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Jayne Gackenbach, Mycah Darlington, Mary-Lynn Ferguson, Arielle Boyes

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Jayne Gackebach, Mycah Darlington, Mary-Lynn Ferguson and Arielle Boyes

Grant MacEwan University

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Abstract

This inquiry is a replication and extension of a recent study with military gamers examining the thesis that the play of video games might act as a type of nightmare protection. This hypothesis is based on the idea of a well-rehearsed defense due to game play, a numbing against violence and the idea that memories in the six hours post trauma are best interrupted with a visual cognitive task, like video game play. This replication was done on university students who had experienced a trauma in the past and reported a dream associated with that trauma along with a recent dream. Controls were emotional reactivity and trauma history. We conclude that male high-end gamers seemed to be less troubled by nightmares while female high-end gamers were the most troubled by nightmares. So what is different between these two types of gamers? Three suggestions are considered, game genre, game sociability, and sex role conflict. It seems that the nightmare protection hypothesis of video game play should be qualified to apply to male high end gamers who play few casual games, play socially, and do not seem to experience sex role conflict due to type of game play.

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Video Game Play as Nightmare Protection: A Replication and Extension

In previous research we have postulated that video game play may act as a protection against nightmares. This was based upon the concept that defensive rehearsal in at least combat centric video game play, if done repeatedly over a long period of time, would result in well learned defensive responses. These would generalize to other altered realities, in this case dreams. This process is similar to the imagery rehearsal technique for treating nightmares (Krakow & Zadra, 2006). Other lines of support include the numbing towards violence associated with serious combat centric game play (Barlett, Anderson, & Swing, 2009) and Holmes, James, Kilford, and Deepro (2010) argument that for six hours post trauma engaging in a visuospatial cognitive task “will interfere with visual flashback memory consolidation, and reduce later flashbacks” (p. 2). Video game play is a demanding visual spatial cognitive task and thus such video game play post trauma would presumably interfere with the flashback memories characteristic of PTSD nightmares. This was suggested in the study we did with military gamers who evidence less of some forms of dreamt threat in their military dreams (Gackebach, Ellerman, & Hall, 2011). Additionally, they told us antidotes about various incidences where they would come back from a combat situation and want to play video games, puzzling at their own choices.

This work followed a series of studies examining the dreams of high-end video game players (summarized in Gackebach, 2012). One type of dream that has been studied is the nightmare (Gackebach & Kuruvilla, 2008a, 2008b; Gackebach et al, 2009). In early inquiries this group found through content analysis that, while gamers did behave aggressively in dreams, this behavior occurred far less often than with those who rarely gamed. On the other hand, when dream aggression happened for gamers, it was more intense. Gamers were also less likely to experience misfortune in dreams. This combination of selective but strong aggression and the lack of misfortune suggested that gamers did not see threat in a dream as frightening, but rather as empowering. Gackebach and Kuruvilla (2008a) showed some support for this thesis, which was more clearly seen in another study by the same group (Gackebach, et al, 2011). Direct inquiries of gamers about their incidence of nightmares has resulted in mixed findings. Sometimes they reported fewer nightmares and other times no difference from lower gaming

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peers. However, even when there was no difference in incidence, there was a difference in response to their dreams with gamers reporting being energized by their nightmares (summarized in Gackenbach, 2012).

The current inquiry is a replication and extension of the Gackenbach, Ellerman and Hall study. Specifically, soldiers from around the world answered several online surveys about their gaming history, their emotional reactivity, and history of trauma. They were also asked to provide a recent and a military dream with the later followed by a series of dream relevant questions. Several content analysis and self-reports supported the notion of video game play as nightmare protection. It was found that the high-end gaming group exhibited less threat and war content in their military dreams than the low-end group and were more empowered. While not denying the horror of their military dreams, they were also seen by the high-end gamers as exciting.

This study administered the same inventories but this time to a sample of college students. Additionally, information was gathered from these students about their nightmare experiences associated with their trauma histories. In both studies, respondents were screened for PTSD type symptoms before they could enter the survey. It was expected that differences in threat would also be evidenced in this replication, such that the high-end gamers would evidence less in their trauma associated nightmares. However, in this inquiry both men and women were examined while last time the sample was almost entirely male. This gender difference might affect the responses to dreamt trauma as gender differences in dream content are well established (Hall & VandeCastle, 1966; Domhoff, 1996). In fact, Schredl and Reinhart (2011) have shown in a meta-analysis of gender differences in nightmare frequency, that young adult women report more nightmares than their peers. Additionally, high-end male game play choices differ somewhat from those of females and thus the nightmare protection function of gaming might not generalize to women.

Methodⁱ

Participants

Students enrolled in Introductory Psychology courses at a western Canadian university were the research participants. Entering the study were 658 students, with 469 getting through the pre-screening, of these 17 said no to the informed consent. Thus there were 452 potential participants, 170 males and 282 females. They tended to be largely young adults with 92.9% being 18 to 25 years old, with 48% of those 18 and 19 year olds. The vast majority (96%) were never married.

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Measures

These are listed in the order they were administered in the online survey.

Prescreening Questionnaire. Eight questions constituted the two prescreening levels. The first level simply asked whether the potential participants had ever played a video game. A positive response allowed participants to proceed to the second prescreening level where they were asked three demographic questions (i.e., military service, age, education) and four mental health questions derived from Davis, Byrd, Rhudy, and Wright (2007). Skip logic on these questions did not allow moving on if a question was answered incorrectly. Criteria for exclusion were less than 18 years of age, not having a high school education and being in the military as well as indications of apparent diagnosed mental disorder, “active suicidality or recent parasuicidal behaviors, or current alcohol or drug dependence” (p. 190). This list is in line with a previous study on nightmares in trauma-exposed individuals seeking treatment (Davis, et al., 2007).

Demographic Questions. These five items asked for general demographic information; gender, age, education, marital status, and race or ethnicity,

Video Game Play History Questionnaire. This 18-item questionnaire was adapted from Gackenbach (2006). Questions inquired into the participants’ life history of playing video games. Types of questions included frequency of play, length of play, number of games played, age begun play, age of peak play, and genres preferred at various times in the lifespan. These questions were followed by others inquiring into 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.

Emotional Reactivity and Numbing Scale (ERNS). This 62-item scale was developed by Orsillo, Theodore-Oklot, Luterek, and Plumb (2007) because hyperarousability and numbing are known to be part of the experience of PTSD. However, while there are other emotional reactivity measures, they do not include the numbing aspect which has been found to affect PTSDs “development, maintenance, and treatment” (p. 830; Orsillo, et al., 2007). This scale was normed on U.S. military veterans and thus was most directly relevant to the earlier study (Gackenbach et al., 2011) but is also being used here in order to compare results across studies. Items are clustered into five subscales: positive, sad, general, anger, and fear.

Trauma Inventory. This 38-item scale was adapted from the *Loss/Trauma Questionnaire* of Kuiken (2009).

