Video Games, Personality, Aggression and Arousal:

The Predictions of the General Aggression Model.

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Abstract

In this study twenty-two participants each played two video games. Warhammer 40,000 Space Marine and Journey, a violent and non-violent game respectively. While participants did this their Heart Rate was recoded. According to the General Aggression Model participant aggression and arousal are strongly linked to one another (Anderson & Bushman, 2001). Personality is also a factor in participant video game preference. However it was found that participant aggression was not correlated with their arousal, nor was it found that personality was correlated with either participants arousal nor their video game preference. The implications of this and avenues for future research are also discussed.

Introduction

The usage of Video Games are increasingly becoming more common, in fact according to statistics published by the Entertainment Software Association (ESA, 2012) video games and video game accessories are responsible for nearly $25 billion dollars of revenue during 2011 alone. It is no surprise then that video games are increasingly becoming a new area for research for psychologists (Markey, & Markey, 2010). It is impossible to deny the increasing prevalence of video games and other electronic gadgets in our lives. Any of the myriad of mobile devices have either preinstalled or easily obtained gaming software. The Itunes App store for example contains hundreds of games. The most downloaded being Angry Birds along with the user interface apps for Facebook and Instagram (Reuters, 2012).

Given the estimated user size of Facebook being somewhere in excess of 1,000 Million (1.01 Billion) the possibility of being absent from video game exposure is shrinking by the day. However with such easily access to in some instances quite violent media, there is growing concern over the content of video games and what effect they may have on their most frequent users. (Anderson & Bushman, 2001).

So far prior research has looked at Personality types (Jeng & Teng, 2008; Markey & Markey,

2010; Chory & Goodboy, 2011), Stress Levels (Mazur et al 1997; Herbért et al., 2005; Hossini et al., 2011), Aggression and Hostility (Arriaga et al., 2006; Peng et al., 2008), as well as biometric factors such as heart rate and blood pressure (Arriaga et al., 2006) for possible effects that long term video games usage may have. After such extensive experimentation there is still little consensus among scholars as to what effects, if any video games can have. While it have been demonstrated several times that there are both physical and behavioural changes that frequent video games users experience (Anderson & Dill, 2000) there has been numerous issues raised regarding the extend of the influence of video games on these changes alone. Pinker (2002) suggest that "third" party variables such as innate violence tendencies and family environment are better explanation of any link between video games and aggression, as opposed to Anderson and Dill's (2000) explanation of the participatory nature of video games being the root cause.

Prevailing Theories

The prevailing theory surrounding the implications of exposure to video game violence and to violence in other media is the General Aggression Model (Anderson & Dill, 2000; Anderson & Bushman, 2001; Anderson et al 2004). According to the GAM violent media increases aggression by increasing arousal or enhancing aggressive cognition. That aggressive related priming will influence the occurrence of aggressive behaviour. This increase which is observed in both male and females negatively effects prosocial behaviour both in the short term and the long term. Anderson et al (2008) states that the effect of video games violence on aggression has been demonstrated in wide segments of society. However as mentioned others have concluded that this effect is marginal and is only a factor with those who are already at risk for violence. (Pinker, 2002; Giumetti & Markey, 2007; Markey & Scherer 2009). Others have stated that the methodological problems that underline video game research mean that no meaningful conclusions can be made. (Durkin & Barber 2002: Kutner & Olson, 2008)

Zillmann's Excitation Transfer Theory (Zillmann, 1996) proposes that violent video games could increase aggression through arousal transfer. Jeong et al (2012) tested this theory in their study. In

their experiment participants were exposed to varying degrees of sensory realism. Blood was either red or blue, screams of pain either on or off, or participants viewed the game in either First or Third Person perspective. While they did find that arousal, which in this instance was skin conductivity, had increased when participants were exposed to the red blood and screams of pain conditions they found that this increase had no significant effect on aggression, which they had measured using a modified version of the Buss-Perry aggression questionnaire. Their findings do lend weight to the criticism directed at the General Aggression Model that heightened arousal is not always a precursor to or a consequence of individual aggression.

Personality Factors

Chory and Goodboy (2011) suggest that Personality is a vital predictor of choice of media and as such is a primary determinant of what video game choices people make. As such their study looked at the personality types and preferences of players. Using the Goldberg Big Five measure (Goldberg, 1992) they found that those players who scored higher in Openness but who were lower in Agreeableness played violent video games more frequently. Additionally those who scored lower in Neuroticism preferred violent video games. They identify that for those who scored lower in Agreeableness would prefer more violent games as they give the ability to live out violent tendencies through a fantasy world. Additionally Chory and Goodboy (2011) also state that those individuals who scored higher in Openness would prefer more violent games, as being more inquisitive and imaginative they are more open to the variety of experience that are on offer. Another of the Personality Factors that they measured was Extraversion. They found that those who scored higher in Extraversion played more violent video games with greater frequency and had a stronger preference for them. They mention that this view is in line with Krcmar and Kean's (2005) research that the excitement seeking nature of highly Extraverted individuals predicted a stronger preference for violent media. However Chory & Goodboy (2011) identify that this view and their own research is in contrast to the prevailing idea that extraversion was not related to violent game usage (Anderson et al, 2004). They theorise that this is due to current prevalence for multiplayer

