. There was a negative relationship between ASA and frustration during game play, but the findings do not support the explanation that those with high ASA would have a preference for violent video game, and therefore feel less frustrated while playing them.

DSA was expected to negatively predict engagement. The model supported the path between DSA and engagement, but not in the predicted direction as high DSA predicted increased engagement. Further, the model did not support the expected relationships between DSA and arousal, acceptance of rules, or openness to experience. Upon reflection, it may be possible that some violent video game stimuli do not cross the threat threshold to trigger aversion in those with high DSA. It may also be possible that the *Batman: Arkham City* video game itself was not threatening enough to warrant a negative reaction in participants with high DSA. Manipulation checks for the game stimuli (with 7-point scales) indicated that participants found the game to have violent content (M = 5.19, SD = .89) and violent graphics (M = 5.37, SD = 1.39), but did not find it to be realistic (M = 3.31, SD = 1.5), scary (M = 2.54, SD = 1.51), or shocking (M = 3.14, SD = 1.4). It is also possible that the variation in the game stimuli, which switched from an aversive segment (avoiding attacks), to a coactive segment (attacking and avoiding attacks), to an appetitive segment (exploring the environment), and back to a coactive segment (attacking and avoiding attacks) allowed those with varying motivational activation to jump in and out of states that they naturally prefer/avoid - potentially negating observable changes in arousal, engagement, and the outcome variables in the current study.

Past research has found that men score higher on ASA and that women score higher on DSA (Bradley, Codispoti, Sabatinelli, & Lang, 2001). The reduced model (dealing only with

those participants who continued to the experimental phase) supported the expected relationships between sex and motivational activation. Posthoc ANOVA tests were used to further investigate the relationships. The amount of coactives (high ASA, high DSA) and inactives (low ASA, high DSA) did not significantly differ between the sexes. The reciprocal ANOVA findings for risk takers (with 81 males and 29 females) and risk avoiders (92 females and 27 males) suggested evidence for a more nuanced relationship between sex and DSA than predicted.

Aggression. One of the more interesting findings of the study lies in the supported relationship between engagement and arousal, which affected state hostility. This finding supports the affect-intensifying effect of excitation-transfer theory (Cantor, Bryant, & Zillmann, 1974; Zillmann, 1971), and suggests that engagement is a mechanism that can increase arousal and therefore aggressive outcomes. Players that were more engaged felt that they were more aroused - which, in turn, predicted state hostility (but not intent to verbally or physically aggress). The indirect effect of engagement on aggression supports the assumption that game engagement strengthens not only positive media effects (enjoyment), but negative effects as well. The treatment – control group comparison demonstrated that violent game exposure led to increased aggression. This finding suggests that more engaging games, while offering more in the way of enjoyment, also facilitate short term increases in aggression – and possibly more changes with long term, repeat exposure.

Frustration also played an important role in determining enjoyment. Further, those with higher resting ASA were less frustrated by the game. Potter, Lee, and Rubenking (2011) found that ASA was linked to increased preference for new media like video games, as well as increased enjoyment of violent games. These past findings suggest that individuals with high

ASA are more likely to play and enjoy games like *Arkham City* outside of the lab, although that explanation was not supported in the current study.

The individual difference variable of trait aggression was an important consideration, as those with increased trait aggression had more intent to physically aggress. Intent to verbally aggress predicted intent to physically aggress, supporting past findings (e.g., Hamilton & Hample, 2011). As the game play variables had no direct impact on intent to physically aggress, trait aggression accounted for more of the change in physically aggressive intent than the processes activated by media exposure. Valkenburg and Peter (2013) discussed the importance of individual difference variables in accounting for variation in media effects sizes, in that they typically moderate media effects. Trait aggression and trait hostility play an important role in determining state aggression in the General Aggression Model (GAM) (e.g., Anderson & Bushman, 2001; Buckley & Anderson, 2006), and have accounted for a significant amount of variance between subjects in effects research that has examined aggression following violent media exposure. The current findings support past research and suggest that trait aggression, when coupled with violent media exposure, can better predict aggressive outcomes.

State hostility did not relate to any other variables in the model but for links to engagement and arousal. Surprisingly, posthoc testing failed to find a main effect for condition on state hostility. In other words, state hostility scores were nearly identical in both the treatment and the control conditions. The conspicuous absence of relationships was at odds with past findings, as experimental research typically finds that violent gaming increases state hostility (Anderson et al., 2010). Even though gamers felt that *Arkham City* was violent, and that it spurred intent to physically and verbally aggress, the current findings suggest that the game alone failed to prime aggressive thoughts. In the current study, participants in the treatment

condition created aggressive words in 25% of their word completion responses, while the control group created aggressive words 24% of the time. These figures were similar to the findings described by Anderson, Carnagey, and Eubanks (2003) in their study of music, except for the difference that the authors found between participants who listened to violent songs (28% aggressive) and those who listened to nonviolent songs (21% aggressive). In the current study, control participants were told that they would have the chance to play a game following completion of the questionnaires, so they might have assumed (or had been informed by classmates) that they would play a violent game and had been somewhat primed prior to exposure.

Interestingly, the hypothesized relationship between sex and trait aggression was not found, despite evidence that males are more aggressive (Archer, 2004). The reduced model did not retain a path from ASA nor DSA to arousal, yet the literature suggested a strong link between resting motivational activation and propensity for arousal during media stimulation. The posthoc testing failed to find a connection between any of the 4 motivational groups and arousal, providing further grounds for the joint use of *both* perceived arousal *and* physiological measures of arousal in future studies. As Cantor, Bryant, and Zillmann (1974) suggested that we are unskilled at gauging our arousal, perceived arousal takes on increased meaning when used in combination with physiological measures.

While there was no evidence of a relationship between motivational activation and arousal, there was support for a difference between groups pertaining to intent to physically aggress. Risk takers reported more intent to physically aggress than all other groups. Lang, Shin, and Lee (2005) found that risk takers scored higher on measures of sensation seeking and reported increased drug use compared to individuals with different motivational activation

dispositions. The current study provides further evidence for using MAM to identify "at risk" individuals, as the evidence suggests that those with high resting ASA and low resting DSA harbor increased aggressive intentions following exposure to violent video games.

The relationship between enjoyment and intent to physically aggress suggests a link between enjoyment and aggression that complicates the relationship between violent game play, engagement, and positive and negative outcomes. Those who reported more enjoyment reported more intent to physically aggress. It is possible that an unobserved variable (perhaps physiological arousal) helps explain this relationship, and warrants investigation in future studies.

Implications

The main goals of this study were to investigate the impact of engagement on media effects outcomes and to determine individual difference factors (specifically, motivational activation) that predict engagement. The findings suggested that increased video game engagement predicted increased enjoyment, and indirectly affected state hostility through excitation-transfer. Engaged individuals experienced more arousal, intensifying their aggressive thoughts. The study of engagement's antecedents found that increased acceptance of video game rules predicted increased engagement, and motivational activation did appear to influence the process through the positive relationship between DSA and engagement. Motivational activation also played a role in determining media effects, as those with increased ASA experienced less frustration while playing, which had a negative relationship with enjoyment.

Aggression following violent game play has been a societal concern for some time now, and the outcome of interest for many video game effects studies. In the current study, aggressive outcomes were greatest for those with high ASA, high trait aggression, and those who

experienced more enjoyment. Indirectly, aggression was increased for those individuals with that had more willingness to accept rules, more game efficacy, and those who experienced more engagement. The personality differences appear to interact with engagement, arousal, and frustration that can occur as a result of video game play to increase aggressive outcomes following play.

Boyle, Connolly, Hainey, and Boyle (2012) called for more experimental and quasi-experimental empirical studies to further understanding of motives that predict video game engagement, the engagement process, and outcomes following play. The current study addressed those concerns and lends insight into which traits were related to engagement. Further, the study investigated processes that were affected by engagement, and how these factors may influence effects outcomes (namely, enjoyment and aggression).

Overall, the effect sizes related to aggression were moderate, and comparable to those from video game effects research (Anderson & Bushman, 2001; Anderson et al., 2010; Sherry, 2001). Trait aggression had a moderate effect on intent to physically aggress ($\beta = .36$) following exposure to a violent video game, and arousal had a moderate effect on state hostility. Considering engagement's relatively large effect ($\beta = .40$) on arousal, tracing the paths from engagement to arousal and then state hostility ($\beta = .25$) with the product rule yields small indirect effects of engagement on state hostility ($\beta = .10$). These effect sizes are comparable to the effect sizes that Anderson et al. (2010) found for violent video game exposure on aggressive affect, behavior, and cognition in experimental studies, which had effect sizes that ranged from .21 - .29.

The findings of this dissertation have implications for the continued study of engagement and video game effects research. Video game effects researchers have often assumed that video

game violence has stronger effects than TV or film violence (e.g., Anderson & Dill, 2000; Anderson, Carnagey, Flanagan, Benjamin, Jr., Eubanks, & Valentine, 2004; Tamborini, Eastin, Skalski, Lachlan, Fediuk, & Brady, 2004). Specifically, Brockmyer et al. (2009) suggested that an increased tendency to become engaged in video game play may lead to increased aggression following play, highlighting the importance of engagement in this process. One of the most important contributions of the current study is that it demonstrates empirical support for a link between engagement and increased state hostility in the short term, and suggests that arousal is the mechanism that links this process. While others have found evidence for excitation-transfer with increased arousal leading towards increased aggression following game play (e.g. Krcmar & Lachlan, 2009), these results suggest that engagement largely contributes to arousal levels.

Engagement directly influenced enjoyment, supporting similar findings by Funk, Chan, Brouwer, and Curtiss (2006). Interestingly, Nabi and Krcmar (2004) suggested that audience dispositions towards characters and events may impact both affective and cognitive enjoyment – therefore, future research may look to a relationship with engagement and disposition theory (Zillmann, 1994) to explain this link. Engaged players may form stronger relationships with the protagonist, and more thoroughly enjoy helping the hero to succeed.

Escapism is another factor related to audience motivations to consume and enjoy media. Escaping from reality may partially explain media enjoyment (Vorderer, Klimmt, & Ritterfeld, 2004), which may pertain to the current finding wherein increased engagement led to increased enjoyment. Increased engagement may have led to a distancing from reality that was experienced favorably, and may be an important motive towards predicting media enjoyment (Nabi & Krcmar, 2004) for audiences that seek out video games.

The findings for enjoyment and aggression suggest that frustration plays a key role in determining both outcomes, as found by Williams (2009). Decreased frustration led to increased enjoyment. The findings also show that those with increased trait aggression are already more likely to have increased intent to physically aggress following violent game play. It may be advisable to train individuals with high trait aggression to recognize game scenarios that frustrate them, so that they could learn to avoid or overcome the frustration. Aggression interventions might be designed to teach players to recognize frustration and then alter the playing environment (e.g., changing game conditions, playing at a lower difficulty, switching to a different title, taking a break) in order to maximize enjoyment.

Individual differences in trait motivational activation (ASA and DSA) have been found to influence reactions to stimuli. High ASA has been associated with physiological reactions consistent with appetitive activation (Lang & Yegiyan, 2012), substance abuse and sensation seeking (Lang, Shin, & Lee, 2005), and preference for riskier media choices such as pornography, rap and rock music, and violent video games (Potter, Lee, & Rubenking, 2011). Krcmar, Farrar, Jalette, and McGloin (2012) found that ASA predicted a preference for violent video games and increased frequency of their use. However, the current study did not find direct effects for ASA on engagement, arousal, enjoyment. Rather, high ASA predicted increased intent to verbally and physically aggress along with decreased frustration.

High DSA has been associated with physiological reactions consistent with startle responses and aversive activation (Lang & Yegiyan, 2012), decreased likelihood of substance abuse (Lang, Shin, & Lee, 2005), as well as preference for familiar music choices (e.g., Top 40 hits) and decreased preference for violent games (Potter, Lee, & Rubenking, 2011). Unexpectedly, the current study found that DSA predicted engagement. The *Arkham City* game

may have provided a safe environment to explore violence without triggering an aversive response, which might have been appealing for high DSA individuals likely to avoid threatening stimuli.

Park (2006) also investigated trait motivational activation and failed to find a main effect for ASA on physiological arousal or enjoyment. Park manipulated video game conditions such that they were intended to elicit aversive, appetitive, or both types of motivational activation – and suggested that the interactions with the conditions may have suppressed the influence of the resting trait levels. Since the current study used one segment of the *Arkham City* game that was thought to elicit aversive, appetitive, and both types of motivational activation, it is possible that the stimuli interacted with trait motivational activation in a manner that suppressed the main effects hypothesized by LC4MP.

High ASA was associated with a decreased sense of frustration after playing *Arkham City*. As those with high ASA have been found to prefer violent games (Krcmar, Farrar, Jalette, & McGloin, 2012; Potter, Lee, & Rubenking, 2011), it was expected that these participants would choose a title like *Arkham City* outside of the lab and have experience playing this game (or others like it). Since that explanation was not supported, it may be possible that individuals with high ASA have adopted to experience less frustration in novel situations.

Acceptance of rules was another individual difference variable that influenced outcomes. Yee (2006) categorized acceptance of video game rules as a motivation to investigate game mechanics, and found it predictive of the use of online role-playing games. In the current study, acceptance of rules had a moderate effect on engagement ($\beta = .28$), indirectly influencing enjoyment. This finding may have importance to future engagement studies as researchers seek to identify factors that make one more receptive to video game engagement.

