Research Project N00133674

by Patrick Kennedy

Violent App Games and the General Learning Model: Arousal, Affect and Access to Aggressive Thoughts

Name: Patrick Kennedy

Student number: N00133674

Year of Programme: Year 2

Assignment: Research Project

Violent App Games and the General Learning Model: Arousal, Affect and Access to Aggressive Thoughts
(word count = 5,067)

Abstract

Previous research has shown that violent video gameplay can lead to increased violent behaviour and/or decreased prosocial behaviour due to changes in access to aggressive thoughts, affect and arousal (Anderson, Carnagey & Eubanks, 2003). The present study set out to investigate the impact of violent smartphone app gameplay on access to aggressive thoughts, affect, and arousal as well as on helping behaviour. 60 participants (30 males), aged between 18 to 56 years (M = 24.8, SD = 7.4), were randomly assigned to play one of four games (Angry Birds Transformers, Angry Birds Go!, Temple Run 2, Dead Target Zombie). They completed the Perceived Arousal (Anderson, Deuser & DeNeve, 1995) and the Positive Affect Negative Affect Schedule (Watson, Clark & Tellegen, 1988) before and after gameplay. They also completed a word completion task (Anderson et al., 2003) to assess access to aggressive thoughts and an amended semantic differential to determine perceived app violence (Kennedy, 2013). Prosocial behaviour was quantified by asking participants to submit their email for further research. Results indicate that violent app game play results in higher negative affect and arousal than non-violent app gameplay. Access to aggressive thoughts was also found to be higher among the violent app game group. However, no difference was observed for helping behaviour. Results were discussed in relation to the General Learning Model. Suggestions for future research such as the development of an alternative scale for measuring perceived app violence and the inclusion of empathy as a moderating variable were made.

Introduction

Considerable research has been conducted on the link between violent/aggressive media on violent attitudes and behaviours among children, adolescents, and adults. Researchers have looked at the impact of violent TV programmes (e.g. Christakis and Zimmerman, 2007; Huesmann, Moise-Titus, Podolski, and Eron, 2003), violent music (e.g. Anderson, Carnagey, & Eubanks, 2003; Lennings & Warburton, 2011; Mast & McAndrew 2011), violent literature (e.g. Kirsh & Olczak, 2002), and violent video games (e.g. Anderson, Gentile, & Buckley, 2007; Anderson et al., 2010; Bushman & Huesmann, 2006; Sherry, 2001; Willoughby, Adachi & Good, 2012). In specific reference to violent video games, Greitemeyer and Mügge (2014) published a meta-analysis of 98 independent articles across experimental, correlational and longitudinal studies and found that "violent video games increase aggression and aggression-related variables and decrease prosocial outcomes, prosocial video games have the opposite effect" (p.1).

There is now broad agreement among media psychologists, communication scientists, paediatricians, and parents that exposure to violent video games increases aggression among children (Bushman, Gollwitzer & Cruz, 2014). However, little if any research to date has focused specifically on app games. According to 148apps, there are over 200,000 app games available on the Apple app store (148apps, 2014). Apple and Android smartphone owners in the US have been found to spend 32% of their time on their phones playing app games, which equates to nearly 52 minutes per day (Khalaf, 2014). Recent research by Chen, Xu, Zhou, and Zhu (2013) also found that app game maturity ratings for violent games can be unreliable with over 30% of Android app games being incorrectly classified. Based on this, it is essential that research is conducted on this gaming platform to assess whether or not it has a similar effect to video games.

Theoretical Perspectives

From a theoretical perspective, there are two initial hypotheses which must be addressed:

1. People can learn new skills or reinforce skills by observing others or characters.
2. Behaviours towards stimuli can be affected by exposure to other stimuli.

Research on social learning provides support for the first hypothesis. Bandura and Walters (1963) defined social learning as a process of learning which can take place purely through observation, even in the absence of motor reproduction. The most famous example of this in research is the Bobo study (Bandura, Ross, & Ross, 1961) where a sample of 48 children (24 male, 24 female) observed an adult model acting aggressively towards a blow-up Bobo doll. A further 24 children (the control group) witnessed the model assembling toys in a quiet subdued manner. At a later point the children were given the opportunity to play with a similar Bobo doll. The children in the study sample were significantly more likely to mimic aggressive behaviours that they had witness previously than those in the control group. While researchers such as Hart, Scholar and Kritsonis (2006) have claimed that the findings of this study are often over-generalised, further support from the social learning concept comes from the identification of mirror neurons by Rizolatti, Fadiga, Gallese, and Fogassi (1996). Mirror neurons are ones which fire when an individual (or animal) is undertaking or observing an action (Rizolatti & Craighero, 2004) or when hearing the sound related to that action (Kohler et al., 2002). Mirror

neurons have been posited as the basis for "empathy, imitation learning and even the evolution of language" (Ramachandran, 2000, p. 3).

Research on knowledge structures and priming lends support to the second hypothesis. Priming refers "to the incidental activation of knowledge structures, such as trait concepts and stereotypes, by the current situational context" (Bargh, Chen, & Burrows, 1996, p.230). It was first identified by Meyer and Schvaneveldt in the 1970's (e.g. Meyer & Schvaneveldt, 1971; Meyer, Schvaneveldt, & Ruddy, 1975) as they showed people would recognise words more quickly if they had seen an associated word previously, e.g. 'nurse' is recognized more quickly following 'doctor' than 'bread'.

Looking at the relevance of priming to media content and violence, Berkowitz and LePage (1967) found that exposure to guns results in increased aggressive behaviour towards a peer. A later study by Anderson, Benjamin, and Bartholow (1990) found that exposure to weapon images increased accessibility to aggressive thoughts, moderating the priming effect. Similar to social learning, doubts have been cast over some studies on priming with Nobel Laureate Psychologist Daniel Kahneman penning an open-email to social psychologists (specifically in relation to priming) saying 'I believe you should do something about this mess" (personal communication, September 26, 2010), after queries were put forth in relation to difficulties of replication of findings, e.g. of Bargh et al.'s 1996 study (Doyen, Klein, Pichon, & Cleeremans, 2012).

