The nightmare protection hypothesis: An experimental inquiry

Carson Flockhart & Jayne Gackenbach

Grant MacEwan University, Edmonton, Canada

Summary. Using the ideas generated in Revonsuo and Valli's Threat Simulation model of the function of dreaming, previous research looked at how military personal's dreams were associated with video game play. A nightmare protection effect was found and replicated using an undergraduate student population. Based on the previous findings, in this study an experimental manipulation was conducted where male participants engaged in one of three computer tasks, including gaming and search. All participants also viewed a frightening movie clip. Following the laboratory session respondents were asked to report a dream. The Threat Simulation method of coding dreams was used to assess threat in participant's dreams. The major hypothesis was that playing a combat centric game would be more likely to result in behaviors in the dream which were less nightmarish after seeing the frightening movie clip, relative to playing a creative video game or doing a computer search task. The results support the thesis for high end male gamers playing combat centric video games close in time to being exposed to a frightening film clip. These young men are either not perceiving the same danger in their follow-up dream as threatening or that the content is not as scary as those without a recent experience of combat centric gaming.

Keywords: threat simulation; nightmare protection; combat centric; dreams; video games

1. Introduction

Of increasing concern in society is the use of video games for health, of which there are an ever increasing pool. Video games are being used to aid in visualization tasks. For instance, those suffering from diabetes, asthma, heart disease and cancer would play a game called Re-mission to help them manage and try to fight back against their conditions. Games such as the Wii- Habilitation can actually be used in virtual or physical rehabilitation sessions. Video games can also offer invaluable resources for improvement of health education and life style changes in all ages with game such as Wii Fit Plus for physical activity using games and Fit Brains from Luminosity for Mental health improvements (Digitome, 2011).

Another health problem, which is the focus of the present inquiry, is nightmares. Nightmares, while fascinating humans for centuries, still plague us with horrific experiences and visions. They occur commonly in the population with three to five percent of the population reporting that they suffer from nightmares (Schredl, Landgraf, & Zeiler, 2003). The purpose of dreams and nightmares is still under debate however Revonsuo and Valli (2000) proposed that a function of dreams from an evolutionary perspective.

Corresponding address:
Prof. Jayne Gackenbach, Department of Psychology, Grant MacEwan University, 10700-104 Ave., Edmonton, Canada T5J 4S2.
Email: gackenbachj@macewan.ca

Submitted for publication: January 2016
Accepted for publication: February 2017

Their threat simulation theory postulated that dreams were artificial simulations where humans could safely engage while practicing well learned defensive manoeuvers to certain dangerous situations or experiences. These defensive manoeuvers would then transfer over to the waking world and prove to be evolutionarily beneficial to our survival as a species. Nightmares, however, are the failure of this threat simulation system, in that the point of the simulation is for the brain to regulate negative emotions and as a consequence at times, while in these threatening situations to foster the learning of defensive tactics. In the case of a nightmare, this threat regulator breaks down and is unable to deal with the total influx of negative emotions and so a wake up event usually follows. Levin and Nielson (2009) summarized research into nightmares, they concluded that emotional reactivity and past history of traumas, can increase a person's likelihood of experiencing a nightmare.

In the case of emotional reactivity, a person's individual level of affect disstress, which is their level of reaction to events with high levels of negative emotional reactivity, impacts the likelihood of a dream being so stressful that the dreamer awakens. As well, past history of trauma can create a susceptibility in a person to experience nightmares. The best example is post-traumatic stress disorder which can be characterized by extremely vivid nightmares that may actually re-traumatize a person's suffering from them. This would be more likely in individuals with a history of trauma or high emotional reactivity. Thus controlling for these pre-existing conditions is important in any study examining the effects of an activity on night time dreams.

The effects of video game play on dreams and nightmares has been initially explored. Some research has examined how video game play effects the nightmare experienced by gamers (Gackenbach, Kuruvilla, Dopko, & Le, 2010, 127-

136). They found through dream content analysis that male gamers behaved less often aggressively, but when they did it was more intense. It was a combination of this intense infrequent aggression, with a reduced likelihood of experiencing misfortune in the dream that seems to lead to these gamers experiencing a sense of empowerment rather than fear from the threatening dreams. This finding was supported in a follow up study which looked at threat elements in the dreams of those with varying frequency of gaming (Gackenbach & Kuruvilla, 2008).

They concluded that the major hypothesis that gamers have developed adaptive dream strategies for processing violent game play was broadly supported. In fact, all threat factors, did show a decrease in all types of threats in terms of intensity and outcomes. This led researchers to postulate that video game play may act as a form of nightmare protection. Defensive rehearsals that take place through combat-centric video game play, when done over a long period of time would result in well-learned defensive responses (Gackenbach, Ellerman, & Hall, 2011; Gackenbach, Darlington, Ferguson, & Boyes, 2013). This process is very similar to the imagery rehearsal technique for treating nightmares, which shows how these learned responses can generalize to other altered realities, in this case dreams (Krakow & Zadra, 2006).

A strong support for this thesis was a study conducted by Gackenbach, Ellerman and Hall (2011). Military gamers participating in the study evidenced less of some forms of dream threat in their military dreams. This is evidence of the numbing toward violence associated with serious combat-centric game play (Barlett, Anderson, & Swing, 2009). Pointing to the work of Luther and colleagues who argue that exposure to complex visual-spatial motor tasks up to six hours after a traumatic event, can reduce later flashbacks, which are often seen in nightmares (Luther, Andrew, Matthew, & Alexander, 2015). A replication and extension of the Gackenbach et al. (2011) study by Gackenbach, Darlington, Ferguson and Boyes (2013) used undergraduate participants sing the same inventories they replicated the earlier study with men. A recent replication was done trying to show the nightmare protection effect in another lab (Blagrove, Samson, McMurtie & Carter, 2013), did not find the nightmare protection effect, however the key piece that they were missing was controlling for emotional reactivity and history of trauma.

