EFFECTS OF VIDEO GAME PLAY VERSUS MEDITATION/PRAYER IN WAKING AND DREAMING EXPERIENCES

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ABSTRACT: Gackenbach (2008) hypothesized that video game play (VGP) may offer similar effects on consciousness as the practice of meditation. Based on various attention findings with both practices, VGP and meditation/prayer (M/P) were examined through the context of dream reports, change blindness tasks, and subjective reports of the effects of each practice in waking life. Although the dream content evaluation results were mixed, performance on the waking attention task was superior for gamers while self-reports of activity effects were highest for the M/P group. Experienced gamers reported experiencing higher levels of dream control in comparison to M/P practitioners. There was also a marginal difference found in dream lucidity favoring the M/P group. Gamers still reported more lucidity than controls. These findings imply that the absorbing qualities of VGP and M/P may share a similar role in their effects on consciousness.
KEYWORDS: video games, meditation, prayer, attention, change blindness, absorption, mindfulness, dreams, lucid dreams.

Today, technology is a gateway to various experiences that were previously either unavailable or more difficult to attain. Accordingly, it is worthwhile to examine some of the transpersonal implications of technology use. In her 2008 study, Gackenbach hypothesized that video game play (VGP) may offer some of the same effects as the practice of meditation based on findings in the early gaming literature (Greenfield, 1996) as well as her dream lucidity and control research on gamers and meditators (Gackenbach, 2006, 2008; Gackenbach & Bosveld, 1989). Furthermore, previous research that has examined meditation and video games independently has shown interesting parallels between the two practices.

Video gaming and lucid dreaming have both been associated with improved spatial skills (Gackenbach, Heilman, Boyt, & LaBerge, 1985; Sims & Mayer, 2002; Subrahmanyam & Greenfield, 1994). The high attention and absorption reported by video game players (Boot, Kramer, Simons, Fabiani, & Gratton, 2008; Glicksohn & Avnon, 1997-98) is reminiscent of similar effects in meditation (Holzel & Ott, 2006; Weinstein & Smith, 1992). Meditators have been found to have high levels of lucidity in sleep (Gackenbach & Bosveld, 1989; Hunt, 1989; Mason, Alexander, Travis, Gackenbach, & Orme-Johnson, 1995) as have gamers (Gackenbach, 2006). Gackenbach (2012) posits that a lengthy exposure to video games is essentially the same as being in an alternate reality,

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virtual in this case. This in turn may act as a cultural amplifier fostering alternative states of consciousness. Extant research has shown that VGP has the potential to alter a broad range of human mental functioning including significant advances in attention and cognitive ability in both the long and short term (Green & Bavalier, 2003).

When gamers are fully immersed in the virtual reality of a video game, they are experiencing what is called *presence*, defined as a felt sense of 'being there' in the moment. Presence may be comparable to *absorption*, a psychological construct that describes an alternative state of consciousness in waking reality (Preston, 1998, 2007). When gamers are absorbed and experience presence, they may also experience flow, where action and awareness merge, a high sense of control and temporal distortions occur, and the activity is intrinsically rewarding (Csikszentmihalyi, 1990). Gamers' experiences, in turn, may be analogous to the mindfulness states found during deep meditative states (Gackenbach & Bown, 2011).

In a 2011 study conducted by Gackenbach and Rosie, gamers experienced a sense of immersion and presence that appeared to parallel what they experienced dreaming. Thus, the similar states of consciousness experienced in a virtual gaming world and a biological dream world may translate to greater control in the video game world and, subsequently, to greater ego control in the dream world. This speculation draws upon the Game Transfer Phenomena (GTP) concept (Ortiz de Gortari & Griffiths, 2012); in video games immersion triggers subsequent emotions, thoughts and behaviors that are transferred from the virtual gaming world to reality and dreaming. The potential effect video games have on attention/absorption opens a window that may give more people access to previously unavailable aspects of consciousness (Gackenbach, 2012). Therefore, video games today may be considered self-sufficient cultural amplifiers that support the growth of consciousness.

Meditation/Prayer

Meditation is an essential component of Eastern spiritual disciplines as well as many Western contemplative religious traditions. Practitioners train in meditation as a means to expand their conscious awareness of their global surroundings, optimize states of psychological well-being and heighten overall consciousness (Walsh, 1983). Neuro-cognitive research suggests that meditation is capable of facilitating long-term attentional and emotional benefits (Lutz, Slagter, Dunne, & Davidson, 2008). Furthermore, Holzel and Ott (2006) found that psychological absorption predicted meditative depth more strongly than years of practice. In his 2009 article, Shapiro suggested matching subjects of the same demographic on alternative attentional practices for the purpose of understanding how meditation affects consciousness. Thus, VGP may be conceptualized as a viable alternative practice, as gaming requires high levels of attention.

There are other elements of gaming that also show similarities to meditative practice. On a physiological level, it has been shown that casual video games

(e.g., Bejeweled 2, Bookworm Adventures, Peggle) can significantly decrease tension, depression, anger, fatigue, confusion, and physical stress while simultaneously increasing mood state and vigor (Russoniello, O'Brien, & Parks, 2009). These findings support the similar functional relationship shared by various video game genres and different meditation forms. Gackenbach (2008) asserts that while both meditation and gaming can induce trance-like states, video games cater to a larger population with immediate rewards and engaging stimuli. Alternatively, meditation requires individual patience and perseverance, and, while it offers a deeper transcendence, it is, consequently, less accessible.

Praying, like meditation, is a spiritual practice that affects practitioners' consciousness. Research has shown that those who pray regularly experience various benefits, such as reducing stress, pain, depression and anxiety (Laird, Snyder, Rapoff, & Green, 2004; McCullough, 1995). Egoless prayer may work similarly to certain forms of meditation, namely, meditation that facilitates the negation of ego and opens the individual to a transcendent state, which is physiologically or psychologically beneficial (Brown & Ryan, 2003). The state of being egoless appears to be a key component in both prayer and meditation. Both may enhance focus and mindfulness, which is described as looking deeply into the present and paying attention as if it really matters. Hoffman and Hoffman (2006) argue that mindfulness is another key component in both prayer and meditation. Therefore, since prayer has been shown to improve quality of life similar to the benefits of meditation, some forms of prayer have been used as synonymous to meditation in this inquiry.

Dreams

In addition to the apparent influence of video games on waking consciousness, video games may also play a functional role in the emulation of threat simulation typically experienced in dreams (Gackenbach & Kuruvilla, 2008; Revonsuo & Valli, 2000). Nightmares in particular have been suggested to have the evolutionary function of training the individual to deal with threatening events within a biologically fabricated alternate reality. Experienced video game players tend to be less victimized by nightmare scenarios. It has been speculated that the realistic qualities of modern video games may also serve as an electronically mediated alternative to the threat simulation experienced in dreams. Therefore, VGP may be an effective method of nightmare rehearsal in a wakened state, which helps to ease the persistence and intensity of actual nightmares (Gackenbach, Ellerman, & Hall, 2011; Gackenbach & Kuruvilla, 2008; Krakow et al., 2000). This effect may be due to the dual mechanisms of dream lucidity and control. That is, upon recognizing that one is dreaming it becomes easier to control the dream and thus not be a victim of the nightmare.

The aim of the present study was to explore the underlying similarities between VGP and meditation/prayer (M/P) with respect to their impact on consciousness in waking and dream states. Waking effects were assessed by subjects' performance on an attentional task and their attitudes towards their practice.

If no difference existed between VGP and M/P, then we would expect there to be no difference between the groups' performances. Attitudes towards these practices, however, may differ as social acceptance of M/P is generally more positive than it is for VGP. As for the dream effects, it was expected that both groups would score higher than the control group (CON) in dream lucidity and dream control but lower on nightmares (Gackenbach, 2012; Gackenbach & Hunt, 2014; Hunt, 1989).

Participants

The participants were drawn from a psychology subject pool at a western Canadian university. Participating students were awarded up to 6% credit towards their overall grade: 2% for completing the laboratory session and 2% each for reporting two dreams with the accompanying questionnaires online.

Potential research participants were pre-screened through the Department of Psychology's subject management system (SONA). To qualify for participation all subjects had to report high dream recall. Three additional criteria were utilized for group assignment: high frequency of VGP but low frequency of

M/P, high frequency of M/P but low frequency of VGP and low frequency of both VGP and M/P (i.e., control group [CON]). Participants with sensitivity to computer screens or epileptic symptoms were also excluded.

