THE INFLUENCE OF VIDEO GAMES AND TASK OUTCOME ON PROSOCIAL BEHAVIOR

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Abstract

There are numerous factors that affect whether or not a person chooses to engage in prosocial, or helping, behavior. Mood, empathy, arousal, success or failure at a task, and type of video game played are just a few that have been researched. At Allegheny College, students participated in a study examining the effect these variables had on prosocial behavior. While the results showed none of the participants engaged in prosocial behavior, this is believed to be a flaw in the measure of prosocial behavior and not a statement regarding the apathy of college students. The results were still beneficial in that they elucidated some of the mediators of prosocial behavior and showed some trend in regards to different video game types.

The Influence of Video Games and Task Outcome on Prosocial Behavior

Video game use is very prevalent in the United States. A survey performed between October 2008 and May 2009 among a sample of 2,002 3rd through 12th grade students by the Kaiser Family Foundation found that 8 to 18 year olds spend almost eight hours per week in front of a computer monitor playing video games (*Daily media use among children and teens up dramatically from five years ago,* 2009). Among recent video game best sellers, some form of violence is typically present. For example, Grand Theft Auto, a popular video game, allows players to murder police officers, innocent bystanders, and prostitutes while Halo, the popular war based game, lets players imagine themselves as warriors and kill the opposing members of the feud. A good deal of the research on the influence of video games has concentrated on the effects of playing violent games (Anderson & Bushman 2001; Anderson, Shibuya, Ihori, Swing, Bushman, Sakamoto, Rothstein, & Saleem, 2010; Barlett, Harris, & Baldassaro, 2007; Barlett & Rodeheffer, 2009; Carnagey & Anderson, 2004; Chambers & Ascione, 1987; Hummer, Wang, Kronenberger, Mosier, Kalnin, Dunn, & Mathews, 2010; Ivory & Kalyanaraman, 2007; Kurita, 2010; Polman, de Castro, & van Aken, 2008). The results of these studies have generally supported the argument that playing violent games increases the likelihood of aggressive behavior (Anderson & Bushman 2001; Anderson et al., 2010; Barlett, Harris, & Baldassaro, 2007; Barlett & Rodeheffer, 2009; Carnagey & Anderson, 2004; Hummer et al., 2010; Ivory & Kalyanaraman, 2007). If players can acquire aggressive behaviors from playing violent games, hypothetically players should acquire prosocial behaviors from playing prosocial video games. While there is considerably less research on prosocial games than violent games, the research does indicate that prosocial

games can have positive effects (Gentile et. al, 2009; Greitemeyer & Osswald, 2009; Greitemeyer & Osswald, 2010). Lacking in the current research is a direct comparison between aggressive and prosocial games as well as an examination of the variables that might mediate the effects of these games. The present research attempts to address this gap in the research.

In the past decade there have been a rise in the number of violent video games, specifically first person shooter (FPS) games. FPS games are ones in which the world is seen from the point of view of the main character's eyes and the main weapon to defeat the opponents of the 'protagonist' is a form of a gun. The player moves around in a 3-D world and tries to complete an end goal. Many games have objectives for the main character that have to do with killing people or monsters in order to progress the storyline. People who play these types of games may feel a greater sense of identification with the main character because of the first person perspective, and thus, may be more susceptible to the video games' negative disposition effects. One experiment found that, when playing a FPS game, participants who wounded or killed an opponent experienced a high arousal negative affect (Ravaja, Turpeinen, Saari, Puttonen, & Keitikangas-Järvinen, 2008). In this sense, FPSs decrease the player's empathy for other humans (albeit virtual) and often increase aggression and/or anger.

While there may be some positive effects of video games (Carnagey & Anderson, 2004; Castel, Pratt, & Drummond, 2005; Feng, Spence, & Pratt, 2007; Ferguson, 2010; Ferguson & Rueda, 2010; Green & Baveier, 2003, 2006; Reineke, 2009; Russoniello, O'Brien, & Parks, 2009), significant evidence points to a risk for increased aggression after playing violent video games. There are a few theories as to why this occurs, but two

important ones focus on imitation and physiological arousal. Research has focused on the negative effects that violent video games have, such as increased aggressive behavior, cognition, and affect as well as a decrease in empathy and prosocial behavior (Anderson et al., 2010). In addition to those effects, violent video game exposure causes an increase in physiological desensitization to real life violence (Carnagey & Anderson, 2004). Aggressive video games have been known to correlate with significantly fewer prosocial donations in third, fourth, seventh, and eighth grade children (Chambers & Ascione, 1987).

