

Non-gaming computer use relationship to type of dream

Jayne Gackenbach & Arielle Boyes

Grant MacEwan University, Edmonton, Canada

Summary. A new waking influence has emerged that is becoming so widely experienced that it bears further consideration in its own right as to its influence on subsequent night time dreams. That is, digital life. It ranges from listening to music to texting to checking facebook status to playing video games to information checking. All of these activities are computer mediated. In this inquiry, students at a western Canadian university indicated if they had played computer games or used the computer for non-gaming purposes during the day prior to a recent dream they reported. Respondents indicated their confidence about the type of dream they reported as well their video game play habits and generic media used the day prior to the dream. There was some indication that the high end non-gaming computer use group had more lucid (females only) and control dreams but less bizarre dreams. Unlike previous research there were no differences in nightmares or bad dreams among groups. This was discussed in terms of previous video game play and dreams research.

Keywords: computer use; dreams; virtual immersion; non-gaming computer use

1. Introduction

Life online has exploded in the last decade from promises of its potential to the actualization of each of our virtual existences. Even our dream life is now increasingly online as well as affected by our online activities.

The idea that our waking lives impact our dreaming lives is well accepted among contemporary dream researchers as the continuity hypothesis (Schredl, 2003). A new waking influence has emerged that is becoming so widely experienced that it bears further consideration in its own right. That is, digital life. One of the best research efforts tracking life online is the PEW Internet and American Life Project (PEW, 2012). They track not only internet use but also its offshoots like texting, tweeting, social media, wireless access, etc. A quick survey of recent findings by the PEW organization include how widespread wireless access is drawing more people into using their smart phones to access the internet. More than half of individuals over 65 are now online. Twitter use rates are increasing. While Facebook growth has slowed in the U.S., it is exploding overseas. Location based services are now in use by most mobile phone users. Teens, who are the heaviest users of social media, are also the most enthusiastic users of online video capabilities. Also, 71% of households play video games and YouTube is now the fastest growing news source.

What has become clear is that the specialized or early

adopter phase of digital life has passed, as it is now a major media experience in all walks of life, (Rich, 2010). Never before has a media so collectively captured our participation (Levinson, 2013). Thus simply talking about the most immersive media, video game play, and its impact on dreams seems no longer sufficient. For instance, Cirucci (2013) argues that social media users are like video game players and thus should be investigated in the same manner. The new media landscape is not a receptive and passive experience for a few hours a day. This is electronic media that pervades our lives throughout our day despite the level of our use. It is always available, and so frequently accessed that driving laws are now widely passed forbidding various forms of cell phone use while driving. Yes, of course, we have always listened to the radio in the car, but never were we tempted to interact with media to the extent we are today, no matter where we are physically. In fact, even the older "push" media are now push/pull. We call in to vote for singers, we decide who gets voted off of various reality TV shows, we talk online to each other about each new story, news or fiction, that emerges. Based upon cell phone texting, we congregate in public meeting spaces either as flash mobs or more seriously to voice concerns about government. The early call that the internet would democratize life seems on so many levels to be emerging as are attempts to control it. So if one spends several hours editing Wikipedia entries or shopping online for the perfect ceramic tile, all of our lives are increasingly digital and thus virtually experienced (Levinson, 2013).

This new digitally enhanced life we are all leading needs to be examined in the variety of ways it impacts consciousness, including dreams. It has often been pointed out that dreams are a constructed reality. Waking reality, which can be argued is also constructed (Blackmore, 2012), is the most impactful on our lives, and on our dreams according to the continuity hypothesis, but there are other constructed realities; drug use, illness, hypnosis or meditation. The difference is that never before has such a large part of the

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: October 2012

Accepted for publication: February 2014

population been affected so widely by an alternative reality for so much of the 24 hour daily cycle. In this case, a technologically constructed alternative reality. thus in this study we examine the association between non-gaming digital life and dreams.

Our focus to date on gamers is because their online life has been the most immersive, sense of being there, and interactive relative to any other online experiences. But that is no longer the case with the explosion of all forms of electronic media use. This work has been summarized elsewhere (Gackenbach, 2012). The question our lab has been asking is, "Does spending so much time in technologically constructed alternate realities change our perceptions of reality; waking, altered or sleeping?"

1.1. Previous Research into Media Use and Dreams

The question at hand here is general digital media use, other than gaming, associated with subsequent dreams similar to what has been found for video game play? This is a question that we briefly asked before (Gackenbach, 2009). In that study the strongest association to lucid and control dreaming was for video game play and interactive media but there was also a positive association for those who used a lot of audio media or audio/video media. In that study we did not specifically ask the research participants how many hours they used a computer for non-gaming. Rather, we examined their audio media use, audio/video media use and interactive media use. Herein both queries are made.

Several studies in the dream science literature have examined media use and dreaming. Two looked at TV viewing and computer games in children and their association to dreams. Van den Bulck (2004) examined Belgium adolescent's media use reports, finding that most reported pleasant dreams associated with TV viewing. While the majority said that they never have nightmares associated with TV viewing, the percent of teens responding never to nightmares was considerably higher for a question about computer game play and its association to nightmares. Schredl, Anders, Hellriegel, and Rehm (2008) asked younger children than those queried in the Van den Bulck study, 9 to 13 year olds. Schredl et al. concluded that no effect of media use could be found on subsequent dreams. Additionally, and not surprisingly, among college students Propper, Stickgold, Keeley, and Christman (2007) found an increase in dreams related to the 911 terrorist attacks associated with a day of media viewing reporting these events.

