SOCIAL BEHAVIOR AND PERSONALITY, 2016, *44*(10), 1747–1760

http://dx.doi.org/10.2224/sbp.2016.44.10.1747

PRIMING EFFECT OF COMPUTER GAME VIOLENCE ON CHILDREN'S AGGRESSION LEVELS

JIA-KUN ZHENG
Shanghai University of Sport
QIAN ZHANG
Southwest University

We investigated how aggression resulting from playing violent computer games varies by gender and trait aggressiveness level. In Study 1, 220 children rated 2 video games in terms of pleasantness, excitement, violent content, violent images, fear, interest, and reality. Results indicated that Virtual Cop2 and Fight Landlord games were perceived as violent and nonviolent, respectively. In Study 2, 240 different children responded to the Buss–Perry Aggression Questionnaire, played either Virtual Cop2 or Fight Landlord, and completed a semantic classification task involving rating whether 60 words were aggressive or nonaggressive. Results showed that boys, but not girls, displayed stronger aggression after playing Virtual Cop2, compared to Fight Landlord. Further, children with high trait aggressiveness exhibited strong aggression after playing Virtual Cop2, whereas those with moderate or low trait aggressiveness did not. Overall, our results indicate that gender and trait aggressiveness both affect aggression among children who play violent video games.

Keywords: computer games, computer game violence, aggression, children, gender, trait aggressiveness.

Literature Review

Aggression has been defined as a problem behavior involving the intention to attack other people who wish to avoid the attack, or where two aggressive parties

Jia-Kun Zheng, School of Sport Leisure, Recreation, and Arts, Shanghai University of Sport; Qian Zhang, Center for the Study of Mental Health Education, Department of Psychology, and School of Applied Technology, Southwest University.
This research was supported by National Educational Science Funds in China (Grant: CBA130128).
Correspondence concerning this article should be addressed to Jia-Kun Zheng, School of Sport Leisure, Recreation, and Arts, Shanghai University of Sport, No. 399 Changhai Road, Yangpu District, Shanghai 200438, People's Republic of China. Email: **zhengjiakun07@163.com** or Qian Zhang **453457096@qq.com**

attack each other, and neither wants to avoid the attack (Anderson & Bushman, 2002; Baron & Richardson, 1994; DeWall, Anderson, & Bushman, 2012). Therefore, we consider aggression as an implicit action whereby individuals with deliberate intent bring harm to others both directly (i.e., physically hitting, kicking, and punching, or insulting) and indirectly (i.e., engaging in hurtful social gossip, spreading rumors, or excluding a person from the in-group).

Aggression may be enhanced in children through playing computer games, which is a popular form of entertainment for this group (Cesarone, 1998; Gross, 2010; Kirsh, 2003). Playing computer games has been found to make people feel relaxed (Wu, Wang, & Tsai, 2010) and many children spend a great amount of time on this activity (Gentile, Lynch, Linder, & Walsh, 2004). Researchers have estimated that around 89% of the electronic games children play include images of blood and violent content (Wallenius & Punamäki, 2008). For example, counter-strike games teach users to shoot others with automatic rifles in real-life settings through observational learning (Bandura, 1973; Polman, Orobio de Castro, & van Aken, 2008).

In relation to this, teachers have reported that pupils are negatively affected by school violence, and experience great stress from interacting with perpetrators on campus. Rodkin, Hanish, Wang, and Logis (2014) observed that bully/victim dyads were pernicious for both boys and girls in school from a gendered perspective, and caused serious adjustment problems. Thus, violent computer games may represent a virtual world filled with aggression-related stimuli that cause children to tackle conflicts by resorting to violence.

Over the past two decades, researchers have proposed many theories to interpret the mechanisms underlying aggression. For instance, in the general aggression model (Anderson & Bushman, 2002) it is stated that repeated exposure to violent games increases aggressive attitude, aggressive thoughts, hostile feelings, and desensitization. Desensitization, in turn, decreases a person's levels of empathy in relation to realizing the serious consequences of violence toward victims in real life (Funk, Baldacci, Pasold, & Baumgardner, 2004; Strasburger & Wilson, 2002). In this way, players of violent games might become insensitive to the suffering of others and underestimate the consequences of aggression.