Violent video games often reward destructive behavior (with items such as a form of money, points, or experience which may ‘unlock’ another part of the game). In turn, the players of these video games then associate violent behavior with positive things and mimic such behavior in real life. Bandura, Ross, & Ross, in their 1961 study, showed that nursery school children who were presented with aggressively behaving models were inclined to imitate aggressiveness. Two years later in a different experiment, they found that children who observed an aggressive model that was rewarded after the aggressive behavior showed more imitative aggression. The children in the control group, in which the aggressive model was punished, were less likely to imitate the actions performed by the aggressor (Bandura, Ross, & Ross, 1963). This supports the imitation model of aggression.

Multiple subsequent studies have also focused on modeling effects and conditioning as causes of the increase in the likelihood of others acting aggressively after viewing violent behavior that is rewarded. Research supports this imitation model from a number of sources, such as video games (Carnagey & Anderson, 2004), models

(Rosenkrans & Hartup, 1967), and television (Polman, de Castro, & van Aken, 2008). Violent video game use has been known to increase physiological desensitization to violence in everyday life and decrease the incidence of helping behavior. Experience with violent video games has been correlated with an increase in aggressive behavior, cognitions, and affect (Carnagey & Anderson, 2004), which is augmented when aggression is rewarded. Punishing violent actions increases hostile emotion, but does not increase aggressive thinking or aggressive behavior (Carnagey & Anderson, 2005). Models who are rewarded inconsistently produce less aggression in observing participants than models who are consistently rewarded but more aggression than models who are consistently punished (Rosenkrans & Hartup, 1967). These findings are consistent with the social learning theory of psychology, which states "behavior is learned and influenced by environmental antecedents and consequences…Cognitive processes are assumed to play a meditational role…Learning can be direct, as in operant conditioning, or indirect, as in modeling and imitation." (Nangle, Erdley, Adrian, & Fales, 2010). When players of violent video games see that the violent behavior the character in the game exhibits is rewarded, the player (maybe implicitly) learns that said behavior is something that is favorable, and the frequency of that behavior increases.

Some games have also been linked to a decrease in prosocial behavior. Rosenhan & White (1967) found that the rehearsal and observation of playing a game, in this case bowling, both play a role in eliciting charity donations. In the control group, not a single participant contributed to the charity when playing alone. Most of the participants who contributed to the charity when the model was not present were the participants who had contributed in the model's presence. There has been evidence for some negative effects

that violent video games have on the players. Violent, adventure video games have been correlated with a faster habituation to the type of behavior necessary to progress the game, which is often aggressive (Kurita, 2010), which may explain why people who play violent video games have a greater likelihood of acting aggressive than those who play other types of video games. Moreover, video games have also been said to increase aggression from baseline (Barlett, Harris, & Baldassaro, 2007). They may also be correlated with higher inattention and potentially bad grade point averages (Chan & Rabinowitz, 2006) and lead to more aggression than watching television violence (Polman, de Castro, & van Aken, 2008). Excessive video games use resembles dependence syndrome, suggesting that people may become addicted to playing video games (Salguero & Morán, 2002), which is another reason why some people do not approve of children and young adults playing video games. Playing video games for excessive amounts of time inevitably causes a decrease in other interests, and grade performance may suffer as a result. For all these reasons, the widespread use of violent video games may be seen as damaging to adolescents' well-being and mental health.

Physiological arousal has been shown to influence aggressive behavior. Harris & Siebel (1975), who looked at the effects that thinking happy, sad, or angry thoughts had on aggression and prosocial behavior, found that female participants shared more balloons than males, and males exhibited more aggressive behavior than females did. It is speculated that the greater incidence of aggression is responsible for the less prosocial behavior that was exhibited in males. Anderson & Bushman (2001) found that violent video games might lead to an increase in physiological arousal and a decrease in prosocial behavior. More realistic violence has been found to stimulate more aggression

and arousal (Barlett & Rodeheffer, 2009). Violent video games were correlated with lower responses in the part of the brain that control executive functioning and the suppression of unwanted thoughts and behavior, implying that violent video games can have a disinhibition effect. These games increase aggression because watching violent behavior increases the likelihood of the viewer imitating or simply acting out his own aggressive behavior (Hummer et al., 2010). More realistic video games, such as first person shooters, have been associated with increased involvement, physiological arousal, and self-reported arousal. In addition, these games have sometimes been associated with hostility due to the violent content (Ivory & Kalyanaraman, 2007). In Wilson's study in 2008, children who preferred aggressive video games exhibited more aggressive and less prosocial behavior. So it appears that violent video games tend to be more physically arousing and people are more prone to behave violently when aroused than in resting states.