These examined media use and dreams focusing on TV viewing and/or computer games. While important to consider associations to dreams, they do not capture the range and variety of media use which is the reality of today's widely accessible media. Additionally, their queries did not ask about computer use that is NOT gaming the day before a reported dream. Media use is no longer contained within one type of media. One can watch TV shows on a smart phone and listen to the radio on your computer. Both types of questions, media use and nongaming computer use, were asked in this data collection effort. The potential effects of virtual world immersion is no longer just being experienced by gamers. The argument can still be made that gaming offers the most immersive and interactive virtual experience, but other elements of virtual life are increasingly dominating all of our lives. For instance, in one of our more recent studies, Gackenbach and Boyes (in press), examined social media use associations to typical and recent dreams. They

concluded that the high social media use and high video game play groups were most susceptible to dream incorporation if not in a negative manner. That is, both nightmare protection and better self concepts were evidenced in their dreams than among the low end media use groups.

Thus we expect some of the same pattern of dreams experienced by high end non-gaming computer use as we found in video game play research on dreams (summarized in Gackenbach, 2012). Specifically, we would expect more lucid and control dreams to the extent that immersion in online life allows practice in being in an alternative reality such as dreams. However, there was no such difference between gaming and social media groups so it may not emerge as a function of amount of computer use. While we have found at times more bizarre dreams among gamers, it may not be the case for high end non-gaming computer use as presumably the content would not be as bizarre as in video games. As for nightmares the combative element of gaming is not the norm in non-gaming computer use, so the rehearsal for threat and its apparent impact on subsequent nightmares should not occur in non-gaming computer use.

2. Method

2.1. Participants

During the academic year 2011-2012, 508 individuals entered an online survey; 267 in the fall term and 241 in the winter term. The full sample demographics were 313 women and 152 men with the remaining not providing gender information. Their ages were 19 years of age or younger for 261 and another 172 were 20 to 25 years old. Forty-three did not provide age information and the rest were older than 25. The average dream recall of the sample was between once a week to 2 to 3 times a month.

2.2. Instrument

Relevant items from the full inventory are appended.

Demographics: The first part of the online survey asked about general demographic information including gender, age, and typical dream recall.

Video Game and Dream Recall History: This part of the questionnaire asked about the research participants' video game play history. Questions asked dealt with frequency of play, length of typical play session, number of games played over a life time, and age when began playing.

Dream Collection Questions: Subjects most recent dream was collected, followed by several questions about the type of dream as well as emotions felt during the dream. Here a refined question regarding the degree of lucidity in the dreams was added.

Daily Activity: This scale had several parts beginning with video game play the day before their most recent dream which they had just reported. Other media used and other daily activities were also inquired about, as indicated in the research literature, as relevant to dream incorporation but are not all examined in this report. While there was an emphasis on media use, and especially computer and video game play use, there were also questions about activities with significant others. A subset of questions asked about the time engaged in the activity the day before the dream and the emotional valence of the activity, which were adapted from Schredl and Hofmann (2003).

2.3. Procedure

Students were given access to the online survey through their participation in Introductory Psychology mass testing research pool at a western Canadian University. Course credit was awarded, 2% of the final grade, by entering the computer management system. Thus when they were directed to the survey all identifiers were stripped and they participated completely anonymously. They then had to agree to participate by agreeing to an informed consent. They were told that there would be no loss in credit if they decided to not participate or if they dropped out at any time. Once they finished the survey or closed it, thus choosing not to continue, they were presented with a debriefing statement.

3. Results

We focused on non-gaming computer use in the day prior to the reported dream. We selected participants who were male and female and who varied in their day before the dream non-gaming computer use. Research participants were selected who either used a computer not at all or less than an hour the day before the dream they recorded or used a computer for 5+ hours. In either case, the question specifically asked how much of your day did you use "a computer for other activities (i.e., student work, information lookup, for paid work, etc)" and followed an item asking how much of their day they used a computer for video game play. Both males and females were selected. Thus 47 male low end non-gaming computer use individuals and 82 female low end non-gaming computer use individuals were chosen. The high end non-gaming computer use consisted of 10 males and 36 females.

Various descriptive variables means, standard deviations and N's are portrayed in Table 1 as a function of sex of subject and non-gaming group.

As noted above there was a difference in self-reported history of dream recall such that these young women reported more dream recall than the men but no difference in number of words in the dream or days since the dream occurred. As a result of this difference we used dream recall as a covariate in our statistical analysis. Additionally, to rule out video game effects we also controlled for the number of hours these research participants played video games the day before the dream which, as mentioned, was asked about in a separate question. Males overall reported significantly more video game play in this sample than females ($F(1,95)=10.150$, $p=.002$, partial $\eta^2=.097$; mean males=1.904, $SE=.193$, mean females=1.170, $SE=.125$). Thus we are left with groups who vary in gender and in their non-gaming computer use while controlling for the potential confounds of general dream recall and gaming hours the day before the reported dream.

