

## Correlating Video Games to Dream Recall Frequency

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### ABSTRACT

**Dream Recall Frequency (DRF) has been used in many studies throughout psychology. Studies have shown correlations between moods and DRF (Schredl, M. et al. 2009; Tart, C. T. 1962); however, few correlations have been made regarding the increase of DRF by electronic media, such as video games. In this experiment participants were given questionnaires and dream journals to track their abilities to recall nocturnal dreams. Three test groups were utilized in this study: a control group, a Reflection-Intention (RI) group, and a RI/Video Gameplay group. Results of this study show an overall decrease in DRF but did not provide any significant results; nor have the results shown any correlation between video games and DRF. Of particular interest are the results regarding multiple dream recall, referred to as stream recall. While the control group showed a significant decrease in stream recall, the RIO and VG/RI groups show a slight increase. All results could be caused by chance or outlying variables not taken into consideration. Self-selection bias, small selection of participants, and time of year could all be factors in the overall decrease of DRF. Additional studies are recommended to verify results.**

### INTRODUCTION

Dream Recall Frequency (DRF) has been studied in various areas of science for years. For psychology, the study of DRF is directly related to how people process information from the previous day including emotions, events, and information. According to Coon and Mitterer (2007), every person, on average, experiences roughly four to six rapid eye movement (REM) states conducive to dreaming per night. This means that typically, a person could have multiple dreams, referred to as streams, every night; but only 30-40% of people can remember their dreams on a regular basis (Belicki 1986; Webb & Kersey 1967). Even those who remember having dreams report having difficulty in recalling what details or events occurred during the dream state.

Several psychologists believed that working with dreams could help a person

create a positive influence throughout their lives (Belicki 1986; Holzinger et al. 2006; Gackenbach 2006; Gackenbach 2008). So if dreams can help people understand and influence their lives, how can DRF be increased? Is it possible that electronic media, something that many people in today's world experience, could help increase DRF? The use of video games is prevalent in many high school and college students daily lives and has been used in several experiments to determine the effect they have on perceptions, moods, and disorders (Lee et al. 2010). There are even video games designed to promote positive mental health in young people like "Reach Out Central" (Shandley et al. 2010). In this game, individuals age 16-25 encounter situations designed to teach them about peer pressure, how to say no to drugs and alcohol, and learn self-confidence, as well as

anger management.

Along with electronic media, studies have been conducted to show how moods influence dream patterns as well. One experiment shows how negative events in dreams can be correlated to negative moods experienced throughout the day (Tart 1962). This same study also shows how an increase in daytime anxiety can lead to an increase in DRF. Another study supports these results by showing how “negatively toned waking-life experiences have a negative effect on dreams” (Schredl et al. 2009). These experiments used a combination of the diary method and questionnaires to gain insight into participant’s dreams and to then examine the connection of moods to dreams.

Research done on the ‘diary method’ – maintaining a daily dream diary over a specified course of time – shows that it works well for measuring inter-individual differences in DRF reliability, and yet reduces the correlation coefficients obtained in specific examples (Schredl and Fulda 2005). Questionnaires are also a common component of self-report studies, used to determine if a change has occurred over time. Therefore, this study makes use of dream journals as well as daily questionnaires consisting of open answer and set answer questions, to ensure reliable results are collected.

Along with the journals and questionnaires, Reflection-Intention (RI) techniques will be utilized in certain test groups. This method comes from a study done by Paulsson and Parker (2006) who examined the effects of an RI program on lucid dreaming, a dream state in which a person is conscious enough to recognize that they are in the dream state and which stays in their memory. Their method involved training participants to recognize the differences between dreaming or conscious states. This involved a series of steps conducted each day over a period of two weeks starting with differentiating between wakeful states and dream states. Participants were instructed to look through books, clocks, or anything with words/numbers. After looking for a

moment, they were told to look away, and then back again. If the words or numbers changed, they were in a lucid dream state. If they remained the same, they were most likely awake.

Over a course of several years, these techniques have been modified and changed to induce positive results. The techniques listed above caused a significant Dream Recall Frequency (DRF) increase from before the program to week 1 and then again to week 2 even though they were originally developed for lucid dreaming improvement only. In this experiment, the techniques used will be a modification of the Paulsson and Parker method. This research supports this study’s hypothesis that use of RI techniques will contribute to a higher DRF in participants.

Since today’s youth is immersed in a wide variety of electronic media, it is surprising to find that only a handful of research has investigated the possible psychological effects- including DRF. Gackenbach is one of the few psychologists that has conducted a series of experiments and found that “video games is simply the higher immersive form of electronically mediated communication...and that many of us are immersed in these virtual realities” (Gackenbach 2009). This can range from auditory immersion in MP3 players to visual immersion in television and DVDs. Results from these studies show that sensory experiences during dreams often imitate the same processes that occur during wakefulness (Gackenbach 2006; Gackenbach 2008).

