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An examination of psychoticism and motion capture controls as moderators of the effects of violent video games

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ABSTRACT

The current study examined the potential moderating effects of motion capture technology and participants' own level of psychoticism on their hostility and aggressive thoughts after playing violent video games. A total of 118 participants (68 females, 50 males) first completed a measure of psychoticism and then played either a violent video game or a non-violent video game using either a traditional controller or motion capture controls. Immediately after the video game play period, participants' current level of hostility and aggressive cognitions were assessed using self-report questionnaires. Results indicated that the use of motion capture controls did not increase the negative effects of violent video games. However, participants with elevated levels of psychoticism were much more affected by violent video games than other participants. Such findings suggest that only some individuals are adversely affected by violent video games and that those who are affected have preexisting dispositions which make them susceptible to such violent media.

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1. The potential moderating effects of motion capture controls and psychoticism on the effects of violent video games

Over a decade of correlational and experimental research suggests that violent video games are linked to various negative behaviors and cognitions such as aggression, hostility and aggressive thoughts (e.g., Anderson et al., 2004; Bushman & Anderson, 2002; Gentile, Linder, & Walsh, 2003; Gentile, Lynch, Linder, & Walsh, 2004; Sheese & Graziano, 2005; for a critique of this research see Ferguson, 2007; Olson, 2004). Over the years, the advancing technology of video game systems has amplified concerns within the popular media and legal system; players are now able to interact in environments that are much more graphically realistic than in the past and are even able to control their virtual interactions using various forms of motion technology (e.g., Nintendo Wii remote). For example, the release of the violent game Manhunt 2 for the Nintendo Wii caused several violent video game opponents to be particularly concerned about its potential impact on players. To explain this concern, Jack Thompson, a lawyer who often argues for legislating restricting the sales of violent video games, noted in a letter to Florida Governor Charlie Crist:

> "The Wii device does not utilize traditional push button game controllers but instead utilizes hand-held motion capture devices. Thus, as a player moves his hands and limbs, he sees himself act out those motions in the virtual reality setting. Tiger

Woods, for example, has [illustrated] that the Wii motion capture technology allows golfers to play his games and rehearse their swings... Manhunt 2 will feature decapitations with hatchets, bludgeonings with baseball bats, jamming of syringes into eyes, removal of testicles, and various "environmental kills," which are with everyday objects, such electrical cords used to strangle victims... [thus] Manhunt 2, with its hyperviolent content and motion capture technology on Wii, will be a teen murder simulator like the world has never seen." (Thompson, 2007)

Numerous other lay individuals and politicians share Thompson's concern about the potentially negative effects of using motion capture controls to play violent video games (e.g., Senators Hillary Clinton, Joesph Liberman, Sam Brownback, Evan Bah [Lieberman, 2007]; the Attorney General of Florida Bill McCollum [McCauley, 2007]) and the game itself was essentially banned for sale in several countries (BBC News, 2007; IFCO, 2007). However, to date, no study has actually investigated whether or not such controls alter the negative effects of violent video games.

Although empirical research examining the effects of motion capture controls does not exist, there are theoretical reasons to believe that such controls will increase the negative effects of violent video games. Anderson and Dill (2000) argue that video games are more "dangerous" than television or movies because these games make it relatively easy for players to identify with the protagonist in the game. This heightened identification likely occurs because video games allow players to actually control the character in the game and often even see the virtual world

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through the eyes of the main character. It seems probable that a control scheme, which mimics the players' actual hand and arm movements (such as the one discussed above for Manhunt 2), will increase players' emersion and sense of connectedness to the main character in a video game. Therefore, it is likely that the greater interactivity afforded by motion capture controls will cause individuals to be more negatively impacted (e.g., become more hostile, have increased aggressive cognitions, etc.) than individuals who play violent video games using a traditional controller.