online games, which draw the more extraverted personality to them so that they may engage in social interactions. As they mentioned this is the view that is consistent with Teng (2008) who showed that online video game users where more extraverted than non-users. So it is quite apparent that again the proposed theory of the GAM, that video games alone influence the behaviour of those who play them is not fully explaining all that is observed. That those who are extravert and as such are more outgoing and sociable would be less likely to engage with and participate in more violent games. But as Chory and Goodboy (2011) show that is not always the case.

Video Game Genre

While for most people who infrequently play video games the phrase itself of "video game", is an umbrella term to describe a vast amount of different content and different styles. However for those who engage with video games on a more frequent basis there are three main categories that games can fall under.

The first is Casual, in which the player engages with a video game that has a more relaxed nature. It may be that the game is marketed for children or as the name suggests the more "Casual Gamer", someone that does not have the time or interest to play any of the other styles. An example of this type would be games on mobile devices such as the aforementioned "Angry Birds".

The second would be Hardcore games. In essence Hardcore game are those that fall into the more traditional gaming experience. They would require a significant invested by the player through either time or money, as these game are usually on the traditional hardware of PCs and gaming consoles of PS3, Xbox etc. They would also not be marketed toward children or infrequent users possibly because of the content of the game itself or the length of time required to complete it.

The last style would be Art games. What separates Art game for the others is the content of the game itself or the breaking of traditional gaming conventions by which that content is delivered. Namely that experimental design is at the forefront of the game. A clear example of this would be "Dear Esther", a game in which you travel across an unnamed desolate Island while listening to the narrator read out letters he wrote to a woman named Esther. The cryptic nature of the letters and the

unreliable narrator are what drive the player forward. These distinctions which are colloquial within the gaming community are not acknowledged by prior research. Instead prior research only looks that the more visual aspects of video games. Less attention is paid to the narrative within the games and to the participants engagement with that narrative.

Some Limitations of Prior Research

As has been mentioned previously there are significant issues that surround video game research. The most obvious of which is the lack of consensus among scholars as to what effects video games can have and to what extend those effects may be. Another issue that is not dealt with in the literature, is the lack of consistency in the types of games that researchers select to use. Only one study by Peng et al (2008) used games of a similar genre and style. Whereas other studies attempt to measure the level of arousals and/or aggression but when presenting two quite different stimuli. For example Hossini (2011) had participants play Counter Strike, a multiplayer first person shooter, which according to Chory and Goodboy (2011) and Teng (2008) should engage the more extroverted and open players. Hossini (2011) then paired Counter Strike with a non violent alternative, FIFA 2007 a sports game. Which should also engage the more extroverted, socially minded players. As both have significant online components and are styled to be played by several people at one.

If Chory and Goodboy (2011) and Teng (2008) proposed hypotheses hold true then both games in this cases should draw similarly minded players and as such are not dissimilar enough to give an indication of what personality types prefers which game. Conversely if Chory and Goodboy (2011) and Teng (2008) are wrong then the games in these casess are two dissimilar, in terms of content, to compare any biological change or reaction to them. That is if one is looking for changes in arousal, be that heart rate or skin conductivity the fact that these two games have such different content, any comparison would be analogous to comparing participants arousal state when they are watching a horror film to when they were watching a family film. It would be a given that there should be a different arousal state for the participants, this current methodology is not highlighting

when all things being equal which game is having the greatest effect. In the case of Peng et al (2008) however they used two similar games in terms of their violent content, their action originated focus and their narrative structures and they found that more aggressive personalities play the game more aggressively. However they acknowledge that with the games themselves it was impossible to not play non-aggressively or passively.

The aim of this study was an attempt to remedy some of these issues. This was done by having participants play two video games (Violent and Non-Violent) during two sessions of 35 minutes each. This time frame was chosen to allow participants more exposure to the narrative within each of the games. The Violent video game was chosen to be Warhammer 40,000 Space Marine, a game set in the Warhammer 40,000 universe created by Gamesworkshop, which is known for its violence and macabre atmosphere. As such it would be classed as a "Hardcore" game. The Non-Violent video game was chosen to be Journey, a game set in a fantasy universe where players play the role of a silent pilgrim who travels toward a mountain in the distance. While it may not be considered a true casual game it does fall short of the more "Hardcore" category being that there is little difficulty involved. The player cannot die or be trapped at any point in the game however there are obstacles and environmental hazards to avoid. The emotional connection that the player feels to the environment is what drives them on. As such the classification of Journey being an Art game is more appropriate. Both of these games were chosen for their different visual styles and relative obscurity both being released in the last 18 months (September 2011 and March 2012 respectively). Both have similar game play styles, both are third-person, single player narratives with only the levels of violence being distinct. Both engage the player with visual displays and consequently immerse players in their worlds.

