Communication Monographs
Vol. 72, No. 2, June 2005, pp. 217–233

Routledge
Taylor & Francis Group

Internet Fantasy Violence: A Test of Aggression in an Online Game

Dmitri Williams & Marko Skoric

Research on violent video games suggests that play leads to aggressive behavior. A longitudinal study of an online violent video game with a control group tested for changes in aggressive cognitions and behaviors. The findings did not support the assertion that a violent game will cause substantial increases in real-world aggression. The findings are presented and discussed, along with their implications for research and policy.

Keywords: Video Games; Aggressive Behavior; Internet; Online Game

Once considered a defunct fad of the 1970s and 1980s, video games are now a 30-year-old media phenomenon that has entered the cultural mainstream. No longer considered only children's toys, video games have become a significant cultural force crossing old demographic boundaries, and are now played in one form or another, online or off, by a majority of Americans (Pew Internet and American Life Project, 2002; *State of the industry report 2000–2001*, 2001). Over 60% of Americans play some form of interactive game on a regular basis, and 32% of the game playing population is now over 35 (*State of the industry report*). Financially, games have passed the motion picture industry in sales (Williams, 2002).

As with most new media technologies, fears of games' social and health impacts have followed (Dominick, 1984; Ellis, 1984; Fisher, 1994; Wartella & Reeves, 1983, 1985). These fears have risen alongside the rise of the Internet and its own corresponding set of concerns (Slater, 2003). It follows that online games have become a particularly

Dmitri Williams is Assistant Professor in the Department of Speech Communication at the University of Illinois at Urbana-Champaign; Marko Skoric is a Ph.D. candidate at the Department of Communication Studies at the University of Michigan. This research was supported by a dissertation grant from the Department of Communication Studies at the University of Michigan. The authors wish to thank Brad Bushman, W. Russell Neuman, Susan Douglas, Nojin Kwak, and Nicholas Valentino for their comments on earlier drafts of this material, and the *Communication Monographs* referees for their helpful suggestions. Correspondence to: Dmitri Williams, Department of Speech Communication, University of Illinois, 244 Lincoln Hall, 702 S. Wright Street, Urbana, Illinois 61801, USA. Email: dcwill@uiuc.edu

ISSN 0363-7751 (print)/ISSN 1479-5787 (online)
DOI: 10.1080/03637750500111781

worrying source for many, with politicians, pundits, and media outlets focusing on the possible link between Internet game violence and real-world aggression (*Marketing violence to children, 2000*; *Prepared Statement of L. Rowell Huesmann*, 1999; Walsh, 2001). The shocking incident at Columbine High School in Littleton, Colorado, served as a flashpoint for these concerns, with many suggesting that games played a significant role in the tragedy (Slatalla, 1999; Taylor, 1999). These concerns have led to a series of legal challenges involving the marketing and sale of games to minors (Anders, 1999; "Marketing violent entertainment to children," 2001) and First Amendment cases involving arcades (Engle, 2001; Jurkowitz, 2002). Content analyses have shown that games are increasingly violent, even those labeled "E" as appropriate for everyone (Knowlee et al., 2001; Thompson & Haninger, 2001). One reason for this trend is that the first generation of game players has aged and its tastes and expectations have been more likely to include mature fare (Curtiss, 2002; Pham, 2002; Russo, 2001). These tastes, combined with ever-increasing computer processing speed, have made for a series of leaps in the graphic and photorealistic nature of violent games. On the other hand, such violent games have been shown to improve visual acuity (Green & Bavelier, 2003).

Drawing from more established research on television (Bandura, 1994; Berkowitz & Rogers, 1986; Huesmann, 1986), the research on video games has explored effects on aggression and delinquency. However, several recent reviews and meta-analyses of the game research (Anderson & Bushman, 2001; Dill & Dill, 1998; Griffiths, 1999; Sherry, 2001) make contrasting claims about the certainty and scope of game effects. This suggests that we have limited knowledge of what games do to or for people, and that we have even less understanding about the range of content.

The issue is hardly academic—a series of public health, privacy, and First Amendment issues are at stake, and policy-makers and pundits on all sides are grasping for evidence to support their positions. Several gaps in the literature must still be filled before reaching any solid conclusions. In this article, we discuss and bridge those gaps by critiquing and building on prior studies, while also accounting for the internal and external contexts of game play. Furthermore, because the field has failed to demonstrate long-term causal links between game playing and aggression, we undertake the first longitudinal field study of a game.

Prior Research

The research into game violence and aggression is rooted firmly in the more established field of media effects (Funk, 1993), and so researchers have drawn on a series of theories and approaches that have established what most consider to be a reasonable link between media violence and real-world aggression. Following in the footsteps of this research tradition, the game researchers have expected to find stronger links with their medium of study because of the comparatively active level of participation in game play compared to television viewing (Carnagey & Anderson, 2004). However, while some studies have found connections between game violence and aggression (Ballard & Weist, 1995; Bushman & Anderson, 2002; Irwin & Gross,

1995; Schutte, Malouff, Post-Gordon, & Rodasta, 1988), others have not (Cooper & Mackie, 1986; Graybill, Kirsch, & Esselman, 1985; Scott, 1995), and researchers remain divided (Griffiths, 2000; Wiegman & van Schie, 2000). Several recent reviews of the video game research literature have similarly reached somewhat differing conclusions, although they each have pointed out a series of serious shortcomings in the literature.