This correlation study is motivated by the lack of research done on video game influence regarding DRF. Mimicking the procedures done in a variety of other DRF studies, this experiment was used to determine if RI Techniques used in conjunction with video games will have a significant effect on participant’s DRF. The alternative hypothesis concludes that using video games will cause a type of interference in recall, thus lowering DRF; however, there is no current research to support this hypothesis.

## METHODS

### Participants

Participants were recruited through Facebook and word of mouth as non-paid volunteers to participate in a Dream Study. If a person decided to apply, they were instructed to send an email for more information. In return, they received an initial questionnaire and the following information:

This study is testing Dream Recall Frequency over a six week period. Location is not a concern because everything can be completed online through email. An initial survey must be completed to determine if you are eligible to participate. If selected, all materials regarding the survey will be sent to you through email and must be submitted in the same way. This will take a commitment of 20 minutes to one hour per day (maximum) for the entire duration of six weeks. If you are still interested and would like to participate, please return the initial survey that is attached to this email.

### Term Definitions:

MMORPG stands for Massive Multiplayer Online Role Playing Game (World of Warcraft type games). Lucid Dreaming is when you know you are in a dream without waking.

After two weeks of recruitment, 59 people (23 males and 36 females) returned an initial questionnaire that outlined basic information including: whether or not they played video games, whether they used social networking sites, and how often they remembered their dreams. An additional phone interview was done in many cases to clarify answers to certain questions. Applicants were excluded based upon several factors, including: whether they had

difficulty determining the difference between reality and fantasy; if they could devote the required time each day for participation; and if they would agree to adhere to participant guidelines once selected. After all questionnaires were received and phone interview completed, 48 applicants were approved for participation. Physical location was not a factor in recruitment or participation because all correspondences could be done through email, phone, or instant messenger. The average age of participants was between 22 and 40 years old ( $M = 30.9$ ,  $SD = 9.002$ ) and each participant had completed at least some college coursework.

If a participant was unable to fulfill a certain requirement, they were instructed to contact experimenters immediately. If they missed two or more assigned tasks in a row and did not make contact, they were given three days to respond or risk being removed from the study. Over the course of this study, 10 participants had to be removed due to lack of input or response and 11 others dropped out due to time constraint or inability to fulfill study requirements. The remaining 27 participants (11 males and 16 females) completed all assigned tasks and agreed to have their anonymous information used in the results.

### Group Selection

After passing the selection phase, applicants were divided into three separate groups based upon whether or not they played video games on a regular basis. Video games include console games, social networking games, phone app games, etc. The applicants that noted they played games on a regular basis were automatically selected for the Reflection-Intention/Video Games, or RI/VG, group. All other applicants were randomly assigned to the Control Group or Reflection-Intention Only, or RIO, Group. Regardless of which group the applicant was placed in, they were assigned a participant identification number to blind them from experimenters and keep their results anonymous. They were also blinded from other participants through the

use of these numbers ensuring results would not be confounded by group discovery.

### Materials

Participants were given materials dependent on which group they were assigned to. For all participants, the informed consent, journal entry, daily questionnaire, and exit interview format remained the same. Participant guidelines were tailored to each group. The Control Group and RIO Group received the same instructions to not play games through any medium including, but not limited to, consoles, phone apps, online games, etc. The RI/VG Group received instructions to play video games through any medium for a minimum of 20 minutes per day for the duration of the study. In the daily questionnaire, participants were asked to answer one section of yes/no questions regarding: their emotions, video game use, and internet use that occurred throughout the day immediately prior to the corresponding dream journal entry. They were also asked to answer one section of rated questions regarding dream content and information. If the participant did not have a dream, they were instructed to skip this section. Questionnaires were submitted to experimenters on a daily basis through an email address set up specifically for this study.

Journal entries had to be completed every day, regardless of whether a participant remembered the dream or not. If a dream was experienced, they were asked to number each dream in the order they were experienced. Participants were instructed to include information such as: what extreme emotion they experienced the previous day (if any); dream content including, but not limited to, places, people, things, emotions experienced, events, etc.; and detailed descriptions of the previous items. If the subject could not remember the dream, they were asked to describe their feelings upon waking instead. This journal was submitted on a weekly basis through email.