The controller that an individual utilizes to move characters in violent video games may moderate the effects of this media and, according to the General Aggression Model (GAM; Bushman & Anderson, 2002; Gentile et al., 2004; Uhlmann & Swanson, 2004), different people will react differently to violent video games. The GAM theorizes that hostility and aggressive cognitions are best predicted by considering the person within a situation. In other words, stable dispositions might alter how one interprets or responds to violent stimuli. Consistent with this notion, Giumetti and Markey (2007) found that individuals who were angry were much more adversely affected by violent video games than individuals who were not angry. To date, anger is the only characteristic that has been shown to moderate the effects of violent video games. Given the importance of understanding who might be most affected by violent video games, Giumetti and Markey (2007) argued that it is crucial for researchers to examine various personality traits to determine which other traits moderate the effects of violent video games.

Although there are numerous traits which might moderate the effects of violent video games, research examining media violence suggests that psychoticism is a key trait to consider. Individuals who score high on psychoticism tend to be cold, lacking in sympathy, unfriendly, untrustworthy, odd, unemotional, unhelpful, antisocial, and paranoid (Eysenck & Eysenck, 1976). It is further speculated that individuals who score high on psychoticism may be more susceptible, given certain environments, to becoming psychotic. Consistent with this notion, past research suggests that elevated levels of psychoticism tend to be found in schizophrenics, prisoners, individuals with antisocial problems and those who are reckless (Eysenck & Eysenck, 1976). Additionally, research suggests that the trait of psychoticism likely moderates the effects of violent television and movies. Lynn, Hampson, and Agahi (1989) found a causal relationship between television violence and aggression only among individuals who scored high on psychoticism. More recently, Zilmann and Weaver (1997) found that males with elevated levels of psychoticism who viewed violent films were more likely to believe that violence was an acceptable way to resolve conflict. Such research suggests that psychoticism might also moderate the effect of violent video games, causing people who score relativity high on psychoticism to be more hostile and experience more aggressive cognitions after playing violent video games than individuals with low levels of psychoticism.

The current study represents one of the first empirical investigations aimed at examining psychoticism and motion capture controls as moderators of the effects of violent video games. Based on previous research, it is hypothesized that individuals who play violent video games will tend to be more hostile and have higher levels of aggressive cognitions than those who do not play violent video games. Second, it is hypothesized that players who use motion capture controls to play violent video games will be more hostile and have higher levels of aggressive cognitions than players who play violent video games using a traditional controller. Finally, it is hypothesized that participants who score high on psychoticism will be more affected by violent video games than participants who score low on psychoticism.

2. Methods

2.1. Participants

During a 15-week period, 118 university undergraduates, 50 females and 68 males (M age = 19.35 years), participated in the current study. The participants were recruited from undergraduate general psychology classes and were given class credit for their participation in the experiment.

2.2. Procedure

Participants performed the study one at a time with the assistance of an experimenter. After providing informed consent, each participant was told that they were going to be asked to complete a number of different types of tasks that would help the researchers select stimuli for future research projects. Participants completed the study in three phases, lasting a total duration of approximately one hour. In phase one, participants completed a questionnaire packet consisting of a demographics questionnaire, a measure of psychoticism, as well as several additional questionnaires that were used to hide the true purpose of the current study. In phase two, participants engaged in a video game play period. In phase three, participants completed measures of hostility and aggressive cognitions as well as other unrelated questionnaires in order to maintain the cover story.

2.3. Phase 1: Questionnaire completion

Participants were given as much time as needed to complete the following questionnaires related to the current study.

2.3.1. Demographic variables
The first questionnaire was a measure of demographic information, asking the participant for his or her age, gender, and year in college.

2.3.2. Psychoticism
The dispositional trait of psychoticism was measured using the revised version of the Eysenck Personality Questionnaire (EPQ-R; Eysenck & Eysenck, 1991). This scale consists of 27 dichotomous questions which participants used to describe their level of psychoticism. In the current study, the coefficient alpha of the psychoticism scale was .74.

