Too good to care:

The effect of skill on hostility and aggression following violent video game play

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Abstract

An experiment tested if higher skilled players would experience diminished aggression related outcomes compared to lower skilled players due to flow state optimization. Specifically, the study observed if higher flow states made narrative-defined game goals more salient, thus reducing focus on the more peripheral violent content. After controlling for the amount, type, and context of violence, higher skilled players experienced lower levels of hostility and aggression related cognitions and greater levels of flow than lower skilled players. Additionally, skill altered players' perceptions as well, as higher skilled players experienced higher construal levels than lower skilled players.

Keywords: video games, aggression, hostility, flow, construal level theory

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It took only three days in September of 2013 for *Grand Theft Auto* to earn $1 billion in sales, making it the fastest entertainment property in history to reach that milestone (Peckham, September 20, 2013). Although *Grand Theft Auto* may be an outlier, video games in general are a commanding entertainment medium, often outselling other media products (ERA, 2013) and garnering a great deal of use (Takahashi, 2010). Nevertheless, the violent content often featured in video games (see Smith, Lachlan, & Tamborini, 2003) has caused some to investigate its effect on aggression and related constructs (e.g., hostility, hostile attribution bias, etc.). As a result, a prominent debate has formed on the topic. One group of researchers (see Anderson et al., 2010) provides evidence suggesting that video game violence increases players' levels of aggression and related constructs. Another group (see Ferguson & Kilburn, 2010) suggests that violent video games exhibit a null effect on aggression and may even lead to positive effects.

This scientific schism implies that the phenomena at hand may be more complicated than the presence or absence of violent content. Indeed, some research has identified a number of content characteristics and individual differences that moderate and mediate the effect of game violence (e.g., Hartmann & Vorderer, 2010; Krcmar & Farrar, 2009). Despite these inquiries, research that accounts for differences between players is minimal (Weber, Behr, Tamborini, Ritterfeld, & Mathiak, 2009). To address this deficiency and to explore the effect of violence on aggression further, the current study investigates player skill level as another individual difference of interest.

Literature review

Video game violence

Across time, genre, and content rating, content analyses reveal that the vast majority video games contain violent content (Dietz, 1998; Haninger & Thompson, 2004; Thompson & Haninger, 2001). For example, Braun and Giroux (1989), at the genesis of this vein of research, found that 75% of the arcade games they sampled contained violence. A more recent study by Smith et al. (2003) that sampled popular console video games found that about 74% of titles (averaged across content rating) contained violence. Although one could argue that the loose definitions of violence some of these studies use may inflate the prevalence of violence to a degree, it is clear that game developers often employ violence as a vehicle for entertainment.

The commonness of violent content among video games has prompted a litany of research centered upon potential effects. The results of these academic endeavors are perplexing, as conclusions appear to contradict one another. One body of research suggests that video game violence causes a consistent adverse effect on users' levels of aggression and other related constructs such as hostility and arousal (e.g., Arriaga, Esteves, Carneiro, & Monteiro, 2006; Bushman & Huesmann, 2006; Lynch, Gentile, Olson, & van Brederode, 2001). Although the outcome appears to be consistent, a meta-analysis by Anderson et al. (2010) shows that the average effect size is small, $r^2 = .023$. Despite these findings, another body of research suggests that the link between video game violence and aggression does not exist (e.g., Adachi & Willoughby, 2011; Ballard, Visser, & Jocoy, 2012; Valadez & Ferguson, 2012). Furthermore, Ferguson (2007) contends that publication bias, poor measures, and/or the omission of control variables cause many studies linking game violence and aggression to report inflated effects sizes.

Overall, despite the explosion of research, the literature often leaves researchers interested in the effects of game violence with more questions than answers. Why does the literature appear schizophrenic? Rather than being a product of chance, error, or bias, these baffling discrepancies may be the result of unaccounted variables revolving around individual differences.

Individual differences and skill

Research on video game content characteristics and individual differences in relation to aggression show that "content isn't king." The non-linear, interactive nature of video games encourages a multitude of play styles and creative solutions to game challenges. Specifically, existing work has identified a number of individual differences pertaining to violent content. For example, Lachlan and Maloney (2008) observed how trait personality differences affected presence in violent video games. The authors found that players' trait anger and empathy positively correlated with gun violence. In contrast, those with higher trait telepresence tendencies performed less gun violence than those with lower telepresence tendencies.

Trait personality differences aside, one of the most noteworthy individual differences related to video games is player skill, as it greatly affects the content players generate and their overall experience (Matthews & Weaver, 2013; Smith, 2006; Weber et al., 2009). Although skill affects human interaction with a number of technologies (e.g., internet use; van Deursen & van Dijk, 2009), its relationship to video games appears unique. Unlike other media, games *require* a certain level of mastery to progress. Indeed, overtly punishing failure is a common game mechanic.