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The part used herein 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 then followed by a yes/no question as to whether it had been experienced and at what age it was experienced. Two additional questions were asked about intensity of the effects of the traumatic experience and any nightmares which may have occurred after the experience.

Recent and Impactful Dream Recordings Scale. This questionnaire is adapted from the Kuiken group (2009). Respondents are asked first to supply the most recent dream they can recall preferably from last night and then an impactful dream which they believe deals with a traumatic experience.

They were asked to then provide a “Traumatic Experience Impactful Dream”. This wording was added to the same instructions from the recent dream, “dream that is potentially related, either directly or indirectly, to a traumatic experience you have had in the past.” An impactful dream is asked for rather than a nightmare in order to allow for a wider range of replies and to not assume that there were nightmares. In each case subjects are instructed to tell the dream in as much detail as they can.

Impactful Dreams Questionnaire (IDQ). This scale is adapted from Zadra, Pilon, and Donderi, (2006) and Busink and Kuiken (1996). The first part asked about 15 emotions and their intensity that the dreamer thought was experienced during the impactful dream, as per Zadra et al. (2006). Following these emotional evaluations of the dream was a list of 19 questions asking about the traumatic impactful dream as per Busink and Kuiken originally and most recently restructured by Kuiken (2009) in order to classify the dream as nightmare, existential, or transcendental.

Procedure

Students were recruited for this study through the mass testing efforts of the Department of Psychology at a Western Canadian University. Students were told in their introductory psychology classes that they would receive up to 6% of their final course grade from participating in research. The credit received for this survey was 2%. Once they moved past the intake software (i.e. SONA system) they had already gotten course credit. Therefore, their participation was entirely anonymous and any discontinuation of participation was not penalized as they had

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already received the course credit. Participants were aware of this procedure. Additionally, at various points in the survey it was pointed out that they could discontinue their participation with no penalty.

Following a pre-screening informed consent, students answered the various pre-screening questions. Each question had skip logic applied, so if the answer did not meet the study requirements the student was bounced out to a debriefing statement. They were not able to re-enter the study. If they did qualify for the study they were presented with another informed consent and upon their agreement they moved on to the survey. At the end of the survey, or if they chose to end their participation early, they were taken to a debriefing statement.

Resultsⁱⁱ

In order to parallel the results from this study to the previous one game history as a function of sex was examined. Various questions asked about gaming history including frequency of play, length session, number of games played, age began, peak play years, genre preferences, game just played prior to survey and various details about favorite game just played. In the earlier study high and low end gaming groups were identified only by current frequency of play. While not ideal, it does seem to be the single best predictor that we have found for identifying high versus low end gamer groups. Thus in this inquiry we looked at this variable as a function of sex for those who got past the prescreening and agreed to participate in the study. Not everyone provided all information (12 missing info on sex and/or frequency of game play). The Chi Square for game group by sex was significant ($\chi^2(1)=107.79, p<.0001$). The low end gamer group were those who played monthly/yearly or rarely ($n=301$) while the high end group were those who reported playing daily or weekly ($n=139$). Of these 440 participants there were 103 high-end males, 36 high-end females, 67 low-end males and 234 low-end females. Given that this was an introductory psychology research pool it is not surprising that the largest cell was low-end gamer women.

There were several additional analyses that were computed to verify the classification of the two video game groups, which can be found in Table 1 in the online appendix. Basically, other game history questions supported this video game group classification. Also found in the online appendix is a larger section on other considerations of game play behaviors which are used in the interpretation of the findings. These include considerations of genre and multiplayer potential of games and are summarized in part in Table 2 online.

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Emotional Reactivity and Trauma History. As in the previous study we also asked about emotional reactivity (ENRS) and past history of trauma. Five subscales are available for the ENRS; positive, sad, general, anger, and fear. In each case there was a main effect for sex where females scored higher than males (see Table 3 in online appendix). Gamer group factored into two ENRS subscale analyses, anger and fear. While females scored higher on anger, the distinction was primarily accounted for by the low-end gamer group as the interaction was also significant. For the fear subscale of the ENRS there was also a main effect for gamer group with high-end gamers reporting more ENRS fear. As before ENRS subscale scores were entered into all analyses dealing with dreams in order to control for emotional reactivity influences on subsequent dreams.

The incidence of past trauma's was computed by summing the number of times a respondent said yes they had experienced that type of trauma with blanks converted to zeros or no traumas. This was done only for those who reported at least one trauma. There was a main effect for gamer group favoring low end gamers which approached traditional significance levels ($F(1,377)=3.189$, $p=.075$, partial $\eta^2=.008$; high-end=9.872, $SE=.219$, low-end=10.356, $SE=.160$). This was entered as a covariate into the subsequent analyses because of the role of past trauma in sensitizing an individual to nightmares (Levin & Nielsen, 2007). This variable was also used as a covariate in the previous study.

This time we collected additional information about the trauma history; intensity of the effects of the trauma and of any nightmares experienced after the trauma. Again only those who reported at least one trauma were selected and where they then provided no information on other traumas, zeros were inserted. The average intensity of the traumas had a main effect for sex which approached traditional significance levels ($F(1,436)=3.542$, $p=.060$, partial $\eta^2=.008$; males=.430, $SE=.047$, females=.564, $SE=.054$). The nightmares following past traumas question is covered in the next section.

Dream Findings. For subjects who reported at least one trauma the mean nightmare intensity was examined as a function of sex and gamer group with ENRS subscale scores entered as covariates. This analysis resulted in a significant main effect for sex with females reporting more effects of the trauma's ($F(1,334)=4.517$, $p=.034$, partial $\eta^2=.013$; males=.299, $SE=.045$, females=.440, $SE=.044$) and an interaction between sex and gamer.

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It can be seen in Figure 1 that the difference in mean nightmare intensity was accounted for by the high-end gaming group ($F(1,334)=3.648$, $p=.057$, $\text{partial } \eta^2=.011$). Male gamers reported the least intense nightmares, which is consistent with past research, while female gamers reported the most intense nightmares after trauma. There was no difference among the low end gamers in nightmare intensity as a function of sex.

We will now turn to an examination of the two self-reported dreams. Only the trauma dream had questions about it for the dreamer to answer. However, both dreams were content analyzed. Two-hundred and eighty-six subjects gave a time when a recent dream occurred (36% last night; 41% in last week; 13% in last 6 months; 10% over 6 months ago) and 172 gave a time when a traumatic dream occurred (6% last night; 11% in last week; 23% in last 6 months; 60% over 6 months ago). Of these 458 reports of when a dream occurred, 423 dreams of either type could be content analyzed. The loss of dreams was due to too few words, or a statement saying I prefer to not report the dream, or simply talking about the impact of the dream with little to no content of the dream despite instructions to the contrary. The distribution of dreams is offered in Table 4 in the online appendix with Chi-squares for recent ($\chi^2(1)=61.67$, $p<.0001$) and trauma ($\chi^2(1)=27.89$, $p<.0001$) dreams significant. It can be seen that overall fewer trauma dreams were recorded than recent dreams.