In the current study we sought to confirm the nightmare protection effect by using an experimental manipulation instead of correlational techniques, which has been the method used previously. Participants were asked to view a frightening movie clip and to engage in one of three computer tasks, including game play, and then to report a follow-up dream. It was expected that video game play of the combat centric variety would protect against nightmarish imagery resulting from a high fear producing movie clip, when nightmare prediction variables are controlled. Specifically, we expected less self-report fear and nightmares in the combat centric game play condition than in the other two conditions. In terms of dream content analysis by independent judges, we expected less dream threat indicators in the combat centric condition than in the other two conditions.

2. Method

2.1. Participants

Students enrolled in introductory psychology courses at a western Canadian university served as the research participants. A total of 146 students were involved in the study. Of this a total 134 provided sufficient information for data analysis. These were all male of which all but two had been married while the rest were single. Ethnicity was split into Caucasian and non-Caucasian. Nineteen did not report this information. Of the rest, 81 said they were Caucasian and 34 indicated other non-Caucasian ethnic origins. Having been drawn from the Introductory Psychology pool their ages were on average between 18 and 20 years.In the final stages of the study a total of 76 participants reported some form of dream that would allow for content analysis.

2.2. Measures

The following questionnaires were administered in the online survey in the order below.

Pre-screened Questionnaire. We asked the participants three key details as far as pre-screen criterion, dream recall frequency, video game play frequency and gender. Males had to be on the high end of dream recall being at least four times a week. This criteria was used in order to increase the likelihood that these participants would have a dream to report after their participation in the study. Video game play frequency was either high or low. Additional criteria for being included were being at least eighteen years of age, being male, not having trauma in the past six months that may lead to mental turmoil.

Demographic Questions. The following five items were sought to obtain general demographic information; sex, age, education, marital status, and race or ethnicity. Chronbach Alpha's were computed on all the remaining scales and can be found in Table 1.

Video Game Play History Questionnaire. The Video Game Play History Questionnaire is an 18-item instrument adapted from Gackenbach in 2006. This was used to further refine the video game groups. That is beyond the frequency question asked at prescreening, in this survey further information thought to substantiate gaming groups was included. Questions inquired into participants' life history of playing video games. The types of questions included frequency of play, length of play, number of games played, age when the participant began to play, age of peak play, and genres preferred at various times in the life span. These questions were followed by others seeking details on the game(s) played immediately prior to filling out the questionnaires. Questions were also asked about physical game apparatus used as well as social elements of play. Past research with these items have shown adequate chronbach alphas (Gackenbach & Rosie, 2011).

The other items asked about in this questionnaire included favorite game genre, history with playing Farcry 3, Minecraft and using google scholar and the university article search software. Had they been playing a game in the 12 hours prior to reporting to the laboratory was also asked about, as was action versus non-action genre preference, social media use and cell phone texting frequencies. All 134 answered the favorite genre question with 32% saying first person shooters followed by 19 percent preferring real time strategy games. Another 14% preferred sports games and

Table 1. Chronbach Alpha's, Number of Items and Number of Respondents for each Self-Report Measure.

Scale	Number of items	Number of respondents	Chronbach's Alpha
Video Game Play History	4	134	0.649
Emotional Reactivity Scale	17	134	0.804
Trauma Inventory	9	134*	0.625
Movie emotional reactions	11	134*	0.772
Media Presence Scale	14	134*	0.806
Activities day before dream	13	76**	0.747
Dream Types (lucid, control, & observer)	3	59**	0.524
Dream Types (bad dreams & nightmares)	2	60**	0.387
Dream self-reported emotions	15	38**	0.76

Note. *zero's were put into blank responses; **only those reporting a dream reported this information

12% checked adventure games. The rest of the genre categories each had less than 10% preferences indicated. A large majority never played Farcry 3 (75%) while only 57% never played Minecraft. Of those who reported google scholar use slightly over half had not used it (55%) while the universities library search engine was widely reported as used (82%). Sixty-six percent said they had not been gaming in the 12 hours prior to reporting to the laboratory. Of those who reported action vs non-action genre preferences (42 of 134), 16 preferred action games. All 134 used social media with 87% indicated it was at least once a day or more frequency. Likewise all were daily text messenger users with 84% reporting from 11 to 200 messages a day. None of these were used to select the research participants but they offer some insight into their digital lives.

Emotional Reactivity Scale. In the previous studies The Emotional Reactivity and Numbing Scale (ERNS), which is a 62-item scale developed by Orsillo, Theodore-Oklota, Luterek, and Plumb (2007), was used as it was normed on U.S. military veterans, and thus it was most directly relevant to the earlier study (Gackenbach et al., 2011).However a shortened similar scale was found for the current study to help eliminate test fatigue within the laboratory portion of the study. This 17-item scale was designed to measure the tendency to become emotionally aroused under a variety of circumstances (Melamed, 1987). Here is a sample item: "Whenever I think of an unpleasant event that once happened to me, I get upset about it all over again". Respondents answer in terms of how characteristic the statement is of them along a 6 point likert scale. Cronbach's alpha was 0.89.