Research exploring skill's effect on human's processing and effects of video games is uncommon. Nevertheless, the results from correlational and experimental research yield a number of curious findings. Studies using Bracken and Skalski's (2009) Game Playing Skill scale (GaPS) found that skill positively predicted player deaths (Skalski & Whitbred, 2010) and spatial presence when playing video games (Skalski, Tamborini, Shelton, Buncher, & Lindmark, 2011). Additional studies show that skill is positively related with presence and (indirectly) hostility (Nowak, Krcmar, & Farrar, 2008) and negatively related to frustration (Chumbley & Griffiths, 2006). Observing massively multiplayer online game players, Schrader and McCreery (2008) found that low skilled players relied heavily on trial and error during enemy engagements. In contrast, high skilled players performed more problem solving and information gathering due, in part, to their greater game-related knowledge and technical skills. Content analyzing the gameplay from players of all skill levels, Matthews and Weaver (2013) reported that higher skilled players experienced more acts of violence, were more often the perpetrators rather than the targets of violence, saw more graphic violence, and experienced more on-screen and up-close violence.

Another body of evidence exists observing how particular cognitive skills (e.g., 3D mental rotation, targeting, etc.) affect game behavior and experiential outcomes. Specifically, Huh, Rosaen, Sherry, and Bowman (2006) show that performance at each analog test predicts performance in corresponding video games (e.g., targeting and performance at first-person shooter games) and flow during game play (Huh et al., 2006). Additionally, for those with higher cognitive skills, having an audience increases game performance for less challenging games (Bowman & Tamborini, 2008).

In sum, the extant literature on player skill reveals a multitude of implications for games research. However, little (if any) work has observed how skill affects the processing and effects of violent content. This area of inquiry may be illuminating, as skill appears to have a robust relationship with variables commonly featured in violence research. In particular, Csikszentmihalyi’s theory of flow (1990) provides compelling predictions due to its reliance on skill.

Skill, flow, and narrative. Essentially, flow is an autotelic (i.e., self-motivating) experience people seek when attempting to fulfil a goal. Flow is an optimal balance between skill and challenge characterized by intense focus, temporal distortion, loss of a reflective self-consciousness, and a number of other related experiences (Sherry, 2004). Thus, although flow has the ability to alter one’s experience, the careful balance it demands makes it difficult to achieve. Related to video games, it is likely that flow may be an ephemeral state as well, especially when a player’s skill is incongruent with a game’s challenge. However, it is likely that higher skilled players could apply particular skills across an array of game types—thus resulting in more flow states. This reasoning drives the following hypothesis:

H1: Higher skilled players will experience greater flow than lower skilled players.

For those who enter a flow state, the experience alters perceptions in notable ways. As Sherry (2004) explains, media-induced flow can induce powerful emotions and allow people to temporarily ignore their surroundings in the pursuit of seeing a movie’s resolution or conquering the next level in a video game. This hypnotic state motivates/biases users to process goal-relevant information. Because video games are heavily goal-driven, being in a flow state likely alters how players perceive information peripheral to narrative-defined game goals. Existing work on narrative reveals its ability to moderate many effects. For example, Hartmann and Vorderer (2010) found that minute narrative tweaks reduced player’s guilt and negative affect after playing a violent video game. Additionally, narrative—compared to the absence of narrative—increases arousal, presence, identification with player characters (Schneider, Lang, Shin, & Bradley, 2004), and enjoyment (Lee, Park, Jin, & Kang, 2005). To extend this body of literature, the current paper explores the intersection between narrative, flow, and skill. It is likely that violent game content is peripheral to game narrative, as the narrative often identifies and contextualizes goals. Based on this assumption, players in a flow state may experience reduced aggression-related outcomes following game play. However, player skill predicates both of these assumptions. This logic drives the following predictions:

H2: Higher skilled players will experience less hostility than lower skilled players.

H3: Higher skilled players will experience less aggression related cognitions than lower skilled players.

Despite predictions related to flow, the frustration-aggression hypothesis (Dollard, Doob, Miller, Mowrer, & Sears, 1939) may be able to explain the relationship between these variables. Explained briefly, this perspective holds that frustration always leads to aggression in some form. Berkowitz (1989) reformulated the relationship by arguing that frustration causes negative affect that may lead to aggression. Thus, the frustration-aggression hypothesis would predict that lower skilled players may experience greater levels of frustration due to interference of goal attainment (e.g., taking a long time to complete a game level). This increased frustration would subsequently cause lower levels of flow and higher levels of aggression related outcomes.

To allay this potential confound, the current study applies construal level theory (CLT; Trope, Liberman, & Wakslak, 2007). CLT explains that the psychological distance of any given evaluation object (e.g., game violence) affects one's construal—or interpretation—of that object. Objects perceived as psychologically distant elicit high construal levels whereas psychologically near objects elicit low construal levels. High construals cause people to interpret objects abstractly and low construals cause people to interpret the same objects concretely. Applied to video games, it is likely that high construal levels influence players to focus less on each individual act of violence (i.e., the means to the end) and more on the narrative-driven outcomes of the violent acts (i.e., the end itself). Connected to the current study, it is likely that higher skilled players who enter flow will interpret the same content differently. Thus, the aggression-frustration hypothesis may predict the aforementioned hypotheses but it should not affect perceptions. Finding that higher skilled players experience higher construal levels would corroborate the notion that skill alters the perceptions of violent content via flow. This prompts the final hypothesis:

H4: Higher skilled players will experience higher construal levels than lower skilled players.