Judges Dream Content Analysis. Two types of dream content analyses were conducted by independent judges, Revonsuo and Valli's threat simulation (2000) and Hartmann's (2008) central image. A judge was trained to rate the recent dream reports using the "Dream Threat Rating Scale". Using this system, dream analysis is carried out in two phases. To begin, the researcher must identify and isolate the description of any threatening events that may occur in a dream report. A threatening event is one that meets at least one of the following two criteria. First, the event may be considered an "objective threat" if it would impose harm (physical or mental) on the individual or his/her property, were it experienced in the waking world. An event that is indirectly experienced or heard about may also meet this criterion. Conversely, an event may be categorized as a "subjective threat" if it is interpreted by the dreamer to be somehow dangerous, regardless of the presence of an objective threat. A "subjective threat" classification may be given when the dreamer reports feelings of fear or anxiety.

Next, the identified threatening events are rated on the eight following subscales: Nature of the threatening event, target of the threat, severity of the threatening event for the self, participation of the self in the

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threatening event, reaction of the self to the threatening event, consequences of the threatening event to self, resolution of the threatening event, and the source of the threatening event. Each of the subscales allow for further classification within them. For example, an event being analyzed using the “nature of the threatening event” subscale allows the researcher to further breakdown the event by classifying it as one of a variety of threatening events including escapes, accidents, diseases, catastrophes, etc. To ensure an adequate level of training, the judge rated dreams from Gackenbach and Kuruville (2008a) until she came up to an 80% agreement with the threat simulation coding on that original set of ten dreams.

The second coding of these dreams used Hartmann’s central image scheme. In a partial review of the central imagery in dreams research Bulkeley and Hartmann (2011) explain the scale:

A scorer examines a dream report, decides whether there is a central image (“A striking arresting or compelling image which stands out by virtue of being especially powerful, vivid, bizarre or detailed”), then scores the image for “intensity” on a 7-point scale from 0 (*no image*) through 0.5, 1, 1.5, 2, 2.5, to 3 (*about as intense an image as you have seen in a dream*). When there is a CI, the scorer is then asked to guess what emotion or what two emotions (from a list of 18) might be pictured by the CI.

Two students were trained as judges on this scale and had to reach an 80% agreement on ten sample dreams before the rest of the dreams could be coded. The results from the threat simulation analysis will be covered first followed by those from the central image analysis. In all analyses dreams were treated as separate cases because there was a significant loss in participants due to a lack of reporting both types of dreams.

Threat Simulation Dream Content Analysis. Several dream x sex by gamer group ANCOVA’s on subscales of the threat simulation content analysis were computed with the five ERNS subscales and the history of trauma sum as covariates. As expected the presence of a threat as objective, subjective, or nonexistent had one main effect for dream type with trauma dreams marginally evidencing more threat than recent dreams (all F-values, means and standard errors for the threat simulation content analyses are portrayed in Table 5 in the online appendix). For the analysis on the nature of the threat ranging from no harm through nonaggressive harm to aggressive harm, there were two main effects and an interaction for sex by dream. Females reported more

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aggressive threats than males as did high-end gamers over low-end gamers. For the interaction of sex x dream there was a large sex difference in trauma dreams but very little for recent dreams.

The sum of the number of targets of the threats was then considered. Again, there was a dream by sex interaction, such that males were more likely to report more targets of threat in recent dreams but less likely to report the same in their trauma dreams. Females showed the opposite pattern. Severity of the threat for the self, ranged from a circumstance where self is not affected to various elements in the dream affecting the self and finally to a dream ego life threatening circumstance. Both a main effect for sex and a sex by dream type interaction was significant. Females were more likely to be coded as reporting the threat as severe for the self, than were males, but as before this interacted with dream type where the effect was pronounced for trauma dreams of females.

Finally, a series of chi-squares were computed on sex x dream x gamer group on the discontinuous threat simulation variables (participation of the self; reaction of the self; resolution of the threat; and source of the threat). There were no significant findings. Thus in terms of threat simulation unlike the previous study there were few gamer group differences.

Central Image Dream Analyses. As noted central image is coded as present or absent, intensity of the image and emotional valence of the image. Of the 435 dreams coded on the central image variable, only 13 were coded as not having a central image. Of those coded as having a central image there was no difference in the presence or absence of a central image as a function of sex, dream type, or gamer group. However, when the intensity of the central image was examined then a slightly different picture emerged. An ANCOVA was computed with sex, gamer group and dream type as independent variables on image intensity with ENRS subscales scores and trauma sum as covariates. There was a main effect for type of dream ($F(1,414)=22.870$, $p<.0001$, partial $\eta^2=.052$; recent=1.803, $SE=.054$, trauma=2.217, $SE=.068$) and an interaction for sex and gamer group ($F(1,414)=4.006$, $p=.046$, partial $\eta^2=.010$), which is seen in Figure 2. High-end gaming males were judged to have less intense central images than the other three groups. The final central image variable was emotion type. These were classified as either positive emotions or negative ones and the same ANCOVA was computed as for central

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image intensity. There was a main effect for dream type ($F(1,380)=6.973$, $p=.009$, partial $\eta^2=.018$; recent 1.307, $SE=.033$, trauma=1.163, $SE=.043$), such that recent dreams were seen as more positive than trauma ones, and for sex of subject ($F(1,380)=7.284$, $p=.007$, partial $\eta^2=.019$; males=1.320, $SE=.044$, females=1.150, $SE=.039$). Males central images were judged to be more positive than females.

Self-report reactions to trauma dream. The last set of analyses on these data were on self-reports regarding the impact of the trauma dream. Of the 452 responses that got through prescreening and agreed to participate, 288 did not report when a trauma dream occurred either by leaving the dream recording box empty or saying not applicable or don't remember a dream or I prefer to not share the dream. Thus 164 trauma dreams or segments of dreams were reported. They were distributed sex x game group: 30 high gamer males, 16 high gamer females, 23 low gamer males and 95 low gamer females.

A series of factor analyses were computed to examine the relationship between the research participant's self-evaluations of their trauma dream and their gaming history/preferences. There were two components to the post dream questionnaire: the 19 item IDQ and a list of 15 emotions. Each of these types of questions were separately factor analyzed using a varimax rotation and saving the factor scores. Then the factor scores from each were entered into another factor analysis with various video game playing history and preference questions along with sex. These four factor analyses used different cut off points in order to aid clear interpretation. These ranged from .3 to .6 depending on the analyses.

The first factor analysis was on IDQ items and the seven factors loading above .1 eigenvalue. These accounted for 65% of the variance with the first factor accounting for 18% and the second factor 13%. This factor analysis is portrayed in Table 6 in the online appendix with the factor labels at the top of each column. Items used to define each factor were chosen with a cut-off point of .5. These factor scores were then entered into a second factor analysis with various video game play variables and this is portrayed in Table 7. The second factor analysis used .4 cut-offs for interpretation. Factor 1 combined the high end gamer variables, including maleness, with the vestibular factor scores from the IDQ while factor two loaded all of the three genre's scores with the light factor from the IDQ. Cross gaming and dream evaluation loadings also occurred on the third factor with casual play and

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femaleness, loading with separation and a lack of positive qualities in the dream. The last two factors were IDQ factor scores only; lucid and escape.