2.4. Phase 2: Video game play

After completing the questionnaires, participants were randomly assigned to play either a violent video game (Manhunt 2) or a non-violent video game (Tiger Woods Golf 2008) using either a traditional controller on the Playstation 2 or a motion capture control on the Nintendo Wii. Both the Playstation 2 and Nintendo Wii versions of these games are essentially identical to each other except for the control method each employs. Before playing a game, participants were given instructions about how to play the game and were also provided with a sheet of paper that listed the controls for the game they played. The experimenter then left the room and allowed the participant to play the game for 20 min.

2.5. Phase 3: Aggression measure

Once participants finished playing the video game, the video game was turned off and participants were presented with the following two measures in random order.

2.5.1. State hostility

Participants' current level of hostility was assessed using the State Hostility Scale (SHS; Anderson, Deuser, & DeNeve, 1995). This scale consists of 35 items which participants used to describe their current level of hostility (e.g., "I feel furious.", "I feel like banging on a table.") on a 5-point Likert-type scale which are summed to create a total state hostility score. In the current study, the coefficient alpha of the SHS was .82.

2.5.2. Aggressive cognitions

Accessibility of aggressive thoughts was measured using a word completion task which consisted of 49 word fragments (Anderson, Carnagey, & Eubanks, 2003). Participants were asked to fill in the missing letters of word fragments in order to form a complete word. Each of the word fragments can yield complete words which are either aggressive or nonaggressive (e.g., "_unch" could become "punch" or "lunch"). Two research assistants independently coded each word as either "aggressive" or "not aggressive." The proportion of completed words which were rated as aggressive (i.e., 0% = none of the completed words were aggressive; 100% = all of the completed words were aggressive) was used as the assessment of overall aggressive cognitions. The two raters obtained extremely high agreement ($r = .96$) on participants' overall aggressive cognition scores. Because of the high level of agreement, the two judges' proportion scores were averaged in order to provide an assessment of the participants' accessibility of aggressive cognitions.

3. Results

In order to examine the three hypotheses of the current study, separate hierarchal regression analyses were computed for each outcome measure (i.e., hostility and aggressive cognitions). In each of these analyses, video game condition (VGC), control scheme (CS), and psychoticism (P) were entered in the first step. Each of the resulting two-way interactions were entered in the second step (VGC × CS, VGC × P, CS × P) and the three-way interaction (VGC × CS × P) was entered in the third step. To reduce issues associated with multicollinearity, the trait of psychoticism was centered and both the video game condition (0 = non-violent video game and 1 = violent video game) and the control scheme (0 = traditional controller and 1 = motion capture controller) were dummy coded (Cohen & Cohen, 1983).

As shown in Table 1 and consistent with the first hypothesis, participants who played the violent video game tended to be more hostile ($M = 83.72$) and have greater accessibility of aggressive cognitions ($M = 47.84$) than participants who played the non-violent video game ($M = 70.79$, $M = 40.26$, respectively). However, contrary to the second hypothesis, the controller that the participants utilized did not moderate the effect of violent video games. Consistent with the third hypothesis, psychoticism significantly moderated the effect that violent video games had on participants' hostility and aggressive cognitions.[1]

In order to examine exactly how psychoticism moderated the effect of the video game condition on hostility and aggressive cognitions, graphical representations of these interactions were created for individuals who utilized a traditional controller (see Figs. 1 and 2). Each graph was derived by calculating simple regression equations corresponding to individuals scoring at the mean (i.e., moderate scoring psychoticism), 1 standard deviations above the

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[1] To be certain that the moderating effect of psychoticism was not caused by possible gender differences on this trait, a second regression analysis was conduced in order to control for the main effect of gender as well as its interactions with video game condition and psychoticism. Results indicated that none of the gender interaction terms were significant and, more importantly, psychoticism still significantly moderated the effect of the video game condition.

Table 1
Multiple regression analysis.