Method

Participants

121 volunteers (45 females) were recruited from a large Midwestern university from six undergraduate telecommunications courses where the students participated for course credit. Ages ranged from 19 to 27 (M = 20.59, SD = 1.61). Caucasians represented the majority of the sample (73.8%) followed by Asians (16.4%), Latino (3.3%), African Americans (2.5%), other (2.5%), and then Hawaiian/Pacific Islander and unspecified (0.8%).

Stimuli

To experimentally control for the amount, type, and context of violence, the study exposed all subjects to the same custom-built game scenario. The game was created using the Skyrim Creation Kit (SCK), which is a computer-based toolset that facilities from-scratch game development using all of the game elements from *The Elder Scrolls V: Skyrim*. The game scenario was a single medieval-style dungeon that players could explore freely but it had a strict linear progression controlled by color-coded locked doors and correspondingly colored keys to control enemy engagements. Players were tasked to navigate the dungeon, eliminate eight hostile guards, and kill the boss in the final room. To fight, players used a sword and a shield. Players experienced the entire game in the third-person perspective. Before engaging in any combat, players spoke with an in-game quest giver who established the story and provided goals.

Procedure

Following consent, participants were led to a medium-sized conference style room featuring a large table with six gaming laptops divided by large privacy screens. Researchers processed 1-6 participants simultaneously. Each station had a laptop, a mouse, headphones, and information sheets explaining the game controls. Prior to play, an experimenter explained the premise of the game, the controls, and the function of the quest giver. Participants played the game until they completed the level by defeating Orion (the final boss) and taking the last critical quest item. Play time varied between 6 to 48 minutes (M = 16.9 min., SD = 7.2 min.).

After game play, the researcher stopped the video game and administered a questionnaire using online survey software. Once the participant completed the questionnaire, s/he was thanked for her/his participation and dismissed.

Measures

Skill level. To measure skill level, the study employed a four item measure adapted from Gentile et al. (2009) and Matthews and Weaver (2013). Two items related specifically to their immediate game performance and two items related to video games in general. Using a 1 (strongly disagree) to 7 (strongly agree) scale, participants indicated to what extent they agreed with the statements provided. The first item (reverse coded) stated that the game was difficult. The second item (reverse coded) stated, “I was worried that I would not be able to beat the game

I just played." The third item stated, "When I play video games, I set the difficulty higher than the default." The fourth item (reverse coded) asked participants to assess their skill level at video games in general on a 1 (well above average) to 5 (well below average) scale. Each scale item featured a qualifying sentence. For example, a 4 represented *below average* and was qualified by the statement, "sometimes I do okay, but most of the time games are too hard." The single five-point item was converted to a seven-point item and then all items were averaged to create a single indexed score for skill level. A Cronbach's alpha revealed that the scale had acceptable reliability, α = .80.

Flow. To measure flow, the study adapted three subscales of the Flow State Scale (FSS; Jackson & Marsh, 1996) to relate to video games. For each item, participants indicated to what extent they agreed with certain statements using a 1 (strongly disagree) to 7 (strongly agree) scale. The subscales included were concentration on the task at hand, transformation of time, and sense of control. Four items were averaged to create the concentration subscale (Cronbach's α = .88). The items centered on an acute focus on the current task (e.g., "My attention was focused entirely on what I was doing"). Two items comprised the transformation of time subscale (Cronbach's α = .81). A distortion of time such that it appeared to occur faster or slower than normal defined each item (e.g., "The way time passes seemed to be different from normal"). Finally, four items made up the sense of control subscale (Cronbach's α = .92). Each of these items centered on feeling in control of the game (e.g., "I felt in total control of what I was doing").

Aggression related cognitions. To measure aggression related cognitions, the current study asked participants to indicate how they thought characters would react to interpersonal conflicts. The measure, created by Bushman and Anderson (2002), operates under the assumption that violent media content primes aggressive thoughts. More specifically, the measure indicates short-term cognitive associations related to aggressive thoughts and feelings. The study presented three interpersonal conflicts and asked participants what they thought the main characters would think and feel. Conditions that prime aggressive thoughts should more effectively cause participants to describe the protagonists as thinking or feeling more aggressively.

Blind to condition, the author and another graduate student coded the thoughts and feelings people listed as either aggressive or null. The coders identified responses that described physical (e.g., “I feel like hitting something”) or relational aggression (e.g., “There’s no way this waiter’s getting a tip”) as aggressive. If the responses were not aggressive (e.g., “play a game on my phone” or “check and see if the other driver is okay”), the coders identified the response as null.

In total, there were 3,231 responses. Each coder coded half of the sample via randomly assigned participant numbers. After coding the entire sample, they randomly selected about 20% of the sample to recode to assess reliability. According to Krippendorff’s Alpha (Hayes & Krippendorff, 2007) for nominal variables, posttest intercoder reliabilities were .90 and .92 for thoughts and feelings respectively. The number of aggressive thoughts and feelings was summed across all three vignettes.