Students (1,755) were pre-screened with 1,179 (67%) being female, 564 (32%) being male and 12 (1%) who declined to identify their sex. Most participants (63%) fell into the age range of 18-20, followed by 21-25 year olds (26%). Of the 1,755 students pre-screened, 344 qualified to participate in the study. This group was further reduced by students either not agreeing to participate in the study at the prescreen consent phase ($n=17$) or not providing sufficient contact information ($n=32$) or having emails bounced back or not responded to for laboratory session scheduling ($n=48$). Thus, 247 were potential participants.

These 247 prescreened potential participants included 97 in the CON group, 76 in the M/P group, and 74 in the VGP group. Some participants, however, did not sufficiently engage in the activities designated by their group based on the prescreening, most often prayer, while others were involved in multiple activities. Accordingly, the group's criteria were narrowed. That is, the M/P group had little or no gaming, the VGP group engaged in little or no meditation or prayer, and the CON group engaged in little or no M/P practices or VGP. These were based upon the subjects' overall assessment of their behaviors collected in the pre-screening and not on specific behaviors the day prior to reporting a dream. This left 173 who actually participated in the laboratory phase of this study.

These included 114 (66%) females and 59 (34%) males. The CON group consisted of 76 participants with 58 (76%) being female and 18 (24%) being male. The M/P group contained 45 subjects with 40 (89%) being female and

5 (11%) being male. Finally, the VGP group had 52 participants with 16 (31%) being female and 36 (69%) being male. Only 117 of these 173 reported age information, with the majority of each group being 18 to 20 years of age (CON=72%; M/P=71%; VGP=64%). Another big segment of each group were 21 to 25 years of age (CON=20%; M/P=18%; VGP=34%). The remaining subjects in each group were over 25 years of age (CON=8%; M/P=11%; VGP=2%). Two-thirds of participating VGP were male, and upwards of ninety percent of M/P participants were female, demonstrating the existence of a gender bias in this sample. Sex of subject was treated as a covariate because of the small number of males in the M/P group. It should be noted that not all participants reported all data, and, thus, the number of respondents varies as a function of the dependent variable.

Materials

Pre-Screening Inventory

This inventory assessed each participant's video game activity, meditation and prayer habits and participant's ability to recall dreams for group assignment. Three demographic questions in the pre-screening survey recorded participant's sex, age, and stimuli sensitivity. These questions were followed by video game history questions, which included frequency of play, length of play, age begun play, and current genre preference (Gackenbach & Bown, 2011). Following the video game questions, three dream recall items asked about general recall, last week's recall, and last night's recall.

Next, the M/P items were offered. Subjects were asked to indicate the frequency with which they practiced two types of meditation and six types of prayer. The two meditation types, Focused Attention and Open Monitoring, were taken from Raffone and Srinivasan's 2010 research. Focused Attention Meditation (i.e., concentration) entails the voluntary focusing of attention on a chosen object. Open Monitoring Meditation (i.e., mindfulness) involves nonreactive monitoring of the content of experience from moment to moment. There were three items in this scale including other types of meditation ($\alpha = .62$). This category was for those who were run in the laboratory portion of the study. The six prayer types were taken from Whittington and Scher's 2010 study and included:

1. *Receptive prayer*, which involves passively awaiting divine wisdom, understanding or guidance;
2. *Adoration*, which focuses on the worship and praise of God, without reference to specific circumstances or needs;
3. *Thanksgiving*, where one expresses gratitude for life circumstances;
4. *Confession*, which involves acknowledging faults, misdeeds, or shortcomings (i.e., sins);
5. *Supplication*, the most common type, which involves requests for God's intervention in specific life events for oneself or others; and
6. *Obligatory*, prayers required by some religions that consist primarily of fixed prayers repeated at each worship time.

These six items had a Cronbach's alpha of .88 for those who were run in the laboratory portion of the study.

The final part of the pre-screening inventory collected participants' contact information including name, email address and phone. It was explained that this information would be kept confidential and was being collected in case a participant qualified for the full study. Participants were also asked to provide an alias, a user name that could not be connected to them directly but that allowed information gathered across the study to be collected.

Change Blindness Stimuli

The perception of stimuli in the environment is limited by the attentional capacity of the perceiver. Change blindness is a perceptual phenomenon that demonstrates how the attentional awareness of an individual is determined by an individual's perceptual sensitivity to stimuli. There were six online change blindness tasks that illustrated change blindness. Each started with a 17-second tutorial explaining change blindness, followed by the change blindness task, and ended with a reveal of the change at the 48-second mark. The reveal was initiated by a blue pop-up saying "and the change is …" after which the grey distraction screen was removed from the video. The change that occurred in the task continued to flicker, making the change more apparent. Each video was approximately 66 seconds long. The tasks were designed as a measure of participants' level of attention while viewing a change blindness task on a projection screen. The change blindness response sheet gathered the change detection time, location of change and verbal description of the change.

Effects of Meditation-Prayer/Gaming/Involving Activity Scale

Reavley and Pallant's (2009) activity scale was designed for the assessment of meditation. Instructional changes, however, allowed the scale to be used for each of the three groups. The scale investigated the participants' beliefs about their absorbing practice, namely M/P, VGP, and self-defined (i.e., CON group). Questions focused on the participants' subjective experience of emotions, perceptions and sensations while engaging in their respective activities.

The scale was divided into two sections: 'experiences during the activity' and 'effects of the activity in everyday life.' Items on both scales were responded to in terms of a 7-point Likert type response scale with 1 representing *almost never*, and 7 representing *almost always*. The 'experiences during the activity' scale had 29 items, which were scored as five subscales: eight items for cognitive effects (α=.64), six items for emotional effects (α=.75), five items for mystical experiences (α=.70), five items for relaxation (α=.60) and five items for physical discomfort (α=.59). A few items included statements like "my perceptions are clearer," "I experience feelings of tension and anxiety" and "I am able to let my thoughts go and not get caught up in them." The 'effects of the activity in everyday life' scale had 35 items. It was scored in terms of seven

subscales, each of which had five items: physical (α=.71), emotional (α=.76), expanded consciousness (α=.81), social relations (α=.81), cognitive ability (α=.77), non-judgmental acceptance (α=.70) and behavioral habits (α=.65). Examples of statements included "I feel a sense of awe and wonder," "I am more aware of body sensations and responses," or "I am less depressed." The Cronbach alphas for this sample were at or slightly below those suggested by the scale's authors (α=.68 to .87).

Dream Recall Tips Handout (Dopko, 2009)

This handout offered various techniques for improving dream recall as well as methods for keeping a dream diary.

Media Use and Dream Collection Questionnaire

This online survey was implemented using the online survey tool Qualtrics. The questionnaire probed the use of any type of electronic media, VGP, M/P, and the control activity chosen by the control group the day before the dream report. Participants then reported and completed three scales about their dreams.

Participants were asked to record their type of attentional practice (i.e., VGP, M/P, or alternate activity chosen by the CON group) and the amount of time spent on their activities the day preceding their dream recording. The level of detail about each attentional activity was asked about in similar detail as in the pre-screening inventory. Media usage, other than gaming, was collected at the beginning of the questionnaire (i.e., audio, video and interactive).

Detailed instructions were then given to the participants on how to report their dreams. Following the dream report, the first set of questions asked participants what type of dream they had drawn from (i.e., lucid, control, nightmare, bad dream, mythological, bizarre, observer, and normal) (Gackenbach, 2006). Each dream type was defined in the question and a 7-point Likert scale was used to gauge the participants' confidence in their dream type assessment. These dream types were not expected to constitute an internally consistent scale as dream types range widely and are rarely correlated. Indeed, the Cronbach's alpha was −0.07.

Participants assessed the intensity of a range of emotions experienced during the dream choosing field of 15 emotions (i.e., anger, awe, arousal [sexual], anxiety, fear, guilt, frustration, sadness, hatred, happiness, jealousy, embarrassment, ecstasy, downhearted, and terror) (Zadra, Pilon, & Donderi, 2006). The Cronbach's alpha for this scale was .72. Each emotion experienced in the dream was rated on a 5-point Likert scale ranging from *not at all* to *extremely*. Finally, Kahan and LaBerge's (1996) 10-item Meta-cognitive, Affective, and Cognitive Experiences (MACE) Questionnaire was administered. Subjects were asked in

a yes-no format if they had had the experience in their dream, and, if so, to comment. While Kahan and Sullivan (2012) reported a Cronbach's alpha for the whole scale as .68, in this sample it was .47. The subscales for this sample were four items for Self-regulation (α=.51), three items for monitoring external environment (α=.20) and three items for monitoring internal experience (α=.08). Because of the low reliability of the last two subscales, individual items were separately analyzed herein.