Violent Computer Games and Aggression

A growing number of researchers have revealed that violent video games increase aggressive cognition, hostile feelings, aggressive thoughts, physiological arousal, and aggressive behavior (Anderson, 1997; Barlett, Anderson, & Swing, 2009; Giumetti & Markey, 2007; Sherry, 2001; Uhlmann & Swanson, 2004) and decrease prosocial behavior (Anderson & Bushman, 2002; Anderson, Gentile, & Buckley, 2007; Anderson et al., 2010). Further, adolescents who play violent video games more often display more hostile expectations and aggressive

behavior than do those who do not play these games or play them less often (Hasan, Bègue, Scharkow, & Bushman, 2013). Bingenheimer, Brennan, and Earls (2005) conducted a 2-year longitudinal study and indicated that exposure to firearm violence in video games approximately doubled the likelihood of adolescents resorting to violence when faced with aggravating situations in real life. Thus, we speculated that playing violent computer games might escalate adolescents' aggression, and put forward the following hypothesis:

Hypothesis 1: Children who play violent, compared to nonviolent, computer games will show stronger aggression.

Violent Computer Games, Gender, and Aggression

Scholars have indicated that gender differences exist in relation to aggression among adolescents who play violent games (Bartholow & Anderson, 2002; Hoeft, Watson, Kesler, Bettinger, & Reiss, 2008; Martins, Williams, Ratan, & Harrison, 2012). Males', but not females', aggression was observed to be significantly enhanced by reward when playing violent games (Carnagey & Anderson, 2005). Additionally, males demonstrated a stronger perceptual bias toward direct aggression, and showed higher levels of aggression than did females (Craig, Browne, Beech, & Stringer, 2006; Cross & Campbell, 2012; Ramirez, Andreu, & Fujihara, 2001; Smith & Waterman, 2005). This indicates that males might show higher aggression than might females when playing violent games, and we proposed the following hypothesis to test this relationship:

Hypothesis 2: Among adolescents who play violent computer games, boys will show stronger aggression than will girls.

Violent Computer Games, Trait Aggressiveness, and Aggression

Prior researchers have claimed that adolescents with high trait aggressiveness show significantly more aggression than do those with low trait aggressiveness (Anderson & Bushman, 2002; Zhang & Zhang, 2014). In particular, media violence has been found to be positively associated with high, but not low, trait aggressiveness, implying that causal correlations exist between aggressive traits and aggression (Anderson, 1997; Bushman, 1995; Zhang, Zhang, & Wang, 2013). Thus, our third hypothesis was as follows:

Hypothesis 3: After playing violent computer games, children with high trait aggressiveness will show stronger aggression than will those with moderate and low trait aggressiveness.

Taken together, our main focus in Study 1 was on examining gender differences in perceptions of violent and nonviolent computer games, and the aim in Study 2 was testing whether or not playing violent computer games primes aggression among Chinese children. We employed a semantic classification task in the latter study to examine whether or not levels of aggression vary across genders and trait aggressiveness levels.

Study 1

Method

Participants. In the Fall semester of 2013, employing purposive sampling on the basis of parental consent, we recruited 220 children (50% females, 50% males) from two elementary schools in southwest China to participate in our pilot study. Their ages ranged from 9 to 12 years (M = 10.68, SD = 1.16) and approximately 90% were of Han ethnicity, which was representative of the typical demographics in these schools. Among the participants, 82% were from families in which both parents had an educational level of college or above, with the rest being from families in which one or both parents had an educational level of high school or below. The educational backgrounds of these families are comparable to those reported by the National Bureau of Statistics of China (2008) concerning the country's urban population at that time. Therefore, the sample can be considered as representative of children in urban China.

Stimulus materials. Two computer games were selected for participants to rate. Virtual Cop2 is a person-shooting game in which players kill gangsters by shooting them, and it features scenes with blood, verbal assault, and physical fighting content. Fight Landlord is a card game in which players strive for higher scores than other players to achieve victory, and it does not feature any violent content. The audio component of the computer games was spoken in English, and both English and Chinese subtitles were presented.

Procedure. Participants played each game for approximately 15 minutes, then they were asked to complete a seven-item scale to assess the game's violence in relation to the dimensions of pleasantness, excitement, violent content, violent images, fear, interest, and reality. During the procedure, we observed the feelings and attention of all participants.