Sherry's meta-analysis (2001) suggests that games do indeed have some kind of aggression effect, and that this effect is likely smaller than television's. However, Sherry noted the additional proviso that the varying findings, treatment times, stimuli, and participant pools prevent a truly clear understanding of effects. Treatment times have varied from 5 to 75 minutes, and have consisted of "violent" content ranging from crude box-like shapes in an early 1980s boxing game (Graybill et al., 1985) to highly realistic 3D hand-to-hand combat (Ballard & Weist, 1995). A second meta-analysis by Anderson and Bushman (2001) reached the conclusion that exposure to violent video games is positively linked with aggression, but they noted the important absence of longitudinal studies from their analysis. Two other reviews of the literature (Dill & Dill, 1998; Griffiths, 1999)—from the same journal—reached opposite conclusions about the strength of the findings to date. In the first, Dill and Dill refrained from doing a meta-analysis at all because of what they saw as too few studies. Instead, they suggested that the literature points to aggression findings, but that a key shortcoming was the lack of longitudinal methods. Griffiths also suggested that the wide range of available games—and their potentially different effects—has been largely ignored, a theme to be taken up shortly.

There has been some survey-based investigation into the differential impacts of games when the players vary by age, gender, or prior experience (Gibb, Bailey, Lambirth, & Wilson, 1983; Kestenbaum & Weinstein, 1985; Lin & Leper, 1987; McClure & Mears, 1984), but solid conclusions have been elusive. As Funk (1992) has noted, attempts to describe frequent game players' profiles have been both contradictory and inconclusive. Still, researchers continue to measure these variables because of their predictive power in other aggression-related studies (Paik & Comstock, 1994) and they are included in this research as controls.

In sum, researchers suspect a strong linkage between games and aggression but, with the exception of relatively short-term effects on young adults and children possibly caused by increases in arousal and/or priming, they have yet to demonstrate this link. Still, we agree with the other researchers that some games may have long-term effects on aggression due to similar mechanisms found with television violence—learning, rehearsal, and automatization of cognitive structures such as aggressive beliefs, schemata, and scripts (Anderson & Bushman, 2001). Furthermore, unlike television, video games also allow players to practice their aggressive behavioral scripts (Anderson & Dill, 2000). Yet, we notice several gaps that might be bridged. For example, one limitation of the research has been the over-reliance on very young participants in experiments. While exploring issues of children and game violence remains important, we are puzzled that the research community has rejected studying all ages even while the average age of game players steadily increases for both home consoles and online play. Those under 18 now make up only 42% of console players

and only 28% of PC players. Data from the 2004 Pew Internet and American Life Project shows that 46% of all Internet users have played a game online, including an astounding 38% of people over 65 (Fallows, 2004). Because the effect size from television violence is thought to be much lower for adults (Paik & Comstock, 1994), we can speculate that this may also be true for video games.

However, we focus primarily on two potentially major gaps that have yet to be bridged. One is the basic question of method, and the other is a question of the generalizability of the stimuli chosen for study.

To date, game research has relied chiefly on only two methods, the survey and the laboratory or observational field experiment. We have yet to see studies employing longitudinal panel or experimental designs that would provide us with a better understanding of the long-term effects of games. Research suggests that the length of game play may be a vital factor even in the studies investigating short-term effects. In his meta-analysis, Sherry (2001) noted that the initial effects of many short-term laboratory studies might simply have been arousal that wears off to be replaced by boredom or fatigue, neither of which is thought to increase aggression. These laboratory-based experiments on games and aggression have also been assailed as unduly artificial, too short, and not representing the social context of game play (Goldstein, 2001). This last point is especially salient, given that 60% of gamers now play with friends and 25% play with a spouse or parent (*State of the industry report 2000–2001*, 2001). More importantly, for the field to establish a true long-term causal relationship between games and aggression, a longitudinal method must also be employed to help triangulate the findings. Regardless of their individual expectations, each of the four major reviews here came to the same conclusion. To quote Anderson and Bushman, "longitudinal research is badly needed" (2001, p. 359).

Our second point is one that has received little attention in the research to date, but that we believe is equally, if not more, important. This is the issue of the generalizability of games, which vary by both content and the social context of play. The online database www.allgame.com lists descriptions of more than 38,000 different games across 100 platforms. To collapse this wide variety of content into a variable labeled "game play" is the equivalent of assuming that all television, radio, or motion picture use is the same. As Dill and Dill have noted, "This is akin to lumping films like *The Little Mermaid* with *Pulp Fiction*, and expecting this combined 'movie viewing' variable to predict increases in aggressive behavior" (1998, p. 423). Moreover, even if we could agree about the presence or absence of violent content in a movie or video game, that would hardly improve our ability to predict its effects, given the powerful contextual moderators that have been identified in the literature (see Bandura, 1994; Huesmann, 1986; Paik & Comstock, 1994). For this reason, we embarked on an in-depth participant observation study of our game prior to the main study. This involved 150 hours of game time, including systematic observations of player actions and interactions, plus interviews with dozens of players and telephone conversations with the game's usability architects. This process gave us crucial insight into the context of the game world, and helped us to better formulate our hypotheses. What follows is

a description of our stimulus, and the subsequent hypotheses that flow from our study of it.

Understanding the Game

Using the industry's widely used typology of game genres, we are studying a role-playing game (RPG). RPGs are games in which the player creates, grows, alters, and maintains a character through a longer-than-average play experience. RPGs are also the most popular PC game genre (Ow, 2003). We have additionally chosen to study an online game because networked gaming is an extremely high growth area across all play platforms. Online games are played by large and small groups of players, and last for very different time periods. The smallest games—for example, online chess—have only two players and are relatively short. The largest games have hundreds of thousands of players. This last kind of game is known as a "massively multi-player online role-playing game" (MMRPG). These games are the descendents of the MUDs and MOOs best known from the work of Turkle (1995). In an MMRPG, players log into and out of a virtual environment that is "persistent," or always on. Players access this shared virtual space and see a representation of themselves on the screen—their avatar—along with representations of other players. MMRPGs represent the most popular genre of today's PC games and the platform and setting that will likely mark the industry's future.

