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Prosocial video games reduce aggressive cognitions

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Abstract

Previous research has shown that playing violent video games increased aggressive tendencies. However, as pointed out by the General Learning Model (GLM) (Buckley & Anderson, 2006), depending on their content, video games do not inevitably increase but may also decrease aggressive responses. Accordingly, the present research tested the hypothesis that playing prosocial video games decreases aggressive cognitions. In fact, playing a prosocial (relative to a neutral) video game reduced the hostile expectation bias (Experiment 1) and decreased the accessibility of antisocial thoughts (Experiment 2). Thus, these results lend credence to GLMs assumption that the effects of video game exposure depend to a great extent on the content of the game played.

Key Words: video games; aggression; media effects

Prosocial video games reduce aggressive cognitions

Playing video games is becoming more and more popular. According to recent large-scale surveys, 70% of homes with children aged 2 to 17 have computers and 68% have video game equipment (Woodard & Gridina, 2000). Whereas children aged 2 to 7 spend an average of 3 to 5 hours a week playing video games (Gentile & Walsh, 2002), 8th and 9th grade students even average 9 hours per week (Gentile, Lynch, Linder, & Walsh, 2004). Overall, 87% of children play video games regularly (Walsh, Gentile, Gieske, Walsh, & Chasco, 2003). Not only children, but also young and middle-aged adults spend a considerable amount of their time playing video games. According to a recent estimate (Gentile & Anderson, 2006), the average age of a video game player is 29. This growing interest in playing video games has raised concerns about the consequences of video game play. In fact, playing video games with violent content may lead to criminal actions (Anderson & Dill, 2000) and physical violence (Gentile et al., 2004), whereas reducing children's exposure to media violence reduces aggressive tendencies (Robinson, Wilde, Navracruz, Haydel, & Varady, 2001). Thus, there is clear evidence that media exposure can be harmful to social relations. But can it be also beneficial? Does video game play not only increase, but may also decrease aggressive tendencies? In the present research, we test the hypothesis that playing prosocial (relative to neutral) video games reduces aggressive cognitions.

Effects of Media Exposure on Anti- and Prosocial Tendencies

When accounting for the effects of exposure to violent media on anti- and prosocial tendencies researchers have predominantly referred to the General Aggression Model (GAM) proposed by Anderson and colleagues (e.g., Anderson & Bushman, 2002). According to this model, the aggressive content of violent media evokes aggressive behavior through at least one of three routes: aggressive cognitions, arousal, and affect related to violence. When these variables are activated they affect the processing of new information, which in turn

determines a chosen behavioral reaction.

The predictive validity of the GAM for the effects of playing violent video games on anti- and prosocial tendencies are well-documented. For instance, exposure to violent video games increases aggressive thoughts (Anderson & Dill, 2000), state hostility and anxiety levels (Anderson & Ford, 1986), and aggressive behavior (Bartholow & Anderson, 2002) and decreases helping behavior (Sheese & Graziano, 2005). The GAM does not only account for short-term effects of exposure to violent media, but also for long term changes as a consequence of repeated exposure to violent media. Accordingly, longitudinal evidence revealed that exposure to violent media had long-term consequences in that children who played more violent video games early in a school year became more aggressive and less helpful later in the school year (Anderson, Gentile, & Buckley, 2007). Finally, meta-analyses confirm that playing violent video games causes an increase in aggression-related variables and a decrease in helping behavior (Anderson, 2004; Anderson & Bushman, 2001; Bushman & Huesmann, 2006).

But not all video games contain violence. To account not only for the effects of antisocial but also prosocial video games, Buckley and Anderson (2006) expanded the GAM into a General Learning Model (GLM). As with the GAM, the GLM proposes that video game exposure may influence the player's cognition, affect, and arousal, which then instigate behavioral reactions. Extending the GAM, the GLM addresses not only the effects of antisocial but also of prosocial video games: whereas playing antisocial video games increases antisocial tendencies and decreases prosocial tendencies, playing prosocial video games may decrease antisocial tendencies and increase prosocial tendencies.

However, whereas there have been abundant evidence for the effects of playing violent video games on antisocial and prosocial tendencies, evidence for possible positive effects of playing prosocial video games has been relatively sparse. An early study (Chambers

& Ascione, 1987) failed to find an effect of playing a prosocial video game on willingness to donate to a charity. However, the authors themselves admitted that their prosocial video game involved prosocial acts only to a small extent (it mainly involved escaping danger). Thus, and because no manipulation check has been reported, it remained unclear whether the prosocial game used was truly prosocial. More recently, some evidence has been presented that exposure to prosocial video games does increase prosocial behavior (Gentile et al., in press; Greitemeyer & Osswald, in press). Extending this line of research, we aimed to examine the effects of playing a prosocial (relative to neutral) video game on antisocial tendencies. On the basis of the GLM, we expected that playing a prosocial video would decrease aggressive cognitions. So far, this has not been tested.