Limitations and Future Directions

The sample in the current study was composed of young college students, which may differ from audiences of different ages as well as young adults that do not attend college. Ivory and Kalyanaraman (2007) suggested that studying college students would be appropriate for video game research as they fall within the age range that played most often. According to the current Entertainment Software Association sales research (ESA, 2013), the average age of gamers is 30 years old (with 32% of gamers falling in between 18-35 years of age), and males make up 55% of the gaming population. Males made up 49% of the population in the current study, with an average age of 19 years. Future studies may want to use non-college samples, as they may be more likely to contain individuals with a higher range of ASA scores that may place them "at risk" for aggressive outcomes following play.

As with most video game studies, the nature of the video game stimulus provides a source of concern for external validity. Participants were asked to play the video game in a laboratory setting with predetermined settings (e.g., size of TV screen, volume, controller layout, distance from the TV, lighting) under the observation of research assistants within a limited time. Although the laboratory was arranged to approximate a comfortable dormitory setup with couches and a coffee table, it remained an artificial environment in which participants knew that they would complete questionnaires following game play.

The *Batman: Arkham City* game segment featured somewhat realistic human-on-human violence (provided the player suspended disbelief regarding the costumes). The nature of the hand-to-hand combat may have inspired aggressive outcomes due to the player's belief that they could kick and punch an aggressor in real life, but the comic book fantasy characters and setting

may have divorced the player from more intent to aggress. The selection of one particular title, despite its impressive sales figures, may also limit generalizability to other titles and genres.

Also, the game play segments featured content that was thought to elicit aversive, appetitive, and both forms of motivational activation. However, the current study did not feature manipulation checks (e.g., physiological testing) to confirm the type or strength of activation. Park (2006) employed such tests, which would strengthen the case for these assumptions. Further, future research may follow in Park's footsteps and provide several different treatment conditions for each type of activation in order to determine how trait and state motivational activation interact to influence video game effects outcomes such as enjoyment and aggression.

Trait motivational activation (ASA and DSA) did not impact engagement, arousal, or the outcome variables as expected. This may also be a function of the game stimulus in that *Arkham City*'s depiction of violence may have been below the threshold needed to warrant a more aversive response. The fisticuffs violence between a beloved character and masked goons may not have inspired the same feelings of fear, disgust, and uneasiness associated with Mature-rated titles from series such as *Grand Theft Auto* and *Call of Duty*. Future research might use titles with more provocative and risky content to elicit responses associated with motivational activation.

Apart from the nature of the stimulus, the measurement items employed in the current study may have limited findings. This dissertation posited that acceptance of rules, openness to new experience, and suspension of disbelief would predict video game engagement, only acceptance of rules affected engagement. Receptivity towards engagement requires further investigation, and it is also possible that other measures of openness and suspension of disbelief may provide better measurements.

The measurement of aggression may also provide some cause for concern to validity. Despite widespread use of the word completion task (Anderson, Carnagey, & Eubanks, 2003) in video game aggression research, researchers like Ferguson and Dyck (2012) challenge its ability to measure aggression. Participants whom have been exposed to violent media are thought to rehearse aggressive scripts and entertain aggressive thoughts, indicated by completing words associated with aggression. However, Ferguson and Dyck (2012) contend that exposure to violence may in fact prime the completion of aggressive words, but not necessarily rehearsal of scripts or long term changes. Further, researchers also contend that media violence researchers should use measures that are closely linked to criminal violence (Savage, 2004) or work to link psychological measures of aggression to violent criminal behavior (e.g., Ferguson, 2007). Future research may seek to find correlations between aggression measures like those used here (Anderson, Carnagey, & Eubanks, 2003; Buss & Perry, 1992; Farrar, Krcmar, & Nowak, 2006) and real world violence.

Trait motivational activation has gathered research interest as determinant of cognitive processing and media effects (Lang & Yegiyan, 2012; Potter, Lee, & Rubenking 2011). ASA predicted frustration experienced while playing *Arkham City*, and may be an important individual difference factor in accounting for aggressive outcomes via frustration. Video game effects researchers should continue to investigate motivational activation's effect in determining media preferences and modulating media effects. Risk takers (high trait ASA with low trait DSA) may be of particular interest as they would be more likely to engage in dangerous behavior.

Although the current study investigated engagement's impact on engagement and aggression, future research should continue to explore engagement's effect on other outcomes.

For instance, research on how engagement affects attention towards in-game advertisements might be of interest to game designers and advertisers. Educational researchers would be interested in the impact of engagement on learning outcomes from educational games and simulations. Findings like these may help educators and content producers to maximize positive outcomes, minimize negative outcomes, and develop interventions to help “at risk” audiences avoid problematic behavior.

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Appendix A

Dissertation Study Instrument – Part 1

Identifier Number

Please enter the last four digits of your cellular phone number, which you will use again later in Part 2 of our study (if you choose to keep participating).

Then, you will see a list of descriptions for different video games. Please read each description and then indicate how much you would agree with the statement about your desire to play the game.

What are the last 4 digits of your cell phone number?

_ _ _ _

Game Descriptions

Angel of Death: You play as Jeff Nichols, a member of the Special Forces Crisis Resolution squad. When there's a hostage in danger it is your job to line up the sights and eliminate the offender. Shoot down as many kidnappers as you can in order to save the innocent. Shoot first, think later. Head shots are recommended; you aren't interested in mercy, you are interested in blood.

I'd like to play this game.

Strongly disagree	Disagree	Somewhat disagree	Neither agree nor disagree	Somewhat agree	Agree	Strongly Agree

1	2	3	4	5	6	7

Defuse: Being on the clock takes on a whole new meaning for you, Clint Carter, a new member of Baltimore bomb squad. You must hurry to solve logic based problems, bypass traps, and save the day by disarming bombs. Keep innocent people safe under threatening circumstances. Steady hands are a must for this line of work. Make sure that you cut the right wire; save the explosion for the bomb range.

I'd like to play this game.

Strongly disagree	Disagree	Somewhat disagree	Neither agree nor disagree	Somewhat agree	Agree	Strongly Agree
1	2	3	4	5	6	7

Hit and Run: As a hired driver, your car is your weapon. If you are being chased by the police, you need to be able to get away any way you can, without worrying about the consequences. If this means running over people crossing the street, just give the car more gas and gun it. Use your driving skills to smash into cop cars; the harder you hit them the faster they explode. You aren't worried about the carnage you leave behind, just as long as you leave the cops with it. Do this and while you may not get away clean, you will get away easy.

I'd like to play this game.

Strongly disagree	Disagree	Somewhat disagree	Neither agree nor disagree	Somewhat agree	Agree	Strongly Agree

1	2	3	4	5	6	7

Getaway: A hired driver for a heist must be reliable and in this profession that means they have to be highly skilled. If the cops are on the trail, the driver needs to be able to outrun and out-maneuver them without crashing or hurting others. Drive quickly, but remember to drive safely as well. Build your reputation, upgrade your car's performance, and keep your clients anonymous; if you can do all that you'll get a nice reward for your troubles.

I'd like to play this game.

Strongly disagree	Disagree	Somewhat disagree	Neither agree nor disagree	Somewhat agree	Agree	Strongly Agree
1	2	3	4	5	6	7

Blood Fist: A one on one fighting match to the death; blood and gore are the only way to survive. Spend your time battling all comers in a cage match full of destruction. Kill as many as you can before they rip you to shreds. The more you exterminate, the more likely you are to save others from total destruction. Choose your character wisely because each opponent is an expert killer who takes no prisoners.

I'd like to play this game.

Strongly disagree	Disagree	Somewhat disagree	Neither agree nor disagree	Somewhat agree	Agree	Strongly Agree
1	2	3	4	5	6	7

Karate College: Self-defense has just been taken to a new level. Enrich your students' lives by helping them train in the martial arts so that they may learn to defend themselves. Disarm your opponent before they may do you harm. By disarming more attackers, you will make your community safer. Teach your own techniques, compete in tournaments, and even become an action star in movies.

I'd like to play this game.

Strongly disagree	Disagree	Somewhat disagree	Neither agree nor disagree	Somewhat agree	Agree	Strongly Agree
1	2	3	4	5	6	7

Search and Destroy: You are Rex Johnson, an ex US Special Forces soldier whose team is ambushed during a brutal mission. You're the sole survivor. Your goal? Find and destroy the ones who set you up. Hunting them down in their own homes is the only way to stop them from finding and killing you. You must track each one, invade their homes, and kill them all before any of the others know you're still alive. Use your training and ruthlessness to make sure those responsible answer for their crimes.

I'd like to play this game.

Strongly disagree	Disagree	Somewhat disagree	Neither agree nor disagree	Somewhat agree	Agree	Strongly Agree
1	2	3	4	5	6	7

Grand Larceny: Your character's name? Good question. Newspapers named you Loki. Your favorite game? Burglary. But, like a modern day Robin Hood, you don't do it for personal gain. Seek out the wealthy and powerful, take what you need, and give it to the poor. People will call you a criminal, but you're rewriting history with your crimes.

I'd like to play this game.

Strongly disagree	Disagree	Somewhat disagree	Neither agree nor disagree	Somewhat agree	Agree	Strongly Agree
1	2	3	4	5	6	7

Terrorist Takedown: Play as a United States Marine Corps soldier fighting terrorists in Iraq. Track down and kill Taliban leaders. You may be hunting for terrorists, but be on the lookout; they are also hunting for American forces. Defend against ambushes and use all resources available to take down these terror cells. Do all you can in order to protect America from attack. Help make America safe from these murderers!

I'd like to play this game.

Strongly disagree	Disagree	Somewhat disagree	Neither agree nor disagree	Somewhat agree	Agree	Strongly Agree
1	2	3	4	5	6	7

Operation Rebuild: Along with members of your squad, your task is to keep the innocent citizens of war-torn Nicaragua safe. Be on the constant lookout for drug runners who may enter your area with the intent to harm. Help the citizens of this land to rebuild their town and their way of life, while making sure the people of Nicaragua get back on their feet again.

I'd like to play this game.

Strongly disagree	Disagree	Somewhat disagree	Neither agree nor disagree	Somewhat agree	Agree	Strongly Agree
1	2	3	4	5	6	7

Informational Page

Next, we'd like to ask you some brief questions about yourself and your attitudes.

Are you:

Female

Male

I'd rather not say

How old are you?

_ _

In what year of college are you now?

Freshman

Sophomore

Junior

Senior

Please indicate your ethnicity:

White

African American

Asian

Hispanic

I'd rather not say

Other (please specify) _____

Please indicate your level of agreement with the following statements.

"I am a good video game player."

Strongly disagree	Disagree	Somewhat disagree	Neither agree nor disagree	Somewhat agree	Agree	Strongly Agree
1	2	3	4	5	6	7

"I know a lot about video games."

Strongly disagree	Disagree	Somewhat disagree	Neither agree nor disagree	Somewhat agree	Agree	Strongly Agree
1	2	3	4	5	6	7

"A lot of my free time is spent playing video games."

Strongly	Disagree	Somewhat	Neither	Somewhat	Agree	Strongly

disagree		disagree	agree nor disagree	agree		Agree
1	2	3	4	5	6	7

Use of video games

These questions ask you about your use of video games:

Approximately how many days did you play arcade or video games (either on the computer, in the arcade, or on console games such as XBOX, XBOX360, PlayStation 2, PlayStation 3, Wii) in the past week?

0	1	2	3	4	5	6	7

Think back over the last week. Approximately how many hours per day did you play arcade or video games (either on the computer, in the arcade, or on console games such as XBOX, XBOX360, PlayStation 2, PlayStation 3, Wii) in the past week?

0	30 min	1 hr	2 hrs	3 hrs	4 hrs	5 hrs	6 or more hrs

Frequency of video game playing

If you play video games, indicate how frequently you play each of these types:

Never	Almost never	Rarely	Sometimes	Fairly often	Frequently	Always

Adventure (for example: Zelda, Mario Brothers)

Combat Action (for example: God of War, Doom, Army of 2)

Combat Adventure (for example: Resident Evil, Fable)

3-D Realistic Shooters (for example: Gears of War II, Medal of Honor)

Combat Arcade Type (for example: Street Fighter, WWF/WWE Wrestling)

Realistic Combat Role Playing (for example: Red Dead Redemption, GTA 4)

Simulation or Strategic War Planning (for example: Age of Empires, Starcraft, Warcraft)

Sports or Competition (for example: Madden NFL, Tony Hawk)

Role-playing games (for example: Everquest, Borderlands, The Sims)

Realistic Simulation Games (for example: Guitar Hero, Dance Dance Revolution, Flight Simulator)

Puzzle/Games (for example: Mario Party, Jeopardy, Poker)

Comic Combat (for example: Marvel Heroes, X-Men)

Family/Other (for example: Lego, Finding Nemo, HotWheels Racing)

Playing Motivations

The following questions ask what is important to you when playing video games.

How interested are you in the processes underlying game mechanics?

Not at all interested	Not interested	Somewhat not interested	Neutral	Somewhat interested	Interested	Very interested
1	2	3	4	5	6	7

How important is it to you that your character is optimized for the game (collecting power-ups, leveling up, collecting best equipment)?

Not at all important	Not important	Somewhat not important	Neutral	Somewhat important	Important	Very important
1	2	3	4	5	6	7

How often do you use guides or internet information to plan your game play?

Not at all often	Not often	Somewhat not often	Neutral	Somewhat often	Often	Very often

1	2	3	4	5	6	7

How important is it to know as much about the controls and game rules as possible?

Not at all important	Not important	Somewhat not important	Neutral	Somewhat important	Important	Very important
1	2	3	4	5	6	7

How much do you enjoy trying out the roles or personality of your character?

Not at all enjoyable	Not enjoyable	Somewhat not enjoyable	Neutral	Somewhat enjoyable	Enjoyable	Very enjoyable
1	2	3	4	5	6	7

How much do you enjoy being immersed in a fantasy world?