Ratings were made on a 5-point Likert scale ranging from 1 = *very low* to 5 = *very high*. This study was approved by the institutional academic board of the Department of Psychology in Southwest University in China.

Results

Violence evaluation of computer games. A one-way analysis of variance (ANOVA) was used to compare participants' ratings of the two computer games. Participants who played Virtual Cop2 gave significantly higher scores for violent content, $F(1, 75) = 21.61$, $p < .001$, and violent images, $F(1, 85) = 20.52$, $p < .001$, compared with those who played Fight Landlord (see Table 1).

Gender differences. A t test was used to examine gender differences in ratings of computer game violence. Compared to girls, boys regarded Virtual Cop2 as being more pleasant, $t(76) = 4.63$, $p < .001$, exciting, $t(76) = 4.35$, $p < .001$, and interesting, $t(76) = 2.23$, $p < .05$, and causing less fear, $t(76) = -2.33$, $p < .05$ (see

Table 2). Additionally, boys evaluated Fight Landlord as less interesting than did girls, $t(32) = -2.27$, $p < .05$ (see Table 3).

Table 1. *Means, Standard Deviations, and t Test Results for Violence Ratings*

Ratings	Virtual Cop2	Fight Landlord	*F*
Pleasantness	3.44 (1.82)	2.82 (1.73)	2.32
Excitement	4.11 (1.76)	4.49 (1.86)	-1.24
Violent content	5.67 (1.23)	1.58 (0.66)	21.61**
Violent images	5.58 (1.27)	1.56 (0.69)	20.52**
Fear	3.55 (1.95)	2.91 (1.64)	2.13
Interest	3.49 (1.92)	3.67 (1.92)	-0.23
Reality	3.65 (1.86)	4.22 (1.58)	-1.82

Note. Values in parentheses are standard deviations. ** $p < .001$.

Table 2. *Gender Differences in Virtual Cop2 Game Ratings*

Ratings	Boys	Girls	*t*
Pleasantness	4.50 (1.62)	2.55 (1.51)	4.63**
Excitement	5.13 (1.42)	3.32 (1.63)	4.35**
Violent content	5.54 (0.98)	5.68 (1.41)	-0.69
Violent images	5.33 (0.96)	5.87 (1.45)	-1.28
Fear	2.88 (1.83)	4.06 (1.91)	-2.33*
Interest	4.13 (1.83)	3.15 (1.88)	2.23*
Reality	3.88 (1.82)	3.43 (1.91)	0.96

Note. Values in parentheses are standard deviations. * $p < .05$, ** $p < .001$.

Table 3. *Gender Differences in Fight Landlord Game Ratings*

Ratings	Boys	Girls	*t*
Pleasantness	2.64 (1.85)	2.98 (1.68)	-0.26
Excitement	4.12 (1.98)	4.81 (1.71)	-1.12
Violent content	1.71 (0.66)	1.34 (0.64)	1.68
Violent images	1.54 (0.58)	1.68 (0.84)	-0.22
Fear	2.57 (1.62)	3.26 (1.53)	-2.14
Interest	3.07 (1.75)	4.24 (1.97)	-2.27*
Reality	4.07 (1.73)	4.42 (1.47)	-0.77

Note. Values in parentheses are standard deviations. * $p < .05$.

Discussion

There were significant gender differences in game violence ratings, with boys rating Virtual Cop2 as more pleasant, exciting, and interesting than did girls, whereas girls rated it as causing more fear than did boys. Further, compared to boys, girls rated Virtual Cop2 as more violent, although this difference did not reach statistical significance. As for Fight Landlord, interest was the only

dimension that showed significant gender differences.

Ratings of the games' violence were congruent with our observations of participants' aggressive attitude. That is, we saw that most girls exhibited nervous and scared facial expressions when playing Virtual Cop2. Most boys, in contrast, displayed excitement with facial expressions when playing Virtual Cop2, with some even shouting positive words (i.e., "cool," "great," "wonderful") while shooting and attacking the on-screen gangsters. On this basis, we regard Virtual Cop2 and Fight Landlord as being, respectively, violent and nonviolent computer games.