Overview of the Present Research

In a Pilot Study, we aimed to make sure that the prosocial and neutral video games employed in the main experiments indeed differ in their perceived content in that the prosocial video game is perceived as being more prosocial than the neutral video game. In two experiments, we then tested whether playing a prosocial (relative to neutral) video game would decrease the hostile expectation bias (Experiment 1) and the accessibility of antisocial thoughts (Experiment 2). In all studies, participants were tested individually.

Pilot Study

Forty participants (22 women, 18 men) were randomly assigned to play one of two video games (one prosocial and one neutral). The prosocial video game was Lemmings. In Lemmings, the goal of the player is to guide groups of small beings (“Lemmings”) through different worlds and to save them by leading them to the exit. The neutral video game was Tetris. In Tetris, falling geometrical figures must be correctly positioned. Twenty participants played Lemmings, 20 played Tetris. The video games were played for 10 min. Then, participants indicated how prosocial the game, how antisocial the game was, and responded to

two questions measuring liking of the game. The latter two items were highly correlated and thus collapsed using the average ($\alpha = .92$). These items were assessed using a 7-point Likert-type scale (0 = *not at all*, 6 = *absolutely*). In addition, positive and negative affect were assessed by employing the PANAS (Watson, Clark, & Tellegen, 1988). Reliability coefficients were adequate (positive affect: $\alpha = .87$; negative affect: $\alpha = .86$) and thus ratings were collapsed using the average.

As intended, participants who had played Lemmings perceived the game as being more prosocial ($M = 2.70$, $SD = 1.69$) than participants who had played Tetris ($M = 1.40$, $SD = 1.23$), $t(38) = 2.78$, $p < .01$, $d = 0.88$. In contrast, Lemmings ($M = 0.60$, $SD = 0.94$) and Tetris ($M = 0.30$, $SD = 0.57$) did not differ in terms of perceived aggressive content, $t(38) = 1.22$, $p = .23$, $d = 0.39$. Moreover, liking of Lemmings ($M = 3.68$, $SD = 1.85$) and Tetris ($M = 3.90$, $SD = 1.02$) was relatively similar, $t(38) = 0.48$, $p = .64$, $d = 0.14$. Finally, playing the video games had no significant effects on mood, neither on the positive (Lemmings: $M = 2.37$, $SD = 0.66$, Tetris: $M = 2.45$, $SD = 0.56$), $t(38) = 0.42$, $p = .68$, $d = 0.13$, nor on the negative affect scale (Lemmings: $M = 1.16$, $SD = 0.18$, Tetris: $M = 1.28$, $SD = 0.39$), $t(38) = 1.15$, $p = .26$, $d = 0.40$. Thus, the prosocial and the neutral video game clearly differed in the extent to which they were perceived as being prosocial. Moreover, because they matched on aggressive, liking, and affective dimensions, any effects of playing these video games on aggressive cognitions cannot be due to these variables.

Experiment 1

Experiment 1 provides a first test of our hypothesis that playing a prosocial (relative to a neutral) video game decreases aggressive cognitions. After participants played either a prosocial or a neutral video game, they were presented with ambiguous story stems to be completed. Previous research (Bushman & Anderson, 2002) showed that participants who had played a violent video game were more likely to expect others to behave aggressively, to

think aggressive thoughts, and to feel angry than participants who had played a neutral video game. Likewise, we expected that playing a prosocial (relative to a neutral) video game would decrease the expectation of other people responding with aggressive behavior, thoughts, and feelings.

Method

Participants and design. Forty-eight students (35 women, 13 men) of a German university were randomly assigned to one of the two video game conditions (prosocial vs. neutral game). Two participants (one woman, one man) were discarded due to missing responses, leaving a total sample of 46 participants. There were 23 participants in the prosocial condition and 23 participants in the neutral condition. For participation, partial course credit was given.

Procedure and materials. When participants arrived at the laboratory, they learned that they would take part in two unrelated studies. With regard to the first study, participants learned that the researchers would be interested in the enjoyment factor of classical computer games. Participants' responses would help us to select stimuli for future research. In the second study, participants were told that the researchers would be interested in social perceptions. After a short explanation of the video game, participants then played either Lemmings as the prosocial video game or Tetris as the neutral video game.