Not at all enjoyable	Not enjoyable	Somewhat not enjoyable	Neutral	Somewhat enjoyable	Enjoyable	Very enjoyable
1	2	3	4	5	6	7

How often do you consider the story and history of your character?

Not at all often	Not often	Somewhat not often	Neutral	Somewhat often	Often	Very often

1	2	3	4	5	6	7

How often does the character's role or personality influence the choices you make?

Not at all often	Not often	Somewhat not often	Neutral	Somewhat often	Often	Very often
1	2	3	4	5	6	7

Best Response

For each item, indicate which response best applies to you:

Indicate which response best applies to you:

Never	Almost never	Rarely	Sometimes	Fairly often	Frequently	Always

How often do you do dangerous things for fun?

How often do you do exciting things even if they are dangerous?

Strongly disagree	Disagree	Somewhat disagree	Neither agree nor disagree	Somewhat agree	Agree	Strongly Agree

I would like to explore strange places.

I like to do frightening things.

I like new and exciting experiences.

I prefer friends who are exciting and unpredictable.

How You See Yourself

For each item, indicate which response best applies to you:

I see myself as someone who is:

1 Very unintelligent	2	3	4 Neither unintelligent nor intelligent	5	6	7 Very intelligent
1 Very imperceptive	2	3	4 Neither imperceptive nor perceptive	5	6	7 Very perceptive
1 Very unanalytical	2	3	4 Neither unanalytical nor analytical	5	6	7 Very analytical

1 Very unreflective	2	3	4 Neither unreflective nor reflective	5	6	7 Very reflective
1 Very uninquisitive	2	3	4 Neither uninquisitive nor inquisitive	5	6	7 Very inquisitive
1 Very unimaginative	2	3	4 Neither unimaginative nor imaginative	5	6	7 Very imaginative

1 Very uncreative	2	3	4 Neither uncreative nor creative	5	6	7 Very creative
1 Very uncultured	2	3	4 Neither uncultured nor cultured	5	6	7 Very cultured
1 Very unrefined	2	3	4 Neither unrefined nor refined	5	6	7 Very refined
1 Very unsophisticated	2	3	4 Neither unsophisticated nor sophisticated	5	6	7 Very sophisticated

Strongly disagree	Disagree	Somewhat disagree	Neither agree nor disagree	Somewhat agree	Agree	Strongly Agree

I carry the conversation to a higher level.

I am interested in many things.

I prefer variety to routine.

I want to increase my knowledge.

I am open to change.

I prefer to stick with things that I know. (R)

I am not interested in abstract ideas. (R)

I am not interested in theoretical discussions. (R)

I try to avoid complex people. (R)

I rarely look for a deeper meaning in things. (R)

Characteristic of You

Please rate each of the following in terms of how characteristic they are of you. Use the following scale for answering these items.

Rate how characteristic the statement is of you.

1 Extremely uncharacteristic of me	2	3	4 Neither uncharacteristic nor characteristic of me	5	6	7 Extremely characteristic of me

Once in a while I can't control the urge to strike another person.

Given enough provocation, I may hit another person.

If somebody hits me, I hit back.

I get into fights a little more than the average person.

If I have to resort to violence to protect my rights, I will.

There are people who pushed me so far that we came to blows.

I can think of no good reason for ever hitting a person.

I have threatened people I know.

I have become so mad that I have broken things.

I tell my friends openly when I disagree with them.

I often find myself disagreeing with people.

When people annoy me, I may tell them what I think of them.

I can’t help getting into arguments when people disagree with me.

My friends say that I’m somewhat argumentative.

I flare up quickly but get over it quickly.

When frustrated, I let my irritation show.

I sometimes feel like a powder keg ready to explode.

I am an even-tempered person.

Some of my friends think I'm a hothead.

Sometimes I fly off the handle for no good reason.

I have trouble controlling my temper.

I am sometimes eaten up with jealousy.

At times I feel I have gotten a raw deal out of life.

Other people always seem to get the breaks.

I wonder why sometimes I feel so bitter about things.

I know that "friends" talk about me behind my back.

I am suspicious of overly friendly strangers.

I sometimes feel that people are laughing at me behind me back.

When people are especially nice, I wonder what they want.

Morals

When you decide whether something is right or wrong, to what extent are the following considerations relevant to your thinking? Please answer on a scale from: Not at all relevant (This consideration has nothing to do with my judgments of right and wrong) to Extremely relevant (This is one of the most important factors when I judge right and wrong).

Not at all relevant	Not very relevant	Slightly relevant	Somewhat relevant	Very relevant	Extremely relevant
1	2	3	4	5	6

Whether or not someone violated standards of purity and decency.

Whether or not someone did something to betray his or her group.

Whether or not someone suffered emotionally.

Whether or not someone's action showed love for his or her country.

Whether or not someone was cruel.

Whether or not someone acted unfairly.

Whether or not someone conformed to the traditions of society.

Whether or not someone was denied his or her rights.

Whether or not someone acted in a way that God would approve of.

Whether or not someone did something disgusting.

Whether or not an action caused chaos or disorder.

Whether or not someone showed a lack of respect for authority.

Whether or not someone was good at math.

Whether or not someone cared for someone weak or vulnerable.

Whether or not some people were treated differently than others.

Whether or not someone showed a lack of loyalty.

Please read the following sentences and indicate your level of agreement or disagreement.

Strongly disagree	Moderately disagree	Slightly disagree	Slightly agree	Moderately agree	Strongly agree
1	2	3	4	5	6

Compassion for those who are suffering is the most crucial virtue.

People should be loyal to their family members, even when they have done something wrong.

I would call some acts wrong on the grounds that they are unnatural.

When the government makes laws, the number one principle should be ensuring that everyone is treated fairly.

Men and women each have different roles to play in society.

I think it's morally wrong that rich children inherit a lot of money while poor children inherit nothing.

People should not do things that are disgusting, even if no one is harmed.

I am proud of my country's history.

It can never be right to kill a human being.

Chastity is an important and valuable virtue.

Justice is the most important requirement for a society.

It is better to do good than to do bad.

It is more important to be a team player than to express oneself.

One of the worst things a person could do is hurt a defenseless animal.

If I were a soldier and disagreed with my commanding officer's orders, I would obey anyway because that is my duty.

Respect for authority is something all children need to learn.

How does this make you feel?

Last, we'll have you look at pictures. You can view each picture as long as you would like. When you are done viewing a picture, click the "Continue" button. After looking at each picture, you will be asked to rate, on 3 scales, how you felt while you were looking at it.

First, we ask you to rate how aroused you felt on a 9-point scale where 1 is not at all aroused, not at all excited, not at all awake and 9 is extremely aroused, excited, awake

Next, we will ask you to rate both how negative and how positive you felt while viewing each picture. We want you to rate how negative and positive you felt separately. So you can indicate if you feel both negative and positive reactions at the same time, or if you have either a strictly negative or strictly positive reaction.

You will rate how positive you felt on a 9-point scale where 1 is not at all positive, not at all happy, not at all pleased and 9 is extremely positive, happy, pleased.

You will rate how negative you felt on a 9-point scale where 1 is not at all negative, not at all unhappy, not at all annoyed and 9 is extremely negative, unhappy, annoyed.

How aroused and excited does this picture make you feel?

1 not at all aroused, not at all excited, not at all awake

2

3

4

5

6

7

8

9 extremely aroused, excited, awake

How positive does this picture make you feel?

1 not at all positive, not at all happy

2

3

4

5

6

7

8

9 extremely positive, happy

How negative does this picture make you feel?

1 not at all negative, not at all unhappy, not at all annoyed

2

3

4

5

6

7

8

9 extremely negative, unhappy, annoyed

Appendix B

Dissertation Study Instrument – Part 2

Survey Post

What are the last 4 digits of your cell phone number?

_ _ _ _

Are you:

Female

Male

I'd rather not say

How old are you?

_ _

What experimental condition are you in?

1

2

How Do You Feel Right Now?

These questions ask you about how you are feeling. Please indicate the extent to which you agree or disagree with the following statements:

Strongly Disagree						Strongly Agree
1	2	3	4	5	6	7

Right now I feel excited.

Right now I feel aroused.

Right now I feel revved up.

Right now I feel calm.

Right now I feel serene.

Right now I feel awake.

Right now I feel peppy.

Reaction

Imagine that you leave this building when you're done completing this survey. Someone is texting on their phone and bumps into you, spilling your drink and the contents of your backpack. Please indicate how you would react by circling the number that most closely corresponds with your answer. "0" means that the statement is "extremely uncharacteristic of me" and "6" indicates it is "extremely characteristic of me."

I would tell this person openly that I disagree with him or her.	0	1	2	3	4	5	6
I would find myself disagreeing with this person.	0	1	2	3	4	5	6
If this person annoyed me, I may tell him or her what I think of him or her.	0	1	2	3	4	5	6
I couldn't help getting into an argument if this person disagreed with me.	0	1	2	3	4	5	6
This person would say that I'm somewhat argumentative.	0	1	2	3	4	5	6

I wouldn't be able to control my urge to strike this person.	0	1	2	3	4	5	6
Given enough provocation, I would hit this person.	0	1	2	3	4	5	6
If this person hit me, I would hit back.	0	1	2	3	4	5	6
I'd get into a fight with this person a little more than other people would.	0	1	2	3	4	5	6
If I had to resort to violence against this person to protect my rights, I would.	0	1	2	3	4	5	6
If this person pushed me far enough, we would come to blows.	0	1	2	3	4	5	6
I could think of no good reason for ever hitting this person.	0	1	2	3	4	5	6
I might threaten this person.	0	1	2	3	4	5	6
I might become so mad at this person that I might break things.	0	1	2	3	4	5	6

Three Minute Test

In this section, you will complete a timed word completion task. Please type in the whole word that you are spelling, not just the letters you're using. In this section, please work quickly for the next 3 minutes. Your goal is to complete as many of the words as possible by filling in the missing letters. You do not need to complete the words in order and can skip around as much as you want.

b __ h __ __ __	p __ __ s o n
i n __ __ r e	p __ s t __ r
e x __ e __ __	m __ __ g l e
m u __ __ e r	b l __ n d
p r __ __ e	s n __ re
s p e a __	b __ e
f l i __ __ e r	h __ t
e x p l __ __ e	g __ __ p e
w __ __ m	s m __ c k
k i __ __	s m __ __ e
t __ p __	k n __ __ __
h __ p __	t __ n e
a __ t __ r	s __ __ b
c h o __ e	s h __ r __
s __ m p __ __	d r __ __ n
a t t __ c __	p __ __ n e
c __ m p __ __ t	a n g __ __
d e s __ __ __ __	f l __ __ t
s h __ l __	f i __ __ t
s h o __ t	p __ ck
r __ p __ __ t	h a __ e
s t r __ __ e	a __ t

l __ __ e c __ t

b __ r n w __ n

s t __ r __ o f __ r __ __

Did you just play a video game in the lab today?

Yes, I played already.

No, I will play after this.

Thoughts on the Video Game

How did you feel while playing the game? Please indicate your level of agreement with the following statements.

Indicate your level of agreement.

Strongly disagree	Disagree	Somewhat disagree	Neither agree nor disagree	Somewhat agree	Agree	Strongly agree
1	2	3	4	5	6	7

I felt unhappy when playing this game. (R)

I felt worried when playing this game. (R)

I felt happy when playing this game.

I felt exhausted when playing this game. (R)

I felt miserable when playing this game. (R)

If you were playing this game at home, how likely would you be to perform the following behaviors? Indicate your level of agreement with the following statements.

Strongly disagree	Disagree	Somewhat disagree	Neither agree nor disagree	Somewhat agree	Agree	Strongly agree
1	2	3	4	5	6	7

I would talk to myself when playing this game.

I would make loud comments even if nobody is around when playing this game.

I would swear when playing this game.

What are your thoughts about the game? Please indicate your level of agreement with the following statements.

Strongly disagree	Disagree	Somewhat disagree	Neither agree nor disagree	Somewhat agree	Agree	Strongly agree
1	2	3	4	5	6	7

Playing this game or interacting with its character(s) makes me more intelligent.

The activities in this game or the actions of its character(s) are respectable.

The activities in this game or the actions of its character(s) are decent.

This game has consistent quality.

This game is well made.

This game has an acceptable standard of quality.

This game has a poor design. (R)

This game would not entertain me for a long time. (R)

I concentrated on whether there were any inconsistencies in the game. (R)

I didn't really pay attention to the existence of errors or inconsistencies in the game.

I directed my attention to possible errors or contradictions in the game. (R)

I took a critical viewpoint of the game presentation. (R)

It was important for me to check whether inconsistencies were present in the game. (R)

It was important for me whether the game contained errors or contradictions. (R)

Think about your experience playing the game and indicate your level of agreement.

Strongly disagree	Disagree	Somewhat disagree	Neither agree nor disagree	Somewhat agree	Agree	Strongly agree
1	2	3	4	5	6	7

I lost track of time.

Things seemed to happen almost automatically.

I felt different.

I felt scared.

The game felt real.

If someone was talking to me, I didn't hear them.

I got wound up.

Time seemed to kind of stand still or stop.

I felt spaced out.

I wouldn't answer if someone would have talked to me.

I couldn't tell if I was getting tired.

Playing seemed automatic.

My thoughts went fast.

I lost track of where I was.

I played without thinking about how to play.

Playing made me feel calm.

I played longer than I meant to.

I really got into the game.

I felt like I just couldn't stop playing.

Perceptions

Last of all, what were your perceptions of the game?