Hostility. To measure hostility, the study used the State Hostility Scale (Bushman & Anderson, 2002).[1] The measure asked participants to rate on a 1 (strongly disagree) to 7 (strongly agree) scale how they felt. Each of the 30 items relates to hostility (e.g., angry, stormy, enraged, mean, etc.) and the scale divides into 3 subscales: mean (α = .93), aggravation (α = .89),

[1] The State Hostility Scale includes an additional subscale, unsociable, that was omitted from analyses due to low internal reliability.

and lack of positive feelings (α = .88). The items within each subscale were averaged to create index scores.

Construal level. The current study used a shortened version of the Behavior Identification Form (BIF; Vallacher & Wegner, 1989) to measure construal level. The measure contained 16 items. Each item presented an action and two options for identifying the action—one high construal level identification and one low level. For example, participants could identify *locking a door* as either *securing the house* (high construal; identifying the end) or *putting a key in the lock* (low construal; identifying the means to an end). Low construal level responses were coded as one and high level responses were coded as two. All 16 items were averaged to create a single score representing construal level (α = .78).

Results

Hypothesis one predicted that higher skilled players would experience greater levels of flow than lower skilled players. To analyze the effect of player skill level (M = 4.78, SD = 1.44) on the outcomes of interest, skill level was divided into three groups to represent low skilled players (n = 41), moderately skilled players (n = 39), and highly skilled players (n = 41).[2] An omnibus MANOVA indicated significant differences between skill levels, $F(6, 228) = 4.20$, $p < .001$, $\eta^2 = .10$ (see Figure 1). The results mostly supported the hypothesis. Post hoc examinations of beta coefficients showed that concentration and control contributed most to distinguishing the three skill groups. For concentration, the high skilled players (M = 5.54, SD = 1.19) differed marginally from the moderate (M = 4.98, SD = 1.18; β = -.562, p = .056, η^2 = .03) and low skilled players (M = 5.01, SD = 1.48; β = -.53, p = .067, η^2 = .03). For control, the high skilled

[2] Although previous studies involving skill level used median splits for analyses (Bowman & Tamborini, 2008; Bracken & Skalski, 2009), the current study opted for three skill levels in hopes of observing more nuance.

players (*M* = 5.78, *SD* = 1.24) differed significantly from the moderate (*M* = 4.99, *SD* = 1.32; β = -.794, *p* = .01, η^2 = .06) and low skilled players (*M* = 4.34, *SD* = 1.39; β = -1.437, *p* < .001, η^2 = .17). Time did not distinguish the three skill groups significantly. These data indicate that higher skilled gamers experienced more flow than lower skilled players in terms of concentration and control but not time.

Hypothesis two predicted that higher skilled players would experience less hostility than lower skilled players. Because the three hostility subscales—meaness, aggravation, and lack of positive feelings—were internally reliable (Cronbach's α = .75), the scores were averaged together to create a single hostility measure. An ANOVA support the prediction, *F*(2, 114) = 4.06, *p* = .02, η^2 = .07 (see Figure 2). Specifically, as skill level increased, hostility decreased. Post hoc examinations of beta coefficients showed that the high skilled players (*M* = 2.12, *SD* = .91) did not differ from the moderate skilled players (*M* = 2.38, *SD* = .70; β = .26, *p* = .18) but did differ from the low skilled players (*M* = 2.67, *SD* = .90; β = .55, *p* = .01, η^2 = .07). These data indicate that the highest skilled players experienced less hostility than the lowest skilled players.

Hypothesis three predicted that higher skilled players would experience less aggression related cognitions than lower skilled players. An omnibus MANOVA revealed support for the hypothesis, *F*(4, 234) = 2.80, *p* = .027, η^2 = .05 (see Figure 3). For both aggressive thoughts and feelings, higher skilled players tended to report the fewest aggressive responses. For aggressive thoughts, post hoc examinations of beta coefficients showed that high skilled players (*M* = 4.51, *SD* = 2.53) did not differ from the moderate skilled players (*M* = 4.15, *SD* = 2.21; β = -.358, *p* = .50) but did differ marginally from the low skilled players (*M* = 5.49, *SD* = 2.42; β = 1.85, *p* = .067, η^2 = .03). For aggressive feelings, the high skilled players (*M* = 3.95, *SD* = 1.64) did not differ from the moderate skilled players (M = 4.62, SD = 2.17; β = .66, p = .15) but did differ from the low skilled players (M = 5.05, SD = 2.28; β = 1.10, p = .02, η^2 = .05). These data indicate that the highest skilled players experienced less aggressive thoughts and feelings than the lowest skilled players.

Hypothesis four predicted that higher skilled players would experience higher construal levels than lower skilled players. An ANOVA marginally supported this prediction, $F(2, 120)$ = 2.96, p = .055, η^2 = .05 (see Figure 4). The highest skilled players reported significantly higher BIF scores than lower skilled players. Post hoc examinations of beta coefficients showed that the high skilled players (M = 1.69, SD = .22) differed significantly from the moderate skilled players (M = 1.58, SD = .24; β = -.112, p = .026, η^2 = .04) and marginally from the low skilled players (M = 1.60, SD = .21; β = -.10, p = .057, η^2 = .03). These data indicate that the highest skilled players experienced greater construal levels than the lower skilled players.