Procedure

All participants began by taking the pre-screening inventory. Those who did not suffer stimuli sensitivity, sensitivity to computer screens or epileptic symptoms, and had recalled a dream from last night or last week were separated into three groups. Group one reported a high frequency of VGP (i.e., nightly or several times per week) without regular M/P. Group two reported regular M/P without frequent VGP. Finally, group three included the control subjects, which were those who reported no current M/P and no daily or weekly VGP. The qualifying participants were sent an email notifying them that they were eligible to participate in the study and were given instructions to go back to the SONA system to sign up for a laboratory session.

Qualifying subjects participated in the laboratory component in their groups where possible. Participants arrived at scheduled times for their one hour laboratory session and were seated in the two front rows of the lab so that they were at approximately the same distance from the projection screen. Each seat had an envelope placed in front of it, which included the change blindness task sheet, an Effects of Attention Activity Scale (i.e., this inventory had separate cover sheets depending on the group), and a 10-response scantron sheet. The envelopes also included a dream recall tips sheet to take with them following their laboratory session. On top of the envelope was an informed consent sheet that participants filled out at the beginning of their session. On each of these sheets, the participants were instructed to include the alias used in the prescreening test.

At the beginning of each session, participants were introduced to the study and told what was expected of them prior to taking part, including the possibility of earning the 6% research participation credit. Each group of subjects was instructed in the use of the online dream collection through a PowerPoint presentation.

The laboratory sessions were run over a three and a half month period. For the first month, each group had two laboratory sessions per week, after which sessions were reduced to one session per week. The sessions for each group were spread out evenly at different time slots throughout the day.

The six change blindness attention tasks were administered to each group after the explanation of the dream report section of the study. The lights were turned off for this portion of the session in order to increase projection screen clarity.

Before engaging in the change blindness tasks, the participants completed a practice change blindness task so that they knew how to perform on subsequent tasks. For each task, participants recorded three different things: the time taken in seconds to notice the change (regardless of whether it was before or after the reveal[1]), the specific changes they observed in the images, and the quadrant where they observed the change[2].

To conclude the laboratory session, participants completed the Effects of Meditation-Prayer/Gaming/Involving Activity Scales. Each group had different versions of the scale. Members of the control group were instructed to write down an activity that they found absorbing since they had no designated activity (e.g., VGP, M/P). Once they choose their activity, they filled out the scales in reference to that activity. All subjects filled this questionnaire out on the scantron sheet provided, writing their alias on it instead of their actual names.

Participants were sent an email invitation with the web address for their dream reporting following their laboratory session. Participants were instructed to report a dream under two conditions. They had up to two weeks to fulfill each of the two activity conditions (i.e., one: engaged in designated absorbing activity for a substantial period of time during the day; two: not engaged in absorbing activity for the most of the day) and report the follow-up dream. If they did not report their dream within 24 hours of experiencing it, they were instructed that they could not use it. Following the second dream collection participants were provided with a debriefing statement.

Results

In order to investigate any parallels between M/P and VGP both waking and dreaming information was gathered. Specifically, waking information was collected in terms of attention, which is thought to be central to both activities. The results are presented in two major sections below: waking laboratory and dream diary. The laboratory results have both performance and self-report information on attention while the dreams are reported upon in terms of self-reports and judges' assessments.

Due to space limitations the reporting includes statistically significant results exclusively with descriptive statistics offered as needed. The primary analyses were groups (M/P; VGP; CON[3]) by conditions—*high activity days* (HAD) and *low activity days* (LAD)—ANCOVAs with various covariates as a function of the dependent variable. While reporting of results is primarily limited to significant results, occasionally p-values of less than .1 are reported if conceptually important.

Laboratory Results: Waking Attention Self-report and Behavior

The change blindness task offered two measures of performance—correct quadrant and self-reported time in seconds—viewed on the screen to identify

the change in the visual stimuli. Nearly all of the participants selected the correct quadrant. Not all participants reported all information for each of the six change blindness tasks after the practice trial. Those who did numbered 159.

For those who completed both the quadrant placement and the speed reporting there was no difference on a chi-square of correct quadrant. Of the 72 CON group individuals, 67 got all of the quadrant placements correct. Forty-six of the 49 of VGP subjects had 94% correct, while 30 of the 38 M/P group members, or 79%, got all correct. However, when the wrong answers were considered the chi square was significant ($X^2(2)=6.7$, $p=.035$). This observation was accounted for by the higher incidence of wrong answers among the M/P group (M/P=8 out of 30 or 21%; CON=5 out of 72 or 7%; and VGP=3 out of 49 or 6%). There was also a group difference in speed of reporting the change in seconds ($F(2, 141)=4.2$, $p=.017$). The VGP group was significantly faster in recognizing the change (mean=238.3, SD=25.4, N=45) than either the M/P group (mean=249.8, SD=25.8; N=30) or the CON group (mean=251.7, SD=23.3, N=67), who did not differ from one another. The second part of the laboratory experience was taking a self-report scale measuring the effects of Meditation-Prayer/Gaming/Involving Activity. This instrument was divided into subscales assessing experiences during each group's activity (i.e., cognitive, emotional, mystical, relaxation, and physical discomfort) and the effects of that activity on their everyday lives (i.e., physical, emotional, expanded consciousness, social relations, cognition, acceptance, and behavior/habits). Responses to all but three subscales resulted in group differences, which are summarized in Table 1.

In almost all subscale measures the M/P group *believed* their activity affected their daily life, while gamers did not subscribe to such effects. Thus, the M/P group typically scored the highest on effect of their attentional practice. With regards to the subscale scores for perceptions during the activity, the M/P group was not higher on mystical experiences, and the CON group was most relaxed while also reporting the most physical discomfort along with the VGP group. This CON group finding could be due to the variety of absorbing activities they reported.

Online Survey

Following the laboratory session, participants filled out online surveys twice, collecting their dreams on two separate days as well as other relevant information. The survey was completed after a day with high levels of engagement in their activity and a second day with minimal engagement. The order of filling out the surveys was up to the participant, but both required completion for credit. Information about the type and length of activities was collected primarily to verify that the self-manipulation worked. Additionally, general media type used the day prior to the dream was assessed in order to control, across groups, for its effects.

TABLE 1
Total Number Change Blindness Quadrant Identifications as Correct as a Function of Group

Sex (1 = male; 2 = female)				Quadrant placement of change: All correct = 1; some incorrect = 2		
				1.00	2.00	Total
1	Group # (C=1, M=2, V=3)	1	Count	14	3	17
			% within Group # (C=1, M=2, V=3)	82.4%	17.6%	100.0%
		2	Count	4	2	6
			% within Group # (C=1, M=2, V=3)	66.7%	33.3%	100.0%
		3	Count	31	2	33
			% within Group # (C=1, M=2, V=3)	93.9%	6.1%	100.0%
	Total		Count	49	7	56
			% within Group # (C=1, M=2, V=3)	87.5%	12.5%	100.0%
2	Group # (C=1, M=2, V=3)	1	Count	53	2	55
			% within Group # (C=1, M=2, V=3)	96.4%	3.6%	100.0%
		2	Count	26	6	32
			% within Group # (C=1, M=2, V=3)	81.3%	18.8%	100.0%
		3	Count	15	1	16
			% within Group # (C=1, M=2, V=3)	93.8%	6.3%	100.0%
	Total		Count	94	9	103
			% within Group # (C=1, M=2, V=3)	91.3%	8.7%	100.0%

Activity Level Manipulation Verification

The time that each group spent on their designated activities as a function of condition and group was examined in an ANCOVA with the subjects' sex as the covariate. On the response sheet provided, all participants answered all questions about day before activities. Thus, the VGP group answered questions about prayer, the CON group answered questions about gaming and so forth. In this way all of the designated absorbing activities were assessed for all participants.[4] This process allowed some verification of the quasi-experimental manipulation. It was found that there were main effects for length of time spent on type of activity during the day prior to the dream ($F(1, 239)=10.5$, $p<.001$, $\eta_p^2=.02$): VGP, mean=1.8, SE=.111; control absorbing activity, mean=5.9, SE=.2; M/P sum mean=5.6, SE=.3). There was also a main effect for group ($F(2, 239)=3.6$, $p=.03$, $\eta_p^2=.03$): CON mean=4.4, SE=.2; M/P mean=4.9, SE=.23; VGP mean=3.1, SE=.3) and condition ($F(1, 239)=11.7$, $p=.001$): low activity day mean=3.1, SE=.2; high activity day mean=4.9, SE=.2).