3.1. Self-report Dream Types

Following the recording of their dreams, we asked the research participants to indicate their confidence about the type of dream they had reported. They were asked to rate their confidence that the dream they reported had the qualities associated with nine dream types: lucid, nightmare, control, bad, mythological, bizarre, observer, normal and video game. Research participants responded along a 7-point likert-type scale ranging from 1= not at all confident

to 7= extremely confident that they had had each type of dream. As can be seen in the appendix each dream type was defined. Across sex and computer use groups, overall confidence that they had had a specific type of dream was highest for bizarre dreams (mean=3.851, $SE=.246$) and then lucid dreams (mean=2.879, $SE=.226$) and lowest for video game (mean=1.609, $SE=.162$) and observer dreams (mean=1.988, $SE=.184$).

A sex x non-gaming computer use group ANCOVA was computed on each dream type with dream recall and number of hours playing computer games the day before the dream as covariates. For lucid dreaming an interaction approached traditional levels of significance ($F(1,120)=2.884$, $p=.092$, partial $\eta^2=.023$). It can be seen in Figure 1 that there was no difference in lucidity confidence for those who were low computer users but a big difference between the sexes for those who used the computers a lot for non-gaming purposes. That is, female computer users were more confident that they had had a lucid dream than were their male counterparts.

Additional questions designed to refine the question about lucidity, which can be seen in the appendix, were also analyzed and the analysis, using the same covariates, on becoming lucid part-way through the dream resulted in a significant interaction ($F(1,60)=10.365$, $p=.002$, partial $\eta^2=.147$). This was a subset of the larger sample so that it wasn't quite the same, and is portrayed in Figure 1. Also asked were three questions about why they became lucid (i.e., bizarreness, fear, other). These were entered into the same ANCOVA as a repeated measure and again the sex by computer use group interaction was significant ($F(1,58)=4.017$, $p=.05$, partial $\eta^2=.065$). While a subset of the original sample, it evidenced the same pattern.

High end non-gaming computer use was associated with more confidence that they had control over their dreams regardless of sex ($F(1,116)=4.023$, $p=.047$, partial $\eta^2=.034$; mean low end use=1.905 $SE=.155$, mean high end use=2.506, $SE=.258$).

There was also an effect for non-gaming computer use in terms of self-perception of the bizarreness of the dream with the low users of computers reporting more bizarreness in their dreams ($F(1,119)=3.863$, $p=.052$, partial $\eta^2=.031$; mean zero or less hours on computer=4.337, $SE=.246$, mean 5 or more hours=3.406, $SE=.407$). Differences in non-gaming computer use also interacted with the sex of the respondent ($F(1,119)=8.471$, $p=.004$, partial $\eta^2=.066$) which can be seen in Figure 2. It should be noted that there was also a sex of subject main effect which approached traditional levels of significance ($F(1,119)=2.993$, $p=.086$, partial $\eta^2=.025$; mean males=3.441, $SE=.424$, mean females=4.303, $SE=.242$) such that women saw their dreams as more bizarre than men.

This finding of computer use group differences was clearly accounted for by the males who were using computers a lot but not for gaming. Reflecting this finding was the question about normal dreams ($F(1,110)=5.852$, $p=.017$, partial $\eta^2=.051$; mean male one or less hours=2.368, $SE=.348$, mean male more than five hours=4.211, $SE=.612$, mean female one or less hours=2.607, $SE=.263$, mean female more than five hours=2.505, $SE=.324$). Here high male computer users said their dreams were more likely to be normal. There was also a main effect for sex ($F(1,110)=2.936$, $p=.089$, partial $\eta^2=.026$; mean males=3.290, $SE=.360$, mean females=2.556, $SE=.210$) and non-gaming computer

Table 1. Descriptive statistics on dream recall and history of gaming variables.

non-computer use groups	Male		Female	
	low	high	low	high
number of words per dream (no significant differences)				
mean	107.8085	58.9000	100.4878	123.4722
Standard Deviation	156.94871	65.70380	113.37366	120.14955
Number of respondents	47	10	82	36
dream recall (Sex: $F(1,171)=7.060$, $p=.009$, $\eta^2=.04$)				
mean	5.51	4.50	6.15	5.97
Standard Deviation	2.115	2.415	1.786	2.077
Number of respondents	47	10	82	36
Number of Days Since the Dream (no significant differences)				
mean	63.2273	2.2000	114.5500	263.5185
Standard Deviation	172.27081	.83666	691.77975	1134.04705
Number of respondents	22	5	40	27
history of frequency of video game play (Sex: $F(1,168)=54.993$, $p<.0001$, $\eta^2=.247$)				
mean	6.96	7.20	3.83	3.67
Standard Deviation	2.132	2.098	2.333	2.138
Number of respondents	45	10	81	36
History of number of video games played (Sex: $F(1,167)=91.129$, $p<.0001$, $\eta^2=.353$)				
mean	4.56	5.10	2.63	2.67
Standard Deviation	1.423	.876	.905	1.242
Number of respondents	45	10	80	36
History of gaming: Age began playing where high is younger (Sex: $F(1,164)=11.36$, $p=.001$, $\eta^2=.065$)				
mean	3.75	4.00	3.13	3.11
Standard Deviation	.967	.943	1.148	1.207
Number of respondents	44	10	79	35
Length of typical gaming session (Sex: $F(1,152)=26.701$, $p<.0001$, $\eta^2=.149$)				
mean	3.19	3.30	2.15	2.06
Standard Deviation	1.075	.823	1.117	1.014
Number of respondents	43	10	71	32

use ($F(1,110)=4.721$, $p=.032$, partial $\eta^2=.041$; mean one or less hours=2.487, $SE=.213$, mean five or more hours=3.358, $SE=.342$). Males were more likely to say their dream was normal as were those who used the computer a lot for non-gaming purposes.