Discussion

The central goal of the current study was to examine how player skill level affects aggression related outcomes after playing a violent video game. Using flow as a theoretical premise, the present research predicted that higher skilled players would experience diminished aggression related outcomes compared to lower skilled players. The findings largely supported this notion. Specifically—after controlling for the amount, type, and context of violence—higher skilled players experienced lower levels of hostility and aggression and greater levels of flow than lower skilled players. Additionally, the findings show that skill altered players' perceptions as well, as higher skilled players experienced higher construal levels than lower skilled players.

The findings regarding hostility, aggression, and flow are likely interrelated. Because flow is a state people seek when attempting of fulfil a goal (Csikszentmihalyi, 1990), video games are ripe venues for this autotelic experience (Sherry, 2004). Achieving flow during game play may make a game’s narrative more psychologically central, as games often embed explicit goals within narratives. This attention tradeoff may subsequently diminish the processing of content peripheral to narrative. The present study assumed that violent content might be one such peripheral game element. Building off this assumption, higher levels of flow should reduce aggression related outcomes. However, flow is difficult to achieve because games demand a certain level of skill to meet the interactive challenges they issue. Thus, skill should determine both flow and outcome variables related to aggression. This was precisely the pattern of results observed.

Nevertheless, an alternative explanation is that lower skilled players found the game difficult and this contributed to frustration. It is possible that these frustrated players would fail to achieve flow states, which could increase aggression related thoughts and feelings. Similar existing work provides evidence for this possibility (Williams, 2006, 2009). Although the findings do not rule out this possibility, the results surrounding construal provide corroborating evidence of the proposed skill-flow relationship. Specifically, higher skilled players reported higher construal levels than lower skilled players. Recall that high construals motivate people to interpret events abstractly and to focus on the end rather than the means to an end. Thus, it is possible that higher skilled players were more capable than lower skilled players of entering a flow state. The flow state then may have biased their perceptions to attend more toward goal-relevant stimuli (i.e., the narrative) and less toward information peripheral to the goal (i.e., violent content).

One peculiar and consistent finding was the lack of a linear trend across the three skill levels. Of the seven analyses conducted, four did not display a linear pattern. In particular, rather than the moderate skill level outcomes falling between the low and high skill outcomes, these middle-level players often scored similar to the lowest skilled players. One explanation may be that skill may make a qualitative difference only for expert players. Thus, violent content may affect all non-expert players similarly. This qualitative difference may result from the nature of flow. Either players are in a flow state or they are not. Perhaps the slightest aberration due to a lack of skills prevents optimal flow experiences.

Taken together, the present findings have interesting implications for the broader collection of video game violence research. The vast majority of experimental games research samples from players of all skill levels—experts, casual players, and even those who do not play games at all (e.g., Lachlan & Maloney, 2008). Although the conclusions they provide reveal the average effect of violent content across most populations, they fail to illustrate the specific effect on *gamers*—the population (arguably) in question. The current findings show that skill influenced the effect of violent content such that higher skilled players experienced diminished aggression related outcomes after playing a violent video game. Given this, it may be that the general conclusions among video games violence research may be limited in their application to core gamers. Future work may benefit from continuing to explore this possibility.

The current data also have implications for game creators as well. If flow is capable of reducing the adverse effects of game violence, developers should seek to maximize flow whenever possible. This may mean that creators should minimize stimuli that might hamper/interrupt flow states (e.g., cut scenes, point-of-view shifts, etc.). Additionally, since most games have a learning curve that players must overcome during the earliest game levels, players may benefit if developers minimized violent content throughout the earliest game stages.

Limitation and conclusion

Although using a single game to create all conditions ensures experimental control, it limits generalization to dissimilar games. Despite this, the content and structure within *Skyrim* is typical of many violent video games. Because of this, it is likely that people would respond in a similar fashion to violent content from other games and game types. Thus, even though the current study utilized one game, the elements in question may apply broadly.

The debate surrounding video game violence is perplexing, as studies yield divergent conclusions. The reason for these differences is unclear; yet, the current study posits that skill level may be an overlooked variable capable of contextualizing some of these discrepancies. The work reveals a complex relationship between skill, flow, perceptions, and aggression related outcomes. Subsequent video game research may benefit from continuing to investigate this relationship in hopes of bridging the disparate conclusions on the effects of violent video game content.