In other words, the self-reported manipulation worked with more time spent on an activity reported on the high activity than the low activity days. Additionally, the VGP group reported the least activity overall, and that type

TABLE 2
Subscale F-values, Means, and Standard Deviations on Self-Report Effects of Meditation/Prayer, Gaming or Involving Activity Scale for Each Group

Time	Subscale	Mean/SD/N[abc]	*F-values*
During Activity	Mystical	CON:12.9054/5.54476/74[b] M/P: 18.1163/5.90887/43[a] VGP:12.3000/4.99898/50[b]	*F(2, 166)=15.97, p<.0001*
	Relaxation	CON: 18.8243/5.79881/74[a] M/P: 16.2955/5.71648/44[b] VGP: 15.2041/5.75898/49[b]	*F(2, 166)=6.39, p=.002*
	Physical Discomfort	CON: 18.9178/5.63411/73[a] M/P: 14.2500/4.95620/44[b] VGP: 18.4200/5.54422/50[a]	*F(2, 166)=11.06, p<.0001*
After Activity	Physical	CON: 23.9178/6.86123/73[a] M/P: 24.5349/5.26149/43[a] VGP: 18.8980/5.33559/49[b]	*F(2, 164)=13.128, p<.0001*
	Emotional	CON: 23.5676/6.39581/74[b] M/P: 25.9545/4.45105/44[a] VGP: 20.5800/6.43044/50[c]	*F(2, 167)=9.641, p<.0001*
	Expanded Consciousness	CON: 20.9589/6.92708/73[b] M/P: 28.4773/4.00865/44[a] VGP: 16.4694/6.11045/49[c]	*F(2, 165)=46.676, p<.0001*
	Social Relations	CON: 21.8429/7.54049/70[b] M/P: 27.7750/4.42306/40[a] VGP: 20.3191/7.00033/47[b]	*F(2, 156)=14.888, p<.0001*
	Acceptance	CON: 22.5205/6.16241/73[b] M/P: 26.3636/4.76465/44[a] VGP: 21.3333/6.06389/48[b]	*F(2, 164)=9.640, p<.0001*
	Behavior/habits	CON: 20.2877/6.54149/73[b] M/P: 23.6905/5.58957/42[a] VGP: 19.1020/6.73067/49[b]	*F(2, 163)=6.297, p=.002*

[abc] A superscript of a, b or c indicates the result of post-hoc comparisons.

of activity, playing video games by all participants, was also least reported. Further, there was a three-way interaction ($F(2, 239)=3.9$, $p=.02$; $\eta_p^2=.03$) as well as a two-way interaction (length time doing a type of activity by group; $F(2, 239)=23.6$, $p<.0001$, $\eta_p^2=.2$). The point of this analysis was to show that the manipulation worked; not surprisingly, the three-way interaction showed that each group did indeed do their activity more on their high than their low activity days.

Media Use Day Prior to Dream

Media use was thought to be an especially important potential confound. This generation of college students are heavy users of media, and as such we decided to include the type and length of their media use on the day prior to the dream. A two (condition: high, low) by three (group: CON, M/P, VGP) by three (media: audio, video, interactive) ANCOVA with sex of subject as a covariate was computed. There was only one main effect, which was for condition ($F(1, 83)=6.6$, $p=.012$, $\eta_p^2=.07$: high activity, mean=3.1, SE=.109; low activity,

mean=2.693, SE=1.05). All two-way interactions were statistically significant: media use by condition ($F(2, 83)=7.4$, $p=.008$, $\eta_p^2=.08$); media use by group ($F(2, 83)=7.6$, $p=.001$, $\eta_p^2=.15$); and condition by group ($F(2, 83)=6.1$, $p=.003$, $\eta_p^2=.1$). Finally, the three-way interaction was also statistically significant: media use by condition by group ($F(2, 83)=12.6$, $p<.0001$, $\eta_p^2=.2$). Of primary interest is the group by condition interaction that is portrayed in Figure 1.

Expectedly, the VGP group reported the most media use on high activity days and the least on low activity days. The media use for the M/P and CON groups changed slightly as a function of activity levels. Media use was entered as a covariate in all dream analyses because of the significant impact of media use on the VGP group.

Dream Results

This section is divided into self-reports about the dream and the dreams as coded by judges. Participants reported their confidence in the type of dream they recalled (Gackenbach, 2006), emotions about their dream (Zadra et al., 2006) and their thoughts and feelings during the dream (MACE: Kahan & LaBerge, 1996). Group by condition ANCOVAs with sex of subject, day before media use and number of words per dream[5] were computed on each response.

Self-Report Data: Dream Types and Emotions

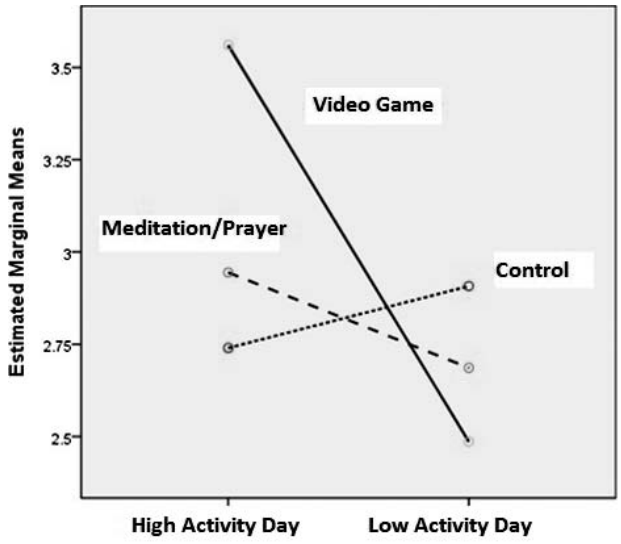
Three of the eight types of dreams asked about resulted in group differences. Specifically, M/P (mean=3.2, SE=2) reported more lucid dreams than either the CON (mean=2.461, SE=.203) or VGP (mean=2.1, SE=.2) groups ($F(2, 230)=2.8$, $p=.06$, $\eta_p^2=.02$). However, for control dreams, often associated with lucidity in sleep, the VGP group (mean=2.2, SE=.16) rated their dreams higher than the other two groups, who did not differ (CON: mean=1.9, SE=.1; M/P: mean=1.7, SE=.1) ($F(2, 225)=3.2$, $p=.04$, $\eta_p^2=.03$). The third dream type that showed a group effect was bad dreams. While nightmares evidenced no group difference, there was an interaction for group by condition for bad dreams ($F(2, 227)=4.3$, $p=.01$, $\eta_p^2=.04$). This interaction is portrayed in Figure 2.

Here the CON group reported the opposite experience in their dreams than the other two groups as a function of condition.

Self-reported emotions experienced during the dream resulted in no group or condition differences. However, the third type of self-report data on the dreams collected, the MACE, did evidence differences and is discussed next.

Self-Report Data: MACE

The three MACE responses regarding reflective awareness were summed while the other items were treated individually[6]. Thus, eight ANCOVA's, in the same



Covariates appearing in the model are evaluated at the following values: Sex (M=1; F=2) = 1.7000

Figure 1. Mean audio, video and interactive media use self-reported the day before the dream under two conditions as a function of group.

format as previously, were computed on each of these scores. Three of these resulted in statistically significant or near statistically significant group by condition interactions (internal commentary $F(2, 232)=2.8$, $p=.1$, $\eta_p^2=.02$; thwarted intention $F(2, 232)=4.4$, $p=.013$, $\eta_p^2=.04$; intense emotions $F(2, 231)=2.5$, $p=.1$, $\eta_p^2=.021$). These three interactions are portrayed in Figure 3.

Judges' Dream Coding

All dreams were coded by independent judges for the presence or absence of dream elements and themes that were thought to be relevant to the major hypothesis. These included indicates of consciousness in dreams, incorporation of absorbing activities into dreams and relevance to nightmares. The explanation of each coding is detailed next, followed by each set of results.