Hypotheses

Using these two game as the standards for our Violent and Non Violent conditions respectively the following hypotheses were devised. Taking the Big Five Inventory (BFI) (John et al., 1999) as a measure of Personality traits, the Buss-Perry Aggression Questionnaire (Buss & Perry, 1992) as a

measure of Aggression and arousal levels, being defined as heart rate (Arriaga, 2006):

1. Would there be a significant difference between the Violent and Non-Violent gaming conditions in participants average Heart Rate
2. Would there be a significant relationship between participants BFI (John et al., 1991) scores and the rate of change in their level of arousal (as outlined above) during the Violent and the Non Violent video game sessions.
3. Would there be a significant relationship between participants scores on the Buss-Perry Aggression questionnaire (Buss & Perry, 1992) and the change in their level of arousal (as outlined above) during both the Violent and the Non Violent video game sessions.
4. Would Personality traits as defined by the BFI (John et al., 1991) and as outlined by prior research (Krcmar & Kean's, 2005; Lachlan & Maloney, 2008; Teng, 2008; Chory & Goodboy, 2011) be predictive of participant preference for the games.

Method

Participants

Twenty two participants, 12 Male and 10 Female (Mean age = 27.73 , SD = 5.01) were recruited through both opportunistic sampling and through an online announcement on the website Meetup.com. Participants were selected if they were between 18 – 40 years of age. This was to ensure that all participants were over the age requirement of the Violent video game and to have a population that would be familiar with and capable of using the control pad with full dexterity. Of the participants 41% classified themselves as a “Gamer”. Participants were offered no incentives to take part in the experiment other than the opportunity to play the games. All participants played both the Violent and Non-Violent video game during two 35 minute sessions with a ten minute break in between.

Design

A within-subjects paired sample and correlational design was chosen to maximise the

amount of time that was available and to allow comparison of participants against themselves.

For the correlations the predictor variables are the subscales of the BFI and each participants total score on the Buss-Perry Aggression Questionnaire. The criterion variable would be the rate of change for participants Heart Rate during the gaming sessions. Which is calculated by subtracting participants Game 1 and Game 2 average Heart Rate scores.

For the paired sample the independent variable is the two game conditions, Violent and Non-Violent. The dependent variable would be each participants average Heart Rate during both of the video game conditions.

Materials

Equipment.

The video games that were used were Warhammer 40,000 Space Marine and Journey. Both games were played on a Philips 4000 series 40inch LED screen. The screen was mounted to the wall at the other end of the room which measured 10 foot by 15 foot. The Heart Rate were recorded using ADI instruments PowerLab 26t data acquisition unit and the LabChart software that was provided with it. Heart rate was recorded using an electrode that was attached to the index toe on the right foot of participants. The Heart Rate was recorded in Beats Per Minute (BPM). The video games were played on a Sony Playstation 3 (PS3) gaming system. The Warhammer game was played using a traditional CD. Journey however was stored on the Hard drive of the PS3 system and required no CD, only an internet connection to allow the game to authorise play.

Aggression Traits

The overall aggression of participants was measure using the Buss-Perry Aggression Questionnaire.(Buss & Perry, 1992). The 29 item questionnaire measured various different aspects of aggression such as Verbal, Physical and Hostility which were then combined to give an total Aggression score. Examples of each are:

Verbal: “I tell my friends openly when I disagree with them.”

Physical: “I have become so mad that I have broken things.”

Hostility: “I wonder why sometimes I feel so bitter about things.”

Participants would rank several such statements on a five-point Likert scale by how much they considered the phrases characteristic or uncharacteristic of themselves. 1 being *Extremely Uncharacteristic* and 5 being *Extremely Characteristic.* A Cronbach's Alpha coefficient found that there was a high internal consistency with this measure $\alpha = .859$

Personality traits

The personality of the participants was measured using the BFI. This 44 item questionnaire measured on a 5-point Likert scale measured how much participants agreed or disagreed with the following statements. The statement were divided into other subcategories namely Extraversion, Openness, Conscientiousness, Neuroticism and Agreeableness. A Cronbach's Alpha coefficient found there was an acceptable internal consistency in using this measure $\alpha = .675$. Examples of each of the statements are as follows with the framing sentence of “I am someone who...”:

Extraversion: “Is reserved”.

Openness: “Is curious about many different things”.

Neuroticism: “Can be tense”.

Conscientiousness: “Perseveres until the task is finished”.

Agreeableness: “Is consider and kind to almost everyone”.