References

Adachi, P. J. C., & Willoughby, T. (2011). The effect of video game competition and violence on aggressive behavior: Which characteristic has the greatest influence? *Psychology of Violence, 1*(4), 259-274. doi: 10.1037/a0024908

Anderson, C. A., Shibuya, A., Ihori, N., Swing, E. L., Bushman, B. J., Sakamoto, A., . . . Saleem, M. (2010). Violent video game effects on aggression, empathy, and prosocial behavior in Eastern and Western countries: A meta-analytic review. *Psychological Bulletin, 136*(2), 151-173. doi: 10.1037/a0018251

10.1037/a0018251.supp (Supplemental)

Arriaga, P., Esteves, F., Carneiro, P., & Monteiro, M. B. (2006). Violent computer games and their effects on state hostility and Physiological arousal. [Article]. *Aggressive Behavior, 32*(4), 358-371. doi: 10.1002/ab.20134

Ballard, M., Visser, K., & Jocoy, K. (2012). Social Context and Video Game Play: Impact on Cardiovascular and Affective Responses. [Article]. *Mass Communication & Society, 15*(6), 875-898. doi: 10.1080/15205436.2011.632106

Berkowitz, L. (1989). Frustration-aggression hypothesis: examination and reformulation. *Psychological Bulletin, 106*(1), 59-73. doi: 10.1037//0033-2909.106.1.59

Bowman, N., & Tamborini, R. (2008). Facilitating Game Play: How Others Affect Performance and Enjoyment of Video Games. [Article]. *Conference Papers -- International Communication Association*, 1-36.

Bracken, C. C., & Skalski, P. (2009). Telepresence and video games: The impact of image quality. *PsychNology Journal, 7*(1), 101-112.

Braun, C. M. J., & Giroux, J. (1989). Arcade video games: proxemic, cognitive and content analysis. [Article]. *Journal of Leisure Research, 21*(2), 92-105.

Bushman, B. J., & Anderson, C. A. (2002). Violent video games and hostile expectations: A test of the general aggression model. *Personality and Social Psychology Bulletin, 28*(12), 1697-1686. doi: 10.1177/014616702237649

Bushman, B. J., & Huesmann, L. R. (2006). Short-term and long-term effects of violent media on aggression in children and adults. [Article]. *Archives of Pediatrics & Adolescent Medicine, 160*(4), 348-352. doi: 10.1001/archpedi.160.4.348

Chumbley, J., & Griffiths, M. (2006). Affect and the Computer Game Player: The Effect of Gender, Personality, and Game Reinforcement Structure on Affective Responses to Computer Game-Play. [Article]. *CyberPsychology & Behavior, 9*(3), 308-316. doi: 10.1089/cpb.2006.9.308

Csikszentmihalyi, M. (1990). *Flow : the psychology of optimal experience* (1st ed.). New York: Harper & Row.

Dietz, T. L. (1998). An examination of violence and gender role portrayals in video games: implications for gender socialization and aggressive behavior. *Sex Roles, 38*(5-6), 425-442.

Dollard, J., Doob, L. W., Miller, N. E., Mowrer, O. H., & Sears, R. R. (1939). *Frustration and aggression*. New Haven, CT: Yale University Press.

ERA. (2013). *Call of Duty: Black Ops II outsells all-comers to be biggest-selling entertainment product of 2012* Retrieved March 14, 2013, from goo.gl/44jBKu

Ferguson, C. J. (2007). Evidence for publication bias in video game violence effects literature: A meta-analytic review. *Aggression and Violent Behavior, 12*(4), 470-482. doi: http://dx.doi.org/10.1016/j.avb.2007.01.001

Ferguson, C. J., & Kilburn, J. (2010). Much Ado About Nothing: The Misestimation and Overinterpretation of Violent Video Game Effects in Eastern and Western Nations: Comment on Anderson et al. (2010). [Editorial Material]. *Psychological Bulletin, 136*(2), 174-178. doi: 10.1037/a0018566

Gentile, D. A., Anderson, C. A., Yukawa, S., Ihori, N., Saleem, M., Ming, L. K., . . . Sakamoto, A. (2009). The Effects of Prosocial Video Games on Prosocial Behaviors: International Evidence From Correlational, Longitudinal, and Experimental Studies. [Article]. *Personality and Social Psychology Bulletin, 35*(6), 752-763.

Haninger, K., & Thompson, K. M. (2004). Content and Ratings of Teen-Rated Video Games. [Article]. *JAMA: Journal of the American Medical Association, 291*(7), 856-865.

Hartmann, T., & Vorderer, P. (2010). It's Okay to Shoot a Character: Moral Disengagement in Violent Video Games. [Article]. *Journal of Communication, 60*(1), 94-119. doi: 10.1111/j.1460-2466.2009.01459.x

Hayes, A. F., & Krippendorff, K. (2007). Answering the Call for a Standard Reliability Measure for Coding Data. [Article]. *Communication Methods & Measures, 1*(1), 77-89.

Huh, S., Rosaen, S., Sherry, J., & Bowman, N. (2006). Cognitive Skill Predicts Video Game Ability. *Conference Papers -- International Communication Association*, 1-15.

Jackson, S. A., & Marsh, H. W. (1996). Development and validation of a scale to measure optimal experience: The flow state scale. [Article]. *Journal of Sport & Exercise Psychology, 18*(1), 17-35.

Krcmar, M., & Farrar, K. (2009). Retaliatory Aggression and the Effects of Point of View and Blood in Violent Video Games. *Mass Communication and Society, 12*(1), 115-138.

Lachlan, K. A., & Maloney, E. K. (2008). Game Player Characteristics and Interactive Content: Exploring the Role of Personality and Telepresence in Video Game Violence. *Communication Quarterly, 56*(3), 284-302. doi: 10.1080/01463370802240866

Lee, K. M., Park, N., Jin, S.-A., & Kang, S. (2005). *Effects of Narrative on Feelings of Presence in Computer-Game Playing.* Paper presented at the International Communication Association, New York, NY.