Study 2

Method

Participants. We recruited a separate sample group of 240 children (54% females, 46% males) from two elementary schools in southwest China. Their ages ranged from 9 to 12 years (M = 11.66, SD = 1.23) and approximately 95% were of Han ethnicity. The experimental (violent game) group comprised 120 children who played Virtual Cop2, and the control (nonviolent game) group comprised 120 children who played Fight Landlord. None of the participants had played these games before, nor did they have color blindness or other visual impairments. Written informed consent was obtained from all children and their parents, and the experiment received ethical approval from the Institute of Psychology at Southwest University. All participants were treated according to the ethical guidelines of the American Psychological Association (APA, 2010).

Stimulus materials. We selected computer games of moderate difficulty to avoid creating too much of a challenge for children who were infrequent game players. We also chose these two specific games because the children had not played them before, thus effectively avoiding familiarity and practice effects and assuring the validity of the experiment.

Goal words. We selected 30 aggressive and 30 nonaggressive words at random from a review of previous studies (Anderson, Benjamin, & Bartholow, 1998). As part of a semantic classification task, we sequentially presented these words, which were formatted in 74-point red italic font, at the center of a computer screen with a gray background. The presentation order was counterbalanced.

Measures. The Buss–Perry Aggression Questionnaire (BPAQ; Buss & Berry, 1992) was used to measure high (HA), moderate (MA), and low (LA) levels of trait aggressiveness. This 29-item scale includes four dimensions of physical aggression, verbal aggression, anger, and hostility, which are rated on a 5-point Likert scale ranging from 1 = *strongly agree* to 5 = *strongly disagree*. The BPAQ's

internal consistency reliability was reported as .94, and the test–retest reliability coefficient was .89 (Buss & Perry, 1992). Cronbach's alpha coefficients for the physical aggression, verbal aggression, anger, and hostility dimensions were .85, .72, .83, and .77, respectively. Children in the top 27% of the 100% score range were considered as HA, those in the bottom 27% were classified as LA, and all others were designated as MA.

Experimental design. A 2 (game type: violent vs. nonviolent) × 2 (goal word type: aggressive vs. nonaggressive) × 3 (trait aggressiveness: HA, MA, LA) × 2 (gender: boys vs. girls) four-way ANOVA was conducted, with game type, trait aggressiveness, and gender as between-groups factors, and goal word as a within-groups factor. Game type, trait aggressiveness, and gender were regarded as independent variables and aggression as the dependent variable.

Procedure. After signing an informed consent form and being assured that they could withdraw at any time if they felt uncomfortable, children were asked to fill out the BPAQ, and then they were allocated to either the experimental or control group to play the violent or nonviolent game for 15 minutes. Next, they completed the semantic classification task (see Figure 1), which was developed using E-prime software (Psychology Software Tools, Inc., Sharpsburg, PA, USA). Trained research assistants instructed the children to identify whether the words presented in red font on the screen were aggressive, in which case they pressed "1" on a keyboard, or nonaggressive, in which case they pressed "2." Participants were asked to react as quickly and accurately as possible in judging the word attributes, and the next trial began as soon as the previous one was completed. After the instructions were presented, a "+" emerged at the screen's center for 200 ms, then each word was shown for 1,000 ms. The interstimulus interval ranged from 250–350 ms. After participants pressed a button on the keyboard, a blank screen appeared for 200 ms, and then the program presented the next trial. If participants did not respond within 1,000 ms, the program automatically moved on to the next trial. We recorded participants' accuracy rates and reaction times (RTs) as measures of frequency of correct answers and speed of response.

Practice trials. Participants completed 20 practice trials for words that did not appear in subsequent test trials, to become familiar with the key pressing procedure. The program returned participants to the practice trial screen if their accuracy rate was below 85%.

Test trials. The test trials were divided into four blocks of 30 trials, with 120 trials presented in total. Each of the 30 aggressive and 30 nonaggressive words were randomly presented only once in each block. Participants had a 2 minute rest between each block. The mean accuracy rate ranged from 85–95%, and wrong answers and missing responses were excluded from the data analysis.