Procedure

When participants had agreed either in person or through email they would be instructed to where the experiment would take place. If necessary they would be led to the building by the researcher. The participants would be instructed to take a seat in front of the consent form (See Appendix, Figure 1) that was laid out for them, to read it and be certain they agreed with all that the experiment entailed, all participants were instructed that they could withdraw at any time. If they did agreed they would then fill out the first section of the demographic questionnaire (Figure 3) Buss-Perry Aggression questionnaire (Figure 2) and the Big Five Inventory (Figure 4) and stop on a

blank page that instructed them to “Please Turn this Page at the End of the Experiment”. When they had done so they would be sat in another chair that was positioned in the centre of the room facing the television screen. Each participant was positioned optimally so as to have the clearest view of the television screen, in as much as the cables of the recording device would allow. As such each participant was approximately 4 foot from the television, which was mounted approximately 5 foot off the floor.

Participants would play either the violent or non-violent game first which was counterbalanced with the order the prior participant played the games, i.e. one would play the violent game first then the next person would play the non-violent game first and so on.

For the violent game, participants would play for 30 minutes at which point the research would take over the controls and play a selection of “audio logs”, recording that provide back story and greater context for the events in the game. Thus allowing each participant to experience as much of the narrative as possible. Each participant here the same “audio logs” as one another.

Similarly the violent game was played on the easiest setting to prevent player death and thus repetition of the more difficult areas which may have increased participants frustration with the game. If in the event of player death or near death, the recoding would be stopped and the researcher would navigate past the obstacle then hand control back to the participant and resume recoding. It was decided that this intervention would not be done when participants were approaching the end of their allotted time, approximately between 25-30 minutes into the violent game session, as at that point most participants would have encountered a minor “Boss” character designed to test players competency with the controls. However for the majority of participants this intervention was not necessary. Of the total participants only one had any significant issue with the use of the control pad but that was only during the violent condition. No participant had any issue with the use of controls in the non-violent gaming session.

After a 10 minute break the participants would then play their second game. For the non-violent game no intervention such as the one outlined for the violent-game was needed. Participants would

play for the full 35 minutes with no interruption.

Prior to playing either game participants was give instruction on the use of the control pad and what the various buttons would do in each game. They would also be given instruction during the gaming session as to where to go and what to do to maximise their progress in the allotted time. After each participant was finished they would then fill in the rest of the demographic component of the questionnaire provided. (Figure 3.1) They would rate both games out of 5 on aspects of Story, Gameplay, Design, Overall Enjoyment. They would then circle their preferred game concluding the experiment at which point they would be debriefed as to what the experiment was about.

Results

After the experiment was completed participant questionnaire data was encoded using SPSS 18. The average Heart Rate of participants was gathered by using the inbuilt functionality of PowerLab's software. This value was then transferred to SPSS 18 for use in analysis.

The following table is the means of all the variables included in this study and the mean Heart Rate (BPM) change of all participants.

Table 1:

Means and Standard Deviations

Variable	Mean	Standard Deviation
Total Aggression	74.37	3.54
Extraversion	3.28	.17
Agreeableness	3.68	.15
Conscientiousness	3.30	.15
Neuroticism	3.25	.17
Openness	3.95	.09
Rate of BPM Change	3.29	7.42

Note: Original Sample size was 22 participants however 1 was excluded because of a faulty reading of their Heart Rate, the 2 others were excluded for being outliers. Total Aggression is calculated as a sum score, while the BFI values are means of the subscales within it. The means here are the average scores of the total population sample.

Hypothesis 1

In testing where there was a difference between the two gaming conditions a Paired Sample t-test was conducted. The results showed that there was significant difference between the Space Marine (M = 48.88, SD = 12.62) and Journey (M = 54.51, SD = 16.19) average participant BPM (t (18) = -4.263, p < .00). Additionally the 95% Confidence Intervals showed that the population mean was between -8.40 and -2.86, the Paired Sample t-test also showed there was a strong correlation between these two variables of .950.

Hypothesis 2

With a significant result being found in Hypothesis 1 a series of scatter plots were done to determine which variables of the BFI would be carried forward for further analysis. It was determined that of the various BFI subscales, based on their R^2 Linear values that Neuroticism (R^2 = .233) and Openness (R^2 = .139) would be taken forward for further analysis. Prior research (Krcmar & Kean, 2005; Lachlan & Maloney, 2008; Teng, 2008; Chory & Goodboy, 2011)) also stipulates that Extraversion would correlated with participant arousal, so it was likewise taken further. Kendal tau b correlations were done to take account of the effect of any other outliers on such as small sample size. It was found that there was significant correlation between participants change in their arousal and their Neuroticism (tau (19) = -.512, p = .003), Openness (tau b (19) = -.346, p = .044). However this was not the case when correlating Extraversion and change in arousal (tau b (19) = -.012, p > .05).

As can be seen participant Extraversion was not significantly correlated with their change in Heart Rate. To help identify why that might be the case several further correlations were conducted. No correlation was found between participants preference for either game and their Extraversion (tau b(19) = .04, p > .05). Another Kendal Tau b correlation was done comparing participant average Extraversion and participant average Heart Rate during both the violent and non-violent conditions separately. This time there was found to be significant negative correlation between average Extraversion and Heart Rate during the Violent condition (tau b(19) = -.346, p = .041).