Trauma Inventory. The Trauma Inventory was adapted from the original by Eng, Kuiken, Temme and Sharma (2005) for the current study. This shortened version of the original was used to help reduce test fatigue. The part used in our study inquired about the incidence and intensity of nine types of trauma including: physical assault, recurrent physical assault, recurrent emotional abuse, criminal victimization, negligent injury, civil, domestic, or industrial disaster, natural disasters, and other trauma. Each trauma was briefly defined and in the original it was followed by a yes/no question as to whether it had been experienced and, if so, at what age. Two additional questions asked about the intensity of the effects of the traumatic experience were also in the scale used in the previous study as were questions about had they experienced any nightmares that may have occurred after the experience. In this inquiry each type of trauma was asked about in terms of the frequency that they had experienced it. At the end of these nine trauma type questions was one question asking if they had ever experienced nightmares associated with any of these traumas. Nightmares were defined in this question. Responses for all of these questions were never, once, twice, three or more times. While details gathered in the original study were not asked about herein, it was thought justified because we were only interested in any history of trauma generically, and if said history was associated with nightmares. We were not interested in the specifics of any one type of trauma.

Post Movie Feedback Scale. Following the movie clip, participants were directed to fill out a "Post Movie Questionnaire". Included in the questions was whether the participant had viewed the entire clip, had they seen the clip before, what was the intensity of their emotional arousal during the viewing of the clip and to rate ten emotional clusters they had felt during the viewing. Both were rated along a seven point likert scale ranging from not at all to very much. The rationale for the use of these questions was to assess if this part of the experimental manipulation differed across groups. It was expected to not differ.

Media Presence Scale. This 14 items scale was adapted from previous scales asking about felt sense of being there in a media experience. Each item was rated along a seven point likert type scale ranging from not at all to very much. A sample item is "To what extent did you feel mentally immersed in the experience?" Gackenbach and Rosie (2011) have shown that presence in virtual world experiences is as strong as in dreams. Gackenbach, Rosie, Bown and Sample (2011) also demonstrated that fidelity and interactivity of a media experience affected presense. This scale was thus included as a verification of the impact of the three types of computer experiences. It was expected that the action video game would have the highest felt sense of presence followed by the creative video game and finally by the search activity. Thus higher presence should predict more likelihood of subsequent incorporation into a later dream.

Dream Recall Survey. The dream recall survey asked participants to write down a dream they remembered from the week following the laboratory session. The questionnaire took the following approach:

Please describe a dream from the week after the lab session. During the lab session you saw a movie and played a video game/worked on a computer. Record the dream as exactly and as fully as you can remember it. Try to tell the dream story, from beginning to end, as if it were happening again (and without any interpretation or explanation). Your report should contain, if possible, a description of:

- *All the objects, places, characters, and events in your dream;*
- *The entire sequence of actions and events, from the beginning to the end of your dream;*
- *Your moment-to-moment thoughts and feelings, from the beginning to the end of your dream, that occurred in the dream; and*
- *Any unusual, incongruous, or implausible dream thoughts, feelings, objects, places, characters, or events.*

If you had more than one dream use the dream which seemed to be most related to the lab session activities you engaged in. Be sure to report only one dream.

In addition, respondents were asked when the dream occurred and what activities the dreamer engaged in the previous day. There were 13 activities asked about including various computer ones as well as more generic ones like reading, driving, talking, etc. Also participants were asked to categorize the dream such as being, lucid dream, control, nightmare, bad, bizarre, observer or electronic media. A definition for each was provided. Finally, respondents were asked about their emotions experienced in the dream along a five point intensity rating. These emotions included both negative (i.e. anxiety, guilt, fear, etc) as well as positive (i.e. awe, happiness, ecstasy, etc). Fifteen emotions were listed.

2.3. Materials

The materials used in this study consisted of three Dell computer stations including monitors, keyboards, headphones and mice. Each computer was configured with a copy of the game Far Cry 3, published by Ubisoft in 2012 and a copy of the game Minecraft, published by Mojang and 4J studios in 2009, as well as a preconfigured web browser set to search sites.

2.4. Procedure

Student's participation was elicited through the mass testing efforts of the psychology department at a university in western Canada. The students were told in their introductory psychology courses that they could receive up to a bonus of six percent credit towards their final course grade if they participated in a number of research initiatives. The credit received for this study was in two parts, the first was two percent bonus for the laboratory portion of the study, and another two percent was awarded for completing the dream recall survey taken in the week following the laboratory part. Once students moved past the research system, SONA, intake software, they would receive their course credit. Their participation was entirely confidential. Drop out or discontinuation was not penalized. All participants were aware of this procedure before starting.

The layout of the laboratory consisted of two rooms with a two way mirror and door separating them. In the outer room the three computer stations were set up with dividers between them to limit cross participant exposure. The second room was for the use of the researcher in order to view the participants and issue instructions through a speaker.

After completing the informed consent, students in the laboratory engaged, in a counter balanced order, one of two conditions; a fearful movie stimulus, or engage in one of three computer conditions. The fearful movie stimulus was a ten minute clip taken from the movie Misery by Steven King. In it the victim's ankles are broken or "hobbled". This film was chosen from a study looking at the different emotions stimulated the most by different movies, in this case Misery was the highest for fear and discomfort (Schaefer, Nils, Sanchez & Philippot 2010). For the computer tasks participants were randomly assigned but maintained counter balancing among the three tasks, the three included a creative, non-combat video game, a combat centric game and a non-video game computer control task. Each task was also 10 minutes in length. For the creative game we used the video game Minecraft where players can build anything in a virtual environment similar to Lego block construction. For the combat centric game we used Far Cry 3, a first person shooter themed in a tropical island with pirates and dangerous wild animals to contend with. The control condition consisted of a scholarly search task using any research database on the computer. As much as possible at any one sitting all three computers were used with each running a different task. Respondent wore headphones and there were dividers between the stations thus interaction between participants was not allowed.