The next set of questions asked about the trauma dream regarded emotions that the dreamer felt during the dream. These were factor analyzed resulting in six factors loading above .1 eigenvalue. The five factors loaded 68% of the variance with the first factor accounting for 26% and the second factor accounting for 18%. The factor titles are displayed in Table 8 using a .6 cutoff for interpretation. These factor scores were then entered into a second factor analysis examining their relationship to various video game play variables and sex of subject. This resulting factor analysis is portrayed in Table 9. The factors which loaded above the .1 eigenvalue accounted for 64% of the variance with factor 1 accounting for 25% and factor 2 accounting for 12%. This is a more difficult factor analysis to interpret thus in order to aid interpretation the cut-off point was .3. The first two factors point to positive emotional evaluations of trauma dreams associated with video game play while the third factor is a negative emotional association to such play. The last two factors did not load gaming or sex with dream emotions. As indicated earlier in these results casual gaming may have different dream impacts than sport or hard-core gaming. Thus in this factor analysis you see that casual gaming did not enter at all into the association of gaming to positive dream emotions but did to a negative emotion, anger. While the first two factors were both positive emotional evaluations to the trauma dream there were differences both in the emotions and the gaming information. Both factors were associated with maleness. The first factor seems to represent the classic hard core male gamer who does not see anger nor embarrassment in his trauma dream thus supporting the nightmare protection thesis for male gamers. While the second factor, also for males, is a somewhat different pattern. Positive emotions in response to the dream were associated with high gaming frequency as well as two genre, hard core and sport.

Discussion

Gamer groups were defined by frequency of play. Nightmares were examined in several ways. First, self-reports of their intensity after traumas, then a recent and a trauma dream were collected. Controlling for emotional reactivity, male high-end gamers showed the least intensity of their nightmares associated with past traumas while the other three groups, female high end gamers, female low-end gamers and male low-end gamers

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reported more mean nightmare intensity. This supports the nightmare protection thesis for at least male high end gamers.

Next the dreams reported by research participants were examined using two content analyses systems and the dreamer's evaluation of the trauma dream. Threat simulation dream content analyses were computed on recent and trauma dreams. In contrast to the previous study, there were few findings supporting the nightmare protection thesis. Specifically, most analyses of threat simulation dependent variables did not show a gamer effect. When it emerged it was not as expected. For instance, there was a main effect for gamer group on the nature of the threat with high end gamers dreams (across sex and dream type while controlling for emotional reactivity and past trauma) evidencing more aggressive harm than low-end gamers. In the previous study (Gackebach, Ellerman, & Hall, 2011) on military gamers, there was an interaction between dream type and gamer group with high end gamers evidencing slightly more aggressive harm in their military dream than their recent dream and the opposite the case for low end gamers. Thus in the preview study it was the low end gamers who evidenced the highest aggressive harm in their military dreams only. In the present inquiry, across dream type and sex, there was more aggressive harm in the dreams of high end gamers. This parallels the finding from the recent dream of the previous study but is quite different for the trauma (military) dream. It's important to consider the situational context of each of these groups of participants. The military were reporting dreams from their military tenure which can be argued is more realistically life threatening than the various traumas that a student group might experience and thus the vulnerability of the soldier who rarely games. But when there is less real world trauma, the students, it may be that then the video game play enters the dream to produce a more aggressive content, no matter if it's a recent dream or one following a trauma.

Shedding further light on this is the central image (CI) content analysis. In a series of controlled studies, CI intensity has been found to be higher after trauma and in students reporting abuse (Hartmann, Zborowski, Rose, & Grace, 2008). CI intensity was also found to be higher in dreams after the terrorist attacks 911, than dreams before, in the same persons (Hartmann & Brezler, 2008). Gamer group played a larger role in these analyses. Using the same covariates the pattern of results was somewhat similar to that of the self-report nightmare intensity findings. Specifically high-end male gamer's central images in their dreams, across type, were judged to be least

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intense relative to the other three groups. However, there was no gamer group differences in the rated emotions associated with the central image.

We then turned to an analysis of the research participants self-evaluations of the trauma dream they reported. Factor analysis was chosen in this set of analysis in order to reduce the variables in a meaningful way and examine any relationship to gaming variables. The IDQ factor analysis resulted in fairly easy to understand factors which were then saved as factor scores. These were labeled positive, separation, vestibular, lucid, light, bizarre and escape. When these factor scores were then loaded into a second factor analysis with game history and preference variables as well as sex of subject the resultant associations again favored the nightmare protection thesis for males at least. The association of the classic hard core gamer variables to the vestibular IDQ factor included items referring to feeling vital, energetic and alive as well as touch and sound. The second factor where there was an association between the three genres and IDQ factor scores was in terms of the light factor. A negative gamer/IDQ association was shown the third factor but only for females and for casual genre. These were associated with a lack of positive items and the presence of separation type IDQ items.

A second set of factor analyses were computed for the self-reported emotions associated with the trauma dream. Five emotional clusters were identified in the factor analysis and loaded as factor scores into another factor analysis which included various gaming variables and sex. Again, male gaming was associated with positive type emotions or the lack of negative ones in the first two factors while especially casual genre, but also the other two genres, were associated with anger regardless of sex.

Limitations. There are various limitations to this inquiry beginning with the problems of self-report. However, because of the way the research participant pool is set up students are guaranteed that their responses are completely anonymous. This, hopefully, gets around some of the problems with self-report. Additionally, not all subjects reported all data which they were encouraged to do if they felt uncomfortable, but it was a long survey so survey fatigue could also have set in. Finally, while the data was collected over an entire academic year the subject pools for each term are always introductory psychology students. One could argue that looking at trauma and its associated nightmares is somewhat lost on such a young subject pool. In terms of some of the types of trauma inquired about in the survey this is true, but physical and emotional abuse was something about which we

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were able to gather the most information. Finally, as is often the case with self-report versus judge's evaluations, there are differences in the eye of the beholder.

Conclusion. We can conclude that male high end gamers seemed to be less troubled by nightmares while female high-end gamers were the most troubled. So what is different between these two types of gamers? While there were emotional reactivity differences, these were controlled in the statistical analyses. Therefore, in terms of the current thesis a few alternative explanations are suggested. First type of games they played, second the social/multiplayer element of gaming and third sex role conflict.

That is, while women report the same pattern of play of hard core (combat centric) and sport games, their play of casual games is different. While female high-end gamers don't play any more casual games than female low-end gamers, they play a lot more relative to the other two genre groupings than the male high-end gamers, whose casual game play is the least favored.