Similarly there was found to be significant negative correlation between participant Extraversion and their heart rate during the Non-Violent condition (tau b (19) = .-418, p = .014).

Hypothesis 3

This hypotheses was tested by comparing participant Total Aggression score and their Heart Rate change. Similarly to take account of such a small sample size a Kendal Tau b correlation was conducted. It found that there was not significant correlation between Total Aggression and Heart Rate (tau b (19) = -.53, p > .05). Nor was there found to be any correlation between Total Aggression and their mean Violent condition Heart Rate (tau b (19) = -.100, p > .05) nor their mean Non-Violent condition Heart Rate (tau b (19) = -.206, p > .05)

Hypothesis 4

This final hypothesis was to compare the various personality traits within the Big Five Inventory (Johns et al, 1991) of the participants and their choice of preferred game out of the two presented in this experiment. (See Table 2 for details)

Table 2:

Correlation between BFI Factors and Preference

Variable Name	Preference
Extraversion	.040
Neuroticism	-.244
Openness	.205

Note: Values are Kendal tau b correlation values

As can be seen there was not significant correlation between participants various personality traits and their preference for either game.

Discussion

Findings of the Current Study

The purpose of this study was firstly to observe the effect of video game violence on a population of Gamers and Non-Gamers in a controlled setting. Secondly to test the proposed ideas of the General Aggression Model, and Personality types regarding exposure and player preference

to violent video games. Lastly this study also sought to highlight certain methodological issues surrounding video game research, namely the broad classification umbrella that exits.

Hypothesis 1.

As shown in the above section there was significant difference between participants heart rate when they were playing the two gaming conditions. This was to be expected both by prior research and by simple intuition, a violent condition would illicit a different response than a non-violent one. However what was not predicted by the literature nor expected by the researcher was that this difference in heart rate would be in favour of the non-violent condition. While playing the violent game participants had a higher average heart rate than when playing the non-violent game. There are several factors that may be influencing the results but the most obvious is the amount of time that each participant had with each game. Most prior research (Chory & Goodboy, 2011; Hossini et al., 2011; Peng et al (2008) had their participants play for 10 or 15 minutes at a time, at which point they would either be finished with the experiment or transfer to the Non-Violent condition. Now while that may have several advantages, such as the amount of time participants must commit to the experiment such a short time frame is only suitable to games that are structured for that, such as multiplayer shooters or sports games. However for this study participants were required to play the games for 35 minutes as the narrative that exits within both of these games would require that time and quite possible much more to experience fully. To fully complete Space Marine for example would require between 8-10 hours for a reasonably competent player to do. The extra time could have a stabilising effect on participants' arousal and decreasing their overall change as they become familiar with the requirements and auditory/visual stimulation of this particular game. While Space Marine is a far harder game in terms of its controls and it's gameplay it is very linear with no branching paths for the player to explore with no change in gameplay from start to finish. Whereas Journey is far less explicit about what requirements the player must fulfil to continue on and as such players make take longer to develop a sense of ease and familiarity.

Hypothesis 2.

Personality types are according to Chory and Goodboy (2011) the most likely predictor of what choices we make regarding media. They highlight that those who were High in Openness and Low in Neuroticism preferred the more violent game. Now in this study that was not the case. While there was a significant correlation between participant Openness and Neuroticism and their arousal, both of these correlations were negative and were also medium strength correlations at best. (Table 2)

While that may mean that those who scored higher on Neuroticism and Openness had less of a change in their arousal state from one game to the next, which could be as a product of their preference and thus familiarity with more violent games. It was also shown that Extraversion did not correlate with participants change in Heart Rate. It did however correlated with their average Heart Rate in both gaming conditions when measured separately.

Again like with Openness and Neuroticism, Extraversion had a negative correlation with participants average Heart Rate, Space Marine condition (tau b(19) = -.346, p = .041) Journey condition (tau b (19) = .-418, p = .014). It can be seen that Journey had a stronger correlation and a greater significance value. This does conflict with the proposed ideas of Chory & Goodboy (2011) that violent games would draw the more extraverted players to them. Now while they are referring to online players and those with high Extraversion being drawn to the more social aspects of those types of games and while participants in this study only played the game offline, the barrier to entry is still centred around violent content. Those high in Extraversion should prefer the more violent game but that was not the case in this study as the vast majority of participants as mentioned preferred Journey over Space Marine.

Hypothesis 3.