In contrast, multiple studies have found that prosocial video games increase the likelihood of helping behavior. Because the game progresses when characters assist and support each other in ways that are not violent, prosocial video games increase the prosocial behavior of players (Gentile et al., 2009; Greitemeyer & Osswald, 2010). These types of video games have also been shown to decrease the accessibility of antisocial thoughts (Greitemeyer & Osswald, 2009). These studies support the claim that prosocial video games tend to increase the likelihood of players imitating the prosocial behavior in the games in real life scenarios and violent video games have the same effect with regards to violent behavior, most likely due to the social learning theory. However, video games are not the only things that increase prosocial behavior; it has been posited that

one's success or failure at a task as well as mood can affect whether or not one will engage in prosocial or violent behavior, as variables that are completely independent of any video game play.

While there are many factors that influence whether a person will demonstrate prosocial behavior, two important ones that are relevant to this study are the outcomes of competition and a person's mood. Many studies have shown that people who win games/task/competitions or who are in positive moods have been known to behave more prosocially. Participants who perform poorly on a task or game have been shown to be less generous and helpful toward a stranger (Isen, 1970). A possible explanation for this trend in behavior is that the person who is in a positive mood wants to share the positive mood state with others and consequently acts prosocially. Another experiment in 1975 by McGuire & Thomas found similar results. Participants were told their performances on a game were higher than, the same as, or lower than the other participants' performances. As predicted, males who were told they performed worse than others were least generous.

The results of a study conducted in 1976 by Ickes, Kidd, & Berkowitz show that participants that succeeded on a task because of their ability donated money more often to a confederate who failed the same task, especially if they saw the failure as beyond the confederate's control (Ickes, Kidd, & Berkowitz, 1976). Even how people frame success has been shown to alter the chances of whether or not they engage in prosocial behavior. Participants who believed success as gaining skill/understanding or working productively with others were more likely to initiate prosocial acts than those who believed success was proving that he or she was better than everyone else (Cheung, Ma, & Shek, 1998).

The participant's mood is another antecedent that can be used to predict if they will exhibit prosocial behavior. In 1973, Moore, Underwood, & Rosenhan found that participants who had positive affects gave more than their control group, while participants who had negative affects gave less than their control group. Baumann, Cialdini, & Kendrink (1981) also found that individuals who are happy are more likely to participate in prosocial behavior than individuals who are sad. Feelings of empathy and attraction are other predictors of helping (Stümer, Snyder, & Omoto, 2005). Prosocial behavior seems to be more likely to occur if people are in better moods or have high levels of empathy for the person in need of help.

Past studies have looked at the effects of either prosocial or violent (antisocial) video games but never both and a control (neutral) video game. Interestingly, no experiment has really determined whether or not it is arousal that influences people who play prosocial video games to have a greater likelihood of helping others, or some other factor. Previous research has also investigated how succeeding in or failing at a task can influence whether or not a participant will engage in prosocial behavior. This proposed study hoped to integrate the aspects of previous research as they pertain to the possible influence of different types of video games and mood as mediated by the success or failure of a task on prosocial behavior.

Participants who play violent video games will not engage in prosocial behavior regardless of whether or not they succeeded at the task. Participants who play neutral video games will engage in prosocial behavior only if they succeeded at the task. Participants who play prosocial video games will engage in prosocial behavior in both task outcome cases.

Method

Participants

The participants were 49 Allegheny students, 27 male and 22 female, who were then enrolled in a psychology course, mostly lower classmen because the classes with the highest number of students are generally beginner courses. The students' professors offered extra credit in all of the courses for participation. A brief summary of the experiment was distributed to some psychology courses and a voluntary sign up sheet was passed around in class.

Measures

The post video game questionnaire had questions relating to the anagram task and video games that were in the form of semantic differentials. The Multiple Affect Adjective Checklist (to measure affect), Davis's Interpersonal Reactivity Index (to measure empathy), and The Perceived Arousal Scale (to measure arousal) were also administered.