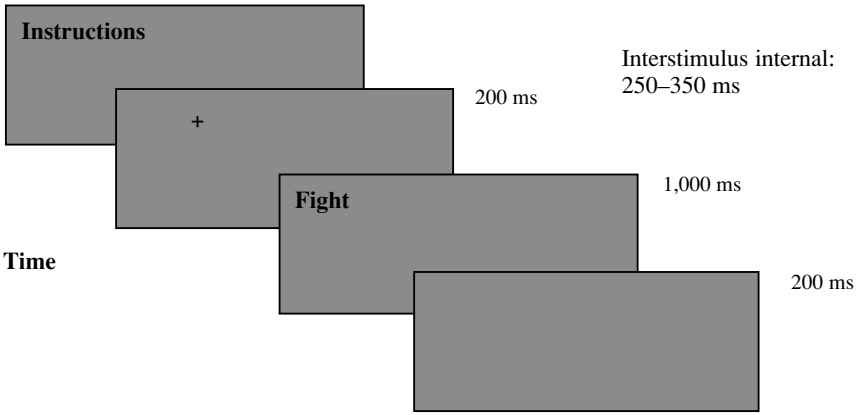

Figure 1. *Semantic classification task.*

Results

Main effect of goal words on aggression. A one-way ANOVA was carried out to obtain a better understanding of the main effect of goal words on children's aggression. Among the experimental group participants, RTs for aggressive words (512.31 ms) were significantly shorter than were those for nonaggressive words (574.17 ms), $F(1, 68) = 4.12$, $p < .05$, indicating that playing violent games primed aggression among children.

Priming aggression score operational calculation. We created a priming aggression score (PAS) to represent levels of aggression, which was calculated by subtracting RTs to aggressive words from RTs to nonaggressive words, and compared these scores between the two groups. The mean PAS of the experimental group (-30 ms) was more negative than that of the control group (-2 ms), indicating that, compared to playing the nonviolent game, playing the violent game led to higher levels of aggression.

Game type × gender interaction. A four-way ANOVA was performed to examine whether or not the PAS difference was significant in relation to all independent variables. A significant main effect of game type on aggression was found, $F(1, 54) = 3.58$, $p < .05$, and there was also a significant game type × gender interaction, $F(1, 62) = 4.89$, $p < .01$. Further simple effects analyses demonstrated that the PAS of boys playing violent games (8.63) was significantly higher than that of boys playing nonviolent games (-1.24), $F(1, 74) = 4.21$, $p < .05$. Girls, however, showed no significant PAS differences between game types, $F(1, 46) = 2.21$, $p > .05$.

Game type × trait aggressiveness interaction. Results showed that there was a significant game type × trait aggressiveness interaction, $F(1, 47) = 4.18$,

$p < .01$. Further simple effects analyses revealed that the PAS of children with HA was significantly higher for those who played violent games, compared to those who played nonviolent games, $F(1, 85) = 6.34$, $p < .01$. The PAS of children with MA and LA yielded no significant differences between game types, $F(1, 42) = 2.37$, $p > .05$; $F(1, 42) = 1.45$, $p > .05$. Further, no significant interactions were found among game type, trait aggressiveness, and gender, $F(1, 63) = 5.27$, $p > .05$.

General Discussion

In this study, we tested the priming effect of playing violent computer games on aggression levels among children by employing a semantic classification task. The findings of Study 1 showed that Virtual Cop2 was perceived as a violent computer game, based on the significantly high scores participants gave for violent content and images. In contrast, Fight Landlord was perceived as a nonviolent computer game because the scores for all game violence rating dimensions were high but nonsignificant. The findings of Study 2 revealed that playing violent computer games significantly primed aggression. Specifically, as predicted, we saw an increase in the number of children whose aggression was significantly activated after exposure to the violent, versus nonviolent, game. These results align with those of previous researchers (Boutwell, Franklin, Barnes, & Beaver, 2011; Salmivalli & Kaukiainen, 2004; Zhang & Zhang, 2007) and support our first hypothesis.

We observed significant gender effects on playing violent games and subsequent aggression, which is, in part, consistent with our second hypothesis. The observed difference may have occurred because females, but not males, rely on empathy to make decisions (Jolliffe & Farrington, 2006; Rueckert & Naybar, 2008; Toussaint & Webb, 2005), including whether or not to use aggression. In fact, we suggest that boys might be apt to play more violent games than girls do in daily life, resulting in rapid development of the brain networks that elicit aggression. Further, boys have been found to be more physically active than girls are in infancy, childhood, youth, and adulthood, causing them, as was the case for our 9–12-year-old participants, to become more physically aggressive during puberty (Archer, 2004, 2009; Carlo, Raffaelli, Laible, & Meyer, 1999).