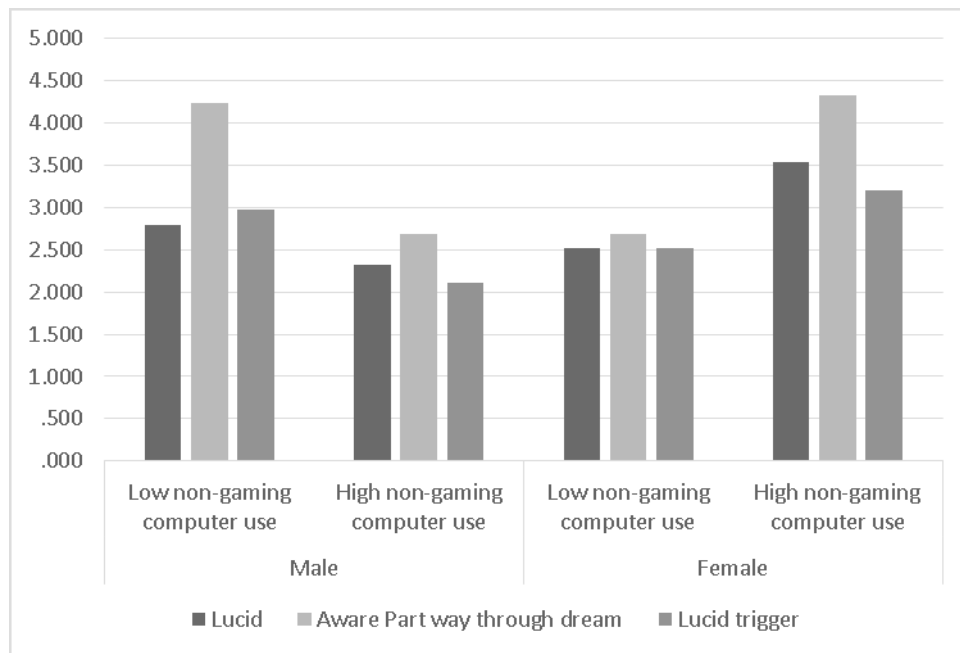
There were no computer use differences in nightmares ($F(1,113)=2.389$, ns). There was however, a sex difference in reporting the dream as a nightmare ($F(1,113)=4.229$, $p=.042$, partial $\eta^2=.036$; mean males=1.845, $SE=.424$, mean females=2.898, $SE=.257$) with females reporting more confidence that their dream was a nightmare. No differences were found for bad ($F(1,115)=1.145$, ns), mythological ($F(1,117)=.779$, ns), observer ($F(1,116)=.595$, ns) or video game dreams ($F(1,110)=.465$, ns).

Finally, two related analysis include feelings about their computer use and other media used the day before the

dream. When these four groups of individuals were compared on their feelings about using a computer for non-gaming purposes the day before the dream, the high non-gaming computer users were slightly more likely to report it as a positive experience than the low end users ($F(1,123)=3.296$, $p=.072$, partial $\eta^2=.026$; low group: mean=3.381, $SE=.111$; high group: mean=3.757, $SE=.175$).

Regarding other media use a 2 (sex of subject) x 2 (non-gaming computer use groups) x 3 (type of media used) ANOVA was computed. There were three main effects: type of media use ($F(1,128)=10.707$, $p=.001$, partial $\eta^2=.077$; mean auditory media time= 3.780, $SE=.151$, mean auditory visual media time=3.819, $SE=.182$, mean interactive media time=3.118, $SE=.162$); sex ($F(1,128)=4.995$, $p=.027$, partial $\eta^2=.038$; mean males=3.822, $SE=.193$, mean females=3.323, $SE=.113$) and non-gaming computer use

Figure 1. Types of dream lucidity measures as a function of sex of subject and non-gaming computer use groups with dream recall and hours played video games the day before the dream controlled..



groups ($F(1,128)=19.181$, $p<.0001$, partial $\eta^2=.130$; lows mean=3.083, $SE=.119$, highs mean=4.062, $SE=.189$). Finally, the media use \times sex of subject interaction was significant ($F(1,128)=5.990$, $p=.016$, partial $\eta^2=.045$; mean males auditory media time=3.833, $SE=.260$, mean males auditory visual=3.967, $SE=.314$, mean males interactive media=3.667, $SE=.279$, mean females auditory media time=3.726, $SE=.153$, mean females auditory visual=3.672, $SE=.185$, mean females interactive media=2.570, $SE=.164$). As we have found with our gaming data, high end electronic media users access a wide variety of such media (Gackenbach, 2009).