If a student decided to end his participation, a debriefing statement would have been sent out to them. None chose this option. This concluded the laboratory side of the study, from here participants went go home and in the following week filled out the dream recall survey once. They were asked to do this as soon as possible after a nights sleep after the laboratory session and submit it to receive their final bonus credit. Following filling out the dream recall form they received the debriefing statement. This study passed the ethics review board at this university.

3. Results

146 undergraduates were run in this study of which 134 people provided sufficient information for data analysis and of these, 76 people reported some sort of dream that could be content analyzed. Groups were based on a median split of video game factor scores which loaded frequency of play, length of play, number of games played and age begun playing. The number of participants in each video game groups ended up being 23 in the high end gamer Far Cry condition with 24 in the low, 23 in the high Minecraft condition and 14 low and finally 20 in the high Article search condition and 30 in the low. A chi square analysis on these numbers was done and was found to be not significant, thus showing that the distribution of research participants was sufficiently balanced across conditions and groups. The game groups were counterbalanced first on whether they experienced the computer condition or the movie condition initially. Secondly they were counterbalanced randomly to either the Far Cry, combat centric game; Minecraft, creative game; or the article search task. However, it should be noted that the three conditions were not equally responded to in terms of

self-reported sense of presence or enjoyment of the experience. Specifically, a gamer group by condition ANOVA on the sum of the presence questions resulted in a main effect for condition, $F(2,85)=12.17$, $p<.0001$, $eta_p^2=.223$. The Far Cry computer experience was reported as resulting in the highest levels of felt sense of being there (e.g., presence) ($M=54.20$, $SE=2.39$) followed by the search task ($M=40.34$, $SE=2.42$) and then Minecraft ($M=36.49$, $SE=3.53$). Likewise the question about did the participant enjoy the media experience, also resulted in a main effect for condition, $F(2, 123)=11.83$, $p<.0001$, $eta_p^2=.161$). But this time while Far Cry was enjoyed the most on a seven point Likert scale ($M= 4.87$, $SE=.264$), it was Minecraft which was enjoyed the second most ($M=3.67$, $SE=.312$) followed by the computer search task ($M=3.07$, $SE=.269$).

Movie. For the movie clip Misery, 26 out of the 133 who had answered this question had seen it before, and all but one person watched the whole clip. Again the Chi square done was found to be not significant, as well an ANOVA done on Emotional Intensity self-ratings in reaction to the film clip was not significant. Specific emotional reactions to the film were factor analyzed using a varimax rotation with .5 cut off for interpretation. All the emotion responses loaded onto three factors: angry/sad, fear/anxiety and amused. An ANOVA was done on condition by gaming group by emotional reaction to the film factor score as the within subject variable. No difference as a function of condition or game or within subject for movie emotional factor scores was found, showing that all those participating that viewed the movie clip had the same emotional reaction.

Video Game Group Definition. The video game group definitions were based on median split factor scores of the four gaming questions (frequency of play, length of play session, age began playing, and number of games played) for those who reported a dream. The groups contained 11 participants in the game condition Far Cry who were also high end gamers and 15 in the low end gaming group. Fifteen participants who were high end gamers were in the Minecraft condition and 7 from the low end, 12 participants in the article search condition were in the high end and 16 in low end. The low number in the Minecraft low condition is concerning but a chi square on these group by condition assignments was non-significant. An ANOVA on when did the dream occur, as well as on sum of media use the day before, were both non-significant. This is important to show that there was no group or condition bias in memory or in media use the day before the reported dream.

Covariate Determinations. Several factors were thought a priori to potentially confound any examination of gaming effects on nightmares. These were specifically examined in this sample to determine if there were confounds and if statistically shown, then that variable was included as a covariate in subsequent dream analysis. We began with the degree to which these young men had a history playing the games in the study. We examined gamer group by condition ANOVA's on history with Far Cry, Minecraft and google scholar. Only on Minecraft history, which is displayed in Figure 1, did we find any between subject differences.

Thus the justification for using Minecraft as covariate in subsequent analysis was based on this significant interaction between gaming groups and condition, $F(2,70)=5.20$,$p=.008$, $eta_p^2=.129$). It can be seen that Minecraft history was higher for the low relative to the high end gamers who were assigned to the Minecraft condition and vice versa for those assigned to the Far Cry (combat game) condition. There was no gamer group difference in history of doing that activity for the scholarly search.

For Emotional reactivity, the scale was scored by the sum of relevant items. In the condition by gamer group ANOVA, a main effect for gamer group was found, $F(1,128)=7.36$, $p=.008$, $eta_p^2=.054$). The Emotional Reactivity sums for gamer groups was found to be 29.57 ($SE=1.33$) in the Highs and 34.76 ($SE=1.38$) in the lows. This indicates that emotional reactivity was differentially distributed as a function of game play history and so it too was entered into subsequent analysis as a covariate.

In a similar analysis the sum of past traumas was not significant as a function of gamer group or condition. Therefore it was not entered as a covariate. However, the history of nightmares associated with past trauma showed that those in the Far Cry condition reported more nightmares associated with past trauma than the other two conditions, $F(2,93)=3.09$, $p=.050$, $eta_p^2=.062$. Because of this, history of nightmares was also used as a covariate.

Based upon these analysis three covariate were entered in the dream analyses; Minecraft history, sum of emotional reactivity and nightmare history associated with past traumas.