While further research is being conducted in this field, the concepts of social learning and priming encouraged researchers to postulate further and

ask: Why do observations of others behaving aggressively or engagement with stimuli we associate with violence lead us to more negative behaviours? The General Aggression Model [GAM], was developed by Anderson and colleagues (e.g., Anderson & Bushman, 2002) in an attempt to answer this question. This model suggests that aggressive contents of violent media may affect a person's internal state via their cognitive processes, affect or arousal (see Figure 1 below).
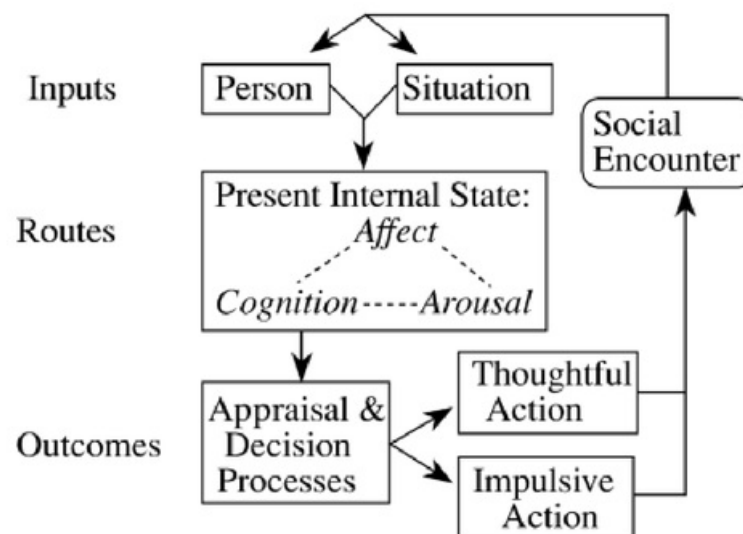

Figure 1. The General Aggression Model (Anderson & Bushman, 2002)

Anderson and Bushman (2001) conducted a meta-analytic review of 35 reports that included 54 independent samples with a total sample size of 4,262. Their analysis focused on violent video gameplay and its effect on physiological arousal, aggression-related thoughts, aggressive behaviour and prosocial behaviour. Looking at experimental and non-experimental studies among young adults and children, they found support for the hypothesis that violent video gameplay is positively associated with aggressive behaviour, aggressive cognition and heightened arousal while it is negatively associated with prosocial behaviour. A more recent meta-analytic review by Anderson et al. (2010) found further support for the above but also suggested that

aggressive affect may play a mediating role in increasing aggressive behaviour while decreased empathy was associated with a decline in prosocial behaviour.

However, while significant research exists to support the general aggression model and the assumption that violent media exposure leads to increased aggressive behaviour, not all research supports such a theory. Ferguson (2007) conducted a meta-analysis of 17 articles and reported that when corrected for publication bias, studies of violent video games provide no support for these conclusions. Another report by Ferguson (2014) highlights the fact that youth violence in the USA declined through the period 1996-2011 despite the maintained high level of media violence. Ferguson and Kilburn (2010) also wrote a direct response to Anderson et al.'s (2010) meta-analytic review claiming "C. A. Anderson et al. included many studies that do not relate well to serious aggression, an apparently biased sample of unpublished studies, and a "best practices" analysis that appears unreliable and does not consider the impact of unstandardized aggression measures" (p.174). What is evident in the debate is that publications from the same researchers consistently come to the same à priori conclusions either for or against the hypothesis, a point acknowledged and discussed in Ferguson and Konijn's (2015) most recent paper.

Outside of the General Aggression Model, another factor has been identified as one which can arise from video gameplay and is often linked to aggressive behaviour. Berkowitz (1989) building on the frustration-aggression hypothesis, suggested that frustrating events may lead to negative affect and thus create aggressive behaviour. Dill and Anderson's (1995) research exploring this found that frustration (created by unjustified blocking of an expected gratification) lead to enhanced levels of aggression above those observed in a justified frustration condition or control (no frustration) condition. In two experiments, Przybylski (2009) reviewed and controlled for frustration created by game control mastery in violent and non-violent games based on previous research by Anderson et al. (2006) and found that complex interfaces undermined the player's competence and resulted in increased aggression for both the violent and non-violent conditions.

Aim of the Present Study and Hypotheses

The primary aim of the proposed study is to determine the effect of playing violent app games on accessibility to aggressive thoughts, arousal and affect. In addition to this, the secondary aim is to look at the impact of game play on helping behaviour. As frustration has also been identified as a potential cause for increased negative affect and aggressive behaviour, measures were included to assess this. Based on previous research on video game play, the hypotheses for the proposed research are as follows:

Hypothesis 1: Playing violent app games will result in higher accessibility to aggressive thoughts than playing neutral app games.

Hypothesis 2: Playing violent app games will result in higher arousal scores than playing neutral app games.

Hypothesis 3: Playing violent app games will result in higher negative affect scores than playing neutral app games.

Hypothesis 4: Playing violent app games will result in lower prosocial behaviour than playing neutral app games.

Method

Research Design

This study used a quantitative experimental design to measure the effect of violent video game apps on arousal, affect, and access to aggressive thoughts. An independent groups design was used in which game condition (violent or non-violent) was the independent variable and arousal, affect, and access to aggressive thoughts were the dependent variables. The dependent variables were quantified using the Perceived Arousal Scale (Anderson et al., 1995), the Positive Affect Negative Affect Scale (Watson et al., 1988), and a word completion task (Anderson et al., 2003) respectively. Participants also completed a modified semantic differential (Kennedy, 2013) which assessed the game content and a question determining how much they liked or disliked the game.