4. Discussion

In this inquiry computer use that was not for video game play, the day prior to a dream, was considered in its relationship to dream type. Previous work has focused upon gaming type computer use and dream type, but with the ubiquitous use of computers in today's society this broader inquiry was undertaken. Non-gaming computer use groups were identified as low (one hour or less) and high (five plus hours) from the day prior to the dream and ANCOVA's for sex by computer use groups were undertaken on self report confidence of having had several dream types. Covariates were self reported dream recall and number of hours playing a video game the day prior to the reported dream. Of the nine types of dreams asked about five evidenced a main effect or interaction.

Unfortunately, we only have limited information on what respondents did on their computers other than what they did not do, play video games. Generic questions were asked about total amount of general media use the day prior to the dream. All subjects were most likely to report audio media use which included land line or cell phone; car, stand alone, internet or satellite radio; or CD/MP3 player. Additionally, males reported the use of all media more than females and the high non-gaming computer use group reported more

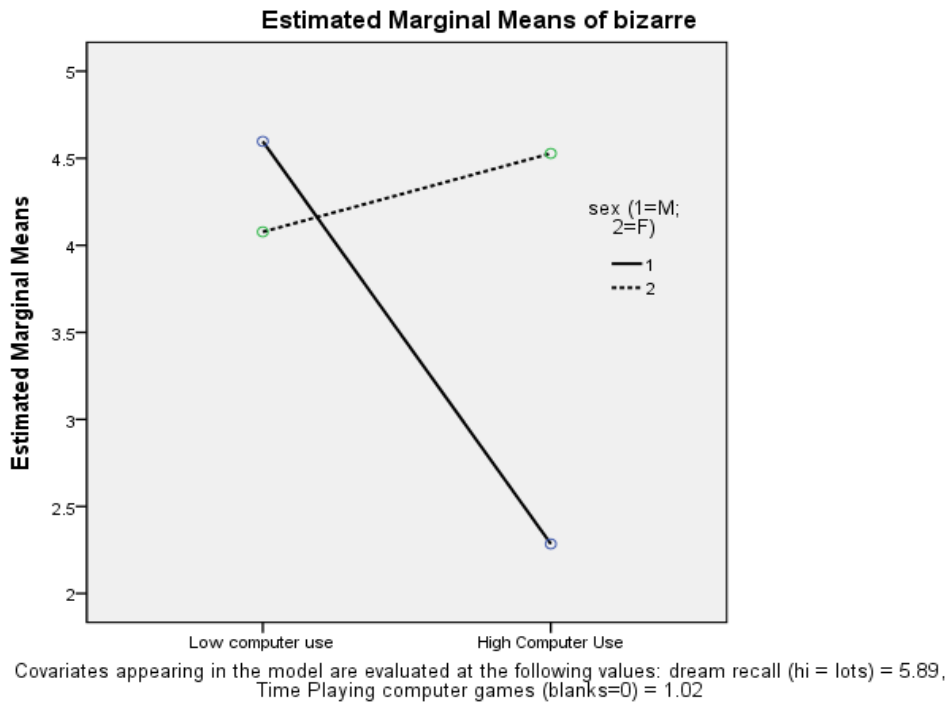
overall media use than the lows. There was an interaction between sex and non-gaming computer use groups such that the low end group evidenced little difference in media use across sex. While both sexes reported more media use in the high end non-gaming computer use group, this was pronounced for the males.

Given that they are college students it may be that a fair amount of their computer time was on university studies which we have found in another study at the same institution in western Canada (Swanston & Gackenbach, 2011). We could also suggest that various social media may be taking up their time as is increasingly evident in the literature on media use (Clipson, Wilson, & DuFrene, 2012), including sex differences in the use of social media. Thus the sex difference in lucidity may be because women typically spend more time in social media than men. Social media use, it can be argued, is more engaging than other computer mediated types of use given its wide dispersal (Guitton, 2012). It could also be due to the small number of men reporting a lot of non-gaming computer use in this sample. Lucid dreaming has been associated with high end video game play in some previous research from our laboratory (Gackenbach, 2009).

In terms of the dream control finding of high non-gaming group reporting more control dreams than the lows, this is similar to findings with high end video game players who repeatedly report more dream control (reviewed in Gackenbach, 2012). While video game play time was controlled in this investigation, none-the-less a high degree of computer use offers a practice in controlling ones experience of a virtual world. While not a fully articulated virtual reality as occurs in gaming, none-the-less it is a virtual world where the notion that one has control over what one does while on the computer is well entrenched and thus not surprisingly may be translating to a perception of dream control.

In terms of the bizarreness interaction, our research found that bizarreness was higher for video game players than non-players (Gackenbach, Kurvilla, & Dopko, 2009; Gack-

Figure 2. Sex by non-gaming computer use groups ANCOVA with dream recall and number of hours playing a video game as covariates on confidence that dream was bizarre..



enbach & Dopko, 2012) but this was followed by a failure to replicate (Gackenbach, Kurvilla, Ferguson, Mathewson, & Darlington, 2014). Here high end non-gaming computer use by males was associated with the least bizarreness in their dreams than any of the other three groups. It is not surprising that video game play would be associated with bizarre dream content while high end non-gaming computer use would not be so associated as presumably the tasks undertaken are rather ordinary relative to those in a video game. This is conjecture as we do not know specifically what they were doing, but we do know that they were the heaviest media users.