The video game I just played:

Was not realistic						Was realistic
1	2	3	4	5	6	7
Was not enjoyable						Was enjoyable
1	2	3	4	5	6	7

Was not frustrating						Was frustrating
1	2	3	4	5	6	7
Had no violent content						Had violent content
1	2	3	4	5	6	7
Had no blood and gore						Had blood and gore
1	2	3	4	5	6	7
Had slow action						Had fast paced action
1	2	3	4	5	6	7
Was very boring						Was engaging
1	2	3	4	5	6	7
Did not maintain my attention						Maintained my attention
1	2	3	4	5	6	7

Was easy						Was difficult
1	2	3	4	5	6	7
Was not scary						Was very scary
1	2	3	4	5	6	7
Was not shocking						Was very shocking
1	2	3	4	5	6	7

Tables

Table A

Participant Sex

	Part 1		Part 2	
	N	%	*N*	%
Female	235	50.3	80	51.9
Male	228	48.8	74	48.1
I'd Rather Not Say	4	0.9	0	0
Total	467	100	154	100

Table B

Participant Age

	Part 1		Part 2	
	N	%	*N*	%
18	162	34.7	68	44.2
19	162	34.7	52	33.8
20	91	19.5	22	14.3
21	32	6.9	7	4.5
22	10	2.1	2	1.3
23	4	0.9	0	0
24	3	0.6	2	1.3
25	1	0.2	0	0
26	1	0.2	1	0.6
29	1	0.2	0	0
Total	467	100	154	100

Table C

Participant Class Year

	Part 1		Part 2	
	N	%	*N*	%
Freshman	262	56.1	104	67.5
Sophomore	138	29.6	31	20.1
Junior	48	10.3	16	10.4
Senior	19	4.1	3	1.9
Total	467	100	154	100

Table D

Participant Race

	Part 1		Part 2	
	N	%	*N*	%
White	349	74.7	113	73.4
Asian	49	10.5	16	10.4
Hispanic	31	6.6	10	6.5
African American	23	4.9	10	6.5
Other	8	1.7	3	1.9
I'd Rather Not Say	4	0.9	2	1.3
Missing Response	3	0.6	0	10
Total	467	100	154	100

Table E

Reported Number of Days Spent Gaming in the Previous Week

	Part 1		Part 2	
	N	%	*N*	%
0	243	52.0	85	55.6
1	65	13.9	18	11.7
2	44	9.4	13	8.4
3	35	7.5	9	5.8
4	30	6.4	13	8.4
5	20	4.3	3	1.9
6	8	1.7	5	3.2
7	21	4.5	7	4.5
Missing Response	1	0.2	1	0.6
Total	467	100	154	100

Table F

Reported Amount of Time Spent Gaming per Day in the Previous Week

	Part 1		Part 2	
	N	%	*N*	%
No time	239	51.2	80	51.9
30 mins	46	9.9	18	11.7
1 hr	53	11.3	18	11.7
2 hrs	48	10.3	15	9.7
3 hrs	36	7.7	10	6.5
4 hrs	18	3.9	5	3.2
5 hrs	11	2.4	3	1.9
6 or more hrs	15	3.2	5	3.2
Missing Response	1	0.2	0	0
Total	467	100	154	100

Table G

Factor Loadings for Video Game Skill

Item	Acceptance of Rules
I am a good video game player.	.94
I know a lot about video games.	.96
A lot of my free time is spent playing video games.	.91
Eigenvalue	2.63
Percent of variance	87.74

Table H

Correlation Matrix for Video Game Skill Items

	Initial	Extraction
I am a good video game player.	1.00	.88
I know a lot about video games.	1.00	.93
A lot of my free time is spent playing video games.	1.00	.83

Table I

Factor Loadings for Frequency of Video Game Play Items

Item	Violent	Non-violent
3-D Realistic Shooters (e.g., : Gears of War II, Medal of Honor)	.90	.06
Realistic Combat Role Playing (e.g., : Red Dead Redemption, GTA 4)	.90	.07
Combat Action (for example: God of War, Doom, Army of 2)	.89	.15
Combat Adventure (e.g., : Resident Evil, Fable)	.83	.28
Combat Arcade Type (e.g., : Street Fighter, WWF/WWE Wrestling)	.68	.34
Simulation or Strategic War Planning (e.g., : Age of Empires, Starcraft, Warcraft)	.66	.32
Sports or Competition (e.g., : Madden NFL, Tony Hawk)	.59	.05
Puzzle/Games (e.g., : Mario Party, Jeopardy, Poker)	.14	.84
Realistic Simulation Games (e.g., : Guitar Hero, Dance Dance Revolution, Flight Simulator)	.20	.81
Family/Other (e.g., : Lego, Finding Nemo, HotWheels Racing)	.09	.76
Eigenvalue	5.04	1.66
Percent of variance	44.30	22.65

Table J

Pearson r Correlations for Frequency of Video Game Play Items

		3D Shooter	Realistic Combat RPG	Combat Action	Combat Adv.	Combat Arcade	Sim War	Sports	Puzzle	Sim	Family
3D Shooter	Pearson Corr.	1	.811**	.788**	.719**	.562**	.525**	.531**	.213**	.274**	.120**
	Sig. (2-tailed)		.000	.000	.000	.000	.000	.000	.000	.000	.009
	N	467	467	467	467	467	467	467	467	467	467
Realistic Combat RPG	Pearson Corr.	.811**	1	.768**	.733**	.560**	.560**	.520**	.193**	.264**	.154**
	Sig. (2-tailed)	.000		.000	.000	.000	.000	.000	.000	.000	.001
	N	467	467	467	467	467	467	467	467	467	467
Combat Action	Pearson Corr.	.788**	.768**	1	.801**	.606**	.597**	.462**	.256**	.308**	.202**
	Sig. (2-tailed)	.000	.000		.000	.000	.000	.000	.000	.000	.000
	N	467	467	467	467	467	467	467	467	467	467
Combat Adv.	Pearson Corr.	.719**	.733**	.801**	1	.636**	.607**	.311**	.335**	.355**	.287**
	Sig. (2-tailed)	.000	.000	.000		.000	.000	.000	.000	.000	.000
	N	467	467	467	467	467	467	467	467	467	467
Combat Arcade	Pearson Corr.	.562**	.560**	.606**	.636**	1	.573**	.316**	.328**	.315**	.328**

	Sig. (2-tailed)	.000	.000	.000	.000		.000	.000	.000	.000	.000
	N	467	467	467	467	467	467	467	467	467	467
	Pearson Corr.	.525**	.560**	.597**	.607**	.573**	1	.256**	.301**	.332**	.276**
Sim War	Sig. (2-tailed)	.000	.000	.000	.000	.000		.000	.000	.000	.000
	N	467	467	467	467	467	467	467	467	467	467
	Pearson Corr.	.531**	.520**	.462**	.311**	.316**	.256**	1	.199**	.210**	.104*
Sports	Sig. (2-tailed)	.000	.000	.000	.000	.000	.000		.000	.000	.024
	N	467	467	467	467	467	467	467	467	467	467
	Pearson Corr.	.213**	.193**	.256**	.335**	.328**	.301**	.199**	1	.647**	.464**
Puzzle	Sig. (2-tailed)	.000	.000	.000	.000	.000	.000	.000		.000	.000
	N	467	467	467	467	467	467	467	467	467	467
	Pearson Corr.	.274**	.264**	.308**	.355**	.315**	.332**	.210**	.647**	1	.443**
Sim	Sig. (2-tailed)	.000	.000	.000	.000	.000	.000	.000	.000		.000
	N	467	467	467	467	467	467	467	467	467	467
	Pearson Corr.	.120**	.154**	.202**	.287**	.328**	.276**	.104*	.464**	.443**	1
Family	Sig. (2-tailed)	.009	.001	.000	.000	.000	.000	.024	.000	.000	
	N	467	467	467	467	467	467	467	467	467	467

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

Table K

Standardized Factor Loadings for Confirmatory Factor Analysis of Violent Game Play Items

Item	Violent Game
Combat Adventure Game	.91
Combat Action Game	.90
Realistic Combat Role Playing Game	.84
3D Shooter Game	.81
Comic Combat Game	.72
Adventure Game	.70
Combat Arcade Game	.70
Simulation War Game	.68
Role Playing Game	.58
Sports Game	.50
χ^2 / *df* ratio	1.27

Note: χ^2 (21, N = 467) = 26.75, p = .18 (comparative fit index [CFI] = .99, root mean square error of approximation [RMSEA] = .02, and standardized root mean square residual [SRMR] = .02).

Table L

Pearson r Correlations for Violent Game Play Items

		Combat Adventure	Combat Action	Real. Combat RPG	3D Shooter	Comic Combat	Advent.	Combat Arcade	Sim War	RPG	Sports
Combat Adventure	Pearson Corr.	1	.801**	.733**	.719**	.670**	.641**	.636**	.607**	.619**	.311**
	Sig. (2-tailed)		.000	.000	.000	.000	.000	.000	.000	.000	.000
	N	467	467	467	467	467	467	467	467	467	467
Combat Action	Pearson Corr.	.801**	1	.768**	.788**	.611**	.595**	.606**	.597**	.494**	.462**
	Sig. (2-tailed)	.000		.000	.000	.000	.000	.000	.000	.000	.000
	N	467	467	467	467	467	467	467	467	467	467
Realistic Combat RPG	Pearson Corr.	.733**	.768**	1	.811**	.573**	.526**	.560**	.560**	.455**	.520**
	Sig. (2-tailed)	.000	.000		.000	.000	.000	.000	.000	.000	.000
	N	467	467	467	467	467	467	467	467	467	467
3D Shooter	Pearson Corr.	.719**	.788**	.811**	1	.537**	.538**	.562**	.525**	.417**	.531**
	Sig. (2-tailed)	.000	.000	.000		.000	.000	.000	.000	.000	.000
	N	467	467	467	467	467	467	467	467	467	467
Comic Combat	Pearson Corr.	.670**	.611**	.573**	.537**	1	.511**	.671**	.508**	.467**	.326**

	Sig. (2-tailed)	.000	.000	.000	.000		.000	.000	.000	.000	.000
	N	467	467	467	467	467	467	467	467	467	467
	Pearson Corr.	.641**	.595**	.526**	.538**	.511**	1	.502**	.501**	.617**	.328**
Adventure	Sig. (2-tailed)	.000	.000	.000	.000	.000		.000	.000	.000	.000
	N	467	467	467	467	467	467	467	467	467	467
	Pearson Corr.	.636**	.606**	.560**	.562**	.671**	.502**	1	.573**	.423**	.316**
Combat Arcade	Sig. (2-tailed)	.000	.000	.000	.000	.000	.000		.000	.000	.000
	N	467	467	467	467	467	467	467	467	467	467
	Pearson Corr.	.607**	.597**	.560**	.525**	.508**	.501**	.573**	1	.579**	.256**
Sim War	Sig. (2-tailed)	.000	.000	.000	.000	.000	.000	.000		.000	.000
	N	467	467	467	467	467	467	467	467	467	467
	Pearson Corr.	.619**	.494**	.455**	.417**	.467**	.617**	.423**	.579**	1	.206**
RPG	Sig. (2-tailed)	.000	.000	.000	.000	.000	.000	.000	.000		.000
	N	467	467	467	467	467	467	467	467	467	467
	Pearson Corr.	.311**	.462**	.520**	.531**	.326**	.328**	.316**	.256**	.206**	1
Sports	Sig. (2-tailed)	.000	.000	.000	.000	.000	.000	.000	.000	.000	
	N	467	467	467	467	467	467	467	467	467	467

**. Correlation is significant at the 0.01 level (2-tailed).

Table M

Factor Loadings for Acceptance of Rules Items

Item	Acceptance of Rules
How interested are you in the processes underlying game mechanics?	.76
How important is it to you that your character is optimized for the game (collecting power-ups, leveling up, collecting best equipment)?	.82
How often do you use guides or internet information to plan your game play?	.67
How important is it to know as much about the controls and game rules as possible?	.79
How much do you enjoy trying out the roles or personality of your character?	.88
How much do you enjoy being immersed in a fantasy world?	.83
How often do you consider the story and history of your character?	.86
How often does the character's role or personality influence the choices you make?	.77
Eigenvalue	5.09
Percent of variance	63.61

Table N

Correlation Matrix for Acceptance of Rules Items

	Initial	Extraction
How interested are you in the processes underlying game mechanics?	1.00	.57
How important is it to you that your character is optimized for the game (collecting power-ups, leveling up, collecting best equipment)?	1.00	.67
How often do you use guides or internet information to plan your game play?	1.00	.44
How important is it to know as much about the controls and game rules as possible?	1.00	.62
How much do you enjoy trying out the roles or personality of your character?	1.00	.77
How much do you enjoy being immersed in a fantasy world?	1.00	.68
How often do you consider the story and history of your character?	1.00	.75
How often does the character's role or personality influence the choices you make?	1.00	.59

Table O

Standardized Factor Loadings for Confirmatory Factor Analysis of Acceptance of Rules Items

Item	Acceptance of Rules
RPG 5. How much do you enjoy trying out the roles or personality of your character?	.90
RPG 6. How much do you enjoy being immersed in a fantasy world?	.77
RPG 7. How often do you consider the story and history of your character?	.86
RPG 8. How often does the character's role or personality influence the choices you make?	.79
Mech 4. How important is it to know as much about the controls and game rules as possible?	.85
Mech 3. How often do you use guides or internet information to plan your game play?	.58
Mech 2. How important is it to you that your character is optimized for the game (collecting power-ups, leveling up, collecting best equipment)?	.76
Mech 1. How interested are you in the processes underlying game mechanics?	.77
χ^2 / *df* ratio	.80

Note: χ^2 (20, N = 85) = 25.78, p = .17 (comparative fit index [CFI] = .84, root mean square error of approximation [RMSEA] = .06, and standardized root mean square residual [SRMR] = .06).