Children with HA were observed to be significantly more aggressive after exposure to the violent game, whereas children with MA and LA were nonsignificantly more aggressive in the same game-priming situation. These findings partly replicate those of prior researchers (Anderson & Bushman, 2002; Bushman, 1995), and are congruent with our third hypothesis as well. As such, children with HA might be particularly vulnerable to becoming aggressive after playing violent games because they have an intrinsically stable aggressive personality

(Huesmann, 2010), whereas children with MA and LA are less sensitive to game violence because they tend to have a more nonaggressive personality. Creating an egalitarian classroom environment and promoting peer ecology could be a good way to resolve aggressive issues among schoolchildren (Gest & Rodkin, 2011). Further, Chinese educators, parents, and policy makers should emphasize adopting prevention and intervention measures in relation to aggression among boys and children with HA, in particular.

According to the cognitive neoassociation and general aggression models, contextual factors (i.e., games, movies, songs, pictures) and individual variables (i.e., grade, gender, age, personality) are responsible for aggressive network formation, including cognition, affect, thoughts, and behavior (Berkowitz, 1990; Carnagey & Anderson, 2003). In this study, we set game type, trait aggressiveness, and gender as the independent variables and aggression as the dependent variable, and the findings were in line with the viewpoints of these two models. In this regard, we postulate that computer game violence might prime aggression only among boys and children with HA.

Study Limitations and Directions for Future Research

Some limitations should be noted in relation to this study. First, we used a cross-sectional design that leaves unanswered critical questions with regard to aggression development. Our ability to clarify the causal correlations among the research variables over time is restricted by this design, whereas evidence from longitudinal studies would permit more accurate examination of the relationship between exposure to computer game violence and aggression. An important next step is examining the trajectories of aggression in children over time. Second, we did not separate the various subtypes of aggression (e.g., physical, verbal, relational, social) to examine these individually. It can be anticipated that playing violent computer games might affect different subtypes of aggression in different ways; hence, the different mediation paths for subtypes of aggression should be tested in future studies. Third, although the BPAQ has been found to have good reliability and validity as a measure of trait aggressiveness among children, it might be unsuitable for evaluating aggression levels among Chinese participants due to cultural variations. To avoid this, developing a Chinese version of BPAQ is necessary in future research. Last, although the sample size was robust in this study ($N = 460$), we did not examine the study power. The use of ANOVA alone for data analysis was also insufficient in this study, and we recommend including structural equation modeling or multilevel regression techniques to interpret the data in future research. We also recommend compensating for missing responses by using maximum likelihood estimation.

References

American Psychological Association. (2010). *Publication manual of the American Psychological Association* (6th ed.). Washington, DC: Author.

Anderson, C. A. (1997). Effects of violent movies and trait hostility on hostile feelings and aggressive thoughts. *Aggressive Behavior*, *23*, 161–178. **http://doi.org/bmnsfz**

Anderson, C. A., Benjamin, A. J., Jr., & Bartholow, B. D. (1998). Does the gun pull the trigger? Automatic priming effects of weapon pictures and weapon names. *Psychological Science*, *9*, 308–314. **http://doi.org/d9vwm2**

Anderson, C. A., & 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. **http://doi.org/bs9d2v**

Anderson, C. A., & Bushman, B. J. (2002). Human aggression. *Annual Review of Psychology*, *53*, 27–51. **http://doi.org/d5vs7n**

Anderson, C. A., Gentile, D. A., & Buckley, K. E. (2007). *Violent video game effects on children and adolescents*. New York, NY: Oxford University Press.

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*, 151–173. **http://doi.org/dv96dw**

Archer, J. (2004). Sex differences in aggression in real-world settings: A meta-analytic review. *Review of General Psychology*, *8*, 291–322. **http://doi.org/fcpm6h**

Archer, J. (2009). Does sexual selection explain human sex differences in aggression? *Behavioral and Brain Sciences*, *32*, 249–311. **http://doi.org/b3hms4**

Bandura, A. (1973). *Aggression: A social learning theory analysis*. Englewood Cliffs, NJ: Prentice-Hall.

Barlett, C. P., Anderson, C. A., & Swing, E. L. (2009). Video game effects—Confirmed, suspected, and speculative: A review of the evidence. *Simulation Gaming*, *40*, 377–403. **http://doi.org/d3zf9d**

Baron, R. A., & Richardson, D. R. (1994). *Human aggression*. New York, NY: Plenum.