Our particular choice was the game *Asheron's Call 2* (*AC2*), and what follows is a description of its characteristics relevant to a study of aggression. *AC2* is a fantasy-based game, complete with the expected assortment of evil monsters, virtuous heroes (and heroines), and panoramic environments. It was ideal for study because of its accessibility, its level of violence, the game goals, the level of interactions with other players, and its representativeness. *AC2* is considered in the game community to be one of the more accessible MMRPGs available ("State of the online union," 2002). Its game manual is short and simple, and the user interface has few options compared to some of the more complex MMRPGs. This relative simplicity makes it better suited to first-time players, especially ones not previously interested in or aware of such games who might be solicited for a study.

AC2 is a game based on combat and conflict, but this conflict is almost never between online players. The overall threat level of the game environment is notable. Players start off in safe zones where they cannot be attacked, but must soon venture outside to begin their tasks. Once outside, foreboding music heralds a series of imminent attacks and the player's "radar" screen shows the location of monsters lying in wait. Combat thus takes place on a nearly constant basis, and cannot be avoided if the player wants to advance their character. Combat itself is fairly typical of the genre in that it involves weaponry and spells, and contains repetitive graphic violence; blood oozes and flies, and creatures writhe and scream when they are reduced to gory corpses. Compared to the content of all video games, it is highly violent, but what makes it especially subject to the predictions of the GAM is the sustained pattern of the violence. Players carry out routinized, patterned actions as they fight and slay

monsters in order to advance their character as quickly as possible. Unlike many "shooter" games, this kind of RPG encourages efficient killing through repetitive actions.

The role of the other players is particularly important in *AC2*. Players may talk with one another openly or in private chat. Those who venture out alone into the wilderness usually fare less well than those who collaborate and join temporary, or more long-lasting, "fellowships." And because players cannot attack other players except in a few specially marked areas, there is very little inter-player strife. In fact, the player community is proactive in its help of others, with players frequently taking a moment to help out those with less power or knowledge.

Like most MMRPGs, *AC2* has a cultish following and the most hard-core players report that they play upwards of 60–80 hours per week, while more casual players report 20–25 hours per week. This quantity of play is much higher with MMRPGs than with across all video games (Griffiths, Davies, & Chappell, 2003; Yee, 2002). But since *AC2* is also friendly and particularly accessible to those new to the genre ("State of the online union," 2002), it was appropriate for use as a stimulus for first-time players.

Mechanisms and Hypotheses

The existing literature predicts changes in aggressive cognitions and behavior following repeated exposure to violent video games. The major mechanisms in this realm are the cognitive-neoassociation analysis (CNA) model (Anderson & Ford, 1986; Berkowitz & Rogers, 1986), social learning theory (Bandura, 1994; Schutte et al., 1988), and the repetition of aggressive scripts (Huesmann, 1986). All of these approaches are subsumed into Anderson and Bushman's General Aggression Model (GAM), which incorporates aggressive beliefs and attitudes, perceptual schemata, expectation schemata, behavior scripts, and desensitization (Anderson & Bushman, 2001). In short, according to the GAM, learning, rehearsal, and activation of aggression-related cognitive structures causes aggressive behavior via changes in aggressive personality. If these approaches are applicable, we should expect an increase in both physical aggression and aggressive cognitions over time when players are exposed to a violent game.

First, exposure to a violent video game can result in short-term increases in aggressive behavior as it affects the individual's present internal state, that is, cognitions, affect, and arousal (Anderson, 2002). Every exposure to the game can be viewed as an *episode*, a cycle of the player's ongoing social interaction, which represents a central focus of the GAM theoretical model (Anderson & Bushman, 2002). According to the model, playing a game like *AC2* could cause short-term aggression via priming of aggressive cognitions and creation of aggressive affect, as well as via increases in arousal. Repeated exposure to such "episodes" over times leads to the development, automatization, and reinforcement of aggressive cognitions, which may produce long-term effects, including more aggressive perception, beliefs, attitudes, and behavioral scripts (Anderson & Bushman, 2002). It is assumed that temporary

changes in affective states and arousal are not very important for the study of long-term effects as they dissipate over time (Anderson, 2002). Although we are mainly interested in the medium- to long-term effects of *AC2*, it is possible that our aggression measures may pick up some short-terms effects as well (i.e., if the participant was playing the game shortly before filling out the questionnaire). While this remains a possibility, we think that only a small minority of hard-core gamers were likely to do so.

In the GAM model, the game-induced changes in aggression-related knowledge structures affect the individual's personality and their patterns of social interactions (see Anderson, 2002; Anderson & Bushman, 2002). We aimed to test the causal path starting from exposure to a violent video game, and leading to changes in patterns of behavior/social interactions via changes in normative beliefs about aggression. Normative beliefs about aggression—cognitions about the appropriateness of violent behaviors—influence responses in novel, but also in familiar situations, thus serving as regulators of behavior (Huesmann & Guerra, 1997). Thus, we hypothesized that individuals playing *AC2* would be more likely to approve of aggressive behavior as an acceptable response in a social situation, and hence become more aggressive in their interactions with people than a group not playing the game.