Judges' dream coding: Consciousness in dreams. Coding was developed to assess consciousness in dreams. That is, the first coding sought to determine dream content relevant to the identification of elements of lucidity, pre-lucidity, dream control and perspective of the dream ego (i.e., first versus third person). Each element to be coded included a range of options in terms of certainty or types. Thus, lucidity was coded along four points ranging from clear indication that the dreamer knew they were in a dream to no such indication. Pre-lucid dreams were identified in terms of four types: talked about dreams, wondered if they were in a dream but decided not, false awakening and out-of-body experience. Dream control was coded for self along a 4-point Likert scale as

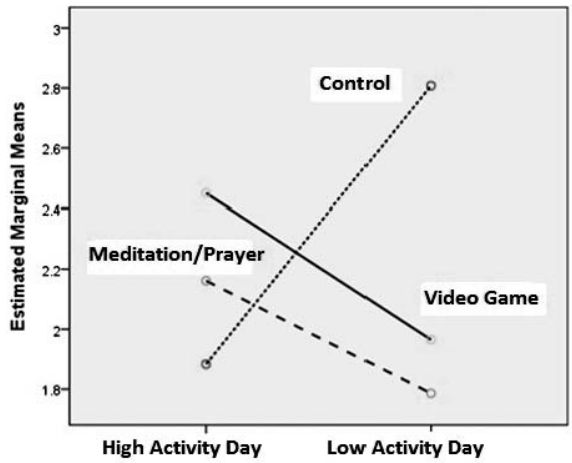


Figure 2. Self-report confidence of having had a bad dream as a function of group and condition.

well as for dreamt characters and environment. Dream ego stance ranged from entirely within the self to entirely watching. Finally, the degree to which the watcher was emotionally involved in the dream was also assessed.

The same ANCOVAs were used to assess these judges' estimates of consciousness in dreams (group by condition with sex of subject, number of words in dream, and the media use variables three days prior to the dream). There were no main effects or interactions for judges' assessments of dream control, point of view or number of pre-lucid dreams but there was an interaction, which approached traditional statistically significance levels for judges' estimates of lucidity ($F(2, 224)=2.3$, $p=.1$, $\eta_p^2=.02$). This finding is displayed in Figure 4.

Because of its conceptual importance. The interaction is largely accounted for by the VGP group whose members were judged as reporting more lucidity after days with high gaming activity.

Judges' dream coding: Incorporation of absorbing activities. The next set of judges' coding probed for the presence of each of the three absorbing activities within the dream: VGP, M/P, or CON absorbing activity. Video game elements in the dream included any reference to, or implication of, a video game as the dream environment, as played in the dream, or as referred to in some indirect way in the dream. Additionally, selected general subscales from the Hall and Van de Castle (HVDC, 1966) dream content analysis system were coded as present or absent in terms of gaming content including characters, activities, emotions, settings and objects. Next, the Entertainment Software Rating Board (ESRB) themes for rating video games were coded for all dreams

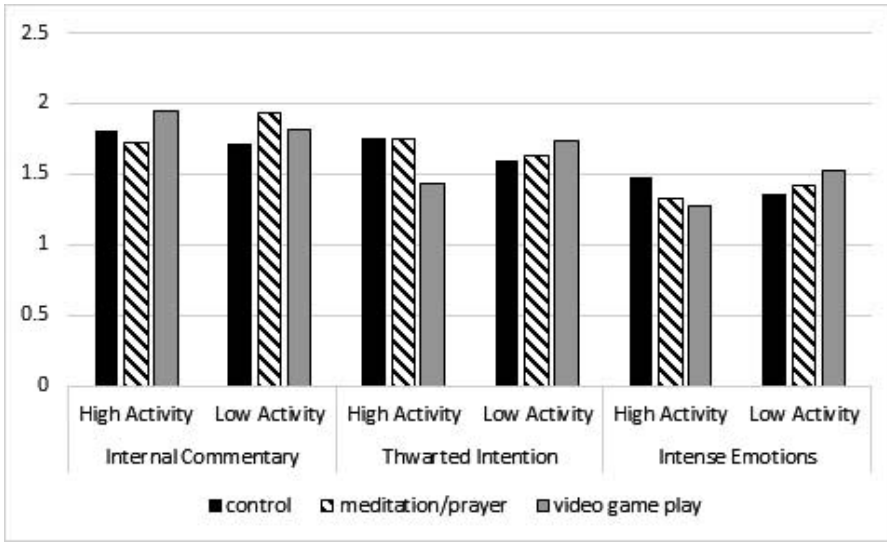


Figure 3. Mean MACE responses to dream content as a function of activity level and group.

whether or not they had gaming content. These were coded as the presence or absence of violence, sex, drugs, language, humor and gambling.

The same ANCOVAs were computed as previously. In terms of gaming in dreams and judges' dream coding, the categories of *the dream has a game in it* and *games mentioned in the dream* had no statistically significant effects. However, *the dream is a game* did result in a group main effect ($F(2, 224)=3.1$, $p=.05$, $\eta_p^2=.02$). The VGP group's dreams were judged to be most likely to have a dream that is a game (mean=.238, SE=.059) relative to the other two groups who did not differ (CON mean=.07, SE=.05; M/P mean=.04, SE=.05).

The sums of the HVDC and the ESRB subscales were computed, and the same ANCOVA was calculated. There was a group main effect for each of the sums: HVDC ($F(2, 224)=2.7$, $p=.07$, $\eta_p^2=.02$) and ESRB ($F(2, 224)=3.8$, $p=.02$, $\eta_p^2=.03$). In both cases the VGP group's dreams were rated the most game like (HVDC mean=.7, SE=.15; ESRB mean=.6, SE=.08) relative to the other two groups, CON (HSRV mean=.2, SE=.1; ESRB mean=.4, SE=.1) and M/P (HSRV mean=.2, SE=.1; ESRB mean=.3, SE=.1).

Elements relevant to meditation or prayer were also coded as continuity elements. Dreams were first coded in terms of the presence of any type of M/P as defined in the pre-screening. In line with Casto, Krippner and Tartz (1999), as well as the previous game coding, this was followed by the same five subscales from the Hall and Van de Castle (1966) dream content scale. Dreams were coded separately for spiritual and religious themes in the same presence or absence format. Casto et al. (1999) added another category called Spiritual Experiences, which they defined as:

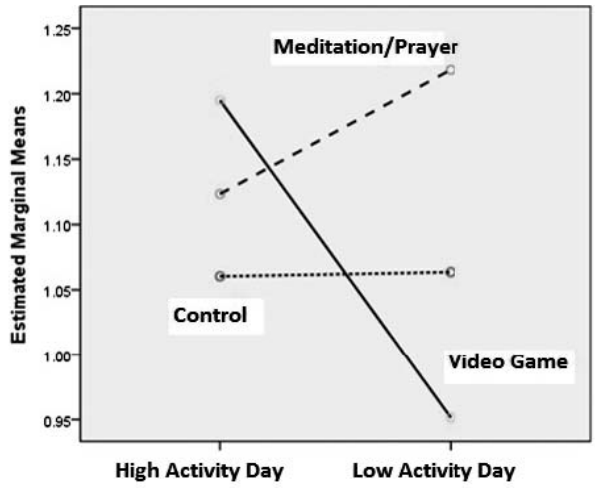


Figure 4. Judges' estimates of lucidity in recent dream as a function of group and condition.

> Experiences in which a sense of direct contact, communion, or union with something that is considered to be ultimate reality, God, or the divine; and/or experiences in which one's sense of identity temporarily reaches beyond or extends past his or her ordinary personal identity to include an expanded perspective of humanity and/or the universe; and/or experiences where one appears to enter a sacred realm or condition that goes beyond the ordinary boundaries of space and linear time. (as cited in Krippner & Sulla, 2001, p. 68)

All of the meditation and prayer types of imagery, as defined in the prescreening, were counted as present or absent in the dreams. These were summed, and the resulting interaction from the ANCOVA was marginally statistically significant at p=.099. This finding was primarily due to the M/P type imagery. When a separate ANCOVA was computed on that sum alone, it improved the near statistically significant level ($F(2, 224)=2.6$, $p=.07$, $\eta_p^2=.02$). This group by condition interaction is portrayed in Figure 5.

Given that the majority of participants prayed rather than meditated, it is not surprising that the interaction was accounted for by the M/P group on the high activity day. The next set of judges' content analysis on whether religious/spiritual dream content was present/absent counts on the five subscales of the HVDC scale. These were summed for the religious content as well as the spiritual content separately, but the ANCOVA was not significant.

Unlike the M/P and VGP groups the control group's absorbing activity was more complex as various activities could be selected. In order to determine what types of absorbing activities were entered into the online media and

dream recording questionnaire, they were read and compiled by the primary researcher. Several groups of activities emerged: study/school, music, physical activities, relationships and watching media. Study/school was the overwhelming majority of dreamt themes. Each dream was coded for the presence or absence of each of these sorts of activities along the same five Hall and Van de Castle (1966) subscale categories used in coding the VGP and M/P activities. Therefore, a character playing music would be coded as present as an example of a music dream character. However, if the character was throwing a basketball around, it was coded as present object under physical activity type content[7]. All of the dreams were coded by the same two researchers, who attained 92% agreement coding the same 10 dreams.