Lynch, P. J., Gentile, D. A., Olson, A. A., & van Brederode, T. M. (2001). The Effects of Violent Video Game Habits on Adolescent Aggressive Attitudes and Behaviors.

Matthews, N. L., & Weaver, A. J. (2013). Skill gap: Quantifying violent content in video game play between variably skilled users. *Mass Communication and Society, 16*(6), 829-846. doi: 10.1080/15205436.2013.773043

Nowak, K. L., Krcmar, M., & Farrar, K. M. (2008). The Causes and Consequences of Presence: Considering the Influence of Violent Video Games on Presence and Aggression. [Article]. *Presence: Teleoperators & Virtual Environments, 17*(3), 256-268.

Peckham, M. (September 20, 2013). Grand Theft Auto V No Longer Wants to Be a Billionaire. *TIME.* Retrieved March 19, 2014, from http://techland.time.com/2013/09/20/grand-theft-auto-v-no-longer-wants-to-be-a-billionaire/

Schneider, E. F., Lang, A., Shin, M., & Bradley, S. D. (2004). Death with a Story How Story Impacts Emotional, Motivational, and Physiological Responses to First-Person Shooter Video Games. [Article]. *Human Communication Research, 30*(3), 361-375.

Schrader, P. G., & McCreery, M. (2008). The acquisition of skill and expertise in massively multiplayer online games. [Article]. *Etr&D-Educational Technology Research and Development, 56*(5-6), 557-574. doi: 10.1007/s11423-007-9055-4

Sherry, J. L. (2004). Flow and media enjoyment. [Article]. *Communication Theory, 14*(4), 328-347. doi: 10.1093/ct/14.4.328

Skalski, P., Tamborini, R., Shelton, A., Buncher, M., & Lindmark, P. (2011). Mapping the road to fun: Natural video game controllers, presence, and game enjoyment. *New Media & Society, 13*(2), 224-242. doi: 10.1177/1461444810370949

Skalski, P., & Whitbred, R. (2010). Image versus sound: A comparison of formal feature effects on presence and video game enjoyment. *PsychNology Journal, 8*(1), 67-84.

Smith, S. L. (2006). Perps, Pimps, and Provocative Clothing: Examining Negative Content Patterns in Video Games. Mahwah, NJ, US: Lawrence Erlbaum Associates Publishers.

Smith, S. L., Lachlan, K., & Tamborini, R. (2003). Popular video games: Quantifying the presentation of violence and its context. [Article]. *Journal of Broadcasting & Electronic Media, 47*(1), 58-76. doi: 10.1207/s15506878jobem4701_4

Takahashi, D. (2010). Time spent playing video games keeps going up. *VentureBeat*, from http://venturebeat.com/2010/03/02/time-spent-playing-video-games-keeps-going-up/

Thompson, K. M., & Haninger, K. (2001). Violence in E-Rated Video Games. [Article]. *JAMA: Journal of the American Medical Association, 286*(5), 591.

Trope, Y., Liberman, N., & Wakslak, C. (2007). Construal Levels and Psychological Distance: Effects on Representation, Prediction, Evaluation, and Behavior. [Article]. *Journal of Consumer Psychology (Lawrence Erlbaum Associates), 17*(2), 83-95. doi: 10.1080/10577400701242227

Valadez, J. J., & Ferguson, C. J. (2012). Just a game after all: Violent video game exposure and time spent playing effects on hostile feelings, depression, and visuospatial cognition. *Computers in Human Behavior, 28*(2), 608-616. doi: 10.1016/j.chb.2011.11.006

Vallacher, R. R., & Wegner, D. M. (1989). Levels of personal agency: individual variation in action identification. [Article]. *Journal of Personality and Social Psychology, 57*, 660-671. doi: 10.1037/0022-3514.57.4.660

van Deursen, A., & van Dijk, J. (2009). Using the Internet: Skill related problems in users' online behavior. [Article]. *Interacting with Computers, 21*(5-6), 393-402. doi: 10.1016/j.intcom.2009.06.005

Weber, R., Behr, K.-M., Tamborini, R., Ritterfeld, U., & Mathiak, K. (2009). What do we really know about first-person-shooter games? An event-related, high-resolution content analysis. *Journal of Computer-Mediated Communication, 14*(4), 1016-1037. doi: 10.1111/j.1083-6101.2009.01479.x

Williams, K. D. (2006). High Scores: How Violence and Frustration in Video Games Affect Aggression. *Conference Papers -- International Communication Association*, 1-37.