H1: Game play will result in beliefs more accepting of violent behaviors.

H2: Game play will result in more aggressive social interactions.

Method

Design and Procedures

A two-wave, field-based panel study with a control group was used to test the hypotheses. Participants were first-time MMRPG players, but not necessarily first-time video-game players, although many were. The study tested for the effect of a particular kind of content that is substantially more violent than the average video game and should have more effect, given the highly repetitive nature of the violence. To make an analogy to television, this study took individuals who watched a wide range of television content and asked them to watch a large dose of known, violent fare. The results show that the exposure to this violent game exceeded their prior exposure, but more importantly, this exposure was much more violent than the average across the universe of content. In keeping with the analogy, this would be the equivalent of having television viewers displace most of their regular viewing with *only* strong violence *and* having the new total number of hours go up.

Participants were recruited and assigned randomly to a treatment group that received the game, or a control group that did not. Participants in the treatment condition were mailed a copy of the game, along with instructions and time diaries to record their playing time. Game play then lasted for 1 month. The mean number of hours played by participants in the treatment condition was 56, although as is typical of field settings, the exposure was not uniform. All pre-test measures were collected before exposure to

the stimulus, and all post-test measures were collected after the exposure ceased. In each case, these were collected within 1 week of the beginning and end of the stimulus period, with the majority collected within 3 days of the start and end of the play period.

Participants

Participants were solicited via online message boards on both game and general interest web sites, with language that asked for a range of prior playing experience. We then selected only those who reported no prior MMRPG play. Thus, the study was comprised wholly of first-time MMRPG players, many of whom had never played any game. A precondition of the study was that the participants should be willing to play the game for at least 5 hours per week; 68% of the treatment group exceeded this minimum. As incentives, members of the treatment group were given a free copy of the game (retail value $50), and members of the control group were promised entry into a generous raffle for other free copies and prizes. Because the control group members did not have perfectly equivalent incentives, it was assumed that they would have a lower retention rate, and were therefore over-sampled. Furthermore, there was no guarantee that those in the treatment condition would play the game. The post-test time diaries showed that 11 participants never played the game, and these were dropped from the group. Additionally, minor data errors resulted in the loss of eight other participants. In the final analysis, a total of 213 participants (167 male, 45 female, 1 unstated) completed both waves of the study. Study-wide, the mean age was 27.7 years, ranging from a low of 14 to a high of 68. The sample was also predominantly white (85%), male (84%), educated, and middle class; its median educational level was an Associate's degree/specialized technical training; and the median annual income was near the top of the $30,000–$40,000 bracket. According to data from Microsoft (the game's publisher) and two MMRPG player surveys (Griffiths et al., 2003; Yee, 2002), these demographics are consistent with the typical player profile.

The treatment group contained 75 final participants and the control group, 138. Retention rates were 78.8% and 72.6%, respectively. This difference is a product of the relative lack of control common to field settings. A key issue is whether the two groups ultimately were different enough to violate the group equivalence gained by the random assignment. To ensure that they were equivalent, we ran independent samples *t*-tests comparing the two groups on all of the wave one dependent measures and on demographics. Despite the slightly different retention rates, the treatment and control groups did not differ significantly (with alpha set conservatively at .1) on any of the demographic measures, nor did the participants who dropped out. The exception was gender, in that there was a higher percentage of female players in the treatment group (26.7%) than the control group (17.40%). To control for this, gender was included in the analyses as a control variable.

Power Analysis

We used Cohen's (1992) power analysis method and offer the following proviso: With alpha set at .05, our design had the power to detect medium or large effects,

but not very small ones. According to Cohen, we would detect any differences larger than half of a standard deviation when comparing treatment and control group.

Measurement

Self-reported questionnaires were completed pre- and post-test online via a secure web site, and included a range of demographic, behavioral, and personality variables. To avoid suspicions about the intent of the research, the measures used in this study were scattered within a larger questionnaire, and comprised less than 10% of the total questions answered.

Aggression-related beliefs were measured with the Normative Beliefs in Aggression (NOBAGS) general scale (Huesmann & Guerra, 1997). Previous studies have used the NOBAGS scale to measure both short-term effects of television and video game violence (Meyers, 2002) and long-term effects of social interventions such as a peer-mentoring program on beliefs about violence (Sheehan, DiCara, LeBailly, & Christoffel, 1999). The NOBAGS scale ranges from 8 to 32, with higher values indicating larger normative beliefs about the acceptability of aggression (study alpha $=$ .92).

Aggressive social interactions were measured with two behavioral questions. One asked the participants if, in the past month, they had had a serious argument with a friend. The other asked if they had had a serious argument with a spouse, boyfriend, or girlfriend. Similar items were used to measure the frequency of aggressive behavior in a longitudinal study of television violence reported by Huesmann, Moise-Titus, Podolski, and Eron (2003).

Results

Treatment Check

To ensure that the participants in the treatment condition did in fact play the game and those in the control did not, participants were asked in the post-test to report the number of hours they had played *AC2*. As a further check, the participants were asked in the post-test to report whether or not they regularly played a PC game in the evening. Those in the treatment group were far more likely to answer "yes" ($t = 2.042$, $p < .05$).

Analysis

Table 1 gives descriptive statistics for the variables in the treatment and control groups. A correlation matrix for all of the measures used in the study is presented in Table 2. Pearson correlation co-efficients suggest that game play had a marginally significant relationship with two dependent measures, the post-test NOBAGS measure and the post-test arguing with a friend measure. However, these effects did not hold up in the controlled regression presented below.