The social element of gaming may also play a role. Specifically as one reviewer noted the higher casual game play of female high end gamers may be less often multiplayer. We examined this for those who played a game in the six hours prior to filling out the survey and consistent with the reviewer's suggestion female high end gamers were less likely to have been playing a multiplayer type game.

The third suggested reason for the gender difference among high end gamers in terms of response to nightmares regards potential sex role conflict. That is, playing a combat centric game for women is in conflict with traditional sex roles for women. No matter their protestations consciously of rejecting such roles, when faced with threat in the unconscious level in dreams such defenses may crumble and thus leave them more vulnerable.

In conclusion, it seems that the nightmare protection hypothesis of video game play should be qualified to apply to males who play few casual games and play multiplayer scenarios. Furthermore, it may most strongly apply in situations with immediate real life threat as in the previous military study.

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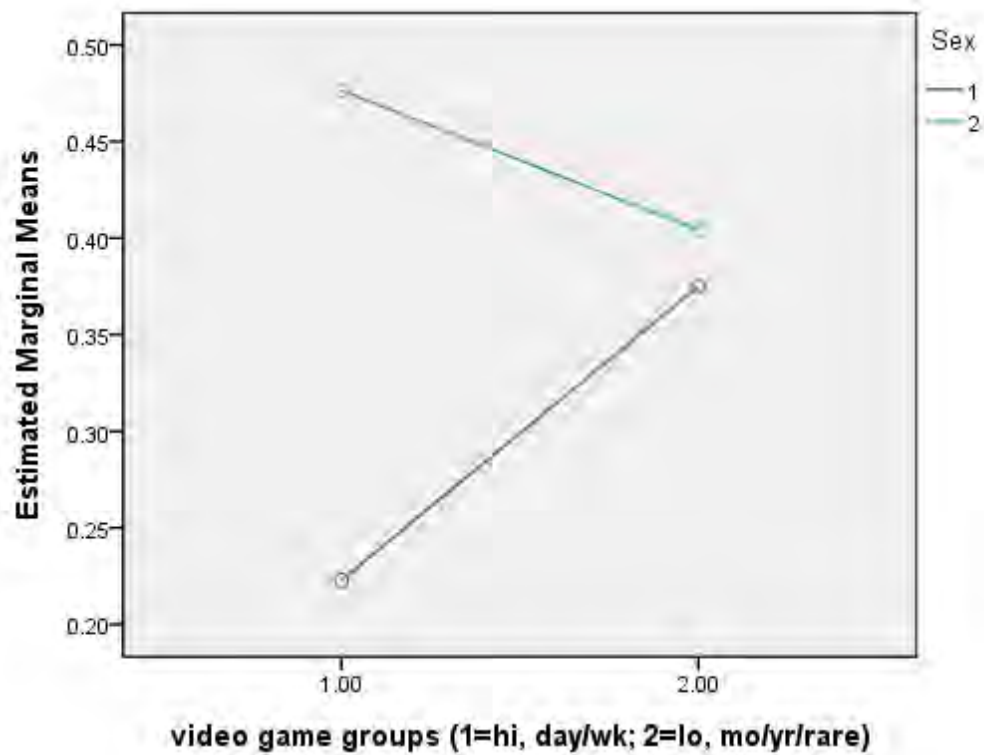


Figure 1. Mean self-report nightmare intensity as a function of gamer group and sex of subject with emotional reactivity as covariate for individuals who reported at least one trauma.

VIDEO GAME PLAY AS NIGHTMARE PROTECTION

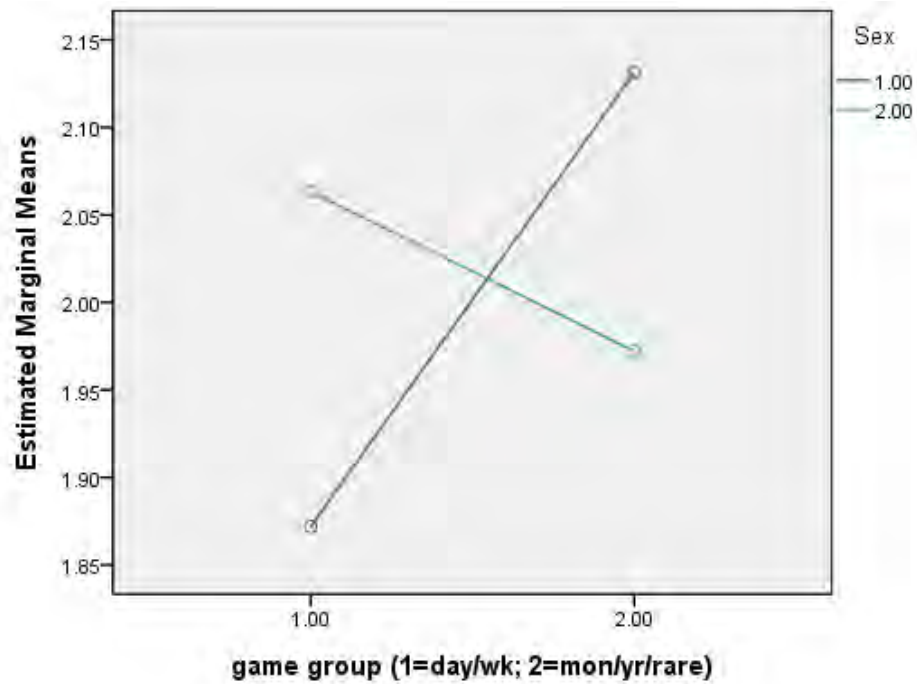


Figure 2. Mean judges estimate of central image intensity as a function of sex and gamer group with ENRS subscales and trauma sum as covariates.

ⁱ An extended methodology is available online.

ⁱⁱ All tables referred to in the results section are available online.

APPENDIX: Video Game Play as Nightmare Protection: A Replication and Extension

Jayne Gackebach, Mycah Darlington, Mary-Lynn Ferguson and Arielle Boyes

Grant MacEwan University

Method

Participants

Students enrolled in Introductory Psychology courses at a western Canadian university were the research participants. Entering the study were 658 students, with 469 getting through the pre-screening, of these 17 said no to the informed consent. Thus there were 452 potential participants, 170 males and 282 females. They tended to be largely young adults with 92.9% being 18 to 25 years old, with 48% of those 18 and 19 year olds. The vast majority (96%) were never married.

Measures

These are listed in the order they were administered in the online survey.

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Prescreening Questionnaire. Eight questions constituted the two prescreening levels. The first level simply asked whether the potential participants had ever played a video game. A positive response allowed participants to proceed to the second prescreening level where they were asked three demographic questions (i.e., military service, age, education) and four mental health questions derived from Davis, Byrd, Rhudy, and Wright (2007). Skip logic on these questions did not allow moving on if a question was answered incorrectly. Criteria for exclusion were less than 18 years of age, not having a high school education and being in the military as well as indications of apparent diagnosed mental disorder, “active suicidality or recent parasuicidal behaviors, or current alcohol or drug dependence” (p. 190). This list is in line with a previous study on nightmares in trauma-exposed individuals seeking treatment (Davis, et al., 2007).