Williams, K. D. (2009). The Effects of Frustration, Violence, and Trait Hostility After Playing a Video Game. [Article]. *Mass Communication and Society, 12*(3), 291-310. doi: 10.1080/15205430802461087

Appendix of figures

Figure 1. Reported flow categorized by subscale and skill level

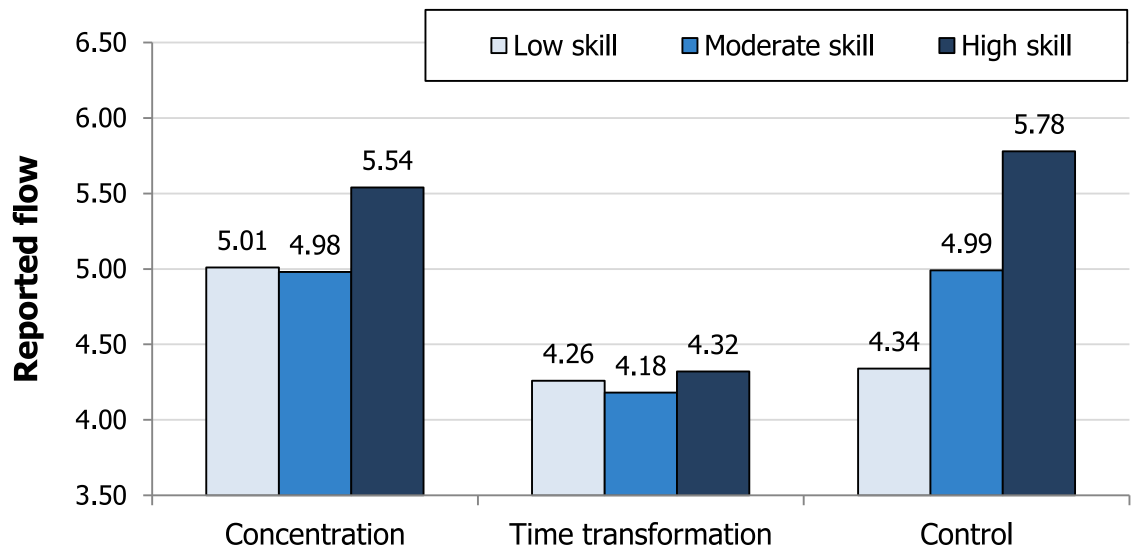

Figure 2. Reported hostile feelings categorized by skill level

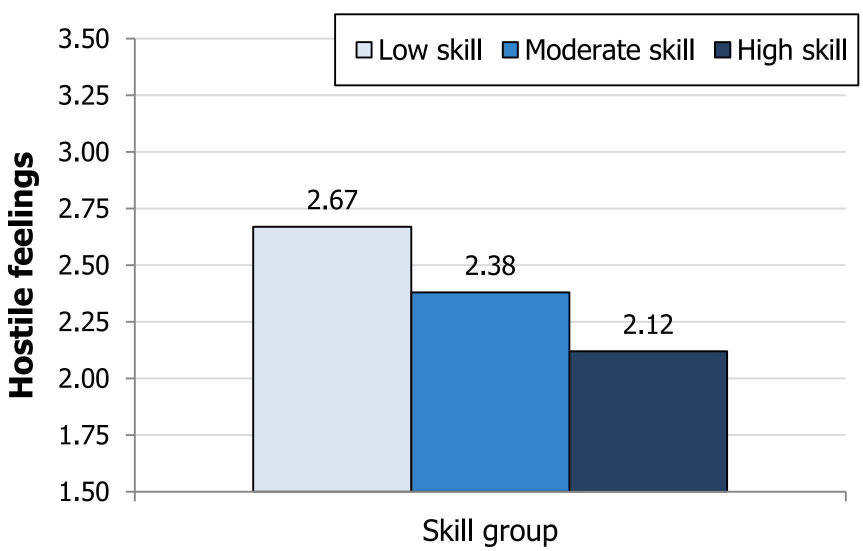

Figure 3. Number of aggressive responses categorized by skill level

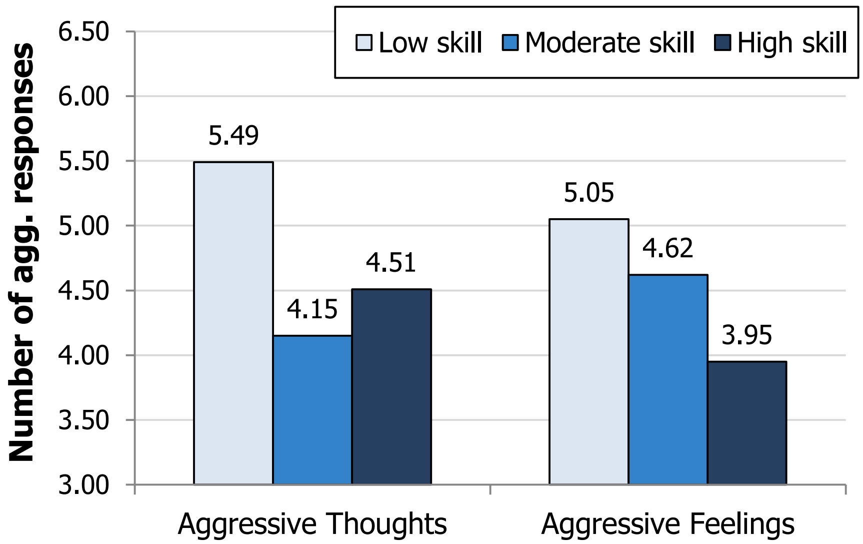

Figure 4. BIF scores categorized by skill level