Table 1 Descriptive Statistics for Study Variables by Condition

Variable	Treatment group	Control group
Age	27.15 (8.21)	27.72 (8.23)
NOBAGS, T1	11.49 (4.04)	10.75 (3.25)
NOBAGS, T2	11.90 (5.20)	10.87 (3.67)
Hours of game played	56.03 (54.02)	0.00 (0.00)
Argument with friend, T1	21.33%	15.94%
Argument with partner, T1	28.00%	33.33%
Argument with friend, T2	28.00%	17.40%
Argument with partner, T2	28.00%	24.64%
Gender	26.67% female	17.40% female

Table entries for age, NOBAGS, and hours played are means with *SD* given in parentheses. Entries for gender and arguments are percentages.

Three models were used to assess the impact of game play on the various dependent measures. In each, age and gender were included as controls and to allow for interaction terms. For the first dependent measure, the Normative Beliefs in Aggression, or NOBAGS general scale, the model was an ordinary least squares regression. The remaining two dependent variables were binary, and so logistic regressions were used. The results are presented in Table 3.

Despite a robust exposure that averaged 56 hours over the month of the study, the results did not support the hypotheses. Simple correlations between hours played and the three dependent variables were non-significant. In the controlled regressions, game play—controlling for gender, age, and time one aggression scores—was not a significant predictor of aggressive cognitions. Compared to the control group, participants after the experiment were not statistically different in their normative beliefs on aggression than they were before playing the game. Similarly, game play was also not a predictor of aggressive behaviors. Compared to the control group, treatment group participants did not increase their argumentative behaviors after game play and were not significantly more likely to argue with their friends and partners. Age was a significant predictor of NOBAGS and the "argument with friend" measure, indicating that older participants were overall less likely to report aggressive cognitions and behavior. Still, a marginally significant interaction co-efficient for argument with friend measures suggests that older participants in the experimental group were perhaps more strongly influenced by game play and argued with friends more than their younger counterparts.

Alternative hypotheses were tested and ruled out. To test for the possibility that other game exposure may have added noise to the results, regressions were performed that included measures of the participants' pre-test quantitative and qualitative exposure to games. These controls were the number of hours of typical game play and the participants' preference for graphic violence. Neither variable significantly impacted the results. To test for the possible impact of the variation in hours played within the treatment group, the models were run with a variable

Table 2 Correlations Among Predictor and Dependent Variables

	Gender	Age	NOBAGS, T1	Argument with friend, T1	Argument with partner, T1	Game play	NOBAGS, T2	Argument with friend, T2	Argument with partner, T2
Predictor variables									
Gender		.26***	−.16**	.00	.07	.10	−.19***	−.04	.01
		(212)	(204)	(212)	(212)	(212)	(200)	(212)	(212)
Age			−.27***	−.06	.09	−.03	−.37***	−.18***	.15**
			(204)	(212)	(212)	(212)	(200)	(212)	(212)
NOBAGS, T1				.06	−.04	.10	.64***	.04	−.15**
				(204)	(204)	(204)	(194)	(204)	(204)
Argument with friend, T1					.21***	.07	.11	.45***	.20***
					(213)	(213)	(201)	(213)	(213)
Argument with partner, T1						−.06	−.14	.17**	.48***
						(213)	(201)	(213)	(213)
Game play							.12*	.12*	.04
							(201)	(213)	(213)
Dependent variables									
NOBAGS, T2								.14**	−.12*
								(201)	(201)
Argument with friend, T2									.22***
									(213)
Argument with partner, T2									

*$p < .10$. **$p < .05$. ***$p < .01$. *N* appears in parentheses. "NOBAGS" refers to the Normative Beliefs in Aggression General Scale. "T1" and "T2" refer to time 1 (pre-test) and time 2 (post-test) measures.

Table 3 The Effects of Predictor Variables on Cognitive and Behavioral Measures of Aggression

Variable	NOBAGS, T2	Argument with friend, T2	Argument with partner, T2
Gender	−0.48 (0.74)	0.08 (0.71)	−0.43 (0.59)
Age	−0.09 (0.04)**	−0.10 (0.04)**	0.04 (0.03)
NOBAGS, T1	0.67 (0.07)***		
Argument with friend, T1		2.40 (0.43)***	
Argument with partner, T1			2.35 (0.37)***
Game play	0.25 (1.63)	−1.63 (1.45)	−0.04 (1.35)
Interaction terms			
Game by gender	−0.10 (1.14)	−0.49 (1.02)	0.01 (0.91)
Game by age	0.00 (0.06)	0.09 (0.56)*	0.02 (0.05)
R^2	0.45		
Negelkerke R^2		0.31	0.32
N	193	212	212

"NOBAGS" refers to the Normative Beliefs in Aggression General Scale. "T1" and "T2" refer to time 1 (pre-test) and time 2 (post-test) measures. Table entries are ordinary least-squares regression coefficients in the case of NOBAGS measures, and logit coefficients in the case of behavioral measures, with standard errors in parentheses.
*$p < .10$. **$p < .05$. ***$p < .01$.

for hours played. This variable was not significant for any of the dependent measures, suggesting that the effects do not materialize regardless of the amount of exposure.