At each prescreening question if they did not answer it correctly they were bounced out of the survey. Thus by the end of the prescreening 27.4% were deleted. This was fairly evenly distributed across the various prescreening questions.

1. 3.5% said they did not play video games
2. 1.2% had been in the military
3. 2.4% were not 18 years of age or older
4. 0.6% did not have a high school education
5. 1.8% had been diagnosed with a mental disorder in the last 6 months
6. 0.8% had tried to commit suicide in the last 6 months
7. 9.6% had performed risky behaviors in the last 6 months
8. 1.7% were addicted to drugs in the last 6 months
9. 5.8% missing responses

Demographic Questions. These five items asked for general demographic information; gender, age, education, marital status, and race or ethnicity,

Video Game Play History Questionnaire. This 18-item questionnaire was adapted from Gackenbach (2006; & Rosie, 2009; & Rosie, Bown, Sample, 2011). Questions inquired into the participants’ life history of playing video games. Types of questions included frequency of play, length of play, number of games played, age begun

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play, age of peak play, and genres preferred at various times in the lifespan. These questions were followed by others inquiring into 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.

Gackenbach and Bown (2011) report the following validity information for this scale. In their study, the four game group-defining variables were frequency of play, duration of typical play, number of games played in a lifetime, and age begun playing with younger coded as a higher number. "Validity for these general history of game play questions was determined in terms of their relationship to questions about their game play immediately prior to the research participation. The number of games subjects reported playing prior to participating in the study was associated with typical gaming session duration $r=.247$, $p<.009$ and number of different games played in lifetime $r=.204$, $p<.032$. In terms of these four group-defining history of play item responses to the length of the prior to research participation gaming sessions (game frequency $r=.294$, $p<.0001$; gaming session duration $r=.496$, $p<.0001$; number of different games played in lifetime $r=.325$, $p<.0001$). Thus, history of gaming was related in various ways to actual play behavior, in the 24 hours prior to filling out the research inventories" (p. 3).

Emotional Reactivity and Numbing Scale (ERNS). This 62-item scale was developed by Orsillo, Theodore-Oklota, Luterek, and Plumb (2007) because hyperarousability and numbing are known to be part of the experience of PTSD. However, while there are other emotional reactivity measures, they do not include the numbing aspect which has been found to affect PTSDs "development, maintenance, and treatment" (p. 830; Orsillo, et al., 2007). This scale was normed on U.S. military veterans and thus was most directly relevant to the earlier study (Gackenbach et al., 2011) but is also being used here in order to compare results across studies. Items are clustered into five subscales: positive, sad, general, anger, and fear. Orsillo et al. report that these "demonstrated good to excellent internal consistencies with the following Cronbach α levels: positive subscale, $\alpha = 0.91$; sadness subscale, $\alpha = 0.88$; anger subscale, $\alpha = 0.87$; fear subscale, $\alpha = 0.81$; general subscale, $\alpha = 0.81$ " (p. 3). This scale was also reported as having good test-retest reliability as well as convergent and discriminate validity.

Trauma Inventory. This 38-item scale was adapted from the *Loss/Trauma Questionnaire* of Kuiken (2009). The part used herein inquired about the incidence and intensity of nine types of trauma:

- Physical Assault: assault, incest, sexual assault, mutilation, physical abuse

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- Recurrent Physical Assault: repeated physical assault (as defined above)
- Recurrent Emotional Abuse: repeated verbal aggression, humiliation, neglect, or isolation
- Criminal Victimization: armed robbery, burglary, kidnapping, drive-by shooting
- Negligent Injury: drunk driving resulting in physical harm, a serious car accident resulting in physical harm, inappropriate or negligent medical treatment resulting in physical harm
- Civil, Domestic, or Industrial Disaster: serious fires, collapse of a structure (e.g., bridge), crash of a transportation system (e.g., plane, train), technological accident (e.g., exposure to radiation), work-related accident (e.g., explosion)
- Cultural Violence: war, genocide, terrorism, torture
- Natural Disasters: earthquake, hurricane, tornado, avalanche, forest fire, flood
- Other trauma: e.g., life threatening illness, animal attacks, freak accidents

Each trauma was briefly defined and then followed by a yes/no question as to whether it had been experienced and at what age it was experienced. Two additional questions were asked about intensity of the effects of the traumatic experience and any nightmares which may have occurred after the experience.

Recent and Impactful Dream Recordings Scale. This questionnaire is adapted from the Kuiken group (2009). Respondents are asked first to supply the most recent dream they can recall and then an impactful dream which they believe deals with a traumatic experience. These were the instructions for the recent dream:

Please pick the most recent dream that you recall, preferably from last night. Please describe this 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; and
- Any unusual, incongruous, or implausible dream thoughts, feelings, objects, places, characters, or events

They were asked to then provide a “Traumatic Experience Impactful Dream”. This wording was added to the same instructions from the recent dream, “dream that is potentially related, either directly or indirectly, to a traumatic experience you have had in the past.”

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An impactful dream is asked for rather than a nightmare in order to allow for a wider range of replies and to not assume that there were nightmares. In each case subjects are instructed to tell the dream in as much detail as they can.

Impactful Dreams Questionnaire (IDQ). This scale is adapted from Zadra, Pilon, and Donderi, (2006) and Busink and Kuiken (1996). The first part asked about 15 emotions and their intensity that the dreamer thought was experienced during the impactful dream, as per Zadra et al. (2006). Following these emotional evaluations of the dream was a list of 19 questions asking about the traumatic impactful dream as per Busink and Kuiken originally and most recently restructured by Kuiken (2009) in order to classify the dream as nightmare, existential, or transcendental.

Procedure

Students were recruited for this study through the mass testing efforts of the Department of Psychology at a Western Canadian University. Students were told in their introductory psychology classes that they would receive up to 6% of their final course grade from participating in research. The credit received for this survey was 2%. Once they moved past the intake software (i.e. SONA system) they had already gotten course credit. Therefore, their participation was entirely anonymous and any discontinuation of participation was not penalized as they had already received the course credit. Participants were aware of this procedure. Additionally, at various points in the survey it was pointed out that they could discontinue their participation with no penalty.

Following a pre-screening informed consent, students answered the various pre-screening questions. Each question had skip logic applied, so if the answer did not meet the study requirements the student was bounced out to a debriefing statement. They were not able to re-enter the study. If they did qualify for the study they were presented with another informed consent and upon their agreement they moved on to the survey. At the end of the survey, or if they chose to end their participation early, they were taken to a debriefing statement.