After participants played the video game for 10 min, the experimenter stopped the game session, and participants responded to two questions measuring liking of the game.

These two items were highly correlated and were thus collapsed into one liking-scale ($\alpha = .91$) using the average. In addition, they rated the perceived difficulty of the video game.

Finally, participants indicated to what extent they perceived the content of the video game to be aggressive. (Because we did not want to alert participants to the true purpose of the experiment, participants were not asked how prosocial they perceived the video game.) All

items were assessed using a 7-point Likert-type scale (0 = *not at all*, 6 = *absolutely*).

Participants were then thanked and told that the first study was over.

Then, participants completed three ambiguous story stems. Similar story stems have been successfully used in previous investigations into the effects of violent video games on hostile expectations (Bushman & Anderson, 2002). In the first story, participants learned that the main character was driving with his bicycle down the road. When he crossed the intersection a car driver violated his right of way. If the bicycle driver had not stopped, a dangerous accident would have happened. The car driver stopped across the intersection and opened the window. In the second story, the main character made an appointment with a friend to watch a movie. As agreed, the main character was on time 30 minutes before the movie starts. However, his friend was late and did not show up until 15 minutes after the movie has started. This has already happened several times in the past. Instead of apologizing, the friend simply noted that he did not look after the time. In the third story, the main character worked hard all day long and decided to reward herself with a meal in a restaurant. After about 15 minutes, a waiter took her order. Another 45 minutes later, when she was about to leave the restaurant the waiter approached her with her food. To make matters worse, the waiter spilled some of the food on the main character's clothes. When this happened the main character spotted the general manager in the back. Each story stem ended with the question "What happens next?". Participants were asked to list 20 things what the main character will do or say, think, and feel as the story continues. One rater who was blind to experimental conditions coded the number of aggressive behaviors, thoughts, and feelings listed by the participants. Previous research (Bushman & Anderson, 2002) has found that codings of different raters were highly correlated. Thus, we felt confident in using only one rater. As in Bushman and Anderson's study, for the analysis, we averaged responses from the three story stems.

Finally, participants answered demographic questions, were thanked, and debriefed. In debriefing none of the participants noted our hypothesis that playing a prosocial video game decreases aggressive responses. The same applies to Experiment 2.

Results and Discussion

Preliminary analyses revealed that participant sex did not moderate any of the main findings. The same applies to Experiment 2. Thus, this variable is not considered further.

A 2 (type of video game: prosocial vs. neutral) X 3 (dependent measure: aggressive behavior, aggressive thoughts, aggressive feelings) mixed-model analysis of variance (ANOVA) with repeated measures on the latter factor was used to test the hypothesis that playing a prosocial (relative to a neutral) video game decreases aggressive cognitions. As predicted, participants who had played the prosocial video game expected fewer aggressive responses from the characters in the stories than did participants who had played the neutral video game, $F(1, 44) = 10.82, p < .01, \eta^2 = .20$ (see Figure 1). Participants who had played the prosocial video game were less likely to expect the characters to say or do something aggressive, $F(1, 44) = 9.75, p < .01, \eta^2 = .18$, to have aggressive thoughts and ideas, $F(1, 44) = 8.19, p < .01, \eta^2 = .16$, and to feel angry and aggressive, $F(1, 44) = 4.94, p < .05, \eta^2 = .10$, than did participants who had played the neutral video game.

There was also a significant main effect of type of dependent measure, $F(2, 43) = 11.12, p < .001, \eta^2 = .34$. Aggressive behaviors ($M = 5.59$) were reported more frequently than aggressive thoughts ($M = 4.85$), followed by aggressive feelings ($M = 4.04$). In contrast, the interaction between type of video game and type of dependent measure was not significant, $F(2, 43) = 1.93, p = .16, \eta^2 = .08$.

Liking of the prosocial ($M = 4.20, SD = 1.51$) and the neutral video game ($M = 3.63, SD = 1.60$) was relatively similar, $t(44) = 1.23, p = .22, d = 0.37$. Moreover, perceived difficulty of the prosocial ($M = 1.26, SD = 1.29$) and the neutral video game ($M = 1.26, SD =$

1.39) was identical, $t(44) = 0.00, p = 1.00, d = 0.00$. The prosocial ($M = 1.39, SD = 1.50$) and the neutral video game ($M = 1.22, SD = 1.44$) also did not differ in terms of perceived aggressive content, $t(44) = 0.40, p = .69, d = 0.12$. Finally, when we controlled for liking, perceived difficulty, and aggressive content of the video game the effect of type of video game on aggressive responses remained significant, $F(1, 41) = 10.56, p < .01, \eta^2 = .20$.