Discussion

This 1 month longitudinal study of an MMRPG found that, contrary to some expectations, there were no strong effects associated with aggression caused by this violent game. As noted in the power analysis, our study was incapable of detecting very small effects. If such small effects do exist for this game, we cannot prove or disprove them here. We can say that no moderate or large effects were caused by exposure to the treatment. However, we note that two of the three regression co-efficients were actually in a negative direction. This suggests that with a larger sample capable of detecting small effects (approximately double ours), there is little likelihood that the co-efficients would change direction. More power might well have yielded the opposite of what the GAM suggested rather than simply null results. At minimum, this lack of medium or large effects does not offer strong support for the predictions suggested by the GAM (Anderson & Bushman, 2001) and other theoretical models postulating that violent games directly increase aggressive beliefs or behaviors. Given the older sample, this finding may not be surprising. However, we find that since so few adolescents play MMRPGs, studying them makes little sense. The key implications relate to the theoretical approach used by researchers, to violent games as a cause of aggression and to the duration of effects in the research more generally.

First, our results lead to speculation about the appropriate theoretical model to use for video game research. Some researchers have questioned the appropriateness of models based on social learning theory, such as the GAM, for game research on both theoretical and laboratory issues. By borrowing a theoretical framework that is appropriate for the study of more passive media such as television, the concern is that new media such as games may be functionally different enough to cause a problem. Sherry, for example, suggests that because the typical game experience is highly social, the dominant format of laboratory studies based on solo game players playing against a computer may be testing for an effect that does not occur in natural settings (Sherry & Lucas, 2003). Others think that the model should hold and that any effects should be stronger because the interaction is simply more engaging than television (Anderson & Dill, 2000; Carnagey & Anderson, 2004).

We believe that social learning models are appropriate, but that when studying games, the theory requires more nuances in its operationalization. It is our suggestion that social learning can occur in three ways through game play. First, players may observe and potentially model the behavior of computer-driven characters. This kind of observational learning is what has been tested in prior studies, and is applicable only to games played alone. Second, players in a multi-player game such as an MMRPG will also observe and potentially model the behaviors of other players in the virtual space. Because the content is necessarily interactions—however mediated—with other real people, effects should be stronger than with the more passive observation theorized for television. This is especially salient because as games become more and more multi-player, game content is driven more and more by actions among the players themselves. Last, social learning may occur from play that takes place in virtual space and also in physical proximity, as in an arcade, home or office, in Internet cafés, or in LAN tournaments. In this case, the in-game interactions and observations occur in parallel with real-world ones. Our own results speak primarily to a combination of the first two possibilities in that there is content driven by the computer and by other players, but most play occurs in physical isolation. Our lack of findings using the GAM suggests either that social learning based models may not be appropriate for these various play contexts, or, equally possible, that there are simply no aggression effects for this type of game. Future research should control for these three play contexts.

Second, our results support the contention of researchers who suggest that some violent games do not necessarily lead to increased real-world aggression. The heightened levels of concern following in the wake of the Columbine and Paducah might be more epiphenomenally than globally warranted. However, because our method did not concentrate solely on younger teenagers, we cannot say that teenagers might not experience different effects.

Interestingly, our findings reveal a very marginal interaction between age and game play, suggesting that older participants may have been more susceptible to the effects of violent video games. If accurate, this is somewhat surprising, as media violence research has found significantly smaller effects among older populations with more developed cognitions (Paik & Comstock, 1994). However, such a result would be consistent with findings from Sherry's (2001) meta-analytic study that suggested

a weak, but positive relationship between age and the effect size. Such conflicting findings may stem from two distinct types of effects—age-related and cohort-related effects; the effects may stem simply from age or they may stem from being part of a generation that did not spend a large portion of its youth playing video games. While not disputing that adults' cognitive structures are less prone to change than children's, it is also possible that a video-game experience may be more intense and overwhelming for Baby Boomers than it would be for their younger counterparts 10–20 years from now. We believe that this issue of habituation warrants further investigation, and that longitudinal and cohort designs should be preferred to short-term experimental or cross-sectional studies. This issue also points out the paucity of research on older players at a time when the average gamer is nearing 30—far older than most stereotypes suggest.

Third, findings from prior short-term effects research indicate that the length of exposure to violent video games matters. Sherry's (2001) meta-analysis indicated that the initial effects may wear out after a short period of time. What happens when players participate in video-game violence for longer than 1 or 2 hours? Our study duration of 1 month is the longest by far to date, and so offers new insight into the duration of effects. If the effects of some games wear out after an hour, and disappear (or remain very small) after a month, the duration of strong effects becomes suspect. These findings cannot, of course, speak to any longer term processes that may be at work, as we have no evidence about the possible cumulative impact of exposure to violent video games over several months or years. This may be especially important given the observed trends about the increasingly violent nature of video games played by today's gamers (Knowlee et al., 2001; Thompson & Haninger, 2001). Thus, it is vital to examine whether the children who are currently playing them will grow up to be more aggressive adults, a hypothesis that has received empirical support in the case of television violence (Huesmann, 1999; Huesmann et al., 2003).

There are policy implications to be drawn from the findings. The results show that one type of violent game is having no (or a very small) impact on young adults and adults. Other types and contexts might be having larger ones. For example, this game featured fantasy violence, while others featuring outer space or even everyday urban violence may yield different outcomes. Thus, if the content, context, and play length have some bearing on the effects, policy-makers should seek a greater understanding of the games they are debating. It may be that both the attackers and defenders of the industry's various products are operating without enough information, and are instead both arguing for blanket approaches to what is likely a more complicated phenomenon. Researchers can play an important role by refining our gross-level understanding of violent game effects into something more rigorous.

On that point, we noted earlier the inappropriateness of research that made claims about what "games" or "violent games" do to people without accounting for the content of game play. Our own results speak to violent fantasy role-playing games that are played online. Such qualification might be less exciting than stating something more global, but we feel tougher qualification is consistent with the rigor that the field ought to employ. Simply put, all games are different and each should be accounted for

by a thorough examination of content and setting to determine representativeness and generalizability. If each study proceeded with this level of understanding, we could begin as a field to make sense of what kinds of dimensions underlie different games and therefore lead to different effects.

