Will Violent Content in an Active Video Game Make You Move More Vigorously?

Extended Abstract

Background

The newest trends in video games are active video games or “exergames,” which utilize body movements to control actions within the game. Recent research has shown that playing active video games is equivalent to light to moderate levels of physical activity (Peng, Lin, & Crouse, 2011), transforming the sedentary screen time of video gaming (playing video games while sitting)—one of the most significant contributors to sedentary behavior—into active screen time (playing using actual body movements to interact with the game interface).

The relationship between violence in video games and players’ aggression has been a topic of great interest in the past few decades. Research has shown a positive association between the violent video game content (e.g., blood and gore) and players’ short-term aggression (Anderson & Bushman, 2001; Anderson et al., 2004; Barlett, Harris, & Bruey, 2008; Barlett, Rodeheffer, Baldassaro, Hinkin, & Harris, 2008; Krcmar & Farrar, 2009; Lindsay & Anderson, 2000).

Virtually no research has been conducted to examine the effects of violent content in active video games. To our best knowledge, only one study compared the naturally mapped active inputs of Bodypad (www.bodypad.com) with traditional video game controller and investigated their effects on aggression (Jung, Lee, & Park, 2010). The authors found that the naturally mapped active input resulted in faster reaction time to negative/violent words than the traditional video game controller, especially for participants with high trait aggression. Although this study examined the effects of active input in a violent active video game, it did not study the effect of violent content in the active video game on aggression. Previous studies have shown
that violent content can increase arousal among participants (Anderson & Bushman, 2001). In the context of playing active video games, will the violent content also increase arousal among the players? If so, will the increased arousal drive the players to play more vigorously and thus lead to greater energy expenditure and better workout? Additionally, will the violent content also increase aggression among the players? Therefore, the purpose of the current study was to explore the following research question.

RQ: What are the effects of different levels of violence in an active video game on a) state hostility, b) perceived arousal, c) game enjoyment, d) perceived effort in game, and e) activity intensity in game?

**Method**

Participants ($N = 78$) were recruited from undergraduate telecommunication classes at Michigan State University. Participants’ ages ranged from 18 to 30 years old, with a mean of 20 years ($SD = 1.89$). Fifty-three (67.9%) participants were male; twenty-five were female (32.1%). Nine of the 78 participants indicated that they have been exposed to the game used in the current study and thus were excluded from data analysis.

The game used in the study was *Olympus*, a game developed by the Games for Entertainment and Learning Lab at Michigan State University. The game was developed and tested by the development team for one and a half years, including alpha and beta playtesting by undergraduate students from the target audience. Several focus groups and interviews were conducted to collect feedback from these test players for game improvement (Peng, Winn, Pfeiffer, Crouse, & Lin, 2010; Winn, Peng, & Pfeiffer, 2011a; Winn, Peng, & Pfeiffer, 2011b). The game was actively played by using the inputs of the dancepad and Wiimote. When moving the player’s avatar in the game, players need to literally walk or run on the dancepad. Players’
walking and running speed correspond to their avatars’. Players also need to physically jump to make the character jump, use both their hands (holding the Wiimote) to punch, or use the Wiimote as if it were a sword. One scene of the game was chosen in this experiment: fighting incoming hordes of enemies to thwart a beachfront attack on the player’s home city.

The violence level of this scene was manipulated to be low, moderate or high. In the low violence condition, there were no sound effects of punching, grunting, or growling, no splatters of blood when hitting the enemy, and no onscreen splatter of blood when the player was hit by the enemy. The enemy would just disappear out of existence upon defeat with an on-screen feedback message of "guards defeated". When the players died, they would re-spawn and their health bars would be recharged. In the moderate violence condition, there were sound effects of punches or swords hitting but no sound effect of the results of the blows, such as grunts or groans. Minor blood splatter would show on screen when hitting enemies. No onscreen splatter of blood would show when the player was hit by the enemies. The enemies would drop to the ground on being defeated using ragdoll physics with on screen feedback of "guards defeated" but no blood would be shown on the ground. When the players died, they would be asked to fight death by shaking their Wiimotes and running on the dancepad. In the high violence condition, there were sound effects of punching, swords hitting, grunting, and groaning. Major blood splatter would show on screen when hitting enemies. Splatters of blood would also show when the players were hit by the enemies. The enemies would drop to the ground on being defeated using ragdoll physics with on screen feedback of "guards killed" and blood would appear on the ground near the corpse.

Participants first completed a brief online survey to gauge their video game skill level, time spent regularly playing games, trait aggression, and to schedule their lab sessions. When the
participants came to the lab, they first signed the consent form. They were randomly assigned to play one of the three versions of the game. The research assistant first showed them how to use the controllers and then fitted accelerometers, used to collect data on activity intensity while playing, on their waist and the wrist of the participants’ dominant hand. After the 10-minute timed gameplay, participants then completed a post-test questionnaire.

State hostility was measured using the scale by Anderson, Deuser, and DeNeve (1995). The 7-point scale was used. Five items of the original scale (willful, tender, vexed, frustrated, and tame) were excluded based on the recommendation of the researchers, making this a 30-item scale \( M = 2.55, SD = 0.93, \text{Cronbach's } \alpha = .97 \). The four subscales (Anderson & Carnagey, 2009) were also examined separately, including feeling unsociable \( M = 1.92, SD = 1.00, \text{Cronbach's } \alpha \) was not calculated as only two items were included, \( r = .31, p = .01 \), feeling mean \( M = 1.88, SD = 0.89, \text{Cronbach's } \alpha = .96 \), lack of positive feelings \( M = 3.86, SD = 1.14, \text{Cronbach's } \alpha = .90 \), and aggravation \( M = 2.08, SD = 1.15, \text{Cronbach's } \alpha = .92 \).