Participants

60 participants (30 male and 30 female), with an age range of 18-56 (M = 24.8, SD = 7.4) took part in the research. Participants were randomly assigned to play one of four games, two of which contained violent content. Participants were recruited through invitations in IADT College Dublin. A snowball effect (Goodman, 1961) was utilised to encourage greater participation levels as participants were asked to inform other students about the research.

Apparatus and materials

Participants completed the research in the company of the researcher on a laptop using Survey Monkey (SurveyMonkey, 2015). They were invited to play one of the app games which were pre-loaded on an iPhone 6 and a Samsung Galaxy S5. The participant could choose the device depending on their preferred software platform (i.e. iOS or Android). A timer was used to set time allocations for the word completion task, the practice session and the game play session.

The four games included Angry Birds Transformers (ABT), Dead Target Zombie (DTZ), Temple Run 2 (TR2), and Angry Birds Go! (ABG). ABT is an isometric side-on cartoon character based game where the gameplay character aims to shoot (and kill) enemy angry birds. DTZ is a first person shooter where the object is to shoot (and kill) oncoming zombies. TR2 provides an over-the-shoulder view of the player's character who has to run through an obstacle course while collecting coins. ABG is a cartoon car racing game.

The Positive Affect Negative Affect Schedule (Watson et al., 1988) was used to measured affect (see Appendix A). Participants were asked to rate the extent to which they felt certain 20 mood states (e.g., 'distressed', 'excited') at that moment using a 5 point Likert scale from 1 (not at all) to 5 (extremely). The PANAS is divided into subscales which allow for the determination of positive and negative affect. Positive affect was measured using ten of the mood states, e.g. 'active', 'nervous', etc. which had good reliability (α pre-gameplay = 0.843, α post-gameplay = 0.636). Negative affect was measured using the other ten items which included 'scared', 'nervous' etc. which also had good reliability (α pre-gameplay = 0.910, α post-gameplay = 0.797). Total scores for each scale could range from 10 – 50 with higher scores indicative of greater positive/negative affect.

Arousal was measured using the Positive Arousal Scale (Anderson et al., 1995), a 24 item scale based on 5-point likert style questions from 1 (not at all) to 5 (extremely) on arousal adjectives such as 'drowsy', 'active' etc. (see Appendix B). Negative items were negatively scored and arousal levels were found by summing participants' scores which could range between 24 and 120 with higher scores indicative of greater arousal. The Perceived Arousal Scale had good internal reliability with a Cronbach's alpha of 0.946 pre-gameplay and 0.833 post-gameplay.

Access to aggressive thoughts was measured using a word completion task (Anderson et al., 2003) in which the participant completes words, e.g. B_h_ _ _ - behead (violent) or behold (neutral) to reveal neutral, violent, or ambiguous thoughts (see Appendix C). The respondent was provided with a

list of 98 incomplete words and asked to complete as many as possible within a 3 minute timeframe.

The modified semantic differential (Kennedy 2013) was used to assess participants' perceptions of the game content, i.e. violent or neutral. Participants were asked to assess the presence of themes in the apps along a continuum, e.g. between "love" and "hate" (see Appendix D). Within the semantic differential, scores from three continuums ('love' – 'hate', 'peace' – 'war', and 'cooperation' – 'conflict') were combined to create an app aggression score. Cronbach's alpha score for these items, while acceptable, was relatively low (α = 0.527). The semantic differential also included a 'frustrating' – 'calming' continuum to assess the effects of gameplay on frustration levels.

Procedure

Participants began by reading an information sheet (see Appendix E) and consented to take part based on the information provided. Participants answered questions on their demographic information (gender and age) before completing the PAS (Anderson et al., 1995) and the PANAS (Watson et al., 1988) so that a base level could be established. It was decided that participants should not complete the word completion task (Anderson et al., 2003) as scores in a post-experiment version may change due to practice rather than gameplay.

Participants were invited by the researcher (male) to select a preferred phone (iPhone 6 or Samsung Galaxy S5). Having been randomly assigned to play one of the four games, participants completed a 5 minute practice session which was led by the research. They then took a five minute break before completing a ten minute free-play gaming session. The researcher kept track of time before encouraging participants to continue with the questionnaire on the laptop.

Once participants completed the gameplay session, they completed the PAS (Anderson et al., 1995), the PANAS (Watson et al., 1988) and the word completion task (Anderson et al., 2003). They also completed the amended

semantic differential (Kennedy, 2013) and answered the question 'how much did you like the game' which was scored on a scale of 1 (not at all) to 5 (extremely). They were asked to put their email address into the system if they would be willing to assist the researcher with further studies. An email input was coded as '1' while no input was coded as '2' meaning lower scores were indicative of greater helping behaviour.   The researcher then provided the participant with a full debrief (see Appendix F) outlining the purpose and the objectives of the research.

Results

Descriptive statistics are displayed in Table 1 below for gender, age, song theme and enjoyment scores for each of the four games. Mean scores suggest that sample composition differed in terms of age as mean scores varied from 21.9 for DTZ to 27.4 for TR 2. As anticipated, aggressive theme score was higher for ABT (11.3) and DTZ (12.5) than ABG (9.7) and TR2 (9.4). Mean scores for game enjoyment were similar across the four games, ranging between 2.7 and 3.2 out of 5.