Research Design

This study was a 2 x 3 factorial between subjects design, manipulating success or failure at a task (difficulty) and the type of video game (game): violent, neutral, and prosocial. The participants were randomly assigned to each condition. The primary intended measurement was to be how long it took the participants to engage in prosocial behavior, as measured by opening the door, in seconds up to a minute. All participants completed the three measures (affect, empathy, and arousal) at the completion of the video game time period.

Procedure

The participants came to Carnegie Hall, on the Allegheny College campus, on the night that they signed up to participate. In the hallway, they were asked to complete a consent form that briefly described part of the experiment, making it seem the goal was to assess the participants' ability to perform two types of tasks, a mental task and a hand-eye coordination task. It was made clear that if they wish to do so they may opt out of the study with no penalty.

Next, they were directed into a room where they were individually to come up with as many four-letter words as they can, using only the letters in the word 'category', in a time limit of five minutes. The participants were randomly assigned to either a six or twenty word constraint, which operated as success or failure to the participants, and the type of video game. They were then asked to play a violent/antisocial (Resident Evil 4), neutral (SSX 3, a snowboarding game), or prosocial (Animal Crossing) video game on a Nintendo GameCube for approximately fifteen minutes, not including a brief instructional period.

Following the game, a short questionnaire with questions in the form of semantic differntials, the Multiple Affect Adjective Checklist, Davis's Interpersonal Reactivity Index, and the Perceived Arousal Scale were administered. The questionnaire did not ask the participant's name but it asked the sex of the participants. Afterward, I informed the participant that I "forgot the debriefing form downstairs" and left the room. A pre-recorded noise of some books falling down the stairs, which was intended to sound as though someone fell in the hallway, and me stating "Oh" was played once I left the room. How long it took the participant to leave the room to see if someone was in need of help

was recorded. If, after 60 seconds passed, the participant did not open the door to investigate the noise, I returned to the room (Latané & Darley, 1968). Finally, the participants were debriefed and informed that the study was actually looking at whether different video games and the outcome of the task influenced their decision to engage in prosocial behavior.

Analyses

A series of Analyses of Variance (ANOVAs) were conducted, looking for a relationship between the outcome variables (scores on the measurement instruments: arousal, empathy, affect, and the post video game questionnaire) and the experimental conditions (game and difficulty). The homogeneity of variance results were reported for each analysis, and the alpha level was adjusted to .01 in cases of heterogeneity of variance.

Results

Tables 1 through 15 show the results of the ANOVAs.

Table 1. *Summary of ANOVA for Arousal*

Source of Variance	***SS***	***df***	***MS***	***F***	**η2**
Game	1975.07	2	987.54	4.87*	0.17
Difficulty	181.67	1	181.67	0.90	
Game X Difficulty	796.48	2	398.24	1.97	
Error	8712.24	43	202.61		
Total	11682.00	48			

*$p < .05$

Levine's test of homogeneity of variance did not show a significant level (at alpha = .05) of heterogeneity. While there were significant main effects of game, $F(2, 43)= 4.87$, $p > .05$, there were no significant main effects of difficulty, $F(1, 43)=0.90$, $p > .05$. The interaction was also not significant, $F(2, 43)=1.97$, $p > .05$. Participants who played the prosocial video game ($M = 73.22$, $SD = 3.46$) reported significantly less arousal than participants who played the violent video game ($M = 83.85$, $SD = 3.68$) and those who played the neutral video game ($M = 88.08$, $SD = 3.46$), Tukey *HSD*, $p < .05$.

Table 2. *Summary of ANOVA for Empathy*

Source of Variance	***SS***	***df***	***MS***	***F***	**η2**
Game	109.23	2	54.61	3.49*	0.13
Difficulty	0.05	1	0.05	0.00	
Game X Difficulty	72.01	2	36.00	2.30	
Error	672.87	43	15.65		
Total	846.82	48			

*$p < .05$

Levine's test of homogeneity of variance did not show a significant level (at alpha = .05) of heterogeneity. While there were significant main effects of game, $F(2, 43)= 3.49$, $p > .05$, there were not significant main effects of difficulty, $F(1, 43)=0.00$, $p > .05$. The interaction was also not significant, $F(2, 43)=2.30$, $p > .05$. The main effect for video game type accounted for 13% of the variability ($\eta 2 = 0.13$). Participants who played the

violent video game reported significantly higher feelings of empathy (*M* = 21.87, *SD* = 3.25) than the participants who played the prosocial video game (*M* = 18.29, *SD* = 4.43), though no other statistically significant differences were found, Tukey *HSD*, $p > .05$.