Perceived arousal was measured using the 24-item scale developed by Anderson et al. (1995). The 7-point scale was used \( M = 4.75, SD = .88, \text{Cronbach's } \alpha = .93 \).

Perceived effort was measured using the subscale of effort in the Intrinsic Motivation Inventory (McAuley, Duncan, & Tammen, 1987). Participants rated their perceived effort for the game using a 7-point scale anchored by 1 (not at all true), 4 (somewhat true), and 7 (very true) on five items (Cronbach's \( \alpha = .90 \)).

Game enjoyment was measured using the scale used in Peng, Lin, Pfeiffer, & Winn (2012). Participants rated the game using a 7-point scale anchored by 1 (describes the game poorly) and 7 (describes the game very well) on seven adjectives \( M = 3.98, SD = 1.29, \text{Cronbach's } \alpha = .93 \).
Activity intensity was objectively measured using the ActiGraph GT3X accelerometer. One accelerometer was fitted on the waist and one on the wrist of the dominant hand. Due to the excessive Kurtosis value of the waist accelerometer count, only the arm accelerometer count was used to measure activity intensity ($M = 9482.46$ count/min, $SD = 4542.00$).

Trait aggression has been commonly found to be a strong predictor for how aggressively a person reacts after exposure to violent stimuli (Anderson, 1997; Tamborini et al., 2004). Therefore, trait aggression was measured to be included as a covariate in the data analysis. Participants were given Buss and Perry’s (1992) 29-item Trait Aggression Survey (1992), which asked participants the extent to which they agreed with a series of statements on scale of 1 (does not reflect how I feel at all) to 7 (accurately reflects how I feel). These 29 items were averaged to form an aggregate trait aggression measure ($M = 2.81$, $SD = 0.81$, Cronbach’s $\alpha = 0.90$).

**Results**

Analysis of covariance (ANCOVA) controlling for trait aggression was used to analyze the data. The means and standard deviations of dependent variables for each condition as well as the ANCOVA F-test statistics are reported in Table 1. The three conditions with varied levels of violence were not different for any of the dependent variables, including state hostility, perceived effort, game enjoyment, and activity intensity. Trait aggression was not found to be a significant covariate. However, significant group difference was found among the three varied levels of violence with regard to one subscale of the state hostility measure—feeling mean. Post-hoc analyses revealed that the moderate violence game resulted in greater feeling of meanness among the players immediately after gameplay than the low violence game ($p = .007$) and the high violence game ($p = .04$).


Table 1. Means and standard deviations (in parentheses) of the dependent variables and F test statistics of ANCOVA.

<table>
<thead>
<tr>
<th></th>
<th>Low violence (n = 22)</th>
<th>Moderate violence (n = 23)</th>
<th>High violence (n = 24)</th>
<th>ANCOVA F statistics</th>
<th>Partial eta square</th>
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<tbody>
<tr>
<td>State Hostility</td>
<td>2.35 (.83)</td>
<td>2.91 (1.05)</td>
<td>2.40 (.83)</td>
<td>$F(2, 65) = 2.04$, $p = .14$</td>
<td>.059</td>
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<tr>
<td>State Hostility: Aggravation</td>
<td>1.80 (1.05)</td>
<td>2.48 (1.29)</td>
<td>1.95 (1.01)</td>
<td>$F(2, 65) = 1.77$, $p = .18$</td>
<td>.052</td>
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<td>State Hostility: Feeling mean</td>
<td>1.56 (.66)$^a$</td>
<td>2.32 (.98)$^b$</td>
<td>1.74 (.88)$^g$</td>
<td>$F(2, 65) = 4.24$, $p = .019$</td>
<td>.12</td>
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<td>State Hostility: Lack of positive feeling</td>
<td>3.83 (1.23)</td>
<td>3.92 (1.03)</td>
<td>3.82 (1.21)</td>
<td>$F(2, 65) = .33$, $p = .97$</td>
<td>.001</td>
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<td>State Hostility: Unsociable</td>
<td>1.61 (.70)</td>
<td>2.35 (1.22)</td>
<td>1.79 (.90)</td>
<td>$F(2, 65) = 2.93$, $p = .06$</td>
<td>.083</td>
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<td>Perceived arousal</td>
<td>4.63 (.93)</td>
<td>4.56 (.97)</td>
<td>5.05 (.69)</td>
<td>$F(2, 65) = 1.89$, $p = .16$</td>
<td>.055</td>
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<tr>
<td>Game Enjoyment</td>
<td>4.00 (1.30)</td>
<td>3.95 (1.33)</td>
<td>3.98 (1.30)</td>
<td>$F(2, 65) = .003$, $p = 1.00$</td>
<td>.00</td>
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<td></td>
<td>Perceived Effort</td>
<td>Activity Intensity (arm count)</td>
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<td></td>
<td>5.05 (1.33)</td>
<td>9099.39 (3935.83)</td>
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<tr>
<td></td>
<td>5.37 (1.14)</td>
<td>8389.23 (4229.28)</td>
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<tr>
<td></td>
<td>5.01 (1.09)</td>
<td>10881.29 (5134.40)</td>
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<tr>
<td></td>
<td>$F(2, 65) = .67, p = .52$</td>
<td>$F(2, 65) = 1.53, p = .22$</td>
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<td></td>
<td>$.02</td>
<td>$.045</td>
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