Bartholow, B. D., & Anderson, C. A. (2002). Effects of violent video games on aggressive behavior: Potential differences. *Journal of Experimental Social Psychology*, *38*, 283–290. **http://doi.org/fm9s9d**

Berkowitz, L. (1990). On the formation and regulation of anger and aggression: A cognitive-neoassociationistic analysis. *American Psychologist*, *45*, 494–503. **http://doi.org/bgt6jj**

Bingenheimer, J. B., Brennan, R. T., & Earls, F. J. (2005). Sociology: Firearm violence exposure and serious violent behavior. *Science*, *308*, 1323–1326. **http://doi.org/cqx3b5**

Boutwell, B. B., Franklin, C. A., Barnes, J. C., & Beaver, K. M. (2011). Physical punishment and childhood aggression: The role of gender and gene–environment interplay. *Aggressive Behavior*, *37*, 559–568. **http://doi.org/bt2mpt**

Bushman, B. J. (1995). Moderating role of trait aggressiveness in the effects of violent media on aggression. *Journal of Personality and Social Psychology*, *69*, 950–960. **http://doi.org/b4j6bm**

Buss, A. H., & Perry, M. (1992). The Aggression Questionnaire. *Journal of Personality and Social Psychology*, *63*, 452–459. **http://doi.org/cxm**

Carlo, G., Raffaelli, M., Laible, D. J., & Meyer, K. A. (1999). Why are girls less physically aggressive than boys? Personality and parenting mediators of physical aggression. *Sex Roles*, *40*, 711–729. **http://doi.org/fr7bgx**

Carnagey, N. L., & Anderson, C. A. (2003). Theory in the study of media violence: The general aggression model. In D. A. Gentile (Ed.), *Media violence and children: A complete guide for parents and professionals* (pp. 87–105). Westport, CT: Praeger.

Carnagey, N. L., & Anderson, C. A. (2005). The effects of reward and punishment in violent video games on aggressive affect, cognition, and behavior. *Psychological Science*, *16*, 882–889. **http://doi.org/dkx9hn**

Cesarone, B. (1998). *Video games: Research, ratings, recommendations*. Eric Digest, Report No. EDO-PS-98-11.

Craig, L. A., Browne, K. D., Beech, A., & Stringer, I. (2006). Differences in personality and risk characteristics in sex, violent and general offenders. *Criminal Behaviour and Mental Health*, *16*, 183–194. **http://doi.org/fp2ngk**

Cross, C. P., & Campbell, A. (2012). The effects of intimacy and target sex on direct aggression: Further evidence. *Aggressive Behavior*, *38*, 272–280. **http://doi.org/bc96**

DeWall, C. N., Anderson, C. A., & Bushman, B. J. (2012). Aggression. In H. Tennen & J. Suls (Eds.), *Personality and social psychology* (pp. 449–466). New York, NY: Wiley.

Funk, J. B., Baldacci, H. B., Pasold, T., & Baumgardner, J. (2004). Violence exposure in real-life, video games, television, movies, and the Internet: Is there desensitization? *Journal of Adolescence*, *27*, 23–39. **http://doi.org/crtphv**

Gentile, D. A., Lynch, P. L., Linder, J. R., & Walsh, D. A. (2004). The effects of violent video game habits on adolescent hostility, aggressive behaviors, and school performance. *Journal of Adolescence*, *27*, 5–22. **http://doi.org/d3b6dd**

Gest, S. D., & Rodkin, P. C. (2011). Teaching practices and elementary classroom peer ecologies. *Journal of Applied Developmental Psychology*, *32*, 288–296. **http://doi.org/bp9r5s**

Giumetti, G. W., & Markey, P. M. (2007). Violent video games and anger as predictors of aggression. *Journal of Research in Personality*, *41*, 1234–1243. **http://doi.org/fnzdzx**

Gross, M. L. (2010). Advergames and the effects of game-product congruity. *Computers in Human Behavior*, *26*, 1259–1265. **http://doi.org/fwt6mg**

Hasan, Y., Bègue, L., Scharkow, M., & Bushman, B. J. (2013). The more you play, the more aggressive you become: A long-term experimental study of cumulative violent video game effects on hostile expectations and aggressive behavior. *Journal of Experimental Social Psychology*, *49*, 224–227. **http://doi.org/bdbf**