Table 1

Descriptive Statistics for Game Played on Age, Aggressive Theme Score and Enjoyment

	N	Min.	Max	Mean	SD
Angry Birds Transformers (7 male)					
Age	15	18	56	26.7	11.9
Aggressive theme score	15	9	13	11.3	1.05
Enjoyment	15	1	5	2.80	1.42
Angry Birds Go! (7 male)					
Age	15	18	32	23.3	3.95
Aggressive theme score	15	8	12	9.73	1.16
Enjoyment	15	1	4	2.80	0.86
Temple Run 2 (7 male)					
Age	15	18	41	27.4	6.80
Aggressive theme score	15	7	12	9.40	145
Enjoyment	15	2	5	3.20	0.86
Dead Target Zombie (9 male)					
Age	15	18	27	21.9	2.89
Aggressive theme score	15	10	14	12.5	1.25
Enjoyment	15	1	5	2.73	1.10

ANOVA tests were used to test for significant differences in aggressive theme scores and enjoyment between the four games. Looking first at aggressive theme score, Levene's test for equality of variance indicated equal variances (F = 1.014, p > .05) so a one-way ANOVA could be used to look for differences. This test revealed a main effect of game played on aggressive theme scores, $F(3,59) = 20.09$, $p < .05$. Post-hoc analyses using Tukey's HSD indicated that aggressive theme scores were significantly higher for DTZ than ABG ($p < .001$) and TR2 ($p < .001$). The same was true for ABT which scored significantly higher than ABG ($p < .05$) and TR2 ($p < .001$). There was no difference between scores for DTZ and ABT (p > .05).

Looking then at game enjoyment scores, Levene's test for equality of variance indicated equal variances (F = 2.261, $p > 0.05$) so a one-way ANOVA was utilised. This test revealed no significant main effect, $F(3, 59)$, $p > .05$. As a result, it could be assumed that further differences did not arise as a result of game enjoyment.

As both DTZ and ABT were each perceived as being more violent than either ABG or TR2, the scores for DTZ and ABT were combined to create a more general 'violent' app game score while those of ABG and TR2 were combined to create a 'non-violent' app score. Using an independent sample t-test, Levene's test for equality of variance indicated equal variances (F = 0.633, $p > 0.05$). A significant difference was observed between the violent app group and the non-violent app group when comparing app theme scores, $t_{(58)} = 7.022$, $p < 0.001$. A review of the mean scores suggests the combined score for DTZ and ABT (11.9) was significantly higher than the combined score for ABG and TR2 (9.567).

Descriptive statistics are displayed in Table 2 overleaf for arousal, affect (pre and post gameplay), access to aggressive thoughts and email provision for the violent and non-violent app conditions. An analysis of the mean scores showed little change in positive affect for either game condition. Violent game mean scores for positive affect fell from 29.9 pre gameplay to 29.7 while non-violent mean scores increased slightly from 28.9 to 30.7. There was slightly more variation in negative affect scores as violent mean scores increased from 29.7 to 33.8 while non-violent mean scores fell slightly from 28.4 to 26.5 after gameplay. Larger differences could be seen in mean scores

for arousal pre and post gameplay. Mean scores in the violent condition increased from 69.5 to 81.4 for arousal while arousal scores only increased slightly in the non-violent condition (from 66.6 to 69.3). Finally, mean scores for access to aggressive thoughts were higher in the violent condition (8.03) than the non-violent condition (5.07) while those in the violent condition were slightly less likely to provide an email address (1.83) than those in the non-violent condition (1.63) in line with the fourth hypothesis.

Table 2

Descriptive Statistics for Gameplay Condition on Arousal, Affect, Access to Aggressive Thoughts and Email Provision

	N	Min.	Max	Mean	SD
Violent app games					
Positive Affect (pre)	30	16	43	29.9	7.09
Positive Affect (post)	30	19	42	29.7	6.46
Negative Affect (pre)	30	18	44	29.7	7.97
Negative Affect (post)	30	22	42	33.8	5.16
Arousal (pre)	30	40	102	69.5	18.7
Arousal (post)	30	53	98	81.4	11.3
Access to Aggressive Thoughts	30	4	15	8.03	3.08
Email Provision	30	1	2	1.83	0.38
Non-violent app games					
Positive Affect (pre)	30	17	41	28.9	7.44
Positive Affect (post)	30	21	38	30.7	4.22
Negative Affect (pre)	30	11	42	28.4	9.69
Negative Affect (post)	30	15	37	26.5	6.10
Arousal (pre)	30	40	99	66.6	18.0
Arousal (post)	30	58	84	69.3	7.18
Access to Aggressive Thoughts	30	1	12	5.07	2.52
Email Provision	30	1	2	1.63	0.49

Prior to testing the hypotheses, comparisons were made between the pre gameplay scores for arousal and affect. Using independent samples t-tests,

no significant differences were observed between the violent and non-violent pre gameplay conditions for positive affect, t(58) = .551, p > 0.05, negative affect, t(58) = .582, p . 0.05, nor arousal, t(58) = .605, p > 0.05. As there were no significant differences between pre gameplay scores, the researcher could infer with greater certainty that any post gameplay differences would be the result of the assigned condition.

Testing the first hypothesis, that playing violent app games would result in higher accessibility to aggressive thoughts than playing neutral app games, an independent samples t-test was used to look at differences in mean scores. Levene's test for equality of variances indicated equal variances (F = 1.00, *p > 0.05*). A significant difference was observed for accessibility to aggressive thoughts as those in the violent condition (*M* = 8.03, *SD* = 3.08) scored significantly higher than those in the non-violent condition (*M* = 5.07, *SD* = 2.52), $f_{(58)}$ = 4.085, *p* < 0.001. Examination of the 95% confidence interval allowed for further interpretation. Both the lower (1.52) and the upper (4.42) values were removed from zero so one would expect a significant result upon replication. In addition, a Pearson product-moment correlation coefficient was computed between aggressive theme score and arousal. There was a moderate positive relation between the two variables, r = 0.314, p < 0.05, indicating that higher perceptions of aggressive content were positively correlated with greater accessibility to aggressive thoughts.