The lack of computer use differences in nightmares is interestingly. Data from this same inquiry examining those who played a video game the day before the dream versus those who did not found that gaming, was associated with less confidence that they experienced a nightmare for men but not for women (Gackenbach, Ferguson, Mathewson, & Darlington, 2012). This finding is consistent with other research by our group on gaming as potentially a nightmare protection, at least in males (Gackenbach, Ellerman, & Hall, 2011). Computer use alone seems not to provide that potential protection which makes sense if one considers combat centric gaming as practice for fighting back in a chase type dream, the most frequent scenario of nightmares.

Additionally, and not surprisingly, video game content has been found more often in those who play video games than in those who do not (Gackenbach, Sample, & Mandel, 2011). Since video game play was controlled in this inquiry, the lack of video game type dreams is not surprising.

4.1. Limitations and Conclusion

While we selected extreme groups in order to examine the relationship of non-gaming computer use to subsequent

dreams, a few additional limitations need to be kept in mind. There were more women than men but we were able to find ten men who used the computer a lot but for non-gaming purposes. Also, the data is all self-report about the dream and the previous day's activities. While there was a range of time delays from the dream to it's telling, there were no group differences in such delays. None-the-less any delay becomes problematic in terms of the accuracy of the dream and waking activity memories. The question becomes, how reliable are such self-reports? We can say that the students had no reason to lie as they got course credit whether or not they answered any of the items. Additionally, all questions were asked completely anonymously (i.e., credit was awarded prior to participating in the online survey). But lying may not be at issue, so much as unconscious distortion over time since the dream. Finally, the unequal cell sizes and the small number of male low end non-gaming computer users is problematic.

Because this data is correlational, we cannot say that non-gaming computer use causes any of these dreams. We can say there is an association between non-gaming computer use and some dream types, specifically lucid, control and bizarre dreams. However, unlike the gaming studies, the pattern of dream types was inconsistent across computer use groups. Specifically, lucid dreams were marginally most likely to be reported by female high end non-game computer users than any of the other three groups. Among gamers we sometimes find high end gamers report more lucid dreams but they also tend to be male.

Control dreams were seen as highest in the non-game computer user groups and in previous research in the gamer groups, and as noted, this may be more a function of waking practice in controlling virtual worlds of varying types. Bizarre dreams were reported herein by the few male low end non-game computer users, while among gamers, who

are largely male, bizarreness associations have had mixed results.

Nightmares evidenced no group differences but among gamers we have found either fewer nightmares or less threatening nightmares (reviewed in Gackenbach, 2012). In this sample video game dreams were not found to evidence group differences. This is not surprising since gaming amount was a covariate.

The major consistency in this data, compared to our previous gamer data, seems to be for lucid (female) and control dreams. While early, and only suggestive, this effect may be as much a function of simply being in these virtual realms, whether or not it is in a game. A recent study from our laboratory (Gackenbach & Boyes, in press) examined social media use versus video game play in an attempt to cull what types of electronic media experiences are happening beyond gaming and what effects might these have on dreams. Social media use and game play group differences seemed to support the nightmare protection thesis of video game play such that high end gaming, no matter the degree of social media use, suffered less from these negative types of dreams. Additionally, the high video game play and high social media use group had the thinnest psychological boundaries and thus were perhaps most susceptible to media effects. While at the same time this group of high end media users showed the least negative self concepts in their recent dream content.

Finally, as computer mediated communication becomes ubiquitous, overlapping and in some cases just about replacing face to face interactions, the implications for associated dreams become important to understand. Such dream shifts, be they simply content or more generically type, are important to understand in terms of clinical implications as well as personal well being.