The General Aggression Model (Anderson & Dill, 2000) proposes something quite to the contrary to what was found in this study. That Aggression and Arousal are linked, particularly regarding exposure to violent media. When individuals are exposed to violent media for an extended length of time then they would shown signs of increased Aggression through “aggressive

knowledge structures"(Anderson & Bushman, 2001). The General Aggression Model argues that this exposure leads to a feedback loop of aggressively primed perceptual schemas. Whereas prior to the development of these cognitive structures when a individual is bumped on the street they may see the event as accidental, but after their exposure the may see the same event in a much more intentional frame. However as can be seen no significance was to be found between participant Total Aggression and their Heart Rate change. If the General Aggression Model is to hold true that should not be the case. But likewise with participants Heart Rate change and their Openness or Neuroticism those who are aggressive may not have that much of a significant arousal change between the two conditions owning to their possible preference for violent video games and subsequent desensitisation to the nature of them. To account for this as can be seen a Kendal tau b correlation was done between participant preference and their Total Aggression. It found that there was no significance. (Results, Hypothesis 3)

So this poses a number of questions, how applicable is the GAM in all cases, and what factors could of influenced the results in this case? Regarding those points there is research that highlights some of the shortcomings of the GAM (Pinker, 2002; Giumetti & Markey, 2007) that it is not an all encompassing model and can be quite selective. It may be that in this instance the lack of correlation between Aggression and Arousal could be down to those shortcomings. One factor that may influence the expected results of the GAM is that when violent games are paired with a non-violent alternative that is similar in terms of narrative structure, scope and player involvement as is the case in this study, the proposed link between video game influenced aggression is less clear. When accounting for as many variables as possible and leaving only the levels of violent as distinct participants did not show the significant increase in arousal state in the way that was expected by the model. Instead participants had an average higher Heart Rate during the non-violent condition.

Hypothesis 4.

Prior research (Krcmar & Kean, 2005; Lachlan & Maloney, 2008; Teng, 2008; Chory & Goodboy, 2011) had proposed the idea that certain personality types namely those who score High

in Extraversion, High in Openness and low in Neuroticism would prefer the more violent video games. However in this instance there was no significant correlation between those personality traits and what game people preferred. While it was apparent that 80% of participants preferred Journey which was the non-violent condition over Space Marine it was observed that no particular personality trait score, be it high or low was more inclined to pick one game over the other. While the majority did choice one particular game they did so across a wide range of personality scores.

Limitations & Recommendations for Further Research

There are several limitations of this study that will be laid out here along with possible avenues for future research to explore. An obvious criticism of this study may be that the Violence that was in the Violent condition was not enough to cause an increase in arousal. That the visual elements of the game the blood, gore and so on were not realistic enough to evoke the expected response. Both Jeong et al (2012) and Barlett et al (2008) showed that when their participants were exposed to different levels of blood effects within the game, High, Medium, Low or None they had a increase in physiological arousal and hostility. For Jeong et al (2012) they also showed that realistic blood and sound effects also led to an increase in arousal from their participants. To address this issue it must be stated how violent Warhammer 40,000 Space Marine is. The game itself is set in the fictional Universe created by Gamesworkshop which is known by fans as being extremely dystopian. In the game players must fight their way through hordes of enemy opponents using a vast array of ranged and melee weapons. It is not possible for the player to regenerate their health without “executing” enemy opponents. These execution animations that the player performs vary from weapon to weapon but they involve for example lifting up an opponent, slamming them onto their back then finally stamping on their head at which point great fountains of blood spew up and cover the player in gore. This is only one execution animation for one of the players melee weapons, it goes without saying that there are many more of a far more grizzly variety.

Another limitation from this study would be the small sample size. There are two main reason for this. Firstly the amount of time needed for participants to complete the experiment was a

significant issue that could not be overcome due to the nature of this study. Each participant was required to give a minimum of 70 minutes to play through each game, plus any other time required for them to complete the questionnaires and to be connected to the recording instruments. Secondly it was not possible for more than one participant to do the experiment at any one time owning to there being only one television screen of adequate size and only one PS3 console available. These two factors led to a limit of the number of participants that could be requited for the experiment. However of the final tally of participants gender participation was approximately equal, a factor that is not very common in other studies of a similar nature,.

A further limitation would be the lack of several points of date to calculate arousal levels. While Heart Rate is an excellent judge of a individuals arousal, it is very suspect to where the electrode placement is. For this study the electrode was placed on a participants toe, chiefly to prevent it's interference with playing the games both in limiting participant movement and to prevent the effect of any movement influencing the reading itself. A better alternative would be to measure Galvanic Skin response however that may require a more specialised recording device so as to limit the effect it would have on participants while there were using a standard control pad. These limitations can be easily overcome with the use of more specialised equipment or a more appropriate use of generalised equipment.