Table P

Pearson r Correlations for Acceptance of Rules Items

		Mech 1	Mech 2	Mech 3	Mech 4	RP 1	RP 2	RP 3	RPG 4
Mech 1	Pearson Correlation	1	.471**	.448**	.560**	.654**	.515**	.679**	.481**
	Sig. (2-tailed)		.000	.000	.000	.000	.000	.000	.000
	N	85	85	85	85	85	85	85	85
Mech 2	Pearson Correlation	.471**	1	.372**	679**	.652**	.580**	.584**	.555**
	Sig. (2-tailed)	.000	.000	.000	.000	.000	.000	.000	.000
	N	85	85	85	85	85	85	85	85
Mech 3	Pearson Correlation	.448**	.372**	1	458**	412**	.344**	473**	.496**
	Sig. (2-tailed)	.000	.000	.000	.000	.000	.000	.000	.000
	N	85	85	85	85	85	85	85	85
Mech 4	Pearson Correlation	.560**	.679**	.458**	1	.726**	.627**	.700**	.549**
	Sig. (2-tailed)	.000	.000	.000	.000	.000	.000	.000	.000
	N	85	85	85	85	85	85	85	85
RPG 1	Pearson Correlation	.654**	.652**	.412**	.726**	1	.702**	.715**	.672**
	Sig. (2-tailed)	.000	.000	.000	.000	.000	.000	.000	.000
	N	85	85	85	85	85	85	85	85
RPG 2	Pearson Correlation	.515**	.580**	.344**	.627**	.702**	1	.620**	.562**
	Sig. (2-tailed)	.000	.000	.000	.000	.000	.000	.000	.000
	N	85	85	85	85	85	85	85	85
RPG 3	Pearson Correlation	..679**	.584**	.473**	.700**	.715**	.620**	1	.639**
	Sig. (2-tailed)	.000	.000	.000	.000	.000	.000	.000	.000
	N	85	85	85	85	85	85	85	85
RPG 4	Pearson Correlation	.481**	.555**	.496**	.549**	.672**	.562**	.639**	1

	Sig. (2-tailed)	.000	.000	.000	.000	.000	.000	.000	.000
	N	85	85	85	85	85	85	85	85

** Correlation is significant at the 0.01 level (2-tailed).

Table Q
Pearson r Correlations for Mechanics and Role Playing Factors

		Mechanics	Role Playing
Mechanics	Pearson Correlation	1	.837**
	Sig. (2-tailed)		.000
	N	85	85
Role Playing	Pearson Correlation	.837**	1
	Sig. (2-tailed)	.000	
	N	85	85

**. Correlation is significant at the 0.01 level (2-tailed).

Table R

EFA Factor Loadings for Openness Items

Item	Abstract	Creative	Flexibility	Refined
IO 8. I am not interested in theoretical discussions. (R)	.86	-.04	.12	-.04
IO 9. I try to avoid complex people. (R)	.84	-.07	.18	.04
IO 10. I rarely look for a deeper meaning in things. (R)	.73	.19	.00	.18
IO 7. I am not interested in abstract ideas. (R)	.69	.26	-.01	-.38
O 7. I see myself as someone who is very creative.	.02	.94	.03	-.04
O 6. I see myself as someone who is very imaginative.	.13	.91	.12	.15
IO 7. I prefer variety to routine.	.01	.11	.88	.04
IO 5. I am open to change.	.20	.03	.87	-.02
O 9. I see myself as someone who is very refined.	.03	.10	.02	.95
Eigenvalue	2.88	1.71	1.40	1.06
Percent of variance	27.90	20.36	17.69	12.23

Table S

Standardized Factor Loadings for Confirmatory Factor Analysis of Openness Items

Item	Openness
Open 3. I see myself as analytical.	.60
Open 4. I see myself as reflective.	.65
Open 5. I see myself as inquisitive.	.65
Open 6. I see myself as imaginative.	.82
Open 7. I see myself as creative.	.57
Open 8. I see myself as cultured.	.56
Open 9. I see myself as refined.	.52
Open 10. I see myself as sophisticated.	.68
Int Open 1. I carry the conversation to a higher level.	.56
Int Open 2. I am interested in many things.	.83
Int Open 3. I prefer variety to routine.	.57
Int Open 4. I want to increase my knowledge.	.80
Int Open 5. I am open to change.	.75
Int Open 7. I am not interested in abstract ideas (R).	.52
Int Open 10. I rarely look for a deeper meaning in things. (R).	.55
Int Open 9. I try to avoid complex people. (R).	.77
Int Open 8. I am not interested in theoretical discussions. (R).	.67
Open 1.	.41
χ^2 / *df* ratio	1.18

Note: χ^2 (131, N = 85) = 154.39, p = .08 (comparative fit index [CFI] = .64, root mean square error of approximation [RMSEA] = .05, and standardized root mean square residual [SRMR] = .18).

Table T
Pearson r Correlations for Openness Items

		Open 1	Open 3	Open4	Open5	Open6	Open7	Open8	Open9	Open1 0	Int Open1	Int Open2	Int Open3	Int Open4	Int Open 5	Int Open 7	Int Open8	Int Open 9	Int Open 10
Open 1	Pearson Correlation	1	.234*	.249*	.269*	.157	.085	.227*	.175	.268*	.157	.264*	.136	.229*	.075	.155	.164	.251*	.151
	Sig. (2-tailed)		.031	.022	.013	.152	.437	.036	.110	.013	.150	.014	.213	.035	.498	.157	.134	.021	.169
	N	85	85	85	85	85	85	85	85	85	85	85	85	85	85	85	85	85	85
Open 3	Pearson Correlation	.234*	1	.413**	.428**	.350**	.195	.159	.185	.113	.189	.388**	.154	.400**	.078	.177	.186	.207	.231*
	Sig. (2-tailed)	.031		.000	.000	.001	.073	.145	.090	.305	.084	.000	.158	.000	.477	.105	.089	.057	.033
	N	85	85	85	85	85	85	85	85	85	85	85	85	85	85	85	85	85	85
Open 4	Pearson Correlation	.249*	.413**	1	.450**	.377**	.190	.144	.334**	.435**	.304**	.403**	.059	.302**	.128	-.042	-.058	.057	.040
	Sig. (2-tailed)	.022	.000		.000	.000	.081	.189	.002	.000	.005	.000	.590	.005	.245	.705	.598	.606	.716
	N	85	85	85	85	85	85	85	85	85	85	85	85	85	85	85	85	85	85
Open 5	Pearson Correlation	.269*	.428**	.450**	1	.346**	.191	.263*	.045	.211	.302**	.533**	.189	.386**	.242*	.192	.069	.217*	.140
	Sig. (2-tailed)	.013	.000	.000		.001	.079	.015	.681	.052	.005	.000	.083	.000	.026	.078	.533	.046	.201
	N	85	85	85	85	85	85	85	85	85	85	85	85	85	85	85	85	85	85
Open 6	Pearson Correlation	.157	.350**	.377**	.346**	1	.751**	.328**	.209	.457**	.414**	.308**	.183	.327**	.166	.255*	.111	.074	.260*
	Sig. (2-tailed)	.152	.001	.000	.001		.000	.002	.055	.000	.000	.004	.093	.002	.130	.019	.312	.498	.016
	N	85	85	85	85	85	85	85	85	85	85	85	85	85	85	85	85	85	85
Open 7	Pearson Correlation	.085	.195	.190	.191	.751**	1	.300**	.042	.377**	.377**	.177	.115	.142	.060	.213	-.002	.020	.179

	Sig. (2-tailed)	.437	.073	.081	.079	.000		.005	.701	.000	.000	.106	.296	.193	.584	.050	.986	.856	.102
	N	85	85	85	85	85	85	85	85	85	85	85	85	85	85	85	85	85	85
	Pearson	.227*	.159	.144	.263*	.328**	.300**	1	.231*	.419**	.401**	.392**	.326**	.193	.276*	.143	.187	.304*	.084
Open	Correlation																		
8	Sig. (2-tailed)	.036	.145	.189	.015	.002	.005		.034	.000	.000	.000	.002	.076	.011	.191	.086	.005	.446
	N	85	85	85	85	85	85	85	85	85	85	85	85	85	85	85	85	85	85
	Pearson	.175	.185	.334**	.045	.209	.042	.231*	1	.486**	.196	.321**	.069	.181	.001	-.162	.004	.028	.062
Open	Correlation																		
9	Sig. (2-tailed)	.110	.090	.002	.681	.055	.701	.034		.000	.073	.003	.528	.097	.996	.139	.969	.799	.572
	N	85	85	85	85	85	85	85	85	85	85	85	85	85	85	85	85	85	85
	Pearson	.268*	.113	.435**	.211	.457**	.377**	.419**	.486**	1	.586**	.380**	.208	.171	.154	.130	.112	.187	.126
Open	Correlation																		
10	Sig. (2-tailed)	.013	.305	.000	.052	.000	.000	.000	.000		.000	.000	.056	.117	.158	.236	.307	.087	.250
	N	85	85	85	85	85	85	85	85	85	85	85	85	85	85	85	85	85	85
	Pearson	.157	.189	.304**	.302**	.414**	.377**	.401**	.196	.586**	1	.397**	.326**	.297**	.375*	.009	.055	.206	.161
IntOp	Correlation																		
en1	Sig. (2-tailed)	.150	.084	.005	.005	.000	.000	.000	.073	.000		.000	.002	.006	.000	.932	.615	.058	.141
	N	85	85	85	85	85	85	85	85	85	85	85	85	85	85	85	85	85	85
	Pearson	.264*	.388**	.403**	.533**	.308**	.177	.392**	.321**	.380**	.397**	1	.418**	.593**	.364*	.151	.151	.393*	.210
IntOp	Correlation																		
en2	Sig. (2-tailed)	.014	.000	.000	.000	.004	.106	.000	.003	.000	.000		.000	.000	.001	.167	.167	.000	.054
	N	85	85	85	85	85	85	85	85	85	85	85	85	85	85	85	85	85	85
	Pearson	.136	.154	.059	.189	.183	.115	.326**	.069	.208	.326**	.418**	1	.369**	.566*	.064	.124	.145	.058
IntOp	Correlation																		
en3	Sig. (2-tailed)	.213	.158	.590	.083	.093	.296	.002	.528	.056	.002	.000		.001	.000	.564	.259	.187	.600
	N	85	85	85	85	85	85	85	85	85	85	85	85	85	85	85	85	85	85
IntOp	Pearson	.229*	.400**	.302**	.386**	.327**	.142	.193	.181	.171	.297**	.593**	.369**	1	.527*	.211	.155	.365*	.267*
en4	Correlation																		
	Sig. (2-tailed)	.035	.000	.005	.000	.002	.193	.076	.097	.117	.006	.000	.001		.000	.053	.158	.001	.013

	N	85	85	85	85	85	85	85	85	85	85	85	85	85	85	85	85	85	85
	Pearson	.075	.078	.128	.242*	.166	.060	.276*	.001	.154	.375**	.364**	.566**	.527**	1	.115	.253*	.301*	.163
IntOp	Correlation																		
en5	Sig. (2-tailed)	.498	.477	.245	.026	.130	.584	.011	.996	.158	.000	.001	.000	.000		.296	.020	.005	.135
	N	85	85	85	85	85	85	85	85	85	85	85	85	85	85	85	85	85	85
	Pearson	.155	.177	-.042	.192	.255*	.213	.143	-.162	.130	.009	.151	.064	.211	.115	1	.571**	.470*	.313*
IntOp	Correlation																		
en7	Sig. (2-tailed)	.157	.105	.705	.078	.019	.050	.191	.139	.236	.932	.167	.564	.053	.296		.000	.000	.003
	N	85	85	85	85	85	85	85	85	85	85	85	85	85	85	85	85	85	85
	Pearson	.164	.186	-.058	.069	.111	-.002	.187	.004	.112	.055	.151	.124	.155	.253*	.571*	1	.629*	.490*
IntOp	Correlation																		
en8	Sig. (2-tailed)	.134	.089	.598	.533	.312	.986	.086	.969	.307	.615	.167	.259	.158	.020	.000		.000	.000
	N	85	85	85	85	85	85	85	85	85	85	85	85	85	85	85	85	85	85
	Pearson	.251*	.207	.057	.217*	.074	.020	.304**	.028	.187	.206	.393**	.145	.365**	.301*	.470*	.629**	1	.529*
IntOp	Correlation																		
en9	Sig. (2-tailed)	.021	.057	.606	.046	.498	.856	.005	.799	.087	.058	.000	.187	.001	.005	.000	.000		.000
	N	85	85	85	85	85	85	85	85	85	85	85	85	85	85	85	85	85	85
	Pearson	.151	.231*	.040	.140	.260*	.179	.084	.062	.126	.161	.210	.058	.267*	.163	.313*	.490**	.529*	1
IntOp	Correlation																		
en10	Sig. (2-tailed)	.169	.033	.716	.201	.016	.102	.446	.572	.250	.141	.054	.600	.013	.135	.003	.000	.000	
	N	85	85	85	85	85	85	85	85	85	85	85	85	85	85	85	85	85	85

*. Correlation is significant at the 0.05 level (2-tailed).