References

- Blackmore, S. (2012). *Consciousness: An Introduction* (2e). Oxford: Oxford University Press.
- Cirucci, A. M. (2013). First person paparazzi: Why social media should be studied more like video games. *Telematics and Informatics*, 30(1), 47-59.
- Clipson, T. W., Wilson, S., & DuFrene, D. D. (2012). The Social Networking Arena: Battle of the Sexes. *Business Communication Quarterly*, 75(1), 64-67. doi:10.1177/1080569911423961
- Gackenbach, J.I. (2009) Electronic media and lucid-control dreams: Morning after reports. *Dreaming*, 19(1), 1-6.
- Gackenbach, J.I. (2012). Video game play and dreams. In Barrett, D. & McNamara, P. (Eds.) *Encyclopedia of Sleep and Dreams*. Santa Barbara, CA: ABC-CLIO.
- Gackenbach, J.I. & Boyes, A. (in press). Social media versus gaming associations with typical and recent dreams. *Dreaming*.
- Gackenbach, J.I. & Dopko, R. (2012). The Relationship between Video Game Play, Dream Bizarreness, and Creativity. *International Journal of Dream Research*, 5(1), 23-36.
- Gackenbach, J.I., Ellerman, E. & Hall, C. (2011). Video Game Play as Nightmare Protection: A Preliminary Inquiry in Military Gamers. *Dreaming*, 21(4), 221-245.
- Gackenbach, J.I., Ferguson, M., Mathewson, K., & Darlington, M. (2012, June). History of gaming and daily activities as predictors of nightmares. Poster presented at the annual meeting of the International Association for the Study of Dreams, Berkeley, CA.
- Gackenbach, J. I., Kuruvilla, B., & Dopko, R. (2009). Video game play and dream bizarreness. *Dreaming*, 19(4), 218-231.
- Gackenbach, J.I., Kuruvilla, B., Ferguson, M.L., Mathewson, K. & Darlington, M. (2014). Gamer Links to Dream Bizarreness and Lucidity: A Failure to Replicate. *International Journal of Dream Research*, 7(1), 67-71.
- Gackenbach, J.I., Sample, T., & Mandel, G. (2011). The continuity versus discontinuity hypotheses: A consideration of issues for coding video game incorporation. *International Journal of Dream Research*, 4(2), 63-76.
- Guitton, M.J. (2012). The immersive impact of meta-media in a virtual world. *Computers in Human Behavior*, 28(2), 450-455.
- Levinson, P. (2013). *New New Media* (2nd edition), NY: Penguin.
- PEW (2012). PEW internet and American Life Project. Retrieved from <http://pewinternet.org/>.
- Propper, R.E., Stickgold, R., Keeley, R. & Christman, S.D. (2007). Is television traumatic?: Dreams, stress, and media exposure in the aftermath of September 11, 2001. *Psychological Science*, 18(4), 334-340.
- Rich, L. (2010) Shiny new things. Retrieved from http://adage.com/images/bin/pdf/shiny_new_things.pdf.
- Schredl, M. (2003). Continuity between waking and dreaming: A proposal for a mathematical model. *Sleep and Hypnosis*, 5(1), 26-39.
- Schredl, M. & Hofmann, F. (2003). Continuity between waking activities and dream activities. *Consciousness and Cognition: An International Journal*, 12(2), 298-308.
- Schredl, M. Anders, A., Hellriegel, S. & Rehm, A. (2008). TV Viewing, computer game playing and nightmares in school children. *Dreaming*, 18(2), 69-76.
- Swanston, D. & Gackenbach, J.I. (2011, June). Morning After Dreams of Video Game Play versus Meditation/Prayer. Paper presented at the annual meeting of the International Association for the Study of Dreams, The Netherlands.
- Van den Bulck, J. (2004). Media use and dreaming: The relationship among television viewing, computer game play, and nightmares or pleasant dreams. *Dreaming*, 14(1), 43-49.

Appendix

Relevant Items from Online Survey

Part 1. General and Demographic Information

There are three parts to this survey. In this first part you are asked for general background information.

Sex

- male (1)
- female (2)

Age

- 19 years old or younger (1)
- 20 to 25 years old (2)
- 25 to 30 years old (3)
- 30 to 39 years old (4)
- 40 years old or older (5)

How often do you typically recall your dreams?

- Never (1)
- Once a Year or Less (2)
- Several Times a Year (3)
- Once a Month (4)
- 2-3 Times a Month (5)
- Once a Week (6)
- 2-3 Times a Week (7)
- 4-6 Times a Week (8)
- Daily (9)

Part 2: Video Game Habits/Experiences: A video game is any game played with a media interface, such as TV, computer, game console, or hand held devise.

How often do you typically play video games?

- Never (1)
- Once a Year or Less (2)
- Several Times a Year (3)
- Once a Month (4)
- 2-3 Times a Month (5)
- Once a Week (6)
- 2-3 Times a Week (7)
- 4-6 Times a Week (8)
- Daily (9)

How long is your typical playing session? (skip if you never play video games)

- 20 minutes or less (1)
- Less than an hour but longer than 20 minutes (2)
- one to two hours (3)
- two to four hours (4)
- more than four hours (5)

How many different video games in any formats have you played to date?

- none (1)
- 1 to 5 (2)
- 6 to 20 (3)
- 20 to 50 (4)
- 50 to 100 (5)
- over 100 (6)

How old were you when you played your first video game?

- grade 10 to grade 12 or later (1)
- grade 7 to grade 9 (2)
- grade 4 to grade 6 (3)
- kindergarten to grade 3 (4)
- before kindergarten (5)

Part 3: Daily Activity and Dream Collection Questionnaire

The rest of this survey deals with your most recent dream, preferably last nights dream, and the activities you engaged in the day prior to that dream. You will also be asked to answer various questions about the dream you record.

What is your most recent dream?

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:

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

If you had more than one dream last night or recently use the dream which had the biggest impact upon you. Be sure to report ONLY ONE DREAM. .

What was the date of this dream?

- 1 (1)
- 2 (2)
- 3 (3)
- 4 (4)
- 5 (5)
- 6 (6)
- 7 (7)
- 8 (8)
- 9 (9)
- 10 (10)
- 11 (11)
- 12 (12)
- 13 (13)
- 14 (14)
- 15 (15)
- 16 (16)
- 17 (17)
- 18 (18)
- 19 (19)
- 20 (20)
- 21 (21)
- 22 (22)
- 23 (23)
- 24 (24)
- 25 (25)
- 26 (26)
- 27 (27)
- 28 (28)
- 29 (29)
- 30 (30)

31 (31)
 unsure (32)
 What was the month of this dream?