Dream Self Reports: Types. Self-labeled lucid, control and observer dream types were all shown to be non-sig-

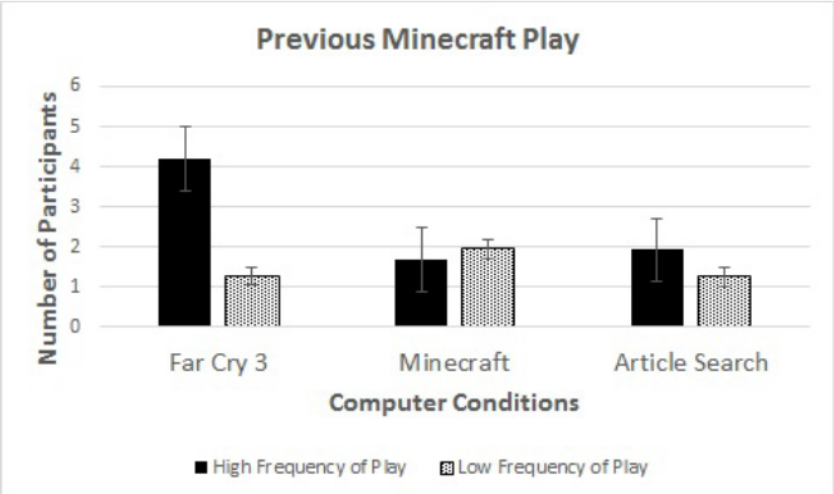

Figure 1. Group by Condition ANOVA's on Self-Reported Previous History with Far Cry, Minecraft and Google Scholar.

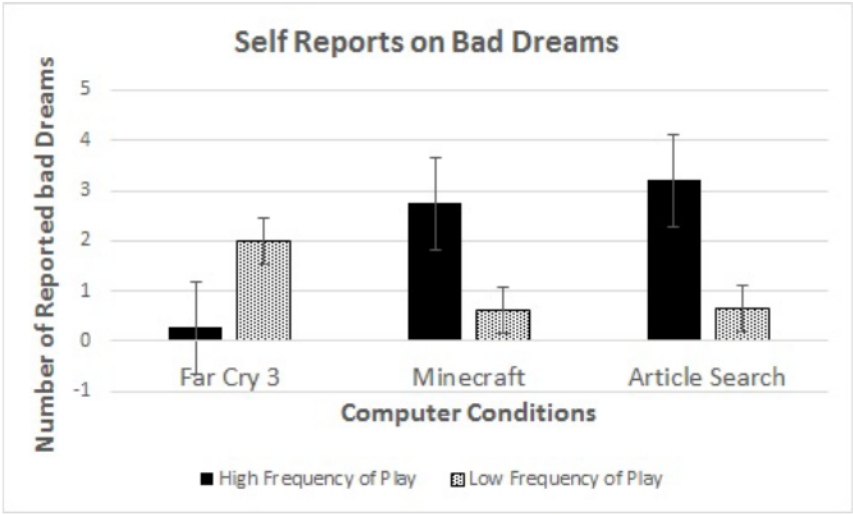

Figure 2. Gaming Group by Condition ANCOVA for Self-Evaluations of Reported Dream as a Bad Dreams.

nificant in a condition by gamer group ANCOVA's controlling for the three covariates. However, nightmare identifications evidenced a significant main effect for gaming groups, $F(1,47)=5.14$, $p=.028$, $eta_p^2=.099$. Participants in the low end game group reported more nightmares ($M=1.919$, $SE=.446$) than those in the high end group ($M=.593$, $SE=.372$). An interaction was found for the gaming group by condition ANCOVA for the self-reports of bad dreams, $F(2,48)=5.37$, $p=.008$, $eta_p^2=.183$).

This is portrayed in Figure 2. The high end gamers reported the opposite from the lows. Specifically, the high's reported fewer bad dreams in the Far Cry condition relative to the other two computer tasks, Minecraft and search, while the lows reported more bad dreams after playing Far Cry than after playing either Minecraft or searching.

Self-reported bizarreness of reported dreams were evaluated by an ANCOVA on gamer group by condition. There was one main effect for condition, $F(2,50)=4.75$, $p=.013$, $eta_p^2=1.60$, and one which approached traditional levels of significance for gamer group, $F(1,50)=3.38$, $p=0.072$, $eta_p^2=.063$. Minecraft condition participants ($M=4.008$, $SE=.567$) reported more dream bizarreness than individuals assigned to the other two conditions (Search $M=2.859$, $SE=.468$; Far Cry $M= 1.722$, $SE=.481$). The marginal gamer group difference favored low end gamers (low $M=3.389$, $SE=.422$; high $M=2.337$, $SE=.385$).

Finally, there was a marginal main effect for the gamer group by condition ANCOVA on seeing their dream as related to electronic media, $F(2,42)=2.91$, $p=.065$, $eta_p^2=.122$. Those playing Far Cry were most likely to report this type of dream ($M=3.134$, $SE=.628$) while second was those doing the search task ($M=2.690$, $SE=.651$) with Minecraft players being much less likely to so report this dream type ($M=.825$, $SE=.767$).

Dream Self Reports: Emotions. Respondents were also asked to evaluate their dream in terms of the emotions they felt during the dream. Since 15 emotions were inquired about, a varimax rotated factor analysis was computed saving the factor scores. This is shown in Table 2.

In gamer group by condition ANCOVA's on each factor score none were significant. However, given the findings of self-reported dream types it was thought advisable to examine specific emotions associated with nightmares and bad dreams, anxiety, fear and terror. An interaction was significant for fear, $F(2,40)=3.54$, $p=.039$, $eta_p^2=.150$.