Our participant observation has taught us that the style of game, the place it is played, and the interactions with other players will be crucial variables in determining the impact of a given title. Additionally, our study measured changes in physically separated individuals through the use of a networked PC. The effects might be different for people using a console system or an arcade machine, or for those networked in an office or in an Internet café. Future studies should consider the varying social contexts of game play: solo or networked, at home, school, or work, in an arcade, on a cell phone, with a few others, with a small crowd, or online with several thousand others. As noted earlier, this game featured little player versus player violence. Whether other players are opponents or collaborators might also have an important impact. Perhaps a game with such violence would have a different outcome. Once again, this approach is a way for us as a research community to begin to sketch out the underlying dimensions of game uses and content. Only when researchers begin to break down and isolate these variables will we be able to confidently assess the impact of anything so global as "video games."

References

Anders, K. (1999). Marketing and policy considerations for violent video games. *Journal of Public Policy and Marketing*, *18*, 270–273.

Anderson, C. (2002). Violent video games and aggressive thoughts, feelings and behaviors. In S. Calvert, A. B. Jordan, & R. B. Cocking (Eds.), *Children in the digital age: Influences of electronic media on development*. Westport, CT: Praeger.

Anderson, C., & Bushman, B. J. (2001). Effects of violent video games on aggressive behavior, aggressive cognition, aggressive affect, physiological arousal, and prosocial behavior: A meta-analytic review of the scientific literature. *Psychological Science*, *12*, 353–359.

Anderson, C., & Bushman, B. J. (2002). Human aggression. *Annual Review of Psychology*, *53*, 27–51.

Anderson, C., & Dill, K. E. (2000). Video games and aggressive thoughts, feelings, and behavior in the laboratory and in life. *Journal of Personality and Social Psychology*, *78*, 772–790.

Anderson, C., & Ford, C. (1986). Affect of the game player: Short-term effects of highly and mildly aggressive video games. *Personality and Social Psychology Bulletin*, *12*, 390–402.

Ballard, M., & Weist, J. (1995). *Mortal Kombat: The effects of violent video technology on males' hostility and cardiovascular responding*. Paper presented at the biennial meeting of the Society for Research in Child Development. Indianapolis, IN.

Bandura, A. (1994). The social cognitive theory of mass communication. In J. Bryant, & D. Zillmann (Eds.), *Media effects: Advances in theory and research* (pp. 61–90). Hillsdale, NJ: Lawrence Erlbaum Associates, Inc.

Berkowitz, L., & Rogers, K. (1986). A priming effect analysis of media influences. In J. Bryant, & D. Zillmann (Eds.), *Perspectives on media effects* (pp. 57–81). Hillsdale, NJ: Lawrence Erlbaum Associates, Inc.

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*, 1679–1686.

Carnagey, N. A., & Anderson, C. A. (2004). Violent video game exposure and aggression: A literature review. *Minerva Psichiatrica*, *44*, 1–18.

Cohen, J. (1992). A power primer. *Psychological Bulletin*, *112*, 155–159.
Cooper, J., & Mackie, D. (1986). Video games and aggression in children. *Journal of Applied Social Psychology*, *16*, 726–744.
Curtiss, A. (2002, January 3). For mature eyes only. *Los Angeles Times*, T4.
Dill, K., & Dill, J. (1998). Video game violence: A review of the empirical literature. *Aggression and Violent Behavior*, *3*, 407–428.
Dominick, J. R. (1984). Videogames, television violence, and aggression in teenagers. *Journal of Communication*, *34*, 136–147.
Ellis, D. (1984). Video arcades, youth, and trouble. *Youth and Society*, *16*, 47–65.
Engle, M. K. (2001, October 27). *The violence debate II: The first amendment, the FTC report, and legal strategies*. Paper presented at the Playing by the Rules conference. Chicago, IL.
Fisher, S. (1994). Identifying video game addiction in children and adolescents. *Addictive Behaviors*, *19*, 545–553.
Funk, J. (1992). Commentary. Video Games: Benign or Malignant? *Developmental and Behavioral Psychology*, *13*, 53–54.
Funk, J. B. (1993). Reevaluating the impact of video games. *Clinical Pediatrics*, *32*, 86–90.
Gibb, G., Bailey, J., Lambirth, T., & Wilson, W. (1983). Personality differences between high and low electronic video game users. *Journal of Psychology*, *114*, 159–165.
Goldstein, J. (2001, October 27). *Does playing violent video games cause aggressive behavior?* Paper presented at the Playing by the Rules conference. Chicago, IL.
Graybill, D., Kirsch, J., & Esselman, E. (1985). Effects of playing violent verses nonviolent video games on the aggressive ideation of aggressive and nonaggressive children. *Child Study Journal*, *15*, 199–205.
Green, C., & Bavelier, D. (2003). Action video game modifies visual selective attention. *Nature*, *423*, 534–537.
Griffiths, M. (1999). Violent video games and aggression: A review of the literature. *Aggression and Violent Behavior*, *4*, 203–212.
Griffiths, M. (2000). Video game violence and aggression: Comments on "Video game playing and its relations with aggressive and prosocial behaviour". by O. Wiegman and E.G.M. van Schie. *British Journal of Social Psychology*, *39*, 157–149.
Griffiths, M., Davies, M. N., & Chappell, D. (2003). Breaking the stereotype: The case of online gaming. *CyberPsychology and Behavior*, *6*, 81–91.
Huesmann, L. (1986). Psychological processes promoting the relation between exposure to media violence and aggressive behavior by the viewer. *Journal of Social Issues*, *42*, 125–139.
Huesmann, L. (1999). The effects of childhood aggression and exposure to media violence on adult behaviors, attitudes, and mood: Evidence from a 15-year cross-national longitudinal study. *Aggressive Behavior*, *25*, 18–29.
Huesmann, L., & Guerra, N. C. (1997). Children's normative beliefs about aggression and aggressive behavior. *Journal of Personality and Social Psychology*, *72*, 408–419.
Huesmann, L., Moise-Titus, J., Podolski, C. P., & Eron, L. D. (2003). Longitudinal relations between childhood exposure to media violence and adult aggression and violence: 1977–1992. *Developmental Psychology*, *39*, 201–221.
Irwin, A., & Gross, A. (1995). Cognitive tempo, violent video games, and aggressive behavior in young boys. *Journal of Family Violence*, *10*, 337–350.
Jurkowitz, M. (2002, October 2). Appeals court holds key in battle over regulation of violent video games. *Boston Globe*, 1.
Kestenbaum, G., & Weinstein, L. (1985). Personality, psychopathology, and developmental issues in male adolescent video game use. *Journal of the American Academy of Child Psychiatry*, *24*, 329–333.
Knowlee, K. H., Henderson, J., Glaubke, C. R., Miller, P., Parker, M. A., & Espejo, E. (2001). *Fair play? Violence, gender and race in video games*. Oakland, CA: Children Now.
Lin, S., & Leper, M. R. (1987). Correlates of children's usage of videogames and computers. *Journal of Applied Social Psychology*, *17*, 72–93.