Experiment 2

After Experiment 1 provided initial evidence for our hypothesis that playing a prosocial (relative to a neutral) video game decreases aggressive cognitions, we aimed to further test our hypothesis by using a different measure to assess aggressive responses. Concretely, we employed a word completion task to measure the accessibility of aggressive thoughts. Using such a task, Anderson and colleagues (2004) found that participants who had played a violent video game were more likely to produce aggressive word completions than participants who had played a neutral video game. We expected that playing a prosocial (relative to a neutral) video game would decrease the number of aggressive word completions. Finally, because affective states and arousal have been linked to aggressive responses (Anderson & Bushman, 2002), we also controlled for these variables.

Method

Participants and design. Thirty-two students (18 women, 14 men) of a British university were randomly assigned to one of the two video game conditions (prosocial vs. neutral game). There were 16 participants in the prosocial condition and 16 participants in the neutral condition. No compensation was given for participation.

Procedure and materials. As in Experiment 1, participants learned that they would take part in two unrelated studies, one that deals with the enjoyment factor of classical computer games and one that deals with social perceptions. Then, participants played either Lemmings as the prosocial video game or Tetris as the neutral video game for 10 min. After

the experimenter stopped the video game session, participants indicated to what extent they liked the video game, how difficult they perceived the video game, how aggressive they perceived the content of the video game, and to what extent the video game was arousing.

These items were assessed using scales ranging from 0 (*not at all*) to 6 (*absolutely*).

Then, to measure antisocial thought accessibility, participants completed a word completion task. Participants received a list of 50 word fragments, which were adapted from Anderson and colleagues (Anderson, Carnagey, & Eubanks, 2003; Anderson et al., 2004). Their task was to fill in the missing letters to form a word. For instance, “sho_t” can become the antisocial word “shoot” or the neutral word “short”. Accessibility of antisocial thoughts was the proportion of word completions that were antisocial. In determining whether a word completion was antisocial or not, we used the coding scheme developed by Anderson and his colleagues.

Finally, positive and negative emotions were assessed by employing the PANAS (Watson et al., 1988). Reliability coefficients were adequate (positive affect: $\alpha = .89$; negative affect: $\alpha = .73$) and thus ratings were collapsed using the average.

Results and Discussion

As expected, the effect of type of video game on antisocial thought accessibility was reliable: Participants who had played a prosocial video game ($M = 0.19$, $SD = 0.09$) had lower antisocial word completion scores than those who had played the neutral video game ($M = 0.30$, $SD = 0.09$), $t(30) = 3.17$, $p < .01$, $d = 1.22$.

There were no significant effects for mood, neither on the positive affect scale (prosocial: $M = 2.62$, $SD = 0.68$, neutral: $M = 2.41$, $SD = 0.80$), $t(30) = 0.79$, $p = .44$, $d = 0.28$, nor on the negative affect scale (prosocial: $M = 1.24$, $SD = 0.31$, neutral: $M = 1.27$, $SD = 0.31$), $t(30) = 0.23$, $p = .82$, $d = 0.10$. Liking of the prosocial ($M = 4.13$, $SD = 1.41$) and the neutral video game ($M = 3.63$, $SD = 1.82$), $t(30) = 0.87$, $p = .39$, $d = 0.31$, perceived difficulty

of the prosocial ($M = 1.75$, $SD = 1.23$) and the neutral video game ($M = 1.75$, $SD = 1.39$), $t(30) = 0.00$, $p = 1.00$, $d = 0.00$, and arousal properties of the prosocial ($M = 2.56$, $SD = 1.31$) and the neutral video game ($M = 1.63$, $SD = 1.54$), $t(30) = 1.85$, $p = .07$, $d = 0.65$, were relatively similar. Moreover, when controlling for positive mood, negative mood, liking, perceived difficulty, perceived aggressive content, and arousal properties of the video game the effect of type of video game on accessibility of antisocial thoughts was still evident, $F(1, 24) = 11.09$, $p < .01$, $\eta^2 = .32$.