This is portrayed in Figure 3. It can be seen that the interaction is accounted for by the high end gamer group having different fear emotions in their dreams after the laboratory experience than the other two groups. Specifically, and as predicted, high end gamers playing the combat

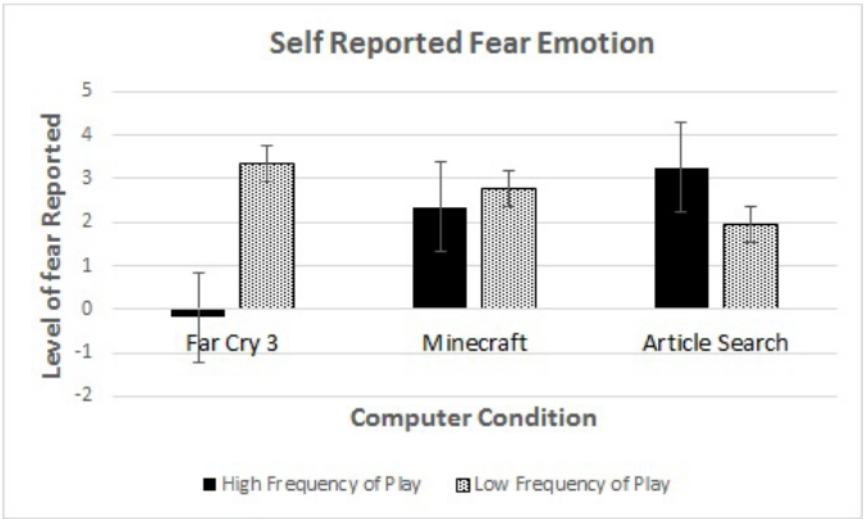

Figure 3. Gamer Group by Condition ANCOVA on Self-Evaluation of Fear in Reported Dream.

Table 2. Factor Loadings for the Varimax Rotated Factor Analysis on 15 Self-Evaluations of Emotions for Self-Reported Dream.

Dream Emotions	Fear/Sad	Anger	Happy/Sex	Awe	Hate/Terror
Anger	0.127	0.802	-0.064	-0.239	0.139
Awe	0.18	0.057	-0.068	0.94	0.07
Arousal	0.028	-0.078	0.762	-0.257	-0.024
Anxiety	0.691	0.442	-0.169	0.019	0.042
Fear	0.857	0.087	0.141	0.111	0.229
Guilt	0.81	0.097	0.293	0.035	-0.235
Frustration	0.186	0.775	-0.184	0.043	0.164
Sadness	0.88	0.047	0.147	-0.003	0.024
Hatred	0.004	0.411	-0.043	0.003	0.646
Happiness	-0.182	-0.365	0.607	0.445	-0.185
Jealousy	0.274	0.208	0.763	0.055	-0.069
Embarrassment	0.106	0.71	0.276	0.285	-0.143
Ecstasy	0.099	-0.283	0.522	0.292	0.381
Downhearted	0.596	0.396	-0.089	0.154	-0.466
Terror	0.681	0.015	-0.254	0.189	0.577

centric game reported less fear than other types of gamers and then in for high end gamers playing either the creative game, Minecraft, or doing the search task.

Threat Simulation Coding by Judges. Revonsuo and Valli's threat simulation dream coding technique includes several variables. Herein, we examine the results of only the ones that could be placed along a continuum; presence of threat (objective = 3; subjective=2; no threat=1), nature of threat (aggressive harm=3; nonaggressive harm=2; no harm=1), sum of the targets of threat, and severity of threat (life threating=4; social/psychological=3; trivial=2; none=1). Two of these four judges' estimates of threat in the dream had marginal interactions. Because they are in the same direction and may be due to small cell sizes and are consistent with the self-reports of the dreamers about their dreams they are reported herein.

The interaction on presence of threat ANCOVA on the same independent variables and covariates as used with the self-report dream variables, was marginally significant, $F(2,48)=2.50$, $p=.092$, $eta_p^2=.094$. It had the same pattern as that for the self-reported bad dreams and fear in the dream. The second scale to show some effect was severity of threat. As before there were no significant main effects but a marginally significant interaction, $F(2,33)=2.89$,$p=.070$, $eta_p^2=.149$. This is portrayed in Figure 4 While the dream impact of the two gaming conditions was the same as in the previous interactions for both gaming groups, the effect of threat severity evidenced no difference as a function of gaming group for the scholarly search condition.

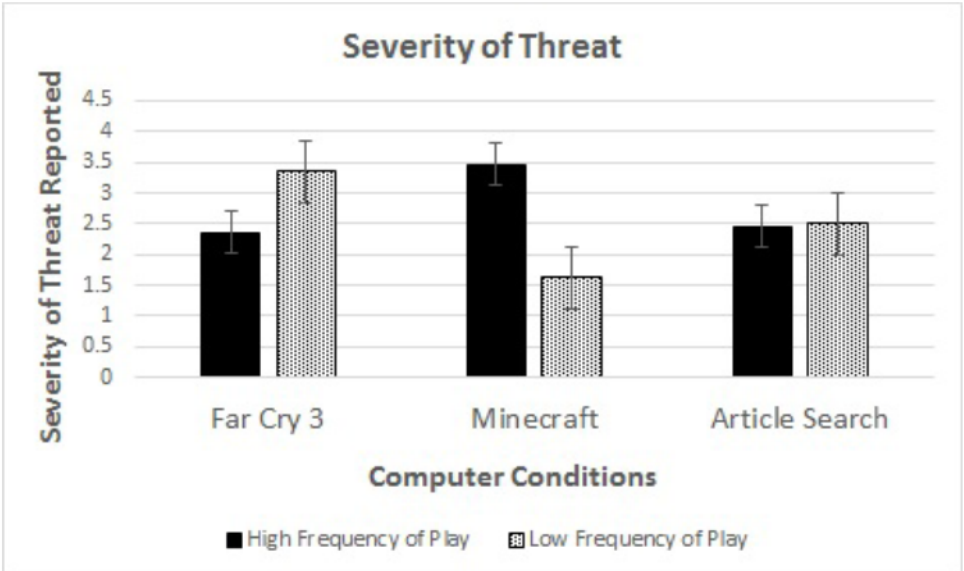

Figure 4. Gamer Group by Condition ANCOVA on Severity of Threat Judges Coding of Reported Dream...