The wide range of activities reported by the CON group participants necessitated separate ANCOVAs for each type of activity. The first ANCOVA was for the sum of school/study activities manifest in dreams using the HVDC coding as present or absent. There was a group main effect ($F(2, 224)=3.6$, $p=.03$, $\eta_p^2=.03$) such that the VGP group had the least school/study imagery in their dreams (mean=.357, SE.184) relative to the other two groups. Both the M/P and CON groups, conversely, reported more school/study imagery than the VGP group but did not differ from one another (CON mean=.9, SE=.1; M/P mean=1.0, SE=.2). There was a marginally statistically significant group main effect for physical activities in the dream ($F(2, 224)=2.4$, $p=.1$, $\eta_p^2=.02$). Surprisingly, the VGP group was found to have more dreamt physical activities (mean=1.7, SE=.2) relative to the other two groups (CON mean=1.1, SE=.2; M/P mean=1.0, SE=.2). While this may seem unusual when one thinks about the stereotypes of playing a video game, as secondary, and its transference into dreams, there is a lot of perceived physical activity in gaming (e.g., during virtual battles).

There were no main effects or interactions for the ANCOVA's for music or media dreamt activities. There was an interaction for relationship activities ($F(2, 224)=2.8$, $p=.1$, $\eta_p^2=.02$), however, which can be seen in Figure 6.

Here the difference was accounted for by big group differences on the high activity day. More specifically, gamers dreamt about relationships the least while the control group dreamt about relationships the most.

Judges' dream coding: Relevant to nightmares. In addition to the consciousness in sleep and the content incorporation codings, judges coded two final types of dream content: threat simulation dream coding (Revonsuo & Valli, 2000) and central image dream coding (Hartmann, 2008). These were both assessed to examine the nightmarish or bad dream content, which has also been found in our previous work and was hypothesized to differ as a function of absorbing activity. Two judges were trained to rate the dream reports using the Dream Threat Rating Scale. Dream analysis was carried out in two phases: identification and isolation of the description of any threatening events. To ensure an adequate level of training, both judges rated dreams from Gackenbach and Kuruvilla (2008) until they reached 80% agreement with the threat simulation coding on a set of 10 dreams.

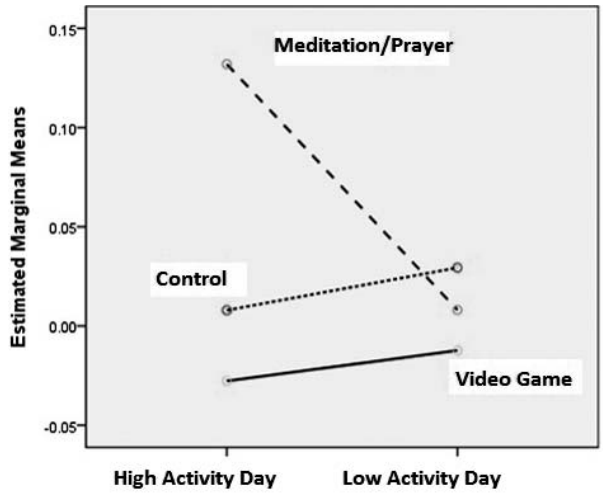


Figure 5. Sum of judges' estimates of prayer relevant imagery in dreams as a function of group and condition.

The same ANCOVA's as previously used were computed for the threat coding. Threat simulation type ranged from no threat through subjective threat to objective threat, resulting in a group main effect ($F(2, 209)=5.3$, $p=.01$, $\eta_p^2=.048$) and interaction ($F(2, 209)=5.4$, $p=.005$, $\eta_p^2=.04$). Figure 7 shows that both the group main effect and the interaction are accounted for by the higher threat among gamer's dreams on high activity days. This is the only threat simulation analysis where all dreams were included. The remaining results are only for those dreams that exhibited some threat. Interestingly, there were no effects on the ANCOVA for the nature of the threat in the dream, which varies in terms of coded aggression. Participation of the dream ego in the dream was also coded and resulted in a statistically significant group by condition interaction ($F(2, 135)=4.0$, $p=.02$, $\eta_p^2=.06$), which is shown in Figure 7.

Gamers were more active in their dreams than participants from either the M/P or CON groups. There was a group main effect for resolution of the threat where high scores indicated positive resolutions ($F(2, 135)=3.6$, $p=.03$, $\eta_p^2=.05$). Gamers were judged to have the most positive resolutions (mean=1.9, SE=.1) followed by the M/P group (mean=1.6, SE=.1) and finally, the CON group (mean=1.4, SE=.1).

The judges' last dream analysis was done using Hartmann's (2008) central imagery system. 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

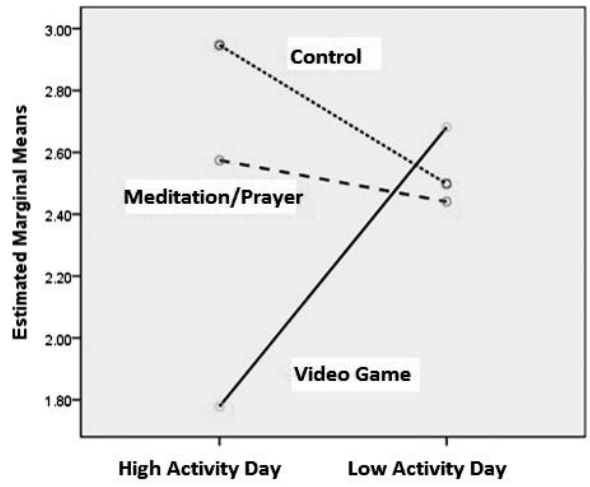


Figure 6. Number of relationship activities present in dreams as a function of group and condition.

> 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 [central image], the scorer is then asked to guess what emotion or what two emotions (from a list of 18) might be pictured by the CI. (p. 160)

One student was trained on this scale, and she reached an 80% agreement on 10 previously coded central imagery sample dreams from an earlier judge. ANCOVAs were computed on central imagery intensity and emotion sum scores. In both cases there was a statistically significant group by condition interaction (intensity $F(2, 223)=5.4$, $p=.005$, $\eta_p^2=.05$; emotion sum $F(2, 222)=5.8$, $p=.003$, $\eta_p^2=.05$), which is portrayed in Figure 8.

It can be seen that condition had no effect on judgments of imagery intensity for the M/P group but had a statistically significant effect on the CON and VGP groups. The VGP group was judged to have more intense central imagery after a day of high VGP while the CON group had very low intensity after a day of high activity in their absorbing activity. The opposite was true after a low activity day. With regards to the number of emotions associated with intense central imagery, the VGP and M/P groups were mimics of each other with lots of emotions on high activity days and few emotions on low activity days. The CON group showed the opposite pattern. Emotions were identified as both positive and negative, but ANCOVAs on valence resulted in no group or condition effects.

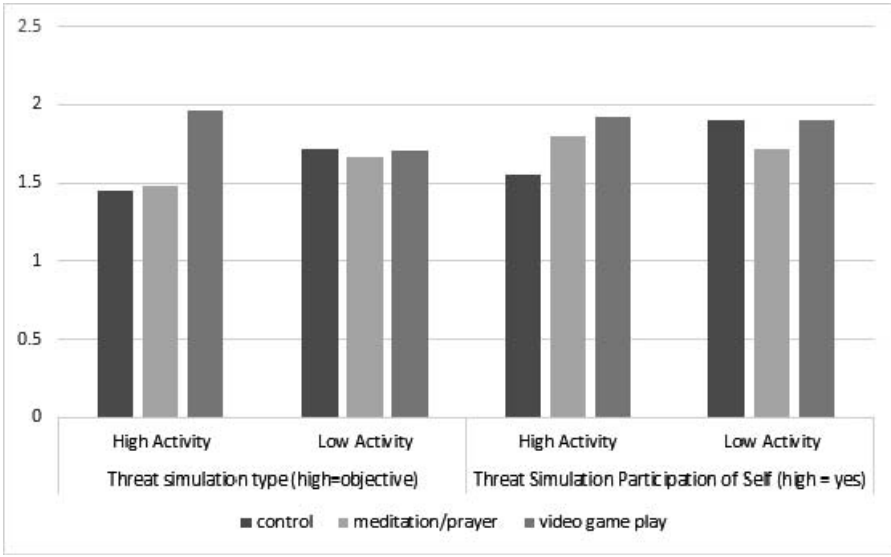


Figure 7. Degree of dream threat and participation of self in threat as a function of group and condition.