General Discussion

Two experiments lend credence to our hypothesis that playing prosocial (relative to neutral) video games decreases aggressive responses. More specifically, playing a prosocial video game reduced the expectation that other people respond with aggressive behavior, thoughts, and feelings (Experiment 1) and decreased the accessibility of antisocial thoughts (Experiment 2). In both experiments, effect sizes were medium to large. These effects were not due to differences in liking, perceived difficulty, and aggressive content of the video games. They also remained unaffected when controlling for mood and arousal. It should be also noted that these effects occurred even though participants played the video games for only 10 min, which is a shorter period of video game play than is usually used in other experimental video game studies. So far, there has been abundant evidence that playing antisocial video games increases aggressive tendencies (for meta-analyses, see Anderson, 2004; Anderson & Bushman, 2001; Bushman & Huesmann, 2006). The present research provides the first evidence that playing video games may also decrease aggressive responses.

In concert with previous investigations into the effects of violent video games, the present set of studies provides strong support for GLMs assumption that the effects of video games depend to a great extent on the content of the game played. Playing antisocial video games increases hostile expectations (Bushman & Anderson, 2002), whereas playing a

prosocial video game decreases it (Experiment 1 of the present research). Likewise, playing antisocial video games increases the accessibility of antisocial thoughts (Anderson et al., 2004), whereas playing a prosocial video game decreases it (Experiment 2 of the present research). Thus, it appears that GLMs aim to bring the effects of video games on social tendencies together within a common theoretical framework is not only a valuable endeavor, but is also supported from empirical evidence.

In the present research, we wanted to provide first evidence for our hypothesis that playing prosocial video games reduces aggressive cognitions. According to the GLM, these cognitive associations in turn may activate aggressive behavior. Thus, there are good reasons to believe that prosocial video games decrease aggressive behavior. However, inasmuch as we did not test the effects of playing prosocial (relative to neutral) video games on aggressive behavior, this is an important area for future research. It would be also interesting to examine possible mediating mechanisms. For example, does playing prosocial video games reduce aggressive behavior via a decreased hostile expectation bias and/or decreased accessibility of antisocial thoughts? Moreover, whereas our findings indicate that playing prosocial video games reduces aggressive cognitions, we did not address the affective route of the GLM. For instance, playing an antisocial (relative to a neutral) video game increases state hostility (Anderson & Ford, 1986). Likewise, playing prosocial video games may decrease state hostility, which in turn may decrease aggressive behavior. Thus, future research that more thoroughly examines the whole model is definitely of need.

Future research is also needed to examine why playing prosocial video decreases aggressive cognitions. It may be that exposure to prosocial video games activates prosocial-related schemas, which in turn alter the interpretation of subsequent information. In fact, Greitemeyer (2009) showed that listening to prosocial (relative to neutral) songs increased the proportion of word completions that were prosocial. This greater accessibility of prosocial

thoughts may affect a video game player's interpretation of ambiguous information in that she or he is less likely to interpret cues as aggressive. However, this prediction is rather speculative and awaits further research.

A further limitation involves the use of only one rater who coded the responses to the story stems in Experiment 1. However, inasmuch as the results of Experiment 2 in which an entirely different dependent measure was used were similar to Experiment 1, we are rather confident that our findings are not biased by the sole use of a single rater.

Note also that the video games that were employed in the present studies were rather old. However, the age of the video games is irrelevant for testing the basic research question whether exposure to prosocial video games decreases aggressive cognitions. Moreover, if anything, modern prosocial video games that may be more involving than Lemmings (the prosocial video game used in the present set of studies) should have a greater impact on a player's aggressive cognitions.

The present research revealed that playing prosocial video games decreased aggressive responses. Future research may also address whether these effects extend to other media sources, such as songs with prosocial lyrics. In fact, whereas exposure to songs with violent lyrics increased aggressive affect and cognitions (Anderson et al., 2003) and aggressive behavior (Fischer & Greitemeyer, 2006), exposure to songs with prosocial lyrics increased prosocial affect, cognitions, and prosocial behavior (Greitemeyer, 2009). Thus, it is conceivable that songs with prosocial lyrics also reduce antisocial tendencies.

Conclusion

Anderson and Bushman (2001) wondered whether video games could be used to teach nonviolent solutions to social conflicts. Based on the present findings, and in concert with previous investigations showing positive effects of television with prosocial content (Mares & Woodard, 2005) and of songs with prosocial lyrics (Greitemeyer, 2009) on prosocial

tendencies, it indeed appears that media exposure does not inevitably harm, but may also benefit social relations.

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Figure Caption

Figure 1: Number of aggressive responses for aggressive behavior, thoughts, and feelings as a function of type of video game.

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