**. Correlation is significant at the 0.01 level (2-tailed).

Table U
Pearson r Correlations for Openness Factors

		Openness	Intellectual Openness
Openness	Pearson Correlation	1	.470**
	Sig. (2-tailed)		.000
	N	85	85
Intellectual Openness	Pearson Correlation	.470**	1
	Sig. (2-tailed)	.000	
	N	85	85

**. Correlation is significant at the 0.01 level (2-tailed).

Table V

Factor Loadings for Trait Aggression Items

Item	Hostility	Verbal	Physical	Suspicious	Retaliate	Even
I wonder why sometimes I feel so bitter about things.	.84	.14	.14	.17	.01	-.05
At times I feel I have gotten a raw deal out of life.	.81	-.04	.18	.12	-.09	.10
Other people always seem to get the breaks.	.76	.08	.07	.25	.15	.06
I am sometimes eaten up with jealousy.	.71	.17	.29	.02	-.18	.02
I tell my friends openly when I disagree with them.	-.12	.80	.01	.08	.05	.10
When people annoy me, I may tell them what I think of them.	.06	.76	.00	.08	.08	-.12
I can't help getting into arguments when people disagree with me.	.16	.71	.26	.28	-.05	.01
I often find myself disagreeing with people.	.31	.69	.17	.30	.03	.04
When frustrated, I let my irritation show.	.26	.66	.26	-.36	-.00	.04
I get into fights a little more than the average person.	.22	-.03	.89	.07	.00	.04
Once in a while I can't control the urge to strike another person.	.19	.09	.82	.11	.22	.10

There are people who pushed me so far that we came to blows.	.25	.18	.74	-.13	.10	-.10
I have threatened people I know.	-.02	.26	.67	.24	.05	.15
When people are especially nice, I wonder what they want.	.28	.15	.18	.84	-.09	-.04
I am suspicious of overly friendly strangers.	.32	.26	.06	.74	.04	-.19
I can think of no good reason for ever hitting a person. (R)	-.18	-.04	.11	.07	.81	.32
If somebody hits me, I hit back.	.12	.21	.26	-.17	.74	-.37
I am an even-tempered person. (R)	.14	.05	.14	-.17	.07	.89
Eigenvalue	5.49	2.19	2.11	1.33	1.08	1.01
Percent of variance	16.95	16.39	15.95	10.16	7.44	6.48

Table W

Standardized Factor Loadings for Confirmatory Factor Analysis of Trait Aggression Items

Item	Openness
TA 14. My friends say that I'm somewhat argumentative.	.70
TA 13. I can't help getting into arguments when people disagree with me.	.80
TA 12. When people annoy me, I may tell them what I think of them.	.50
TA 10. I tell my friends openly when I disagree with them.	.50
TA 11. I often find myself disagreeing with people.	.76
TA 9. I have become so mad that I have broken things.	.72
TA 8. I have threatened people I know.	.73
TA 6. There are people who pushed me so far that we came to blows.	.61
TA 5. If I have to resort to violence to protect my rights, I will.	.64
TA 3. If somebody hits me, I hit back.	.51
TA 1. Once in a while I can't control the urge to strike another person.	.83
TA 2. Given enough provocation, I may hit another person.	.80
TA 15. I flare up quickly but get over it quickly.	.66
TA 16. When frustrated, I let my irritation show.	.65

TA 17. I sometimes feel like a powder keg ready to explode.	.80
TA 18. I am an even-tempered person.	.42
TA 19. Some of my friends think I'm a hothead.	.85
TA 20. Sometimes I fly off the handle for no good reason.	.91
TA 21. I have trouble controlling my temper.	.87
χ^2 / *df* ratio	1.01

Note: χ^2 (149, N = 85) = 150.17, p = .46 (comparative fit index [CFI] = .97, root mean square error of approximation [RMSEA] = .01, and standardized root mean square residual [SRMR] = .19).

Table X

Pearson r Correlations for Trait Aggression Items

		Trait Agg 14	Trait Agg 13	Trait Agg 12	Trait Agg 10	Trait Agg 11	Trait Agg 9	Trait Agg 8	Trait Agg 6	Trait Agg 5	Trait Agg 3	Trait Agg 1	Trait Agg 2	Trait Agg 15	Trait Agg 16	Trait Agg 17	Trait Agg 18	Trait Agg 19	Trait Agg 20	Trait Agg 21
Trait Agg 14	Pearson Corr.	1	.606**	.399**	.379**	.574**	.275*	.257*	.250*	.221*	.060	.349**	.115	.435**	.350**	.423**	.171	.537**	.510**	.518**
	Sig. (2-tailed)		.000	.000	.000	.000	.011	.018	.021	.042	.585	.001	.295	.000	.001	.000	.118	.000	.000	.000
	N	85	85	85	85	85	85	85	85	85	85	85	85	85	85	85	85	85	85	85
Trait Agg 13	Pearson Corr.	.606**	1	.527**	.445**	.618**	.258*	.435**	.323**	.319**	.158	.276*	.205	.469**	.421**	.396**	.028	.519**	.481**	.394**
	Sig. (2-tailed)	.000		.000	.000	.000	.017	.000	.003	.003	.149	.011	.060	.000	.000	.000	.797	.000	.000	.000
	N	85	85	85	85	85	85	85	85	85	85	85	85	85	85	85	85	85	85	85
Trait Agg 12	Pearson Corr.	.399**	.527**	1	.524**	.442**	.092	.089	.198	.206	.175	.107	.165	.388**	.369**	.222*	-.045	.259*	.145	.156
	Sig. (2-tailed)	.000	.000		.000	.000	.403	.419	.070	.059	.110	.330	.130	.000	.001	.041	.679	.017	.186	.155
	N	85	85	85	85	85	85	85	85	85	85	85	85	85	85	85	85	85	85	85
Trait Agg 10	Pearson Corr.	.379**	.445**	.524**	1	.489**	.185	.285**	.164	.226*	.146	.050	.198	.301**	.360**	.195	.058	.133	.060	.157
	Sig. (2-tailed)	.000	.000	.000		.000	.090	.008	.134	.037	.184	.646	.069	.005	.001	.073	.596	.224	.585	.152
	N	85	85	85	85	85	85	85	85	85	85	85	85	85	85	85	85	85	85	85
Trait Agg 11	Pearson Correlation	.574**	.618**	.442**	.489**	1	.305**	.354**	.233*	.206	.177	.360**	.246*	.475**	.481**	.407**	.046	.404**	.431**	.475**
	Sig. (2-tailed)	.000	.000	.000	.000		.005	.001	.032	.058	.105	.001	.024	.000	.000	.000	.675	.000	.000	.000
	N	85	85	85	85	85	85	85	85	85	85	85	85	85	85	85	85	85	85	85
Trait Agg 9	Pearson Corr.	.275*	.258*	.092	.185	.305**	1	.560**	.356**	.439**	.328**	.560**	.405**	.397**	.338**	.423**	.306**	.453**	.432**	.490**
	Sig. (2-tailed)	.011	.017	.403	.090	.005		.000	.001	.000	.002	.000	.000	.000	.002	.000	.004	.000	.000	.000
	N	85	85	85	85	85	85	85	85	85	85	85	85	85	85	85	85	85	85	85
Trait Agg 8	Pearson Corr.	.257*	.435**	.089	.285**	.354**	.560**	1	.373**	.462**	.235*	.476**	.511**	.289**	.243*	.276*	.133	.355**	.370**	.416**
	Sig. (2-tailed)	.018	.000	.419	.008	.001	.000		.000	.000	.030	.000	.000	.007	.025	.010	.225	.001	.000	.000
	N	85	85	85	85	85	85	85	85	85	85	85	85	85	85	85	85	85	85	85

Trait Agg 6	Pearson Corr.	.250*	.323**	.198	.164	.233*	.356**	.373**	1	.448**	.315**	.556**	.501**	.264*	.322**	.522**	.123	.397**	.398**	.331**
	Sig. (2-tailed)	.021	.003	.070	.134	.032	.001	.000		.000	.003	.000	.000	.015	.003	.000	.261	.000	.000	.002
	N	85	85	85	85	85	85	85	85	85	85	85	85	85	85	85	85	85	85	85
Trait Agg 5	Pearson Corr.	.221*	.319**	.206	.226*	.206	.439**	.462**	.448**	1	.470**	.489**	.628**	.322**	.240*	.306**	.121	.343**	.306**	.317**
	Sig. (2-tailed)	.042	.003	.059	.037	.058	.000	.000	.000		.000	.000	.000	.003	.027	.004	.272	.001	.004	.003
	N	85	85	85	85	85	85	85	85	85	85	85	85	85	85	85	85	85	85	85
Trait Agg 3	Pearson Corr.	.060	.158	.175	.146	.177	.328**	.235*	.315**	.470**	1	.348**	.596**	.271*	.301**	.257*	-.103	.156	.056	.106
	Sig. (2-tailed)	.585	.149	.110	.184	.105	.002	.030	.003	.000		.001	.000	.012	.005	.017	.347	.154	.613	.333
	N	85	85	85	85	85	85	85	85	85	85	85	85	85	85	85	85	85	85	85
Trait Agg 1	Pearson Corr.	.349**	.276*	.107	.050	.360**	.560**	.476**	.556**	.489**	.348**	1	.624**	.323**	.357**	.473**	.248*	.510**	.536**	.537**
	Sig. (2-tailed)	.001	.011	.330	.646	.001	.000	.000	.000	.000	.001		.000	.003	.001	.000	.022	.000	.000	.000
	N	85	85	85	85	85	85	85	85	85	85	85	85	85	85	85	85	85	85	85
Trait Agg 2	Pearson Corr.	.115	.205	.165	.198	.246*	.405**	.511**	.501**	.628**	.596**	.624**	1	.310**	.254*	.290**	.057	.244*	.256*	.255*
	Sig. (2-tailed)	.295	.060	.130	.069	.024	.000	.000	.000	.000	.000	.000		.004	.019	.007	.605	.024	.018	.019
	N	85	85	85	85	85	85	85	85	85	85	85	85	85	85	85	85	85	85	85
Trait Agg 15	Pearson Corr.	.435**	.469**	.388**	.301**	.475**	.397**	.289**	.264*	.322**	.271*	.323**	.310**	1	.441**	.478**	.198	.440**	.466**	.456**
	Sig. (2-tailed)	.000	.000	.000	.005	.000	.000	.007	.015	.003	.012	.003	.004		.000	.000	.070	.000	.000	.000
	N	85	85	85	85	85	85	85	85	85	85	85	85	85	85	85	85	85	85	85
Trait Agg 16	Pearson Corr.	.350**	.421**	.369**	.360**	.481**	.338**	.243*	.322**	.240*	.301**	.357**	.254*	.441**	1	.565**	.231*	.374**	.341**	.292**
	Sig. (2-tailed)	.001	.000	.001	.001	.000	.002	.025	.003	.027	.005	.001	.019	.000		.000	.033	.000	.001	.007
	N	85	85	85	85	85	85	85	85	85	85	85	85	85	85	85	85	85	85	85
Trait Agg 17	Pearson Corr.	.423**	.396**	.222*	.195	.407**	.423**	.276*	.522**	.306**	.257*	.473**	.290**	.478**	.565**	1	.417**	.585**	.671**	.565**
	Sig. (2-tailed)	.000	.000	.041	.073	.000	.000	.010	.000	.004	.017	.000	.007	.000	.000		.000	.000	.000	.000
	N	85	85	85	85	85	85	85	85	85	85	85	85	85	85	85	85	85	85	85
Trait Agg 18	Pearson Corr.	.171	.028	-.045	.058	.046	.306**	.133	.123	.121	-.103	.248*	.057	.198	.231*	.417**	1	.308**	.391**	.401**
	Sig. (2-tailed)	.118	.797	.679	.596	.675	.004	.225	.261	.272	.347	.022	.605	.070	.033	.000		.004	.000	.000
	N	85	85	85	85	85	85	85	85	85	85	85	85	85	85	85	85	85	85	85
Trait Agg 19	Pearson Corr.	.537**	.519**	.259*	.133	.404**	.453**	.355**	.397**	.343**	.156	.510**	.244*	.440**	.374**	.585**	.308**	1	.766**	.739**
	Sig. (2-tailed)	.000	.000	.017	.224	.000	.000	.001	.000	.001	.154	.000	.024	.000	.000	.000	.004		.000	.000

	N	85	85	85	85	85	85	85	85	85	85	85	85	85	85	85	85	85	85	85
Trait Agg 20	Pearson Corr.	.510**	.481**	.145	.060	.431**	.432**	.370**	.398**	.306**	.056	.536**	.256*	.466**	.341**	.671**	.391**	.766**	1	.784**
	Sig. (2-tailed)	.000	.000	.186	.585	.000	.000	.000	.000	.004	.613	.000	.018	.000	.001	.000	.000	.000		.000
	N	85	85	85	85	85	85	85	85	85	85	85	85	85	85	85	85	85	85	85
Trait Agg 21	Pearson Corr.	.518**	.394**	.156	.157	.475**	.490**	.416**	.331**	.317**	.106	.537**	.255*	.456**	.292**	.565**	.401**	.739**	.784**	1
	Sig. (2-tailed)	.000	.000	.155	.152	.000	.000	.000	.002	.003	.333	.000	.019	.000	.007	.000	.000	.000	.000	
	N	85	85	85	85	85	85	85	85	85	85	85	85	85	85	85	85	85	85	85

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

Table Y
Pearsons r Correlations for Trait Aggression Factors

		Physical Agg	Verbal Agg	Anger
Physical Agg	Pearson Correlation	1	.387**	.557**
	Sig. (2-tailed)		.000	.000
	N	85	85	85
Verbal Agg	Pearson Correlation	.387**	1	.560**
	Sig. (2-tailed)	.000		.000
	N	85	85	85
Anger	Pearson Correlation	.557**	.560**	1
	Sig. (2-tailed)	.000	.000	
	N	85	85	85

**. Correlation is significant at the 0.01 level (2-tailed).

Table Z

Factor Loadings for State Aggression Items

Item	Verbal	Physical
I would tell this person openly that I disagree with him or her.	.91	.10
If this person annoyed me, I may tell him or her what I think of him or her.	.80	.15
I would find myself disagreeing with this person.	.80	.19
This person would say that I'm somewhat argumentative.	.80	.34
I couldn't help getting into an argument if this person disagreed with me.	.75	.28
If I had to resort to violence against this person to protect my rights, I would.	.13	.87
If this person pushed me far enough, we would come to blows.	.30	.82
If this person hit me, I would hit back.	.21	.81
I could think of no good reason for ever hitting this person.	.12	.52
Eigenvalue	4.55	1.55
Percent of variance	38.70	29.14

Table AA

Standardized Factor Loadings for CFA of State Aggression Items

Item	Openness
I would tell this person openly that I disagree with him or her.	.92
If this person annoyed me, I may tell him or her what I think of him or her.	.75
I would find myself disagreeing with this person.	.82
This person would say that I'm somewhat argumentative.	.87
I couldn't help getting into an argument if this person disagreed with me.	.79
If I had to resort to violence against this person to protect my rights, I would.	.86
If this person pushed me far enough, we would come to blows.	.86
If this person hit me, I would hit back.	.79
I could think of no good reason for ever hitting this person.	.42
χ^2 / *df* ratio	1.34

Note: χ^2 (25, N = 85) = 33.48, p = .12 (comparative fit index [CFI] = .86, root mean square error of approximation [RMSEA] = .06, and standardized root mean square residual [SRMR] = .07).