(2000). *Marketing violence to children*. Washington DC: U.S. Senate.

(2001). *Marketing violent entertainment to children. A six-month follow-up review of industry practices in the motion picture, music recording and electronic game industries*. Washington, DC: Federal Trade Commission.

McClure, R. F., & Mears, F. G. (1984). Video game players: Personality characteristics and demographic variables. *Psychological Reports*, *55*, 271–276.

Meyers, K. S. (2002). *Television and video game violence: Age differences and the combined effects of passive and interactive violent media*. Unpublished doctoral dissertation. Baton Rouge: Louisiana State University.

Ow, R. (2003). *Video games quarterly report*. 3rd quarter of 2002. Retrieved June 23, 2003, from http://www.npdfunworld.com

Paik, H., & Comstock, G. (1994). The effects of television violence on antisocial behavior. *Communication Research*, *21*, 516–546.

Fallows, D. (2004) *The Internet and daily life. Few Internet and American life project*. Retrieved April 12, 2005, from http://www.pewinternet.org

Pham, A. (2002, October 10). Mature games prompt debate as sales jump. *Los Angeles Times*, 1.

(1999). *Prepared Statement of L. Rowell Huesmann*. Washington Dc: U.S. Senate.

Russo, T. (2001, February). Games grow up: But is the rest of the world ready? *NextGen*, *3*, 54–60.

Schutte, N., Malouff, J., Post-Gordon, J., & Rodasta, A. (1988). Effects of playing video games on children's aggressive and other behaviors. *Journal of Applied Social Psychology*, *18*, 451–456.

Scott, D. (1995). The effect of video games on feelings of aggression. *Journal of Psychology*, *129*, 121–132.

Sheehan, K., DiCara, J. A., LeBailly, S., & Christoffel, K. K. (1999). Adapting the gang model: Peer monitoring for violence prevention. *Pediatrics*, *104*, 50–54.

Sherry, J. (2001). The effects of violent video games on aggression: A meta-analysis. *Human Communication Research*, *27*, 409–431.

Sherry, J., & Lucas, K. (2003, May). *Video game uses and gratifications as predictors of use and game preference*. Paper presented at the annual conference of the International Communication Association, San Diego, CA.

Slatalla, M. (1999, May 10). I beg to differ. *Time*, 59.

Slater, M. (2003). Alienation, aggression, and sensation seeking as predictors of adolescent use of violent film, computer, and website content. *Human Communication Research*, *53*, 105–121.

State of the industry report 2000–2001 (2001). Washington, DC: Interactive Digital Software Association.

State of the online union (2002, February). *PC Gamer*, *9*, 46–54.

Taylor, C. (1999, May 3). Digital dungeons. *Time*, 50.

Thompson, K. M., & Haninger, K. (2001). Violence in E-rated video games. *Journal of the American Medical Association*, *286*, 591–598.

Turkle, S. (1995). *Life on the screen: Identity in the age of the Internet*. New York: Touchstone.

Walsh, D. (2001, October 27). *Video game violence and public policy*. Paper presented at the Playing by the Rules conference, Chicago, IL.

Wartella, E., & Reeves, D. (1983). Recurring issues in research on children and media. *Educational Technology*, *23*, 5–9.

Wartella, E., & Reeves, D. (1985). Historical trends in research on children and the media: 1900–1960. *Journal of Communication*, *35*, 118–133.

Wiegman, O., & van Schie, E. G. (2000). Video game playing and its relations with aggressive and prosocial behavior. *British Journal of Social Psychology*, *37*, 367–378.

Williams, D. (2002). Structure and competition in the U.S. home video game industry. *International Journal on Media Management*, *4*, 41–54.

Yee, N. (2005). *The Daedalus project*. Retrieved Apirl 12, 2005, from http://www.nickyee.com/daedalus