Testing the second hypothesis, that playing violent app games would result in higher arousal scores than playing neutral app games, was also tested using an independent samples t-test. Levene's test for equality of variances indicated equal variances (F = 3.73, *p > 0.05*). Again the hypothesis was supported as a significant difference was observed, whereby participants in the violent condition had significantly higher post gameplay arousal scores (*M* = 81.4, *SD* = 11.3) than those in the non-violent condition (*M* = 69.3, *SD* = 7.18), $t_{(58)}$ = 4.95, *p* < 0.001. Further examination of the 95% confidence interval indicated that both the lower (7.20) and upper (17.0) values were again removed from zero. Pearson's r was computed looking at the relationship between aggressive theme score and arousal score, while controlling for pre gameplay arousal. Again a moderate positive relationship was observed, r = 0.462, p < 0.001.

Looking at the third hypothesis which stated that playing violent app games would result in higher negative affect scores than playing neutral app games, an independent samples t-test was conducted. Levene's test for equality of variance once again indicated equal variances (F = 2.52, $p > 0.05$) with support was found for the hypothesis as negative affect scores were significantly higher in the violent condition (M = 33.8, SD = 5.16) than in the non-violent condition (M = 26.5, SD = 6.10), $t_{(58)}$ = 4.96, $p < 0.001$. Examination of the 95% confidence intervals again suggest that lower (4.32) and upper (10.2) values were removed from zero. Pearson's r was computed this time looking at the relationship between aggressive theme score and negative score, while controlling for pre gameplay negative. A moderate positive relationship was observed, r = 0.488, p < 0.001. A similar analysis was conducted for positive affect and no significant difference was observed between the violent (M = 29.7, SD = 6.46) and the non-violent (M = 30.7, SD = 4.22) conditions, $t_{(49.9)}$ = -.73, $p > 0.05$.

The fourth hypothesis which stated that playing violent app games would result in lower prosocial behaviour than playing neutral app games, was tested by analysis email provision scores (where lower scores are indicative of greater helping). In this instance, Levene's test for equality of variance was significant indicating unequal variances (F = 12.915, $p > 0.05$). An independent samples t-test indicated that there was no significant difference for provision of emails between the violent (M = 1.83, SD = 0.38) and non-violent conditions (M = 1.63, SD = 0.49), $t_{(54.6)}$ = 1.77, $p > 0.05$.

Finally, considering frustration levels as a potential moderating variable, an independent t-test analysis was conducted to see if there was a significant difference in frustration scores through violent or non-violent gameplay. Levene's test for equality was not significant (F = 0.06, $p > 0.05$). The independent samples t-test revealed no significant difference in frustration scores between the violent (M = 2.63, SD = 0.89) and the non-violent (M = 2.30, SD = 0,88) conditions, $t_{(58)}$ = 1.46, $p > 0.05$.

Discussion

While the present study provided further support for the underlying mechanisms of the General Aggression Model, i.e. that exposure to violent media increases arousal, negative affect and accessibility to aggressive thoughts, no support was found for the hypothesis that these changes would result in lower levels of helping behaviour.

As frustration levels did not differ between the violent and non-violent groups it is unlikely that this under-pinned differences in negative affect, as Berkowitz (1989) suggested. On this point, Przybyblski (2009) suggested that one cause of frustration may be game control and mastery. It may be the case that smartphones do not lend themselves to as complex gameplay as gameplay consoles although further research would be required to explore this hypothesis.

Support for the first hypothesis which suggests that violent app gameplay can lead to higher levels of access to aggressive thoughts is quite concerning if previous research (e.g. Berkowitz et al., 1968; Anderson et al., 2003; Anderson et al., 2010) is correct. The General Learning Model suggest that a heightened sense of or access thoughts will alter the way in which we perceive the behaviours others, typically increasing the likelihood we will see their behaviour as threatening and respond defensively/aggressively (Anderson et al., 2003). In this instance, while access to aggressive thoughts was higher than for neutral gameplay, there was no subsequent negative impact on helping behaviour.

However, this finding may arise as the result of a weakness in the methodology rather than presenting robust against the theory. It was interesting to note that helping behaviour overall was relatively low as only a small proportion of participants provided the researcher with an email address. Future researchers may consider measuring alternative helping behaviours where the method allows for a greater variance in scores, e.g. Kennedy (2013) used a 20 pen-pick up method that had been developed by Twenge, Baumeister, DeWall, Ciarocco and Bartels (2007).

In relation to the second and third theories, that violent gameplay would increase arousal and negative affect, significant differences were observed

17

between the violent and non-violent conditions which is in line with previous research (Anderson et al., 2001; Anderson et al. 2010). Correlational analysis also indicated a moderate positive relationship between aggressive app score, arousal and negative affect. While the research did not find a decrease in helping behaviour, the finding that negative affect increases due to violent app gameplay is concerning given their popularity and accessibility.

While the present study has helped to show that violent app games can lead to changes in mood, arousal and access to aggressive thoughts in line with the General Aggression Model, further research is required to address certain weaknesses which were inherent in the present study. The first relates to the relatively low Cronbach alpha score which was achieved for the internal consistency of the app theme measure. While a similar method had been used previously by Kennedy (2013) to identify prosocial themes in songs, the amended version of this scale did not yield high internal consistency and so alternatives should be considered in the future.

This being said, the present study had a number of inherent strengths which should be replicated in the future. Both the PANAS (Watson et al., 1988) and the PAS (Anderson et al., 1995) showed very high internal consistency. Pre gameplay test revealed no significant differences between groups for arousal or affect meaning differences prior to gameplay could be ruled out as variables. Similarly there were no significant differences between groups on game enjoyment or frustration levels.

Future research should look to address the weaknesses discussed above while maintaining the strengths of the present study. Anderson et al.'s (2010) meta-analysis also high-lighted a relationship between violent gameplay and a lack of/reduction in empathy which resulted in lower prosocial behaviour. Further research might look to include empathy as a dependent variable in the future.

In conclusion, the present study has again shown the potential effects that negative gameplay can have on cognitive processes, arousal levels and affect. While there was no notable impact on helping behaviour, further research is required to add to these findings by employing alternative techniques and across different samples and cultures.