Game Play Additional Results

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Related to the interpretation of the findings is the data on having played a game in the six hours prior to taking this survey. Male high end gamers (n=48) were much more likely to say they had been playing a video game than the male low gamer group (n=3). While for the males who said they were not playing a video game slightly more were low end gamers (n=64) than high end gamers (n=55): $\chi^2 (1)=34.30, p<.0001$. This distinction was less apparent for the females (high gamers, yes playing n=12; low gamers, yes playing n=10) and those females who said no were far more likely to be low end gamers (low=224; high=24): $\chi^2 (1)=35.20, p<.0001$. Of the 69 respondents who indicated what game they played the most in the six hours prior to filling out the survey, most (n=37) were by males playing combat centric games such as World of Warcraft, Starcraft, and Call of Duty. Two of this group indicated they were most playing a sport game (i.e., NFL) and the rest (n=8) indicated some sort of casual game (i.e., Minecraft, Sims). Among the high video game playing women who reported a game they had played in the six hours prior to filling out the survey none played a sport game, and five played a combat centric game with six playing a casual game. It will be seen below that this genre play pattern holds up when examining favorite genre of these sex x gamer groups.

Furthermore, these recent players were also asked to pick one game they had just been playing and to answer a few questions about it concerning its sociability or multiplayer potential. Specifically they were asked if the game could be played alone or with others. A t-test on the male versus female high end gamers was significant ($t(63)=-2.08, p=.041$). Males high end gamers were more likely to have been playing a game with multiplayer functionality than female high end gamers. However, of those actually playing a multiplayer type game, there was no sex difference as to whether they were in fact playing with others ($t(50)=-0.30, ns$).

Genre. While we stayed with this definition of game groups, as that was definition used in military study, there were various genre differences as implied by the types of games played just prior to taking the survey. We classified the list of current favorite genre offered to the respondent into three categories:

1. Hard core (combat centric games): first person shooter (FPS), massively multiplayer (MMO), role play, real time strategy, strategy, adventure, fighting
2. Sport: driving, sport

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3. Casual: simulation, puzzle, card, board

This classification of genre was based on earlier research examining presence and genre (Gackebach & Bown, 2011). Presence is the degree to which the player feels they are “in” the game and are less aware of their surrounding in the real world. Hard core/combat centric games were reported as having the highest presence while casual games as the lowest and sport games falling in between. Thus in addition to the type of play (combat centric) as potentially acting as a rehearsal for threat in nightmares, the felt sense of being there, presence, would also increase the likelihood of these types of games, hard core which tend to be largely combat centric, as nightmare protection.

We computed a mean favorite genre ranking for each category and used it as a within subject independent variable. The video game group x sex x current favorite genre ANOVA resulted in several significant findings, which are summarized in the online appendix in Table 2. For the sex by genre interaction, men preferred two of the three genre more than women (hard core and sport) but did not prefer the third genre, casual, as much as women. In the other two-way interaction each genre was preferred quite differently as a function of gamer group. Specifically, there were no gamer group differences (or minimal) for the casual genre and they were least preferred overall. But the hard core genre which was much more preferred by the high-end gamers across sex than by the low-end gamers. However the opposite was the case for the sport genre, preferred by the low-end gamers more than the high end gamers. It should be kept in mind that these are very rough measures of genre but it points out that playing video games a lot does not necessarily mean all gamers are having the same experience. Specific to the current hypothesis it will be seen that for women the findings regarding the nightmare protection hypothesis are different then for men.

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Results Tables

Table 1. *Video Game Group Classification Verification Variables*

Variable	F-Value	Means and Standard Error
Length of video game play session	F(1,436)=26.797, $p<.0001$, partial $\eta^2=.058$	high-end gamers=3.263, SE=.096, low-end gamers=2.652, SE=.069
Games played	F(1,432)=25.400, $p<.0001$, partial $\eta^2=.056$	high-end=2.925, SE=.112, low-end=2.236, SE=.079
Age started play (high number = younger)	F(1,436)=3.221, $p=.073$, partial $\eta^2=.007$	high-end=8.512, SE=.104, low-end=8.283, SE=.074

Table 2. Video game group x sex x current favorite genre ANOVA

Effect	F-values	Means
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Genre Main effect	F(1,436)=11.529, p=.001, partial eta ² =.026	hard-mean=.341, SE=.015, sport-mean=.371, SE=.022, casual-mean=.281, SE=.019
Sex of Subject Main Effect	F(1,436)=5.586, p=.019, partial eta ² =.013	males=.364, SE=.018, females=.298, SE=.021
Sex x Genre	F(1,436)=72.638, p<.0001, partial eta ² =.143	males hard-mean=.428, SE=.019, males sport-mean=.447, SE=.030, males casual-mean=.216, SE=.025, females hard-mean=.254, SE=.022, females sport-mean=.294, SE=.034, females casual-mean=.346, SE=.028
Gamer Group x Genre	F(1,436)=6.861, p=.009, partial eta ² =.015	high-end hard-mean=.396, SE=.024, high-end sport-mean=.341, SE=.037, high-end casual-mean=.289, SE=.030, low-end hard-mean=.287, SE=.017, low-end sport mean=.400, SE=.026, low-end casual-mean=.273, SE=.022

Table 3. ANOVA's for Emotional Reactivity Scale (ENRS) subscales as a function of sex and gamer group

Subscales for ENRS	F-value	Means and Standard Error
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Positive	F(1,370)=8.407, p=.004, partial eta ² =.022	males=4.060, SE=.038, females=4.219, SE=.040
Sad	F(1,382)=60.765, p<.0001, partial eta ² =.137	males=3.676, SE=.046, females=4.205, SE=.050
General	F(1,383)=26.323, p<.0001, partial eta ² =.064	males=3.856, SE=.053, females=4.252, SE=.057
Fear	Sex: F(1,378)=93.203, p<.0001, partial eta ² =.198	males=3.315, SE=.056, females=4.110, SE=.060
	Gamer group: F(1,378)=4.491, p=.035, partial eta ² =.012	high-end=3.800, SE=.066, low-end=3.625, SE=.049
Anger	Sex: F(1,381)=14.382, p<.0001, partial eta ² =.036	males high-end=3.548, SE=.067, males low-end=3.356, SE=.082, females high-end=3.686, SE=.105, females low-end=3.806, SE=.043
	Interaction: F(1,381)=4.048, p=.045, partial eta ² =.011	

Table 4. *Gamer group (1=daily/weekly; 2=monthly/yearly/rarely) by sex of subject (1=M; 2=F) by type of dream (1=recent; 2=trauma)*

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Gamer group and type of dream			sex of subject		
			Male	Female	Total
High	daily/weekly	Recent	56	23	79
		Trauma	38	148	186
		Total	94	171	265
Low	monthly/yearly/rarely)	Recent	27	16	43
		Trauma	22	93	115
		Total	49	109	158

Table 5. *Threat simulation dream content coding results as a function of gamer group x sex x dream type with ENRS and sum of past traumas as covariates*