Table AB
Pearson r Correlations for State Aggression Items

		State Agg1	State Agg2	State Agg3	State Agg4	State Agg5	State Agg8	State Agg10	State Agg11	State Agg12
State Agg1	Pearson Corr.	1	.764**	.711**	.604**	.684**	.276*	.246*	.355**	.177
	Sig. (2-tailed)		.000	.000	.000	.000	.011	.023	.001	.106
	N	85	85	85	85	85	85	85	85	85
State Agg2	Pearson Corr.	.764**	1	.577**	.512**	.592**	.366**	.323**	.390**	.088
	Sig. (2-tailed)	.000		.000	.000	.000	.001	.003	.000	.421
	N	85	85	85	85	85	85	85	85	85
State Agg3	Pearson Corr.	.711**	.577**	1	.521**	.606**	.269*	.268*	.401**	.178
	Sig. (2-tailed)	.000	.000		.000	.000	.013	.013	.000	.102
	N	85	85	85	85	85	85	85	85	85
State Agg4	Pearson Corr.	.604**	.512**	.521**	1	.761**	.341**	.267*	.422**	.334**
	Sig. (2-tailed)	.000	.000	.000		.000	.001	.014	.000	.002
	N	85	85	85	85	85	85	85	85	85
State Agg5	Pearson Corr.	.684**	.592**	.606**	.761**	1	.460**	.361**	.480**	.255*
	Sig. (2-tailed)	.000	.000	.000	.000		.000	.001	.000	.018
	N	85	85	85	85	85	85	85	85	85
State Agg8	Pearson Corr.	.276*	.366**	.269*	.341**	.460**	1	.687**	.609**	.263*
	Sig. (2-tailed)	.011	.001	.013	.001	.000		.000	.000	.015
	N	85	85	85	85	85	85	85	85	85
State Agg10	Pearson Corr.	.246*	.323**	.268*	.267*	.361**	.687**	1	.705**	.263*
	Sig. (2-tailed)	.023	.003	.013	.014	.001	.000		.000	.015
	N	85	85	85	85	85	85	85	85	85
State Agg11	Pearson Corr.	.355**	.390**	.401**	.422**	.480**	.609**	.705**	1	.399**
	Sig. (2-tailed)	.001	.000	.000	.000	.000	.000	.000		.000
	N	85	85	85	85	85	85	85	85	85

State Agg12	Pearson Corr.	.177	.088	.178	.334**	.255*	.263*	.263*	.399**	1
	Sig. (2-tailed)	.106	.421	.102	.002	.018	.015	.015	.000	
	N	85	85	85	85	85	85	85	85	85

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

Table AC
Pearson r Correlations for State Aggression Factors

		Nov3StatePhysAgg	Nov3StateVerbAgg
Nov3StatePhysAgg	Pearson Correlation	1	.471**
	Sig. (2-tailed)		.000
	N	85	85
Nov3StateVerbAgg	Pearson Correlation	.471**	1
	Sig. (2-tailed)	.000	
	N	85	85

**. Correlation is significant at the 0.01 level (2-tailed).

Table AD

Factor Loadings for Enjoyment Items

Item	Affective	PERVAL	Behavioral	Cognitive
I felt miserable when playing this game. (R)	.84	.18	-.11	-.03
I felt worried when playing this game. (R)	.80	.01	.26	.13
I felt unhappy when playing this game. (R)	.79	.09	-.07	.18
I felt exhausted when playing this game. (R)	.75	.13	.01	.08
This game would not entertainment for a long time. (R)	.66	.30	-.10	.24
This game is well made.	.12	.90	-.03	.18
This game has an acceptable standard of quality.	.08	.85	.03	.14
This game has consistent quality.	.10	.82	.02	.21
This game has a poor design. (R)	.31	.74	.06	.01
I would make loud comments even if nobody was around when playing this game.	-.01	-.01	.92	.08
I would swear when playing this game.	-.07	-.02	.87	-.07
I would talk to myself when playing this game.	.05	.09	.86	-.02
The activities in this game or the actions of its character(s) are respectable.	.19	.19	.11	.82
The activities in this game or the actions of its character(s) are decent.	.02	.17	-.08	.75
Playing this game or interacting with its character(s) makes me more intelligent.	.18	.08	-.01	.70
Eigenvalue	4.65	2.47	2.01	1.41
Percent of variance	21.08	19.81	16.46	12.89

Table AE

Standardized Factor Loadings for CFA of Enjoyment Items

Item	Openness
I felt unhappy when playing this game. (R)	.63
I felt worried when playing this game. (R)	.50
I felt happy when playing this game.	.76
I felt exhausted when playing this game. (R)	
I felt miserable when playing this game. (R)	.56
Playing this game or interacting with its character(s) makes me more intelligent.	.70
The activities in this game or the actions of its character(s) are respectable.	.45
The activities in this game or the actions of its character(s) are decent.	.37
This game has consistent quality.	.79
This game is well made.	.94
This game has an acceptable standard of quality.	.80
This game has a poor design. (R)	.74
This game would not entertainment for a long time. (R)	.65
χ^2 / *df* ratio	1.23

Note: χ^2 (61, N = 85) = 74.70, p = .11 (comparative fit index [CFI] = .78, root mean square error of approximation [RMSEA] = .05, and standardized root mean square residual [SRMR] = .16).

Table AF
Pearson r Correlations for Enjoyment Items

		Enjoy 1	Enjoy 2	Enjoy 3	Enjoy 4	Enjoy 5	Enjoy9	Enjoy10	Enjoy11	PerVal1	PerVal2	PerVal3	PerVal4	PerVal5
Enjoy1	Pearson Correlation	1	.622**	.498**	.512**	.583**	.279**	.271*	.142	.215*	.222*	.194	.322**	.458**
	Sig. (2-tailed)		.000	.000	.000	.000	.010	.012	.194	.049	.041	.075	.003	.000
	N	85	85	85	85	85	85	85	85	85	85	85	85	85
Enjoy2	Pearson Correlation	.622**	1	.358**	.477**	.558**	.206	.336**	.053	.134	.150	.150	.275*	.449**
	Sig. (2-tailed)	.000		.001	.000	.000	.058	.002	.629	.220	.171	.170	.011	.000
	N	85	85	85	85	85	85	85	85	85	85	85	85	85
Enjoy3	Pearson Correlation	.498**	.358**	1	.332**	.439**	.405**	.348**	.344**	.496**	.549**	.360**	.391**	.471**
	Sig. (2-tailed)	.000	.001		.002	.000	.000	.001	.001	.000	.000	.001	.000	.000
	N	85	85	85	85	85	85	85	85	85	85	85	85	85
Enjoy4	Pearson Correlation	.512**	.477**	.332**	1	.628**	.139	.199	.164	.207	.246*	.208	.238*	.440**
	Sig. (2-tailed)	.000	.000	.002		.000	.206	.067	.133	.058	.023	.056	.028	.000
	N	85	85	85	85	85	85	85	85	85	85	85	85	85
Enjoy5	Pearson Correlation	.583**	.558**	.439**	.628**	1	.132	.145	.121	.251*	.224*	.256*	.334**	.557**
	Sig. (2-tailed)	.000	.000	.000	.000		.228	.185	.269	.021	.039	.018	.002	.000

	N	85	85	85	85	85	85	85	85	85	85	85	85	85
	Pearson Correlation	.279**	.206	.405**	.139	.132	1	.466**	.285**	.251*	.280**	.235*	.086	.311**
Enjoy9	Sig. (2-tailed)	.010	.058	.000	.206	.228		.000	.008	.020	.010	.030	.436	.004
	N	85	85	85	85	85	85	85	85	85	85	85	85	85
	Pearson Correlation	.271*	.336**	.348**	.199	.145	.466**	1	.557**	.309**	.327**	.299**	.291**	.335**
Enjoy10	Sig. (2-tailed)	.012	.002	.001	.067	.185	.000		.000	.004	.002	.006	.007	.002
	N	85	85	85	85	85	85	85	85	85	85	85	85	85
	Pearson Correlation	.142	.053	.344**	.164	.121	.285**	.557**	1	.306**	.249*	.248*	.188	.210
Enjoy11	Sig. (2-tailed)	.194	.629	.001	.133	.269	.008	.000		.004	.022	.022	.084	.054
	N	85	85	85	85	85	85	85	85	85	85	85	85	85
	Pearson Correlation	.215*	.134	.496**	.207	.251*	.251*	.309**	.306**	1	.748**	.659**	.517**	.310**
PerVal1	Sig. (2-tailed)	.049	.220	.000	.058	.021	.020	.004	.004		.000	.000	.000	.004
	N	85	85	85	85	85	85	85	85	85	85	85	85	85
	Pearson Correlation	.222*	.150	.549**	.246*	.224*	.280**	.327**	.249*	.748**	1	.751**	.651**	.352**
PerVal2	Sig. (2-tailed)	.041	.171	.000	.023	.039	.010	.002	.022	.000		.000	.000	.001
	N	85	85	85	85	85	85	85	85	85	85	85	85	85
PerVal3	Pearson Correlation	.194	.150	.360**	.208	.256*	.235*	.299**	.248*	.659**	.751**	1	.554**	.237*

	Sig. (2-tailed)	.075	.170	.001	.056	.018	.030	.006	.022	.000	.000		.000	.029
	N	85	85	85	85	85	85	85	85	85	85	85	85	85
	Pearson Correlation	.322**	.275*	.391**	.238*	.334**	.086	.291**	.188	.517**	.651**	.554**	1	.445**
PerVal4	Sig. (2-tailed)	.003	.011	.000	.028	.002	.436	.007	.084	.000	.000	.000		.000
	N	85	85	85	85	85	85	85	85	85	85	85	85	85
	Pearson Correlation	.458**	.449**	.471**	.440**	.557**	.311**	.335**	.210	.310**	.352**	.237*	.445**	1
PerVal5	Sig. (2-tailed)	.000	.000	.000	.000	.000	.004	.002	.054	.004	.001	.029	.000	
	N	85	85	85	85	85	85	85	85	85	85	85	85	85

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

Table AG
Pearson r Correlations for Enjoyment Factors

		AffEnjoy	CogEnjoy	PerVal
AffEnjoy	Pearson Correlation	1	.357**	.541**
	Sig. (2-tailed)		.001	.000
	N	85	85	85
CogEnjoy	Pearson Correlation	.357**	1	.430**
	Sig. (2-tailed)	.001		.000
	N	85	85	85
PerVal	Pearson Correlation	.541**	.430**	1
	Sig. (2-tailed)	.000	.000	
	N	85	85	85

**. Correlation is significant at the 0.01 level (2-tailed).

Table AH

Factor Loadings for Suspension of Disbelief Items

Item	SoD
It was important for me whether the game contained errors or contradictions. (R)	.93
It was important for me to check whether inconsistencies were present in the game. (R)	.90
I directed my attention to possible errors or contradictions in the game. (R)	.89
I concentrated on whether there were any inconsistencies in the game. (R)	.85
I took a critical viewpoint of the game presentation. (R)	.79
I didn't really pay attention to the existence of errors or inconsistencies in the game.	.61
Eigenvalue	4.26
Percent of variance	70.93

Table AI

Standardized Factor Loadings for Confirmatory Factor Analysis of Suspension of Disbelief Items

Item	Openness
It was important for me whether the game contained errors or contradictions. (R)	.92
It was important for me to check whether inconsistencies were present in the game. (R)	.93
I directed my attention to possible errors or contradictions in the game. (R)	.87
I concentrated on whether there were any inconsistencies in the game. (R)	.86
I took a critical viewpoint of the game presentation. (R)	.74
I didn't really pay attention to the existence of errors or inconsistencies in the game.	.61
χ^2 / *df* ratio	2.83

Note: χ^2 (7, N = 85) = 5.82, p = .56 (comparative fit index [CFI] = 1.00, root mean square error of approximation [RMSEA] = .00, and standardized root mean square residual [SRMR] = .03).