4. Discussion

The major reason for conducting this study was to see if we could show experimental verification for the nightmare protection thesis using young men playing combat centric video games. To do this we frightened the participants and had them play one of three computer tasks, one of two games or a control task. They filled out various surveys which allowed us to determine if there were potential confounds between the two groups of gamers assigned randomly to the three computer conditions. When confounds appeared the variable was statistically controlled for in the dream analyses. A clear pattern of results emerged supporting the research hypothesis.

Specifically, low end gamers reported that the dream they experienced was a nightmare. The evaluations of their dream as a "bad dream" evidenced an interaction between group and condition in the direction expected for nightmare protection hypothesis. Among high end gamers, they did not see their dream as a bad dream if they played Far Cry, but did if they played Minecraft or did the search task. The opposite pattern was shown for bad dreams among low end gamers, if not as extreme in differences between the two categories of computer use. Interestingly high end gamers also reported their dreams as marginally less bizarre than their compatriots. Also supporting the nightmare protection finding for high end gamers playing combat centric games, is the interaction between condition and gamer group on self-reported fear. Specifically, the high end gamers playing Far Cry reported less dreamt fear, than in the other two conditions and in the Far Cry condition when played by low end gamers.

Marginal support for this confluence of self-reports about dream experiences is the judges assessments of threat in the dreams. Of the four threat variables examined two were marginally significant and reported herein, because they were in line with the self-reported dream effects. As above when high end gamer respondents played Far Cry they were judged to have less threat and less severe threat in their dreams than when low end gamers played the same game. The opposite was the case for the other two computer tasks. Here are two illustrates of dreams:

High End Gamer who played Far Cry: In my dream I was a marine sniper, I had to crawl towards a target behind enemy lines, I had to crawl through a field wearing a gillie suit, I had to crawl towards my target, toward the end of the dream I was able to shoot my target but an enemy helicopter spotted me. I woke up before I could see if I got away or not.

Low End Gamer who played Far Cry: I was driving to my friend's house one afternoon to study for an upcoming exam, I was stopped at a red light and impatiently waiting for it to turn green. The light turned green I hit the accelerator but the last thing I saw was an SUV driving into the diver side door of my mini-van. This was the point where I woke up.

These findings suggest that combat centric gaming by those who game a lot, may act as a type of imagery rehearsal for threat in subsequent dreams as per Krakow and Zadra (2006). However, the suggestion by Luther et al. (2015) that any imagery task would interfere with subsequent neuronal imprinting of traumatic memories seems not to be supported. If that were the case then the Minecraft manipulation would be expected to have also resulted in nightmare protection. However, the researcher observed that players who were of the higher play frequency, or perhaps had past experience with Minecraft, would occasionally exhibit different play styles within the game than those of the lower frequency. The Minecraft task was played in creative mode where in players had access to unlimited building supplies. All story and combat elements are turned off. However, items still exist in the game, such as some weapons. Although creatures will not die, players could still engage in some form of aggression, if stunted. Participants in this task then might differ in their play style depending on these two factors. So while the usual list of actions involved building or exploring, occasionally these would turn into building a lava trap and filling it with animals or running around hitting things to no effect.

However, the higher presence and enjoyment associated with Far Cry, relative to Minecraft and the computer search task, might in part be why that game was more successful in nightmare protection. These were condition main effects, thus the individual difference found between conditions for nightmare protection variables would argue against this interpretation.

4.1. Limitations

There are various limitations to this study. First is the small cell sizes which may have contributed to the marginal statistical values. However, they were reported because the direction of the findings was consistent. The study was run only on university student males who typically do not have distinct sleep patterns. Rather they vary widely depending on the demands of their life. Previous research done by Ditner, Gackenbach, & Hakopdjanian (2014) we have found that nightmare protection was more elusive with female high end gamers. We only found it when we selected female high end gamers who played combat centric games and identified themselves as relatively masculine. The movie clip while rated as the most frightening in the norms (Schaefer, Nils, Sanchez & Philippot 2010; 1153-1172), is not as graphic in violence, nor possibly as frightening, as the movies and television shows that are popular among today college students. The fear was about the emotional buildup to the final moment. It may be that participants of any gaming history were still relatively numbed to such violence through contemporary entertainment.

Another limitation is in terms of any history of trauma that might have been triggered due to watching the film. Although we controlled for history of trauma in the last six months, we could not say if earlier trauma responses were evident. As noted this did go through university ethics approval and we did provide information to all participants regarding university counseling services if they found that experience uncomfortable. They were also of course free to withdraw with no credit penalty.