Discussion

In this inquiry we examined the thesis that the play of video games may result in some of the same effects as the practice of meditation due to the impact both practices have on attention. Meditation can be characterized as an attention training activity (Lutz et al., 2008), and it has become clear that VGP also trains attention in ways that generalize beyond the game play (Boot et al., 2008). A waking and a dreaming inquiry into any differences between these two activities were undertaken. The waking inquiry measured attention skills and beliefs, while the dreaming inquiry examined types of dreams thought to be associated with both practices due to their emphasis on attention. Three groups of participants were examined: those who meditated, or engaged in a meditative type of prayer, but did not play video games (M/P); those who played video games, but did not meditate or pray (VGP) and a control group who neither meditated/prayed nor played video games (CON).

Waking Attention

Attentional skills were assessed with a change blindness task. Although there were no group differences in identifying where in the scene the change took place, the speed of recognition was statistically significantly faster for the VGP group than for the M/P and CON groups. This is consistent with the evidence supporting the theory that playing action video games benefits gamer's visual attention (Boot et al., 2008; Feng, Spence, & Pratt, 2007; Green & Bavalier, 2003; Green, Li, & Bavalier, 2009). Since video-game intervention has been known to enhance attention and perception, it is reasonable to assume that it can also improve resistance to change blindness (CB). CB describes the

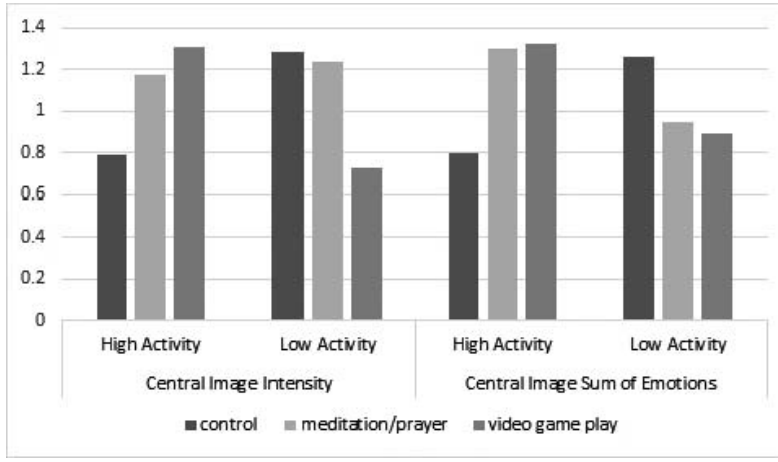


Figure 8. Central imagery judges' coding on intensity and total number of emotions coded for group by condition with covariates of words per dream, sex of subject and media use day before dream.

phenomenon in which humans are poor at detecting changes in a visual scene when distracters are competing for attention in the scene (Rensink, O'Regan & Clark, 1997). In their 2009 study, Durlach, Kring, and Bowens made an attempt to identify this connection but ultimately failed to do so. They were, however, able to replicate Green and Bavalier's (2003) results on some attention tests but were unable to replicate the evidence that VGPs were superior to non-players in the area of CB. It is worth noting that their players' mean reaction time overall was better than non-players', which is consistent with this inquiry. In a more recent inquiry on a related phenomenon, inattentional blindness, Vallett, Lamb, and Annetta (2013) conclude,

> Results of this study strongly indicate that there was a significant difference between those that played action video games and those that did not in their ability to detect new objects in the visual field. This suggests that those that spend time playing action games are less likely to succumb to the phenomena known as inattention blindness, and thus have a greater rate of attention capture with regards to visual stimuli. (p. 2185)

It is also somewhat surprising that the VGP group outperformed the other two groups when Hodgins and Adair (2010) found that meditators, when compared to non-meditators, were superior in change blindness. Two reasons for these conflicting findings may be considered. First, our meditation group was a mix of prayer and meditation practitioners. Second, Hodgins and Adair's (2010) non-meditators may or may not have played video games.

Another type of attentional measure administered in this study was Reavley and Pallant's (2009) "Effects of Meditation Scale." Their scale was adapted for use by the VGP and CON groups by including video game play (VGP group) or self-chosen absorbing activity (CON group) as the target practice. Unlike with the performance measure, on this self-report measure the M/P group scored

higher than the other two groups on nearly all of the effects' subscales. Several explanations might account for this difference. The first and most obvious explanation is that while the wording was changed to accommodate the other two groups absorbing activities, the items were conceptualized for meditation effects and thus may have seemed odd or inappropriate to a gamer or to someone who does not game or pray or meditate (e.g., CON group). An alternate explanation is that while gamers do appear to have superior attentional skills, they may not believe in the positive effects of gaming, given the widespread negative attitude about gaming. Although these negative attitudes are changing, they were still prevalent when this study was run in 2011. Finally, the third and simplest explanation is that the practice of meditation, or meditation-like prayer, does in fact result in various positive effects to a greater degree than the other two absorbing activities (i.e., control group activities were collapsed into one measure).

Dream Reports

Following the laboratory session, research subjects were instructed to report two dreams, one after a day of high levels of participation in their absorbing activity and one after a day of low levels of participation. The rationale for this differentiation was that the level of participation in the absorbing activity would impact the subsequent night's dreams. Although the activities were self-defined and varied considerably in actual length, there was a significant difference in time spent participating across all groups, thus verifying the manipulation. Additionally, to control for any effects of media use the day prior to the reported dream, which varied across groups and conditions, this information was entered into all subsequent dream analyses as covariates. The VGP group was most affected by this condition. Two more covariates were also entered: self-reported dream recall ability and sex of subject. Sex of subject was used as a covariate because of the small cell sizes of some of the group by condition cells. We then examined self-reports of dream types and emotions and judges' rating of specific dream types. Needless to say self-evaluations do not necessarily line up with others' evaluations in human behaviors, including in the dream reporting literature (Mathes, Schredl, & Goritz, 2014), thus the importance of considering dream impact from both perspectives.

Before we discuss the dream types associated with each activity, it is important to consider if the activity specialization of each group showed incorporation into the dream as would be hypothesized by the continuity theory of dream content (Schredl, 2003). The simple answer is yes; we found evidence of incorporation of the activities. Gamers were more likely to rate their dreams as game like, and the coding by judges supported this with more gaming symbolism found in the dreams of gamers than the other two types of activities. This observation was also true with the M/P group. Using the definitions of prayer used to delineate the groups, the M/P group was judged to have more prayer or meditation after a high activity day than a low activity day.

Finally, the absorbing activity for the control group was individually defined. Five groups of dream activities were identified: school, physical activity, music, media use and social relationships. There were no group effects for either music or media use, although they were in part controlled for with the media use covariate. There were, however, group based differences in the prevalence of school activities in the dreams of the meditation and control groups and least in the gamers. The physical activity group main affect may seem confusing. That is, the VGP group was coded as having the highest levels of physical activity with the other two groups not differing. This affect is a consequence of high levels of perceived physical activity when playing a video game. Although the participants themselves are not physically running, the avatar they are controlling in the game is, and thus the continuity with the night's dreams. The continuity, in this case, is thus not with the actual physical events of the day before, but with the perception of physical events. This supports the importance of considering virtual worlds when exploring dreams. The final CON group activity coded by judges was social relationships. In contrast to the high physical activities of the gamers, there was minimal relationship activity in gamers' dreams on high activity days relative to low activity days. The opposite was true for the other two groups. Further, the M/P group showed the most stability in relationship issues across activity days. We can conclude that with some interesting exceptions, the continuity hypothesis is supported.

The central question in this inquiry, however, is the effect of these attentional practices on three dream indices: lucidity/control, bizarreness, and nightmares/bad dreams. Each of these has been identified in both the meditation and gaming literatures as affected by the practice of meditation and gaming, respectively, in apparently the same way. That is, more lucidity and control, more bizarreness and less nightmares/bad dreams (Gackenbach & Hunt, 2014). In this study we were uniquely able to directly compare the effects of meditation to the effects of gaming.

A useful conceptual model to examine the lucidity/control findings is Gackenbach's (1988) argument that lucidity emerges in one of three ways: due to bizarre content, frightening content and "just knew." It can be argued that the emergence of bizarre and frightening content is more intentional while the "just knew" type are more spontaneous. The difference between judges' and dreamers' ratings of the relative lucidity/control differed in this study and might be explained as examples of intentional versus spontaneous lucidity/control. In terms of self-reports of lucidity type dreams, the M/P group reported more across conditions. Consistent with this, the judges found that more prayer type dream imagery was noted in the M/P group's dreams after high activity days, while there was no difference between the VGP and CON groups as a function of their levels of activity. Finally, the MACE self-reports, in terms of details of the cognition in the dreams, found in the high activity days that the M/P group reported less internal dialogue in their dreams. This finding is consistent with decreased internal chatter, which is one aim of meditation.