References

148apps. (2014, April 7). Count of active applications in the app store.
Retrieved from http://148apps.biz/app-store-
metrics/?mpage=appcount

Anderson, C. A., Benjamin, A. J., & Bartholow, B. D. (1998). Does the gun pull
the trigger? Automatic priming effects of weapon pictures and weapon
names. *Psychological Science, 9*, 308-314. doi: 10.1111/1467-
9280.00061

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*(5), 353-359.

Anderson, C. A., & Bushman, B. J. (2002). Human aggression. *Annual Review
of Psychology, 53*, 27-51. doi:
10.1146/annurev.psych.53.100901.135231

Anderson, C. A., Carnagey, N. L., Flanagan, M. Benjamin, A. J., Eubanks, J. &
Valentine, J. C. (2004). Violent video games: Specific effects of violent
content on aggressive thoughts and behaviour. *Advances in
Experimental Social Psychology, 36,* 199-249.

Anderson, C. A., Carnagey, N. L., & Eubanks, J. (2003). Exposure to violent
media: the effects of songs with violent lyrics on aggressive thoughts
and feelings. *Journal of Personality and Social Psychology*, 84(5), 960.

Anderson, C., Deuser, W. E., DeNeve, K. (1995). Hot temperatures, hostile
affect, hostile cognition, and arousal: Tests of a general model of
affective aggression. *Personality and Social Psychology Bulletin, 21,*
434-448.

Anderson, C. A., Gentile, D. A., & Buckley, K. E. (2007). *Violent video game
effects on children and adolescents: Theory, research, and public
policy.* Oxford University Press.

Anderson, C. A., Shibuya, A., Ihori, N., Swing, E. L., Bushman, B. J.,
Sakamoto, A., Rothstein, H. R., & Saleem, M. (2010). Violent video
games effects on aggression, empathy, and prosocial behaviour in

Eastern and Western countries: A meta-analytic review. *Psychological Bulletin, 136,* 151-173.

Bandura, A., Ross, D., & Ross, S. A. (1961). Transmission of aggression through imitation of aggressive models. *Journal of Abnormal & Social Psychology, 63,* 575-582. doi: 10.1037/h0045925

Bandura, A., & Walters, R. H. (1963). *Social learning and personality development.* New York: Holt.

Bargh, J. A., Chen, M. & Burrows, L. (1996). Automaticity of social behaviour: Direct effects of trait construction and stereotype activation on action. *Journal of Personality and Social Psychology, 71,* 230-244.

Berkowitz, L. (1989). Frustration-aggression hypothesis: examination and reformulation. *Psychological Bulletin, 106*(1), 59.

Berkowitz, L., & LePage, A. (1967). Weapons as aggression-eliciting stimuli. *Journal of Personality and Social Psychology, 7*(2), 202.

Bushman, B. J., Gollwitzer, M., & Cruz, C. (2014). There Is Broad Consensus: Media Researchers Agree That Violent Media Increase Aggression in Children, and Pediatricians and Parents Concur. *Psychology of Popular Media Culture.*

Bushman, B. J., & Huesmann, L. R. (2006). Short-term and long-term effects of violent media on aggression in children and adults. *Archives of Pediatrics & Adolescent Medicine*, *160*(4), 348-352.

Chen, Y., Xu, H., Zhou, Y., & Zhu, S. (2013, May). Is this app safe for children?: a comparison study of maturity ratings on Android and iOS applications. In *Proceedings of the 22nd international conference on World Wide Web* (pp. 201-212). International World Wide Web Conferences Steering Committee.

Christakis, D. A., & Zimmerman, F. J. (2007). Violent television viewing during preschool is associated with antisocial behavior during school age. *Pediatrics,120*(5), 993-999.

Dill, J. C. & Anderson, C. A. (1995). Effects of frustration on hostile aggression. *Aggressive Behavior, 21*(5), 359-369.

Doyen, S., Klein, O., Pichon, C. L., & Cleeremans, A. (2012). Behavioral priming: it's all in the mind, but whose mind?. *PloS One*, *7*(1), e29081.

Ferguson, C. J. (2007). Evidence for publication bias in video game violence effects literature: A meta-analytic review. *Aggression and Violent Behaviour, 12*(4), 470-482.

Ferguson, C. J. (2014). Does media violence predict societal violence? It depends on what you look at and when. *Journal of Communication, 65*(1), 1-22.

Ferguson, C. J. & Konijn, E. A. (2015). She said/he said: A peaceful debate on video game violence. *Psychology of Popular Media Culture.*

Goodman, L. A. (1961). Snowball sampling. *The Annals of Mathematical Statistics,* 148-170.

Greitemeyer, T., & Mügge, D. O. (2014). Video Games Do Affect Social Outcomes A Meta-Analytic Review of the Effects of Violent and Prosocial Video Game Play. *Personality and Social Psychology Bulletin*, doi:10.1177/0146167213520459.

Hart, K. E., Scholar, F., Kristonis, W. A., & Alumnus, D. (2006). Critical analysis of an original writing on social learning theory: Imitation of film-mediated aggressive models By: Albert Bandura, Dorothea Ross and Sheila A. Ross. In *National forum of applied educational research journal* (Vol. 20, No. 3).

Huesmann, L. R., Moise-Titus, J., Podolski, C. L., & Eron, L. D. (2003). Longitudinal relations between children's exposure to TV violence and their aggressive and violent behavior in young adulthood: 1977-1992. *Developmental Psychology*, 39(2), 201.