	B	SE B	β
Predicting state hostility			
Step 1			
Constant	70.79		
Video game condition (VG)	12.93	3.47	.28[b]
Control scheme (CS)	−4.76	3.53	−.10
Psychoticism (P)	4.03	.64	.48[b]
Step 2			
VG × CS	−1.38	6.98	−.02
VG × P	2.52	1.25	.22[a]
CS × P	−1.63	1.32	−.15
Step 3			
VG × CS × P	−.63	2.66	−.03
Predicting aggressive cognitions			
Step 1			
Constant	40.26		
Video game condition (VG)	7.58	2.15	.30[b]
Control scheme (CS)	−1.12	2.18	−.04
Psychoticism (P)	1.06	.40	.23[b]
Step 2			
VG × CS	−6.56	4.52	−.19
VG × P	1.58	.79	.26[a]
CS × P	−1.21	.82	−.20
Step 3			
VG × CS × P	−3.10	1.78	−.23

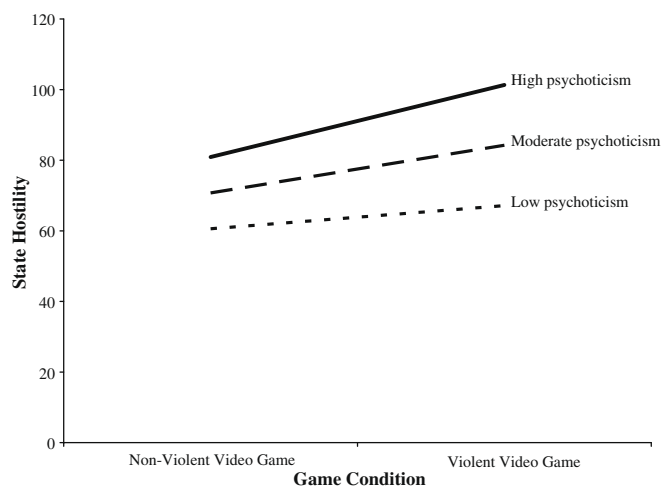*Note.* $n = 118$.
[a] $p < .05$.
[b] $p < .01$.

Fig. 1. Interaction between psychoticism and video game condition when predicting state hostility. A graphic representation of the regression equation: total state hostility score = 70.74 + 3.71 (P) + 13.48 (VG) − 3.95 (CS) + 2.52 (P ∗ VG) − 1.63 (P ∗ CS) − 1.38 (VG ∗ CS).

mean (i.e., high scoring psychoticism), and 1 standard deviations below the mean for anger (i.e., low scoring psychoticism; Aiken & West, 1991). As these figures indicate, individuals who scored high on psychoticism were significantly more affected by violent video games (i.e., were more hostile and had more aggressive cognitions) than individuals who scored low on psychoticism.

4. Discussion

Previous research examining the effects of violent video games demonstrates that violent video games are linked to various negative behaviors and cognitions such as hostility and aggressive thoughts (e.g., Anderson et al., 2004; Bushman & Anderson, 2002;
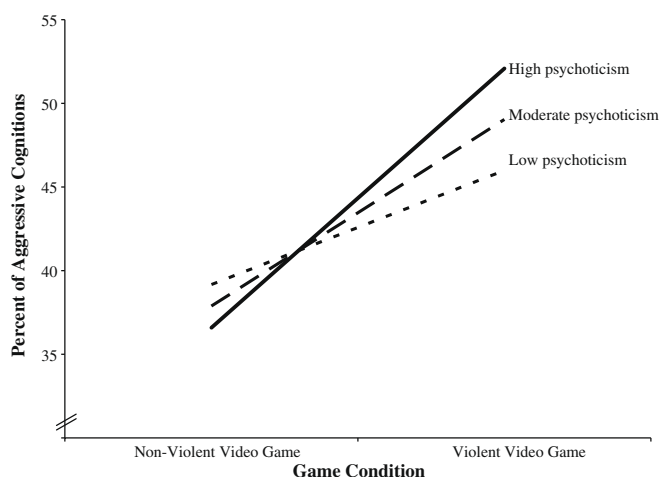
Fig. 2. Interaction between psychoticism and video game condition when predicting aggressive cognitions. A graphic representation of the regression equation: percent of aggressive cognitions = $37.88 - .47$ (P) $+ 11.16$ (VG) $+ 2.51$ (CS) $+ 1.58$ (P * VG) $+ 1.21$ (P * CS) $- 6.56$ (VG * CS).