Variable	F-values	Means and standard errors
Threat presence	Dream: $F(1,409)=3.569$, $p=.060$, partial $\eta^2=.009$	recent=1.738, SE=.032, trauma=1.837, SE=.041
Nature of the threat	Sex: $F(1,335)=5.898$, $p=.016$, partial $\eta^2=.017$	males=2.220, SE=.069, females=2.464, SE=.064
	Gamer Group: $F(1,335)=4.564$, $p=.033$, partial $\eta^2=.013$	high-end=2.436, SE=.070, low-end=2.248, SE=.052
	Sex x Dream: $F(1,335)=4.326$, $p=.038$, partial $\eta^2=.013$	Recent males= 2.308, SE=.082, recent females=2.372, SE=.078, trauma males=2.133, SE=.101, trauma females=2.556, SE=.097
Sum of the number of targets of the threats	Sex x Dream: $F(1,317)=5.545$, $p=.019$, SE=.017	recent males=1.560, SE=.102, recent females=1.395, SE=.095, trauma males=1.203, SE=.126, trauma females=1.533, SE=.115

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Severity of the threat for the self	Sex: $F(1,336)=7.058$, $p=.008$, partial $\eta^2=.021$ Sex x Dream: $F(1,336)=4.358$, $p=.038$, partial $\eta^2=.013$	recent males=2.948, SE=.125, recent females=3.081, SE=.119, trauma males=2.818, SE=.154, trauma females=3.500, SE=.148
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Table 6. *Rotated varimax factor analysis of IDQ items in response to a dream associated with a traumatic event.*

	positive	separation	vestibular	lucid	light	bizarre	escape
My dream involved unusual forms of or sources of light.	.054	.040	.087	.152	.781	.007	-.001
My dream involved vivid sensations of touch, movement, or body position.	.044	-.067	.634	.242	.119	.040	-.191
In my dream I became aware of myself from the point of view of an observer, as if viewing myself from above.	.063	.044	.099	.783	-.073	.001	.064
My dream involved especially vivid sounds.	-.182	.100	.656	-.043	.208	-.043	.092
In my dream I experienced the spontaneous emergence of clear and distinct feelings.	-.080	.549	.324	.026	-.185	.475	-.131
In my dream there were sudden changes in the physical appearance of persons, places, or things.	-.070	-.008	-.073	.123	.111	.815	.230
My dream involved characters (including myself) with exceptional or even magical abilities.	.496	-.140	.025	-.137	.140	.523	-.156
I felt exceptionally vital, energetic, and alive.	.455	-.270	.551	.239	.087	.058	-.047

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My dream involved separation, rejection, or loss.	.050	.740	-.083	.372	.074	-.002	-.017
My feelings became especially intense just before I awakened.	-.081	.531	.411	-.318	-.127	.013	.020
My dream involved sensations of spreading warmth.	.455	-.408	.061	.258	-.340	.157	-.067
My dream involved vivid contrasts between light and darkness.	.001	-.058	.234	.019	.724	.140	.138
In my dream I was successful in attaining my goals.	.557	-.437	.005	.221	.136	.056	-.015
In my dream I repeatedly tried to avoid harm to myself or others.	-.064	.126	-.017	.004	.146	.157	.857
At times my movements in the dream were vigorous and energetic.	.539	-.011	.577	.067	.078	-.080	.353
In my dream I felt tired, weak, or unable to move.	-.738	-.110	.082	.074	.158	.194	-.027
My movements in the dream were exceptionally well balanced and graceful	.621	-.127	-.016	-.011	.290	.225	-.409
In my dream I experienced a distinct shift in visual perspective	-.037	.001	.122	.805	.314	.081	-.063
In my dream I felt like crying—or I actually cried.	-.126	.710	-.121	-.035	.048	-.074	.260

Table 7. *Varimax rotated factor analysis of IDQ factor scores, sex and video game play variables*

	1	2	3	4	5	6
factor score 1 IDQ positive	.059	.173	-.538	-.048	.089	-.153
factor score 2 IDQ separation	-.190	-.112	.495	-.286	.299	-.086
factor score 3 IDQ vestibular	.421	-.094	.314	.209	-.052	.090
factor score 4 IDQ lucid	.054	-.046	-.065	.092	.859	-.003

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factor score 5 IDQ light	-.090	.662	.057	-.143	.279	.148
factor score 6 IDQ bizarreness	-.078	.001	.034	.873	.086	.001
factor score 7 IDQ escape	-.002	.001	.034	.009	.003	.926
Sex (1 = male; 2 = female)	-.644	-.067	.515	-.228	.081	.002
video game frequency recoded daily is high	.753	.144	-.163	-.084	.072	.169
hard core mean of any ranking	.461	.621	-.011	.286	-.218	-.088
sport mean of any ranking	.058	.735	-.260	.018	-.216	-.076
casual mean of any ranking	-.009	.461	.656	.183	-.142	-.200
How long is your typical playing session?	.636	.002	-.106	-.027	.191	-.264
How many different video games in any format have you played to date?	.783	.037	-.161	.043	-.034	-.025
How old were you when you played your first video game?	.679	-.015	.271	-.253	-.141	.002

Table 8. *Rotated varimax factor analysis of self-reported emotions in response to a dream associated with a traumatic event.*

	positive	fear	anger	sad	embarrass
Anger	-.033	.115	.838	.079	.111
Anxiety	-.083	.632	.307	.006	-.180
Arousal (sexual)	.740	-.074	-.008	.034	.333
Awe	.745	-.103	.009	.299	-.128
Downhearted	.084	.061	.069	.809	-.090
Ecstasy	.865	-.191	-.129	-.087	.077
Embarrassment	.055	-.079	.126	.039	.771
Fear	-.304	.824	.040	.157	-.004
Frustration	-.136	.074	.680	.253	-.027

VIDEO GAME PLAY AS NIGHTMARE PROTECTION

Guilt	.155	-.096	.147	.695	.194
Hatred	-.019	.122	.826	.050	.127
Happiness	.740	-.275	-.129	-.102	.234
Jealousy	.273	-.078	.053	.175	.752
Sadness	-.246	.215	.195	.685	.229
Terror	-.146	.894	.064	-.029	-.034

Table 9. *Varimax rotated factor analysis of self-reported dream emotion factor scores, sex and video game play variables*

	1	2	3	4	5
emotions factor score 1 IDQ positive	-.010	.790	-.070	-.020	.121
emotions factor score 2 IDQ fear	-.041	.003	.037	-.008	.950
emotions factor score 3 IDQ anger	-.302	-.074	.394	-.313	-.098
emotions factor score 4 IDQ sad	-.075	-.031	-.035	.871	-.026
emotions factor score 5 IDQ embarrassment	-.448	.166	-.202	-.152	.013
Sex	-.455	-.682	.198	.156	.118
video game frequency recoded daily is high	.684	.374	-.080	-.162	.155
hard core mean of any ranking	.407	.427	.605	-.054	-.141
sport mean of any ranking	-.018	.606	.443	.269	-.251
casual mean of any ranking	.025	-.155	.838	.003	.150
How long is your typical playing session?	.638	.062	-.011	-.205	-.180
How many different video games in any format have you played to date?	.715	.336	-.107	-.135	-.030
How old were you when you played your first video game?	.732	-.056	.087	.255	.041

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