Table 3. *Summary of ANOVA for Mood*

Source of Variance	***SS***	***df***	***MS***	***F***	**η2**
Game	610.64	2	305.32	2.52	
Difficulty	276.22	1	276.22	2.28	
Game X Difficulty	108.57	2	54.29	0.45	
Error	5220.62	43	121.41		
Total	6152.25	48			

*$p < .05$

Note: Higher scores indicate a more negative mood state

Levine's test of homogeneity of variance did not show a significant level (at alpha = .05) of heterogeneity. Neither game, $F(2, 43) = 2.52$, $p > .05$, nor difficulty, $F(1, 43) = 2.28$, $p > .05$, produced significant main effects. The interaction was also not significant, $F(2, 43) = 0.45$, $p > .05$. There were no significant differences found with regards to mood, Tukey *HSD*, $p > .05$.

Table 4. *Summary of ANOVA for Anagram Interest*

Source of Variance	*SS*	*df*	*MS*	*F*	η2
Game	9.97	2	4.98	2.50	
Difficulty	10.80	1	10.80	5.41*	0.10
Game X Difficulty	1.29	2	0.65	0.32	
Error	85.80	43	2.00		
Total	107.06	48			

*$p < .05$

Levine's test of homogeneity of variance did not show a significant level (at alpha = .05) of heterogeneity. While there were no significant main effects of game, $F(2, 43)= 2.50$, $p > .05$, the main effects for difficulty were significant, $F(1, 43)=5.41$, $p > .05$. The interaction was also not significant, $F(2, 43)=0.32$, $p > .05$. The main effect for Difficulty accounted for 10% of the variability (η2 = 0.10). Participants in the easy anagram task were significantly more likely to report that the anagram task was more interesting (M = 5.71, SD = 0.28) than participants in the impossible anagram task (M = 4.77, SD = 0.29), but no other significant differences were found, Tukey *HSD*, $p > .05$.

Table 5. *Summary of ANOVA for Anagram Experience*

Source of Variance	*SS*	*df*	*MS*	*F*	η2
Game	3.82	2	1.91	0.49	

Difficulty	9.78	1	9.78	2.49
Game X Difficulty	2.99	2	1.50	0.38
Error	168.72	43	3.92	
Total	184.49	48		

**$p < .01$

Since there was heterogeneity of variance, the alpha level was adjusted to .01. Neither game, $F(2, 43)= 0.49$, $p > .01$, nor difficulty, $F(1, 43)=2.49$, $p > .01$, produced significant main effects. The interaction was also not significant, $F(2, 43)=0.38$, $p > .01$. There were no significant differences found between or within groups in regards to anagram experience, Tukey *HSD*, $p > .01$.

Table 6. *Summary of ANOVA for Perceived Anagram Difficulty*

Source of Variance	***SS***	***df***	***MS***	***F***	**η2**
Game	1.59	2	0.80	0.39	
Difficulty	34.29	1	34.29	16.88*	0.27
Game X Difficulty	5.13	2	2.56	1.26	
Error	87.37	43	2.03		
Total	128.49	48			

*$p < .05$

Levine's test of homogeneity of variance did not show a significant level (at alpha = .05) of heterogeneity. There were no significant main effects of game, $F(2, 43)= 0.39$, $p > .05$, however the main effects for difficulty were significant, $F(1, 43)=16.88$, $p > .05$. The interaction was also not significant, $F(2, 43)=1.26$, $p > .05$. The main effect for anagram difficulty accounted for 27% of the variability ($\eta 2 = 0.27$). Participants in the impossible anagram task were significantly more likely to perceive the anagram task was more difficult ($M = 4.97$, $SD = 0.29$) than participants in the easy anagram task ($M = 3.29$, $SD = 0.29$), Tukey *HSD*, $p > .05$.

Table 7. *Summary of ANOVA for Perceived Anagram Performance*

Source of Variance	***SS***	***df***	***MS***	***F***	**η2**
Game	0.84	2	0.42	0.17	
Difficulty	57.58	1	57.58	22.98*	0.33
Game X Difficulty	7.88	2	3.94	1.57	
Error	107.72	43	2.51		
Total	173.10	48			

*$p < .05$

Levine's test of homogeneity of variance did not show a significant level (at alpha = .05) of heterogeneity. There were no significant main effects of game, $F(2, 43)= 0.17$, $p > .05$, however the main effects for difficulty were significant, $F(1, 43)=22.98$, $p > .05$. The interaction was also not significant, $F(2, 43)=1.57$, $p > .05$. The main effect for anagram difficulty accounted for 33% of the variability ($\eta 2 = 0.33$). Participants in the easy

anagram task rated their performance on the anagram significantly better (M = 5.40, SD = 0.32) than participants in the impossible anagram task (M = 3.22, SD = 033), Tukey *HSD*, $p > .05$