Table AJ
Pearson r Correlations for Suspension of Disbelief Items

		SoD1	SoD2	SoD3	SoD4	SoD5	SoD6
SoD1	Pearson Correlation	1	.475**	.724**	.588**	.679**	.802**
	Sig. (2-tailed)		.000	.000	.000	.000	.000
	N	85	85	85	85	85	85
SoD2	Pearson Correlation	.475**	1	.496**	.528**	.453**	.533**
	Sig. (2-tailed)	.000		.000	.000	.000	.000
	N	85	85	85	85	85	85
SoD3	Pearson Correlation	.724**	.496**	1	.590**	.818**	.805**
	Sig. (2-tailed)	.000	.000		.000	.000	.000
	N	85	85	85	85	85	85
SoD4	Pearson Correlation	.588**	.528**	.590**	1	.677**	.634**
	Sig. (2-tailed)	.000	.000	.000		.000	.000
	N	85	85	85	85	85	85
SoD5	Pearson Correlation	.679**	.453**	.818**	.677**	1	.845**
	Sig. (2-tailed)	.000	.000	.000	.000		.000
	N	85	85	85	85	85	85
SoD6	Pearson Correlation	.802**	.533**	.805**	.634**	.845**	1
	Sig. (2-tailed)	.000	.000	.000	.000	.000	
	N	85	85	85	85	85	85

**. Correlation is significant at the 0.01 level (2-tailed).

Table AK

Factor Loadings for Engagement (GEQ) Items

Item	Presence	High Flow	Low Flow	Absorption
Playing seemed automatic.	.84	.18	-.11	-.03
Things seemed to happen automatically.	.80	.01	.26	.13
I played without thinking about how to play.	.79	.09	-.07	.18
My thoughts went fast.	.75	.13	.01	.08
I lost track of time.	.66	.30	-.10	.24
If someone talked to me, I didn't hear them.	.12	.90	-.03	.18
I couldn't tell if I was getting tired.	.08	.85	.03	.14
I didn't answer if someone talked to me.	.10	.82	.02	.21
I lost track of where I was.	.31	.74	.06	.01
I played longer than I meant to.	-.01	-.01	.92	.08
I felt like I just couldn't stop playing.	-.07	-.02	.87	-.07
I really got into the game.	.05	.09	.86	-.02
I got wound up.	.19	.19	.11	.82
I felt different.	.02	.17	-.08	.75
I felt scared.	.18	.08	-.01	.70
Eigenvalue	4.35	2.39	1.38	1.23
Percent of variance	29.00	15.90	9.19	8.21

Table AL

Standardized Factor Loadings for Confirmatory Factor Analysis of GEQ Items

Item	Openness
12. Playing seemed automatic.	.82
2. Things seemed to happen automatically.	.69
15. I played without thinking about how to play.	.70
13. My thoughts went fast.	.78
1. I lost track of time.	.62
6. If someone talked to me, I didn't hear them.	.63
11. I couldn't tell if I was getting tired.	.78
10. I didn't answer if someone talked to me.	.38
14. I lost track of where I was.	.72
17. I played longer than I meant to.	.35
19. I felt like I just couldn't stop playing.	.73
18. I really got into the game.	.84
7. I got wound up.	.49
χ^2 / *df* ratio	1.02

Note: χ^2 (62, N = 85) = 63.42, p = .43 (comparative fit index [CFI] = .97, root mean square error of approximation [RMSEA] = .02, and standardized root mean square residual [SRMR] = .11).

Table AM
Pearson r Correlations for Engagement Items

		GEQ12	GEQ2	GEQ15	GEQ13	GEQ1	GEQ6	GEQ11	GEQ10	GEQ14	GEQ17	GEQ19	GEQ18	GEQ7
	Pearson Corr.	1	.507**	.584**	.605**	.374**	.035	.235*	.042	.237*	.118	.195	.350**	.138
GEQ12	Sig. (2-tailed)		.000	.000	.000	.000	.752	.030	.704	.029	.281	.074	.001	.208
	N	85	85	85	85	85	85	85	85	85	85	85	85	85
	Pearson Corr.	.507**	1	.419**	.436**	.503**	.092	.253*	.084	.298**	.190	.174	.314**	.173
GEQ2	Sig. (2-tailed)	.000		.000	.000	.000	.401	.020	.446	.006	.082	.112	.003	.114
	N	85	85	85	85	85	85	85	85	85	85	85	85	85
	Pearson Corr.	.584**	.419**	1	.466**	.232*	.074	.060	-.052	.172	.169	.115	.246*	.073
GEQ15	Sig. (2-tailed)	.000	.000		.000	.032	.504	.588	.638	.116	.123	.295	.023	.506
	N	85	85	85	85	85	85	85	85	85	85	85	85	85
	Pearson Corr.	.605**	.436**	.466**	1	.349**	.163	.261*	.086	.349**	.054	.386**	.448**	.248*
GEQ13	Sig. (2-tailed)	.000	.000	.000		.001	.136	.016	.436	.001	.622	.000	.000	.022
	N	85	85	85	85	85	85	85	85	85	85	85	85	85
	Pearson Corr.	.374**	.503**	.232*	.349**	1	.161	.319**	.220*	.235*	.052	.245*	.357**	.255*
GEQ1	Sig. (2-tailed)	.000	.000	.032	.001		.140	.003	.043	.030	.635	.024	.001	.019
	N	85	85	85	85	85	85	85	85	85	85	85	85	85
	Pearson Corr.	.035	.092	.074	.163	.161	1	.510**	.472**	.362**	.256*	.377**	.213	.421**
GEQ6	Sig. (2-tailed)	.752	.401	.504	.136	.140		.000	.000	.001	.018	.000	.051	.000
	N	85	85	85	85	85	85	85	85	85	85	85	85	85
	Pearson Corr.	.235*	.253*	.060	.261*	.319**	.510**	1	.337**	.499**	.176	.179	.154	.290**
GEQ11	Sig. (2-tailed)	.030	.020	.588	.016	.003	.000		.002	.000	.107	.101	.161	.007
	N	85	85	85	85	85	85	85	85	85	85	85	85	85
	Pearson Corr.	.042	.084	-.052	.086	.220*	.472**	.337**	1	.267*	.351**	.318**	.112	.335**
GEQ10	Sig. (2-tailed)	.704	.446	.638	.436	.043	.000	.002		.014	.001	.003	.307	.002
	N	85	85	85	85	85	85	85	85	85	85	85	85	85
GEQ14	Pearson Corr.	.237*	.298**	.172	.349**	.235*	.362**	.499**	.267*	1	.323**	.305**	.247*	.201

	Sig. (2-tailed)	.029	.006	.116	.001	.030	.001	.000	.014		.003	.005	.023	.066
	N	85	85	85	85	85	85	85	85	85	85	85	85	85
	Pearson Corr.	.118	.190	.169	.054	.052	.256*	.176	.351**	.323**	1	.182	.040	.268*
GEQ17	Sig. (2-tailed)	.281	.082	.123	.622	.635	.018	.107	.001	.003		.095	.715	.013
	N	85	85	85	85	85	85	85	85	85	85	85	85	85
	Pearson Corr.	.195	.174	.115	.386**	.245*	.377**	.179	.318**	.305**	.182	1	.626**	.455**
GEQ19	Sig. (2-tailed)	.074	.112	.295	.000	.024	.000	.101	.003	.005	.095		.000	.000
	N	85	85	85	85	85	85	85	85	85	85	85	85	85
	Pearson Corr.	.350**	.314**	.246*	.448**	.357**	.213	.154	.112	.247*	.040	.626**	1	.374**
GEQ18	Sig. (2-tailed)	.001	.003	.023	.000	.001	.051	.161	.307	.023	.715	.000		.000
	N	85	85	85	85	85	85	85	85	85	85	85	85	85
	Pearson Corr.	.138	.173	.073	.248*	.255*	.421**	.290**	.335**	.201	.268*	.455**	.374**	1
GEQ7	Sig. (2-tailed)	.208	.114	.506	.022	.019	.000	.007	.002	.066	.013	.000	.000	
	N	85	85	85	85	85	85	85	85	85	85	85	85	85

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

Table AN
Pearson r Correlations for Engagement Factors

		Presence	High Flow	Low Flow
Presence	Pearson Correlation	1	.290**	.402**
	Sig. (2-tailed)		.007	.000
	N	85	85	85
High Flow	Pearson Correlation	.290**	1	.501**
	Sig. (2-tailed)	.007		.000
	N	85	85	85
Low Flow	Pearson Correlation	.402**	.501**	1
	Sig. (2-tailed)	.000	.000	
	N	85	85	85

**. Correlation is significant at the 0.01 level (2-tailed).

Table AO

Pearson r Correlations for Variables in the Reduced Model

		1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.
1. Male Sex	Pearson Corr.	1	.175**	-.310**	.315**	.435**	-.090	.637**	.585**	-.093	-.408**	.411**	.292**	.441**
	Sig. (2-tailed)		.000	.000	.000	.000	.052	.000	.000	.397	.000	.000	.000	.000
	N	467	467	467	467	467	467	467	467	85	85	85	154	154
2. ASA	Pearson Corr.	.175**	1	.083	.080	.011	.102*	.090	.089	.105	-.325**	.185	.204*	.299**
	Sig. (2-tailed)	.000		.072	.082	.819	.027	.052	.056	.337	.002	.089	.011	.000
	N	467	467	467	467	467	467	467	467	85	85	85	154	154
3. DSA	Pearson Corr.	-.310**	.083	1	-.224**	-.210**	.206**	-.278**	-.249**	.152	.184	-.087	-.165*	-.313**
	Sig. (2-tailed)	.000	.072		.000	.000	.000	.000	.000	.164	.092	.428	.040	.000
	N	467	467	467	467	467	467	467	467	85	85	85	154	154
4. Trait Agg.	Pearson Corr.	.315**	.080	-.224**	1	.169**	-.092*	.275**	.275**	.160	-.014	.126	.471**	.533**
	Sig. (2-tailed)	.000	.082	.000		.000	.048	.000	.000	.142	.896	.252	.000	.000
	N	467	467	467	467	467	467	467	467	85	85	85	154	154
5. Accept	Pearson Corr.	.435**	.011	-.210**	.169**	1	.147**	.711**	.695**	.329**	-.319**	.521**	.291**	.341**

Rules	Sig. (2-tailed)	.000	.819	.000	.000		.001	.000	.000	.002	.003	.000	.000	.000
	N	467	467	467	467	467	467	467	467	85	85	85	154	154
6. Open	Pearson Corr.	-.090	.102*	.206**	-.092*	.147**	1	.030	.003	.061	.041	.010	-.082	-.061
	Sig. (2-tailed)	.052	.027	.000	.048	.001		.514	.949	.582	.707	.928	.314	.453
	N	467	467	467	467	467	467	467	467	85	85	85	154	154
7. Game Efficacy	Pearson Corr.	.637**	.090	-.278**	.275**	.711**	.030	1	.771**	.170	-.435**	.635**	.279**	.390**
	Sig. (2-tailed)	.000	.052	.000	.000	.000	.514		.000	.121	.000	.000	.000	.000
	N	467	467	467	467	467	467	467	467	85	85	85	154	154
8. Freq. of Violent Games	Pearson Corr.	.585**	.089	-.249**	.275**	.695**	.003	.771**	1	.126	-.433**	.615**	.312**	.377**
	Sig. (2-tailed)	.000	.056	.000	.000	.000	.949	.000		.250	.000	.000	.000	.000
	N	467	467	467	467	467	467	467	467	85	85	85	154	154
9. Engage	Pearson Corr.	-.093	.105	.152	.160	.329**	.061	.170	.126	1	-.065	.364**	.210	.181
	Sig. (2-tailed)	.397	.337	.164	.142	.002	.582	.121	.250		.556	.001	.054	.098
	N	85	85	85	85	85	85	85	85	85	85	85	85	85
10. Frust.	Pearson Corr.	-.408**	-.325**	.184	-.014	-.319**	.041	-.435**	-.433**	-.065	1	-.582**	-.004	-.248*
	Sig. (2-tailed)	.000	.002	.092	.896	.003	.707	.000	.000	.556		.000	.970	.022

11. Enjoy	N	85	85	85	85	85	85	85	85	85	85	85	85	85
	Pearson Corr.	.411**	.185	-.087	.126	.521**	.010	.635**	.615**	.364**	-.582**	1	.192	.378**
	Sig. (2-tailed)	.000	.089	.428	.252	.000	.928	.000	.000	.001	.000		.079	.000
12. Verbal Agg.	N	85	85	85	85	85	85	85	85	85	85	85	85	85
	Pearson Corr.	.292**	.204*	-.165*	.471**	.291**	-.082	.279**	.312**	.210	-.004	.192	1	.621**
	Sig. (2-tailed)	.000	.011	.040	.000	.000	.314	.000	.000	.054	.970	.079		.000
13. Phys. Agg.	N	154	154	154	154	154	154	154	154	85	85	85	154	154
	Pearson Corr.	.441**	.299**	-.313**	.533**	.341**	-.061	.390**	.377**	.181	-.248*	.378**	.621**	1
	Sig. (2-tailed)	.000	.000	.000	.000	.000	.453	.000	.000	.098	.022	.000	.000	
	N	154	154	154	154	154	154	154	154	85	85	85	154	154

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

Table AP

ANOVA tests for the 5 Moral Foundations on Engagement

	df	*F*	*p*
Purity	20	.73	.78
Fairness	16	1.51	.12
Ingroup	20	.54	.94
Harm	21	1.65	.07
Authority	18	1.28	.23

Note: Each moral foundation was tested with a separate one-way ANOVA.

Table AQ

ANOVA tests for the 5 Moral Foundations on Enjoyment

	df	*F*	*p*
Purity	20	.61	.89
Fairness	16	1.06	.41
Ingroup	20	.74	.77
Harm	21	.75	.77
Authority	18	1.54	.11

Note: Each enjoyment dependent variable was tested with a separate one-way ANOVA.