A final limitation of this current study would be the lack of qualitative data that could have been gathered. During the playing session the physical movements of participants was noted. While no participant showed any significant signs of aggression they did however display more bodily movements of both themselves and the controller. For example they would while in their chair subtly move themselves while they moved their character. This effect was most apparent when the games were played by those with little gaming experience. They would also lean forward or lurch backward when elements of the game caught their interest or startled them. What was the most apparent however was the amount of verbal expression that was heard. Most participants would comment on the design and imagery that was displayed by both games. The majority of this praise

was directed toward the non-violent game Journey. Participants would inquire as to the nature of what their character was, be that gender or species as it was not apparent what variety of either the "pilgrim" in Journey was. They would also comment on the aesthetics and beauty that was on display. Another common occurrence was the amount of profanity that the participants uttered while playing both games. While taken on its own the increased use of profanity can be seen as a marker of increased aggression but during this experiment the tone of the profanity was more in bewilderment at the imagery on the screen as with Journey or the shock at seeing the excessive gore as with Space Marine. However as a qualitative approach was not the focus of this research this data was not regarded with any rigour for posterity.

From the findings in this study it is clear that more research is required particularly in further refining what elements of the General Aggression Model are lacking universal validity. What is clear is that when a more rigid frame is placed around the umbrella term of "video game" the current GAM is found wanting. However there are areas of research that could be expanded with this more rigid framework, if researchers gave more consideration to the type of video game that they use and took account of the diverse tastes of video gamers it may be possible to have a more ecologically valid model of video game aggression. A possible experimental avenue to do this would be the comparison of participants arousal levels or total aggression while they played two similar games in terms of narrative structure or gaming genres. If taking in this study Space Marine a violent gory game, and comparing it to a horror based violent game would both games evoke similar or diverse arousal and/or aggression responses in participants. Future research could also look at a more qualitative data approach when conducting video game experiments. What outward displays do people show when they are engaging with a violent video game, do those displays be they verbal or kinaesthetic, differ significantly from other less frequent users? A further area for research could be in longitudinal studies of frequent video game users. This could take the form of self-reports, but if it were possible a study that observed the arousal state and/or aggression levels of gamers after a multitude of gaming session could give a clearer picture of this "stability" effect that

was observed in this study. At what point does the excerpted arousal increase from the violent video game become less apparent? Similarly Role Playing Games (RPG) video games would suit such a long term experiment as the length of time that a player must commit to one far exceeds any other non-multiplayer based gaming experience. Thus they would provide constant new stimulus rather than repetition or the use of different games. For comparison Space Marine as mentioned would take on average around 8-10 hours to complete for a competent frequent "Gamer", however a RPG such as the popular Mass Effect which is similar to Space Marine in a number of way, both are narrative, single player, third-person shooters would take up to 90 hours to complete fully.

Conclusion

As the use of video game media becomes more wide spread it would be pertinent for the Psychological community to have a good grasp on the issues that come with it. The General Aggression Model (Anderson & Dill, 2000; Anderson & Bushman, 2001; Anderson et al 2004) as used quite extensively by researchers to model video game violent has in this case not shown the results that would be expected. When "violent video game", is taken in less broad terms and two video games of similar narrative structure, and which require comparable levels of player input but with widely difference visual styles are presented to players, no expected arousal increase was seen. However what was observed was that participants had a higher average Heart Rate during the Non-Violent game condition something that was not predicted by the literature. Additionally it was found that there was significant negative correlation between individuals personality traits and their change in arousal but no significance was found between those traits and participant's preference for either game. This is something that was not predicted by the literature. (Chory & Goodboy, 2011). Taking these two findings into account it would seem that a more rigid methodology surrounding the use of video games is needed. Future research should see the label "video games", as less of a umbrella term and instead use more genre specific labels. This is likewise a recommendations of Chory and Goodboy (2011) who argue that an increased gaming topography is needed. This increase would allow for a greater number and more ecologically valid comparisons between

gaming types and identify, of the blanket term "violent video game", what specific genre is the most likely predictor of violent tendencies or what preference those individuals with such tendencies have for video games.

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Appendix

Video Game Experiment Consent Form

I am an Undergraduate Psychology student conducting research at Dublin Business School (DBS) and you are invited to take part.
This research will take the form of an experiment in which the participants will be asked to play two video games during two different 35 minute sessions. During this experiment your heart rate and EEG(Electroencephalograph) will be recorded. This will be done through the use of a EEG Cap that will be placed on the head, and a Pulse rate monitor that will be attached to a toe on either foot. Also before the experiment you will be given a questionnaire to fill out, after the experiment you will be given the option to rate the games and which was your preference.

All information will be recorded anonymously. When you take part in the experiment your questionnaire will be stamped with the date and time of recording. This stamp will only be to allow for data entry. After that it will be destroyed. The results will be used as part of a final year undergraduate thesis, but all results will take the form of averaged scores, with no personal information reported.

To take part you must be between 18 and 40 years.

If you have any questions regarding the outcome of this research or if you would like to have your information removed them feel free to email myself at [redacted]

This research is being conducted under the supervision of Dr Patricia Frazer

Please tick the sections that are relevant

"I have read the above declaration, I fulfil the requirement of being between 18 and 40 years and agree to take part in this research".