Gentile et al., 2003, 2004; Sheese & Graziano, 2005). The current study extended these findings by examining psychoticism and motion capture controls as potential moderators of the effects of violent video games. Consistent with the first hypothesis, participants who played a violent video game tended to be more hostile and have more aggressive cognitions than individuals who played a non-violent video game. Such findings are consistent with previous research suggesting that violent video games can cause short-term changes in an individual's hostility and thoughts (Anderson et al., 2004; Bushman & Anderson, 2002; Gentile et al.,2003, 2004; Sheese & Graziano, 2005).

Contrary to the second hypothesis, the negative effects of violent video games were not magnified when individuals utilized a motion capture controller. Specifically, participants who utilized motion capture controls to play the violent video game Manhunt 2 did not experience more hostility or more aggressive cognitions than individuals who utilized a traditional controller. Consistent with the third hypothesis, the trait of psychoticism significantly moderated the negative effects of violent video games. As shown in Figs. 1 and 2, participants with elevated levels of psychoticism tended to experience higher levels of hostility and more aggressive cognitions after playing a violent video game than individuals with lower levels of psychoticism. Such a finding is consistent with previous research demonstrating that individuals who score high on psychoticism tend to be more adversely affected by various forms of violent media (e.g., television, movies, etc.; Lynn et al., 1989; Zilmann & Weaver, 1997). This finding is also consistent with the GAM, which suggests that hostility and aggressive cognitions are best predicted by considering both a person's individual characteristics (e.g., psychoticism) and his or her environment (e.g., playing a violent video game).

Although these findings are consistent with most of our hypotheses, they should be considered in the context of the study's limitations. First, because the current sample consisted entirely of university undergraduates, it is unknown if these findings would generalize to a different population. The current study also only examined the short-term effects of violent video games on participants' self-reports of hostility and aggressive cognitions. It is unknown whether or not these same effects would exist if hostility and aggressive cognitions were assessed several hours after playing a violent video game. Additionally, although the instruments utilized in this study to examine hostility and aggressive cognitions have been used multiple times in previous research, they

only examine how a person feels and thinks and not how a person actually behaves. Finally, even though the laboratory design utilized in this study allowed for causal conclusions concerning exposure to violent video games, it is unclear how well these results would generalize outside of the laboratory. Future researchers might consider examining whether or not a similar moderating effect is found between psychoticism and violent video game play outside the laboratory in order to better understand the generalizability of the findings presented in this study.

The results of this study could have important implications for parents and policy makers. Although the notion of using a motion capture control to simulate stabbing or choking a virtual person might seem shocking or even depraved, there is no empirical evidence to suggest that it actually affects participants' hostility or aggressive cognitions any more than using a traditional controller. In short, it appears that concern for the potentially negative effects of motion capture controls when playing violent video games is somewhat premature. Additionally, not all individuals are affected by violent video games in a similar manner. Results from this study and previous research suggest that individuals with elevated levels of psychoticism or who are extremely angry (Giumetti & Markey, 2007) tend to be affected by violent video games more than other individuals. Of course, these results also suggest that some individuals tend to be unaffected by short-term exposure to violent video games. In other words, it is much too simplistic to suggest that violent video games inevitably cause increases in hostility and aggression. Instead, it appears that violent video games only adversely affect some individuals and those who are affected have a preexisting disposition (i.e., are angry or have elevated levels of psychoticism) which causes them to be susceptible to such violent media.

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