4.2. Conclusion and Clinical Implications

While there was some support for the Nightmare Protection Hypothesis in this experimental manipulation, it was a qualified finding. That is for young university men, with a history of gaming who played a combat centric game close to the frightening movie exposure. Thus application to a clinical situation should not be made too hastily. While there was no

difference between groups in history of trauma, there were differences in emotional reactivity and nightmares associated with trauma. It may be that those most susceptible to nightmares are attracted to combat centric gaming as a type of relief. Blagrove et al's (2013) finding of a statistically positive association between a General Health Questionnaire and nightmare frequency for male high end gamers would support this interpretation. The reason nightmare predictors were controlled for in this study was to focus on the effects of gaming, historically and in the manipulation, on subsequent nightmares. Without such controls it's not surprising that an association might be found between waking stress and gaming history. However, in our data the emotional reactivity measure, which can be argued is a type of stress reaction, was higher for the low end gamers than the highs. There was no individual difference for history of trauma or nightmare history. It will be recalled that nightmare history was associated with condition, not gamer group. These findings argue against the Blagrove et al.(2013) findings and support the idea that combat centric gaming can help in dealing with waking stresses.

Author Notes

This research was possible with a grant from the Undergraduate Student Research Initiative (USRI) at MacEwan University.

References

Barlett, C. P., Anderson, C. A., & Swing E. L. (2009). Video game effects—Confirmed, suspected, and speculative: A review of the evidence. Simulation & Gaming, 40, 377–403. doi:10.1177/1046878108327539

Blagrove, M., Sansom, C., McMurtie, H., & Carter, N. (2013). Video Game Play is Associated with an Increased Correlation between Waking Life Stress and Nightmare Frequency. A presented paper, at the International Association for the Study of Dreams conference, Virginia Beach, VA. Abstract published in the International Journal of Dream Research.

Digitome: Accelerating Digital health [Internet]. (2011). Gaming in Healthcare. [cited December 2015]. Available from http://digito.me/gaming-in-healthcare/

Ditner, A., Gackenbach, J.I. & Hakopdjanian, S. (2014). Video Game Play and Nightmare Protection Hypothesis: A Cross Cultural Analysis. Poster presented at: International Association for the Study of Dreams. June 23-25, 2006 Virginia Beach, VA. Abstract published in the International Journal of Dream Research.

Eng, T. C., Kuiken, D., Temme, K., & Sharma, R. (2005). Navigating the emotional complexities of two Cultures: Bicultural competence, feeling expression, and feeling change in dreams. Journal of Cultural and Evolutionary Psychology, 3, 267-285.

Gackenbach, J. I. (2006). Video game play and lucid dreams: Implications for the development of Consciousness. Dreaming, 16, 96–110. doi:10.1037/1053-0797.16.2.96

Gackenbach, J., Darlington, M., Ferguson, M., & Boyes, A. (2013). Video game play as nightmare protection: A replication and extension. Dreaming, 23(2), 97-111

Gackenbach, J. I., Ellerman, E., & Hall, C. (2011). Video game play as nightmare protection: A Preliminary inquiry in military gamers. Dreaming, 21, 221–245. doi:10.1037/a0024972

Gackenbach, J. I. & Kuruvilla, B. (2008). The relationship between video game play and threat simulation dreams. Dreaming, 18, 236–256. doi:10.1037/a0013782

Gackenbach, J.I., Kuruvilla, B., Dopko, R., & Le, H. (2010). Chapter 5: Dreams and video game play. In Soria, A. & Maldonado, J. (Eds.), Computer games: Learning objectives, cognitive performance and effects on development, Hauppauge, NY: Nova Science Publishers; 127-136.

Gackenbach, J.I. & Rosie, M. (2009). Cognitive Evaluation of Video Games: Players Perceptions. Proceedings of the 2009 Conference on Future Play on @ GDC Canada, Vancouver, British Columbia, Canada. Retrieved December, 2015 from: http://portal.acm.org/citation.cfm?id=1639601.1639615&coll=ACM&dl=ACM&CFID=73975022&CFT OKEN=29423495, 2009.

Gackenbach, J.I. & Rosie, M. (2011). Presence in video game play and nighttime dreams: an empirical inquiry. International Journal of Dream Research, 4(2), 98-109.

Gackenbach, J.I., Rosie, M., Bown, J. & Sample, T. (2011). Dream incorporation of video game play as a function of interactivity and fidelity. Dreaming. 21(1), 32-50.

Krakow, B., & Zadra, A. (2006). Clinical management of chronic nightmares: Imagery rehearsal therapy. Behavioral Sleep Medicine, 4, 45–70. doi:10.1207/s15402010bsm0401_4

Levin, R. & Nielsen, T. (2009). Nightmares, bad dreams, and emotion dysregulation: A review and new neurocognitive model of dreaming. Current Directions in Psychological Science, 18, 84-88.

Luther, E., Andrew, G., Matthew, P., & Alexander, B. (2015). More than just a game? Combat-themed gaming among recent veterans with posttraumatic stress disorder. Games for Health Journal, 4(4), 271-7

Melamed, S. (1987). Emotional reactivity and elevated blood pressure. Psychosomatic Medicine, 49, 217-225.

Orsillo, S. M., Theodore-Oklota, C., Luterek, J. A., & Plumb, J. (2007). The development and psychometric evaluation of the emotional reactivity and numbing scale. Journal of Nervous and Mental Disease, 195, 830–836. doi:10.1097/NMD.0b013e318156816f

Revonsuo, A., & Valli, K. (2000). Dreaming and consciousness: Testing the threat simulation theory of the function of dreaming. Psyche: An Interdisciplinary Journal of Research on Consciousness, 6(8).

Schredl, M., Landgraf, C., & Zeiler, O. (2003). Nightmare frequency, nightmare distress and neuroticism. North American Journal of Psychology, 5, 345-50.

Schaefer, A., Nils, F., Sanchez, X., & Philippot, P. (2010). Assessing the effectiveness of a large database of emotion-eliciting films: A new tool for emotion researchers. Cognition and Emotion, 24(7), 1153-1172.