Hoeft, F., Watson, C., Kesler, S., Bettinger, K., & Reiss, A. (2008). Gender differences in the mesocorticolimbic system during computer game-play. *Journal of Psychiatric Research*, *42*, 253–258. **http://doi.org/djqjwr**

Huesmann, L. R. (2010). Nailing the coffin shut on doubts that violent video games stimulate aggression: Comment on Anderson et al. (2010). *Psychological Bulletin*, *136*, 179–181. **http://doi.org/ds886p**

Jolliffe, D., & Farrington, D. P. (2006). Examining the relationship between low empathy and bullying. *Aggressive Behavior*, *32*, 540–550. **http://doi.org/d9jjnz**

Kirsh, S. J. (2003). The effects of violent video game play on adolescents: The overlooked influence of development. *Aggression and Violent Behavior*, *8*, 377–389. **http://doi.org/dgcssk**

Martins, N., Williams, D. C., Ratan, R. A., & Harrison, K. (2012). Virtual muscularity: A content analysis of male video game characters. *Body Image*, *8*, 43–51. **http://doi.org/drc9mc**

Polman, H., Orobio de Castro, B., & van Aken, M. A. G. (2008). Experimental study of the differential effects of playing versus watching violent video games on children's aggressive behavior. *Aggressive Behavior*, *34*, 256–264. **http://doi.org/fqsdhw**

Ramirez, J. M., Andreu, J. M., & Fujihara, T. (2001). Cultural and sex differences in aggression: A comparison between Japanese and Spanish students using two different inventories. *Aggressive Behavior*, *27*, 313–322. **http://doi.org/c3bf7t**

Rodkin, P., Hanish, L., Wang, S., & Logis, H. (2014). Why the bully/victim relationship is so pernicious: A gendered perspective on power and animosity among bullies and their victims. *Development and Psychopathology*, *26*, 689–704. **http://doi.org/bdbc**

Rueckert, L., & Naybar, N. (2008). Gender differences in empathy: The role of the right hemisphere. *Brain and Cognition*, *67*, 162–167. **http://doi.org/dbzfz7**

Salmivalli, C., & Kaukiainen, A. (2004). "Female aggression" revisited: Variable- and person-centered approaches to studying gender differences in different types of aggression. *Aggressive Behavior*, *30*, 158–163. **http://doi.org/c8zgfc**

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

Smith, P., & Waterman, M. (2005). Sex differences in processing aggression words using the emotional Stroop task. *Aggressive Behavior*, *31*, 271–282. **http://doi.org/drfv6s**

Strasburger, V. C., & Wilson, B. J. (2002). *Children, adolescents, and the media*. Thousand Oaks, CA: Sage.

Toussaint, L., & Webb, J. R. (2005). Gender differences in the relationship between empathy and forgiveness. *The Journal of Social Psychology*, *145*, 673–685. **http://doi.org/ddm64m**

Uhlmann, E., & Swanson, J. (2004). Exposure to violent video games increases automatic aggressiveness. *Journal of Adolescence*, *27*, 41–52. **http://doi.org/cwgpkz**

Wallenius, M., & Punamäki, R.-L. (2008). Digital game violence and direct aggression in adolescence: A longitudinal study of the roles of sex, age, and parent–child communication. *Journal of Applied Developmental Psychology*, *29*, 286–294. **http://doi.org/bpw6tw**

Wu, J.-H., Wang, S.-C., & Tsai, H.-H. (2010). Falling in love with online games: The uses and gratifications perspective. *Computers in Human Behavior*, *26*, 1862–1871. **http://doi.org/d4j2n7**

Zhang, D. J., & Zhang, Q. (2007). Developmental characteristics of adaptability among college students in China [In Chinese]. *Journal of Southwest University* (Social Sciences Edition), *33*, 124–128.

Zhang, Q., & Zhang, D.-J. (2014). The effects of viewing violent movie via computer on aggressiveness among college students. *Computers in Human Behavior*, *35*, 320–325. **http://doi.org/bdbh**

Zhang, Q., Zhang, D., & Wang, L. (2013). Is aggressive trait responsible for violence? Priming effects of aggressive words and violent movies. *Psychology*, *4*, 96–100. **http://doi.org/bdbj**