Jan (1)
 Feb (2)
 Mar (3)
 Apr (4)
 May (5)
 Jun (6)
 Jul (7)
 Aug (8)
 Sep (9)
 Oct (10)
 Nov (11)
 Dec (12)
 unsure (13)

What was the year of this dream?

earlier than 1995 (1)
 1995 to 1999 (2)
 2000-2004 (3)
 2005-2007 (4)
 2008-2009 (5)
 2010 (6)
 2011 (7)
 2012 (8)
 unsure (9)

The next set of questions ask about various activities you engaged in the day prior to the dream you just reported.

How much time did you use auditory only media (i.e., land line or cell phone, car, stand alone, internet or satellite radio, CD or MP3 player) the day before this dream diary entry?

no time (1)
 less than 1 hour (2)
 1 to 2 hours (3)
 2 to 4 hours (4)
 4 to 6 hours (5)
 6 to 8 hours (6)
 8 to 10 hours (7)
 more than 10 hours (8)

How much time did you use auditory and visual media (i.e., television, DVD, movie – if watched on the internet do not include that time here) the day before this dream diary entry?

no time (1)
 less than an hour (2)
 1 to 2 hours (3)
 2 to 3 hours (4)
 3 to 4 hours (5)
 4 to 6 hours (6)
 6 to 8 hours (7)
 8 to 10 hours (8)
 more than 10 hours (9)

How much time did you use interactive media (i.e., internet or video game play either on console, handheld or computer) the day before this dream diary entry?

no time (1)
 less than an hour (2)
 1 to 2 hours (3)
 2 to 3 hours (4)
 4 to 6 hours (5)

6 to 8 hours (6)
 8 to 10 hours (7)
 more than 10 hours (8)

Were you playing a video game during the day before this dream diary entry?

No (1)
 Yes (2)

If you answered yes you had played a video game the day before the dream, please indicate which game you played the longest:

How long was this playing session?

no time (1)
 less than 1 hour (2)
 1 to 2 hours (3)
 3 to 4 hours (4)
 5 to 6 hours (5)
 7 to 8 hours (6)
 9 to 10 hours (7)
 more than 10 hours (8)

Please list all other games played the day before this dream.

How long in total were the playing sessions of all other games played?

no time (1)
 less than an hour (2)
 1 to 2 hours (3)
 3 to 4 hours (4)
 5 to 6 hours (5)
 7 to 8 hours (6)
 9 to 10 hours (7)
 more than 10 hours (8)

These questions continue to deal with activities the day before the dream but they are more broadly based.

Identify how much of your day you did each of these activities.

less than an hour (1)
 1-2 hours (2)
 3-4 hours (3)
 5-6 hours (4)
 7-8 hours (5)
 9-10 hours (6)
 more than 10 hours (7)

Playing computer games (1)

using a computer for other activities (i.e., student work, information lookup, for paid work, etc) (2)

Rate each activity in terms of it's emotionality for you in general. negative emotions (1) somewhat negative (2) neutral (3) somewhat positive (4) positive emotions (5)

Playing computer games (1)

using a computer for other activities (i.e., student work, information lookup, for paid work, etc) (2)

How would you classify the dream you just reported upon?

Various dream elements can occur in the same dream. Indicate all that apply in terms of how confident you are in your classification of the dream:

Not at all confident (1) Barely confident (2) Somewhat confident (3) Moderately confident (4) Very confident (5) Highly confident (6) Extremely confident (7)

Lucid dream - I knew I was dreaming DURING the dream. (1)
Nightmare dream - The dream woke me up because it was so frightening. (2)

Control dream - I was able to control the dream. (3)

Bad dream - The dream was frightening but not enough to wake me up. (4)

Mythological/spiritual dream - The dream had a sense of importance, awe and fascination for me. (This type of dream may resemble or seem like mythology, or fairy tales, or be felt to have a scared/spiritual significance.) (5)

Bizarre dream - This is an out of the ordinary dream that had impossible, unlikely, and/or inconsistent features. (6)

Observer dream - During the dream I watched the activities from the third person perspective. (7)

Normal dream - This dream does not fit into any of the above categories. (8)

Video game dream - This is a dream where you think that a video game was part of the dream. (9)

These next few questions about your dream are further refinements of the last type of dream questions.

If you think you may have had a lucid dream, a dream where you knew you were dreaming, please answer these additional questions. Otherwise skip this question and move on to the next one.

Not at all confident (1) barely confident (2)
somewhat confident (3) moderately confident (4) very confident (5) highly confident (6) extremely confident (7)

a. I was aware that I was in a dream throughout the course of the dream. (1)

b. I became aware part way through the dream that it was a dream. (2)

c. I became aware that it was a dream part way through the dream because of the bizarren dream content. (3)

c. I became aware that it was a dream part way through the dream because of the fearful content. (4)

c. I became aware that it was a dream part way through the dream because of other content elements not mentioned above. (5)