The practice that gaming offers in virtual worlds may be argued to lead to more intentional types of lucidity/control in dreams. Accordingly, it was found that the judges coded the dreams of gamers as more lucid after high activity days relative to low activity days, with no difference in the CON group. The opposite was true in the M/P group. Although the subjects themselves may not have seen their dreams as lucid, the judges did. This was confirmed by the judges' coding of gamer dreams as more like the dream ego is in a dreamt game while in the dream. This interpretation is further supported by two findings. The first is the gamers' self-reports of more internal dialogue, which is associated with less thwarted intentions and fewer emotions than in the low absorbing activity days. The second is the self-reports of the VGP group of more control dreams. An argument against this intentional lucid dream interpretation, however, is the lack of group differences in the levels of self-reported dream bizarreness, subjects' perceptions of dreaming normality and mythic type of dreams. These sorts of dream oddities are often triggers for lucidity and have been found in gamers' dreams in the past (Gackenbach & Dopko, 2012).

The third dream type explored was nightmares and bad dreams. Past research has shown that nightmares/bad dreams occur less often or involve less threatening content among gamers (Gackenbach et al., 2011) and are conceptually less problematic among meditators (Hunt, 1989). In this inquiry nightmares were examined in terms of self-report dream types, negative emotions associated with the dream, and by the judges' evaluations of threat and central imagery in the dream. While there was no group difference in self-reported nightmares, bad dreams resulted in a group by condition interaction. This observation was due to the control a group's bad dream being the opposite of the VGP and M/P groups. The control group reported more bad dreams after a low activity day, while the opposite was true for the VGP and M/P groups. This result is puzzling and contrary to the study's predictions. The dream literature differentiates bad dreams from nightmares in a number of ways. Bad dreams are less upsetting as nightmares, do not wake up the dreamer (Zadra et al., 2006) and tend to be concerned with social tensions. Conversely, nightmares wake up the dreamer and most often involve chase scenes. Although gaming may not prepare respondents for dealing with social tensions in their bad dreams, meditation may have a different effect. Since most of the M/P group were in point of fact praying, it may be that their high activity days were at times of perceived difficulty and as such they were praying for guidance and thus the evidence in the dream.

The judges' coding of threatening dream content resulted in the VGP group's dreams having more threat on the high activity days. This finding is unsurprising given the violent content of most action games. The gamers also had higher levels of participation in their threatening dreams on high activity days, implying that they fought back as has been found previously (Boyes & Gackenbach, 2014). Relatedly, this interpretation is supported with the MACE finding of lower levels of thwarted intention for the VGP group on high activity days compared to low activity days. The opposite was true for the M/P and CON groups. Surprisingly, there were no group effects for emotions

experienced in the dream with regards to the types of emotions experienced in the dream reported in the checklist following the dream report. There was a group by condition interaction, however, for intensity of emotions using the MACE. Participants were less intense during dreams after high activity days. We are left with a picture of gamers thinking about what is happening in a bad dream and not being swept up with the emotions while also doing what was needed to feel better in the dream, as their intentions were not thwarted. This is an empowering picture in response to a bad dream. In contrast, although the meditators had less internal commentary, their dream actions were thwarted.

Finally, the central imagery analysis by judges resulted in two interesting group by condition interactions. First, the gamers had stronger central images after high activity then low activity days while the CON group experienced the opposite. The M/P group, conversely, evidenced no difference in the intensity of their central images as a function of activity level. The emotion ratings of these central images were the same for the VGP and CON group but not for the M/P group. Although no difference in the intensity of the central image was found, a difference in the sum of the emotions coded for the M/P was recorded. More emotions were coded as associated with the central image for the high activity day than for the low for the M/P group paralleling the finding for the gamers and opposite for the CON group.

Limitations and Conclusions

There are two major limitations to this study: distribution of sex across groups and meditation/prayer group activity content. With regards to sex, there were too few males in the M/P group and too few females in the VGP group to use sex as an independent variable. Accordingly, sex was entered as a covariate. While not an ideal solution, work with gaming in the past has repeatedly found certain cells hard to fill. To check the accuracy of these results all analysis were rerun with sex not included as a covariate but the covariates of number of words per dream and the three media types continued to be used. There were no differences with and without sex, except minor differences on occasion of the p-value; i.e., self-reports of dream being lucid with sex as a covariate the $p=.061$ and without sex as a covariate $p=.057$.

The second limitation is the use of meditative type prayer to primarily define the M/P group, which is not as strong as having individuals who are committed to practicing meditation. This limitation was a consequence of availability so future work should try to pair meditation practice with gaming practice as both can reach total hours that define expertise. In this inquiry the VGP group was most likely to have more time in their practice than the M/P group would have, over a lifetime.

A third, but less significant limitation, is the nature of the condition independent variable as self-defined as high or low activity days. While there is support for these self-definitions, ideally these would be more closely controlled in future studies. Only one performance measure was used to assess waking attention

while a multitude of measures is preferable. So too in the dream collection, ideally a two-week series of dreams should be collected from each individual instead of the two dreams collected herein.

In conclusion, Gackenbach (2008) hypothesized that VGP may offer some of the same effects on consciousness as the practice of meditation. This action was based on various attention findings with both practices and was tested in the current inquiry. That is, VGP and M/P were examined through the context of dream reports, change blindness tasks and subjective reports of the effects of each practice in waking life. Performance on the waking attention task was superior for gamers while self-reports of activity effects were highest for the M/P group. The results of the dream content evaluations were mixed. Heavy gamers reported experiencing higher levels of dream control in comparison to M/P practitioners. There was also a marginal difference found in dream lucidity favoring the M/P group and with gamers reporting more lucidity than the CON group. These findings imply that the absorbing qualities of VGP and M/P may share a similar role in their effects on consciousness but also have unique differences.

Notes

[1] They were also instructed to look at the timer the instant they noticed the change to minimize recording delays. Real Player was the media device used, and participants used the timer on this program to record their time.

[2] Each change blindness task sheet has a quadrant table with a number in each quadrant. The participants wrote down the number of the quadrant in which the change occurred, or if the change occurred in more than one quadrant then they wrote down the numbers of more than one quadrant.

[3] Few students at the study's university engaged in any type of meditation. Thus, the group was a combination of meditation and meditative type prayer practiced often. A t-test for the pre-screened sample compared frequency of meditation to frequency of prayer and was statistically significant ($t(1351)=18.6$, $p<.0001$) with average meditation frequency being rarely or never and prayer frequency being several times per year.

[4] It should be noted that from the online survey where dreams were reported, 92 various absorbing activities were categorized into five main groups: school/reading (48), music (6), physical activity (8), relationships (12), watching media (9). The school/reading group was made up of studying (28), homework (8), and general reading (12). Music was mostly in regards to listening (4), but also playing instruments (2). The physical activity category included working out (3), dancing (1) running (1) and yoga (3). Relationships pertained to any significant relationship to the dreamer, which included friendship (6), family (4) and dating (2). The watching media group was consistent with watching television (8) and browsing the Internet (1). The remaining miscellaneous activities included driving, shopping, drawing and work.

[5] Words per dream is a rough estimate of dream recall.

[6] Another ANCOVA was computed for the self-regulation subscale but was not significant. Also the Cronbach's alpha for the three thinking items that constituted reflective awareness was only.16.

[7] While developing the codebook, it was initially intended that rather than coding for the presence or absence of certain themes or elements in a dream, each theme would be scored on a 5-point Likert scale. However this type of assessment was too refined to attain an acceptable inter-rater

agreement. Another method that was being considered was to individually count each instance of each a dream theme or element and tally them together in each subscale of every category. For example, let's say a participant reported a stoic dream of being in school with four friends and they decided to study, eat lunch in the cafeteria and work out in the gym in one dream. The coding method that would have been used would score 2 instances of school setting, 3 instances of school activities, 5 incidences of school related characters (the dream self and the other 4 characters) and 0 instances emotion related to school.

The problem that arose from this was there was a large amount of overlapping in the presence of themes between the subscale categories. This would end up making the dream look like it would have more thematic content than it actually did. For example, the dreamer and his/her friends working out in the gym at school would also fit in the physical activity category and the scoring would yield 1 instance of setting, 5 characters and 1 activity each under two completely different categories, namely physical activity and school. However, in both cases the same thing was being counted twice, which could lead to misinterpretation. Many dreams tended to have many overlapping themes in this way. Therefore, it was determined that it would be simpler to report either the presence or absence of these elements rather than keeping a count of each instance per theme. Thus the participant's dream of being in school would be coded as such: school settings are present, school activities are present, school characters are present and school-related emotions are absent.

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