I agree:____ I do not agree:___

Figure 1: *Consent Form*

Instructions:

Using the 5 point scale shown below, indicate how uncharacteristic or characteristic each of the following statements is in describing you. Place your rating in the space to the right of the statement.

1 = extremely uncharacteristic of me
2 = somewhat uncharacteristic of me
3 = neither uncharacteristic nor characteristic of me
4 = somewhat characteristic of me
5 = extremely characteristic of me

1.Some of my friends think I am a hothead ___

2.If I have to resort to violence to protect my rights, I will. ___

3.When people are especially nice to me, I wonder what they want. ___

4.I tell my friends openly when I disagree with them. ___

5.I have become so mad that I have broken things. ___

6.I can't help getting into arguments when people disagree with me. ___

7.I wonder why sometimes I feel so bitter about things. ___

8.Once in a while, I can't control the urge to strike another person. ___

9.I am an even-tempered person. ___

10.I am suspicious of overly friendly strangers. ___

11.I have threatened people I know. ___

12.I flare up quickly but get over it quickly. ___

13.Given enough provocation, I may hit another person. ___

14.When people annoy me, I may tell them what I think of them. ___

15.I am sometimes eaten up with jealousy. ___

16.I can think of no good reason for ever hitting a person. ___

17.At times I feel I have gotten a raw deal out of life. ___

18.I have trouble controlling my temper. ___

19.When frustrated, I let my irritation show. ___

20.I sometimes feel that people are laughing at me behind my back. ___

21.I often find myself disagreeing with people. ___

22.If somebody hits me, I hit back. ___

23.I sometimes feel like a powder keg ready to explode. ___

24.Other people always seem to get the breaks. ___

25.There are people who pushed me so far that we came to blows. ___

26.I know that "friends" talk about me behind my back. ___

27.My friends say that I'm somewhat argumentative. ___

28.Sometimes I fly off the handle for no good reason. ___

29.I get into fights a little more than the average person. ___

Figure 2: *Buss-Perry Aggression Questionnaire*

Age:_____

Gender:_____ (M/F)

What would be your approximate video game usage? Circle the appropriate answer

Never Once a Year Once a Month Once a Week Once a Day

What would be the Total number of hours that you play these games? (< Less than) (> More than)

< 1 Hour > 1 Hour 2-3 Hours 3-4 Hours >4 Hours

Figure 3: *Demographic Questionnaire section presented before experiment*

Of the two games that you played what score out of 5 would you give both of them on the following:

Story:____ _____

Gameplay:____ _____

Design:____ _____

Overall Enjoyment:____ _____

Of the Two which would you prefer to play? Circle the appropriate answer

Warhammer 40K Space Marine Journey

If you have been affected by anything raised by these questionnaire or experiments then feel free to contact the following:

Samaritans
Phone **1850 60 90 90 lo-call**
Email jo@samaritans.org

Figure 3.1: *Demographic Questionnaire section presented after completion of experiment*

How I am in general

Here are a number of characteristics that may or may not apply to you. For example, do you agree that you are someone who *likes to spend time with others*? Please write a number next to each statement to indicate the extent to which **you agree or disagree with that statement.**

1 Disagree Strongly	**2** Disagree a little	**3** Neither agree nor disagree	**4** Agree a little	**5** Agree strongly

I am someone who…

1. ___ Is talkative
2. ___ Tends to find fault in others
3. ___ Does a through job
4. ___ Is depressed, blue
5. ___ Is original, comes up with new ideas
6. ___ Is reserved
7. ___ Is helpful and unselfish with others
8. ___ Can be somewhat careless
9. .___ Is relaxed, handles stress well.
10. ___ Is curious about many differnet things
11. ___ Is full of energy
12. ___ Starts quarrels with others
13. ___ Is a reliable worker
14. ___ Can be tense
15. ___ Is ingenious, a deep thinker
16. ___ Generates a lot of enthusiasm
17. ___ Has a forgiving nature
23. ___ Tends to be lazy
24. ___ Is emotionally stable, not easily upset
25. ___ Is inventive
26. ___ Has an assertive personality
27. ___ Can be cold and aloof
28. ___ Perseveres until the task is finished
29. ___ Can be moody
30. ___ Values artistic, aesthetic experiences
31. ___ Is sometimes shy, inhibited
32. ___ Is considerate and kind to almost everyone
33. ___ Does things efficiently
34. ___ Remains calim in tense situations
35. ___ Prefers work that is routine
36. ___ Is outgoing, sociable
37. ___ Is sometimes rude to others
38. ___ Makes plans and follows through with them
39. ___ Gets nervous easily

18. ___ Tends to be disorganized

19. ___ Worries a lot

20. ___ Has an active imagination

21. ___ Tends to be quiet

22. ___ Is generally trusting

40. ___ Like to reflect, play with ideas

41. ___ Has few artistic interests

42. ___ Like to cooperate with others

43. ___ Is easily distracted

44. ___ Is sophisticated in art, music or literature

Figure 4: *Big Five Inventory Questionnaire*