Table 8. *Summary of ANOVA for Anagram Future*

Source of Variance	***SS***	***df***	***MS***	***F***	**η2**
Game	7.25	2	3.62	0.94	
Difficulty	12.76	1	12.76	3.30	
Game X Difficulty	8.87	2	4.43	1.15	
Error	166.45	43	3.87		
Total	194.98	48			

*$p < .05$

Levine's test of homogeneity of variance did not show a significant level (at alpha = .05) of heterogeneity. Neither game, $F(2, 43)= 0.94$, $p > .05$, nor difficulty, $F(1, 43)=3.30$, $p > .05$, produced significant main effects. The interaction was also not significant, $F(2, 43)=1.15$, $p > .05$. No scores between or within groups produced any significant differences with regards to participants' likelihood of wanting to work on anagram tasks in the future, Tukey *HSD*, $p > .05$.

Table 9. *Summary of ANOVA for Video Game Engagement*

Source of Variance	***SS***	***df***	***MS***	***F***	**η2**

Game	40.30	2	20.15	5.38**	0.20
Difficulty	1.75	1	1.75	0.47	
Game X Difficulty	3.27	2	1.63	0.44	
Error	161.06	43	3.75		
Total	206.12	48			

**$p < .01$

Since there was heterogeneity of variance, the alpha level was adjusted to .01. While there were significant main effects of game, $F(2, 43)= 5.38$, $p > .01$, the main effect for difficulty was not significant, $F(1, 43)=0.47$, $p > .01$. The interaction was also not significant, $F(2, 43)=0.44$, $p > .01$. The main effect for video game type accounted for 20% of the variability ($\eta 2 = 0.20$). Participants who played the neutral video game were significantly more likely to find the video game engaging ($M = 5.64$, $SD = 0.47$) than participants who played the prosocial video game ($M = 3.46$, $SD = 0.47$), though no other significant differences between or within groups were found, Tukey *HSD*, $p > .01$.

Table 10. *Summary of ANOVA for Video Game Excitement*

Source of Variance	***SS***	***df***	***MS***	***F***	**η2**
Game	51.97	2	25.98	11.54*	0.34
Difficulty	0.08	1	0.08	0.04	
Game X Difficulty	2.33	2	1.16	0.52	

Error	96.80	43	2.25
Total	152.00	48	

*$p < .05$

Levine's test of homogeneity of variance did not show a significant level (at alpha = .05) of heterogeneity. There were significant main effects of game, $F(2, 43) = 11.54$, $p > .05$, but not for difficulty, $F(1, 43) = 0.04$, $p > .05$ nor the interaction, $F(2, 43) = 0.52$, $p > .05$. The main effect for game accounted for 34% of the variability ($\eta 2 = 0.34$). Participants who played the prosocial video game were significantly less likely to find the video game exciting ($M = 2.54$, $SD = 0.37$) than participants who played the violent video game ($M = 4.05$, $SD = 0.39$) and participants who played the neutral video game ($M = 5.00$, $SD = 0.37$), though no other significant differences were found, Tukey *HSD*, $p > .05$.

Table 11. *Summary of ANOVA for Video Game Experience*

Source of Variance	***SS***	***df***	***MS***	***F***	**η2**
Game	2.30	2	1.15	0.26	
Difficulty	19.71	1	19.71	4.49*	0.09
Game X Difficulty	4.88	2	2.44	0.56	
Error	188.85	43	4.39		
Total	214.00	48			

*$p < .05$

Levine's test of homogeneity of variance did not show a significant level (at alpha = .05) of heterogeneity. There were not significant main effects of game, $F(2, 43)= 0.26$, $p >$

.05, but the main effects for difficulty were significant, $F(1, 43)=4.49$, $p > .05$. The interaction was also not significant, $F(2, 43)=0.56$, $p > .05$. The main effect for video game type accounted for 9% of the variability ($\eta 2 = 0.09$). Participants in the easy anagram task were significantly more likely to report having more video game experience ($M = 5.00$, $SD = 0.42$) than participants in the impossible anagram task ($M = 3.63$, $SD = 0.43$), though no other significant differences were found, Tukey *HSD*, $p > .05$.