Kahlaf, S. (2014, April 1). Apps solidify leadership six years into the mobile revolution [Web log post]. Retrieved from http://blog.flurry.com/bid/109749/Apps-Solidify-Leadership-Six-Years-into-the-Mobile-Revolution

Kennedy, P., E. (2013). The relationship between prosocial music and helping behaviour and its mediators: An Irish college sample. *Journal of European Psychology Students*, 4(1), 1-15, doi: http://dx.doi.org/10.5334/jeps.av

Kirsh, S. J., & Olczak, P. V. (2002). The effects of extremely violent comic books on social information processing. *Journal of Interpersonal Violence*,*17*(11), 1160-1178.

Kohler, E., Keysers, C., Umilta, M. A., Fogassi, L., Gallese, V., & Rizzolatti, G. (2002). Hearing sounds, understanding actions: action representation in mirror neurons. *Science*, *297*(5582), 846-848.

Lennings, H. I. B., & Warburton, W. A. (2011). The effect of auditory versus visual violent media exposure on aggressive behaviour: the role of song lyrics, video clips and musical tone. *Journal of Experimental Social Psychology*, *47*(4), 794-799.

Mast, J. F., & McAndrew, F. T. (2011). Violent lyrics in heavy metal music can increase aggression in males. *North American Journal of Psychology*, (13), 63-64.

Meyer, D. E., & Schvaneveldt, R. W. (1971). Facilitation in recognizing pairs of words: evidence of a dependence between retrieval operations. *Journal of experimental psychology*, *90*(2), 227.

Meyer, D. E., Schvaneveldt, R. W., & Ruddy, M. G. (1974). Functions of graphemic and phonemic codes in visual word-recognition. *Memory & Cognition*, *2*(2), 309-321.

Przybylski, A.K. (2009). *Motivational sources of frustration and aggression for video game players* (Unpublished master's thesis). University of Rochester, Rochester, NY.

Ramachandran, V. S. (2000). Mirror neurons and imitation learning as the driving force behind "the great leap forward" in human evolution. Retrieved from: http://www.edge.org/3rd_culture/ramachandran/ramachandran_p1.html

Rizzolatti, G., & Craighero, L. (2004). The mirror-neuron system. *Annu. Rev. Neurosci.*, *27*, 169-192.

Rizzolatti, G., Fadiga, L., Gallese, V., & Fogassi, L. (1996). Premotor cortex and the recognition of motor actions. *Cognitive Brain Research*, *3*(2), 131-141.

Sherry, J. L. (2001). The effects of violent video games on aggression. *Human communication research*, *27*(3), 409-431.

SurveyMonkey. (2014). *SurveyMonkey Inc.* Palo Alto, California, USA
www.surveymonkey.com

Watson, D., Clark, L. A., & Tellegen, A. (1988). Development and validation of brief measures of positive and negative affect: The PANAS scales. *Journal of Personality and Social Psychology, 54*(6), 1063-1070. doi: 10.1037/0022-3514.54.6.1063

Willoughby, T., Adachi, P. J., & Good, M. (2012). A longitudinal study of the association between violent video game play and aggression among adolescents. *Developmental Psychology, 48*(4), 1044.

Appendices

Appendix A: The Positive Affect Negative Affect Schedule (PANAS)

This scale consists of a number of words that describe different feelings and emotions. Read each item and then mark the appropriate answer in the space next to that word. Indicate to what extent you feel this way right now, that is, at the present moment. Use the following scale to record your answers.

1	2	3	4	5
Not at all	A little	Moderately	Quite a bit	Extremely

_____ Interested   _____ Irritable

_____ Distressed   _____ Alert

_____ Excited   _____ Ashamed

_____ Upset   _____ Inspired

_____ Strong   _____ Nervous

_____ Guilty   _____ Determined

_____ Scared   _____ Attentive

_____ Hostile   _____ Jittery

_____ Enthusiastic   _____ Active

_____ Proud   _____ Afraid

Appendix B: The Perceived Arousal Scale (PAS)

Different people react very differently to the same situations. Indicate to what extent you feel this way right now, that is, at the present moment. Use the following 5-point rating scale. Write the number corresponding to your rating on the blank line next to each word.

1	2	3	4	5
Not at all	A little	Moderately	Quite a bit	Extremely

_____	Active	_____	Alert
_____	Drowsy	_____	Dull
_____	Exhausted	_____	Fatigued
_____	Lively	_____	Powerful
_____	Sleepy	_____	Slow
_____	Vigorous	_____	Weak
_____	Aroused	_____	Depressed
_____	Energetic	_____	Excited
_____	Forceful	_____	Inactive
_____	Quiet	_____	Sharp
_____	Sluggish	_____	Tired
_____	Weary	_____	Worn-out

Appendix C: Word Completion Task

Below are a number of incomplete words. Please try to complete as many words as you can in the next 3 minutes. You can skip words if you like. There is more than one way to complete most of the words below.

B_h _ _ _	W_ _m	C_mp_ _t	St_r_o
In_ _re	Ki_ _	Des_ _ _ _	P_ _son
Ex_e_ _	T_p_	Sh_l_	P_st_r
Mu_ _er	H_r_	Sho_t	M_ _gle
Pr_ _e	A_t_r	R_p_ _t	Bl_nd
Spea_	Cho_e	Str_ _e	Sn_re
Fli_ _er	S_mp_ _	L_ _e	B_e
Expl_ _e	Att_c_	B_rn	H_t
G_ _pe	P_ _ne	W_n	Fo_e_t
Sm_ck	Ang_ _	A_e	Off_ _ _
Sm_ _e	Fl_ _t	_ry	L_ _ on
Kn_ _ _	Fi_ _t	Wa_	Cr_ _l
T_ne	P_ck	F_m_	C_e_te
S_ _b	Ha_e	Sl_p	St_r_y
Sh_r_	A_t	B_ _k	M_tc_
Dr_ _n	C_t	R_pe	F_r_ _
T_ _te	C_nt_ _l	S_d_	_unch
N_ _t_	Dis_ _s_ed	B_ _t	Sh_re
W_ _d_w	Prov_ _e	Br_ _ze	A_use
W_ _ ked	P_nb_ll	Rev_ _t	Cl_ _r
Vis_ _n	Out_ _ _e	Coo_	H_nt
En_age	C_ll	S_ _y	W_t_r
Scr_ _n	R_de	D_ _r	S_ash
H_tr_d	M_n_ge	Sm_ck	
T_l_ph_ _ _	Ins_ _ _	Fr_ _t	

Appendix D: Semantic Differential

Below are a series of scales which describe the characteristics of the game you are about to play. Words are arranged with their opposites for each pair. Please tick (or place an 'x') the box closest to the word that best describes the game for each pairing. The closer you put the tick to the word, the more it describes that game. If you feel that neither adjective is relevant to the game, please mark the middle box.