Table 12. *Summary of ANOVA for Video Game Future*

Source of Variance	***SS***	***df***	***MS***	***F***	**η2**
Game	25.04	2	12.52	2.58	
Difficulty	4.34	1	4.34	0.89	
Game X Difficulty	1.73	2	0.86	0.18	
Error	208.65	43	4.85		
Total	238.69	48			

*$p < .05$

Levine's test of homogeneity of variance did not show a significant level (at alpha = .05) of heterogeneity. There were not significant main effects of game, $F(2, 43)= 2.58$, $p > .05$, nor for difficulty, $F(1, 43)=0.89$, $p > .05$. The interaction was also not significant, $F(2, 43)=0.18$, $p > .05$. No significant differences between or within groups with regards to participants' likelihood of wanting to play that video game in the future were found, Tukey *HSD*, $p > .05$.

Table 13. *Summary of ANOVA for Perceived Video Game Type*

Source of Variance	*SS*	*df*	*MS*	*F*	η2
Game	228.99	2	114.49	118.40**	0.84
Difficulty	0.89	1	0.89	0.92	
Game X Difficulty	2.25	2	1.13	1.17	
Error	41.58	43	0.97		
Total	271.27	48			

**$p < .01$

Since there was heterogeneity of variance, the alpha level was adjusted to .01. There were significant main effects of game, $F(2, 43)= 118.40$, $p > .01$, but there were not for difficulty, $F(1, 43)=0.92$, $p > .01$. The interaction was also not significant, $F(2, 43)=1.17$, $p > .01$. The main effect for video game type accounted for 84% of the variability ($\eta 2 = 0.84$). Participants who played the violent video game were significantly more likely to find the video game violent ($M = 6.30$ $SD = 0.25$) than participants who played the prosocial video game ($M = 1.11$, $SD = 0.24$) and participants who played the neutral video game ($M = 2.35$, $SD = 0.24$), and those who played the neutral video game were significantly more likely to find the video game violent than those who played the prosocial video game, but no other significant differences were found, Tukey *HSD*, $p > .01$.

Table 14. *Summary of ANOVA for Perceived Video Game Performance*

Source of Variance	*SS*	*df*	*MS*	*F*	η2

Game	9.78	2	4.89	1.84
Difficulty	7.28	1	7.28	2.74
Game X Difficulty	4.24	2	2.12	0.80
Error	114.46	43	2.66	
Total	134.00	48		

*$p < .05$

Levine's test of homogeneity of variance showed an insignificant level (at alpha = .05) of heterogeneity. Neither game, $F(2, 43)= 1.84$, $p > .05$, nor difficulty, $F(1, 43)=2.74$, $p > .05$, produced significant main effects. The interaction was also not significant, $F(2, 43)=0.80$, $p > .05$. There were no significant differences between or within groups in regards to perceived video game performance, Tukey *HSD*, $p > .05$.

Table 15. *Summary of ANOVA for Experiment Interest*

Source of Variance	***SS***	***df***	***MS***	***F***	**η2**
Game	11.90	2	5.95	3.99	
Difficulty	4.59	1	4.59	3.08	
Game X Difficulty	3.33	2	1.67	1.12	
Error	64.12	43	1.49		
Total	83.63	48			

**$p < .01$

Since there was heterogeneity of variance, the alpha level was adjusted to .01. Neither game, $F(2, 43)= 3.99$, $p > .01$, nor difficulty, $F(1, 43)=3.08$, $p > .01$, produced significant main effects. The interaction was also not significant, $F(2, 43)=1.12$, $p > .01$. Participants who played the prosocial video game were significantly less likely to find the overall experiment interesting ($M = 4.94$, $SD = 0.30$) than participants who played the neutral video game ($M = 6.07$, $SD = 0.30$) and the participants who played the violent video game ($M = 5.82$, $SD = 0.32$), though no other significant differences were found, Tukey *HSD*, $p > .01$.

Discussion

The participants in the easy anagram task category tended to be the most aroused, the most likely to report higher feelings of empathy, and be in the best mood. They found the anagram task more interesting, reported having more experience with anagrams, perceived the anagram task to be easier and rated their performance on the anagram task higher than participants in the impossible anagram task category did, and were more likely to report wanting to work on anagram tasks in the future. These participants also were more likely to find the video game engaging and exciting, report having more video

game experience, feeling like they performed better at the video game, and wanting to play the video game that they played again in the future. Previous research is supported by the findings that these participants reported being in a better mood than those in the impossible anagram task category (Isen, 1970; McGuire & Thomas, 1975).