Game name:

	A	B	C	D	E	
Fantasy						Reality
Happy						Sad
Trust						Distrust
Dependable						Not dependable
Cooperation						Conflict
Active						Passive
Helpful						Unhelpful
Love						Hate
Peace						War

Please indicate below how much you liked this app by ticking the appropriate box.

Not at All	Slightly	Moderately	Very Much	Extremely

Appendix E: Information Sheet

Information sheet for study on app behaviour

My name is Patrick Kennedy. You are invited to participate in a study on app games and content as part of my research study that will form the basis for my postgraduate thesis. My research is being supervised by Nicola Fox Hamilton. Please read the following information before deciding whether or not to participate.

What are the objectives of the study? The nature of this study requires participants to be naive to the exact research question, as information about the research may influence your behaviour and responses. For this reason you may only be told that we are conducting research on app games and their themes. A complete debriefing will be shared after participation, where any questions you may have will be answered.

Why have I been asked to participate? The research requires both male and female participants of all nationalities and levels of education. However, participants must be over 18 years of age to take part.

What does participation involve? You will be asked to complete a number of short psychological tests and to play an app game which may contain violent content for 10 minutes. The purpose/topic areas of the psychological tests cannot be revealed at this stage as to do so may influence your responses although all aspects of the study will be explained in the debriefing.

Right to withdraw: You have the right to withdraw from the research at any point during the experiment without any consequence to you. However, as your individual data will not be linked to your personal details it will not be possible to remove these after you complete the study. You will be given the opportunity to withdraw from the study at the end of the experiment.

Are there any benefits from my participation? While there are no direct benefits to participation, you may find playing the app game to be an enjoyable experience. This type of study can also make an important contribution to our understanding of app behaviour. As such, the findings from this study may be presented at national and international conferences and

may be submitted for publication in peer-reviewed journals. However no individual participant will be identified in any publication or presentation.

Are there any risks involved in participation? There is minimal risk associated with participation, as any inconvenience involved in taking part will be limited.

Confidentiality: All individual information collected as part of the study, including survey responses, will be used solely for experimental purposes. They will be stored safely and will not be publicly displayed or published without prior consent. No information about your identity will be recorded with your responses, so your responses are completely anonymous.

Contact Details

Patrick Kennedy   N00133674@student.iadt.ie

Nicola Fox Hamilton   Nicola.Fox-Hamilton@iadt.ie

- I have read and understood the attached Information Leaflet

- I have had the opportunity to ask questions and discuss the study

- I have received satisfactory answers to all my questions

- I understand that I am free to withdraw from the study at any time without giving a reason and without this affecting my training

- I am over 18 years of age.

- I agree to take part in the study

Do you agree with the above and consent to take part in the research?
- Yes
- No

Appendix F: Debrief Sheet

Debrief sheet for study on app behaviour

Many thanks for taking part in the research. To reiterate, the research was in relation to a study on app games and content as part of my research study that will form the basis for my postgraduate thesis. The research is being supervised by Nicola Fox Hamilton. Below is some additional information regarding the research.

What are the objectives of the study? You were randomly assigned to play one of four app games. 2 of these are classified as violent app games while 2 are non-violent. The objective of the research was to see if violent app games increase affect (mood), emotional arousal, or access to violent thoughts to a greater degree than non-violent games.

A secondary function of the study was to see if violent app game play would reduce one's likelihood to offer to take part in further research relative to non-violent app game play. The researcher is not actually currently planning any future similar research but if you do wish to take part in other studies please visit psych.hanover.edu/Research/exponnet.html where there are a range of psychological research project ongoing at any given time.

Why was I not informed from the outset? It was a concern of both the researcher and the supervisor that providing this information prior to the study may have influenced your behavior. People often try to help the researcher achieve the objectives they have set out which can create unreliable data.

Right to withdraw: You have the right to withdraw from the research prior to leaving the experiment center (closing your online survey). As your individual data will not be linked to your personal details it will not be possible to remove these after you complete the study. You can now choose to withdraw your data from the study if you wish.

Confidentiality: All individual information collected as part of the study, including survey responses, will be used solely for experimental purposes. They will be stored safely and will not be publicly displayed or published. This type of study can also make an important contribution to our understanding of

app behaviour. As such, the general findings from this study may be presented at national and international conferences and may be submitted for publication in peer-reviewed journals. However, as no information about your identity will be recorded with your responses, your responses are completely anonymous.

Contact Details

Patrick Kennedy   N00133674@student.iadt.ie

Nicola Fox Hamilton   Nicola.Fox-Hamilton@iadt.ie

If this study made you feel in any way uncomfortable or upset, please contact your doctor, Niteline or another local help-line for support.

Niteline: 1800 793 793

For more details go to www.niteline.ie

Samaritans: 116 123

For more details go to www.samaritans.org

Aware: 1890 303 302

For more details go to www.aware.ie

Research Project N00133674

FINAL GRADE

/100

GENERAL COMMENTS

Instructor

PAGE 22

PAGE 23

PAGE 24

PAGE 25

PAGE 26

PAGE 27

PAGE 28

PAGE 29

PAGE 30

PAGE 31

PAGE 32