Participants playing the violent game were shown to have been in the worst mood, report having the least amount of experience with anagrams and video games, found the game to be the most violent, and report performing the worst at the video game. Previous research is consistent with finding negative affects with violent video games (Carnagey & Anderson, 2005). Strangely, these participants also were the most likely to convey higher feelings of empathy. Perhaps this was because the participants felt playing a violent video game was supposed to lower their feelings of empathy so they overcompensated in the self reported data. It is not entirely certain why participants who played the violent video game had the highest average scores on empathy, but it is possible that the opportunity to open the bear trap and free the stray wolf influenced the participants' feelings of empathy.

The neutral game produced the most arousal, the best mood, and the most interest in the anagram task. The participants that played the neutral game reported having the most experience with anagrams and video games, being more apt to want to work on anagram tasks and play the video game again in the future, were the most likely to find the video game engaging and exciting, to report performing well at the video game, and were the most likely to convey that the overall experiment was interesting.

The prosocial game showed the least arousal, participants found the anagram task to be the least interesting, found the video game the least engaging and exciting, reporting

wanting to play the video game in the future the least, and found the video game the least violent and the overall experiment the least interesting. These findings, while they were not the primary focus of this experiment, are still useful in further research and in explaining possible mediators of behavior.

There might have been a number of reasons that none of the participants opened the door to see what the noise in the hall was. Other students were in the hallway that the participants came from, and they might have thought it was someone else dropping something. When asked about the noise, many participants claimed to not have heard a noise or thought it was something going on in the hallway that was unrelated to the experiment. While the noise was tested prior to the experiment, it might be possible, however improbable, that the recording was not played loud enough. However, the goal was to try to emulate the sound of a person either dropping some books or falling down the stairs that were a few feet away from the door, so if that was to actually happen outside of the experiment, it is improbable that someone would hear that noise very loudly from inside the room with the door closed. Another possibility is that the participant was distracted and did not hear the noise because many participants were putting on their jackets or checking their phones during the time the noise was played. It also could have been that participants felt they were not supposed to leave the room or open the door due to the nature of experiment.

It is disappointing that no one opened the door, but not overly discouraging. An interesting finding in the violent video game, Resident Evil 4, was that there was an opportunity to open a bear trap that had sprang on a stray wolf. Every participant that got to this part of the game helped the injured animal, with the exception of one participant

who had extremely limited experience with video games, although one participant shot the wolf after he freed it. It is unclear whether the participants simply freed the animal in expectation of reciprocal help, because they believed this was required in order to progress the game, or if they were behaving altruistically. However, this finding suggests that not all the participants were incapable of or unmotivated to help others.

The questionnaire included a number of checks involved with a few of the variables in this experiment. The self reported data stating that the easy anagram task was perceived to be easier than the impossible anagram task served as a successful measure of how difficult the anagram task was. The results to the question regarding the violent content of each video game served as a check to see if the violent video game was considered to be truly violent, the neutral game moderately violent, and the prosocial game not at all violent. The data supports this assertion. And there were still some trends in the questionnaire data that helped explain underlying factors that may be at work when one is playing a video game or attempting to complete a task.

Despite the hypotheses being unsupported, this study incorporated many aspects of previous research that had not been combined before, such as the three different types of video games and the task outcome with video game play.

Conclusion

While there was no evidence that mood, arousal, feelings of empathy, type of video game, and task outcome had any effect on prosocial behavior, this certainly does not mean that this is evidence that these variables had no effect on prosocial behavior. It is more probable that these variables would have produced a more pronounced effect on prosocial behavior if there was a superior determinant of prosocial behavior than the

measure utilized in this experiment. There were also many factors that might have interfered with the process of trying to gage participants' prosocial behavior.

There are a few trends that have become apparent with the results. It seems that students at Allegheny College prefer to play competition-based, quick action video games such as SSX 3 to story-based, gradual paced game such as Resident Evil 4 or Animal Crossing. While point of view, platform, and duration of play were held constant, it is highly difficult, if at all possible, to keep all variables that are intrinsic to the complex nature of video games except for violence versus prosocial progression of the storyline uniform. Also apparent is the positive effects success at a task can have on one's mood, empathy, arousal, feelings of accomplishment at other endeavors, and optimism.

Hopefully this experiment can encourage a different experiment that will use a properly tested and more valid measure of prosocial behavior.

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Appendixes