The RI Techniques used in this study

were modified from their original format to induce dream recall instead of lucidity. This variation involved five steps:

1. Reality Check: Participants were instructed to complete a reality check several times throughout the day. This including looking at a book, clock, or any words, then looking away, and then looking back again. If the words remained the same, they were awake. If they changed, didn't make sense, or were not normal in any way, they were dreaming.
2. Dream Settings: Upon realizing they were awake, participants were instructed to imagine what the surroundings would be like if they were dreaming. They were told to imagine what it would look like, who would be there, and what would be happening if this was a dream. Participants were also instructed to include sensations such as tactile feelings, emotions, scents, sounds, and visual cues.
3. Dream Activities: Upon completing step two, participants were instructed to imagine activities they could do if dreaming, including flying, talking to someone (real or imagined), and any interactions they could think of. Above all, they were instructed to remember this is something enjoyable and that it would lead to an enjoyable dream.
4. Before Sleep Procedure: As participants were lying down to go to sleep or take a nap, they were instructed to repeat the following statement: "I will remember my dreams. I will experience a wide variety of sensations. I will enjoy my dreams."
5. Upon waking, participants were to continue writing in their dream journal without embellishment or exaggeration and complete the daily dream questionnaire.

Participants assigned to use RI Techniques

received written instructions two weeks after the study began on how to use them and were instructed to continue using them for the remainder of the study. Experimenters checked in every few days to see how the techniques were being incorporated into daily activities.

## PROCEDURE

### Study Assignments

Participants in all test groups were assigned to complete questionnaire and journal entries for a total of six weeks resulting in 42 total entries. The questionnaires were submitted daily or weekly, depending upon participant needs, through an email address set up specifically for this experiment. The journals were submitted each Sunday as a single file for the week resulting in six journals upon study completion. These were the only requirements participants in the Control Group had to complete for the duration of the study.

In addition to these basic requirements, participants in the RIO Group had a supplementary requirement that started after the initial two weeks were completed. At the end of the second week, participants received instructions on how to use the RI Techniques outlined above. These instructions were sent at the end of the second week so the first two weeks could be used as a baseline for all test groups. These participants were then instructed to continue using these techniques for the remainder of the study.

Participants in the VG/RI Group were instructed to play video games for a minimum of 20 minutes a day for the duration of the study. They were not given instructions as to which game style to play, a maximum time limit, nor what time during the day to play these games. These game requirements were in addition to the basic requirements listed above. These participants also received instructions at the end of the second week regarding RI

Techniques. They were instructed to continue using these techniques in conjunction with video game play for the remainder of the study.

### Exit Interview

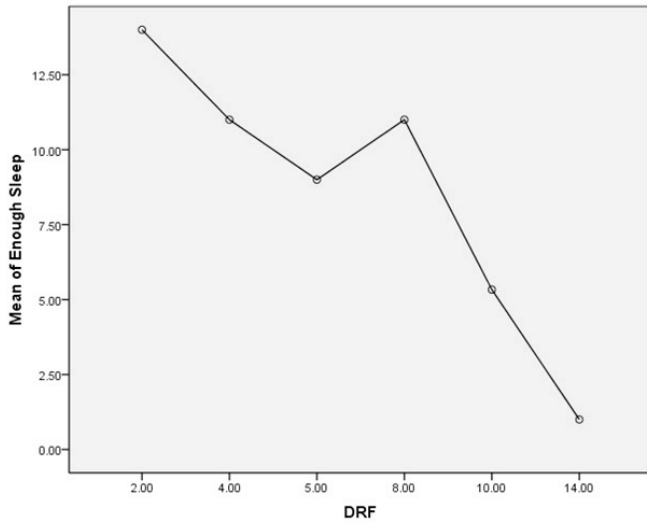
Exit interviews were carried out at the end of the six week study through a variety of means including the phone, in-person meetings, instant messenger, and email. During the exit interview, participants were given full disclosure and allowed the chance to voice their opinion. To complement the final interview, participants were given an exit survey in which they could rate any personal insight gained, make note of specific experiences they had during this study, and the usefulness of this study in their personal life. Participants were also given the chance to have their information removed once full disclosure was received. All 27 participants that completed the study gave written approval to have their anonymous results used. Participants that dropped out throughout the study had their information purged immediately upon dismissal so only one data set is shown in the Results section.

## RESULTS

Analysis only includes results from the 27 participants that completed all study requirements. There were two outliers (more than 2 SD away from the mean) for DRF. These values were replaced by the closest value and analysis was done for both the original and new values. The results for analysis of the new values were not significantly different so only the original analysis is shown. To evaluate if DRF would be affected by RI Techniques or RI Techniques used in conjunction with video games, data was analyzed through Paired Sample-T Tests and one-way ANOVA. Unless specified, data is considered statistically significant in the two-tailed T-Test tests if  $p < 0.05$  and in one-way ANOVA if  $p < 0.5$ . Correlations are considered significant if the  $r$  value is greater than 0.40 or less than -0.40.

**Control Group**

During the analysis, three distinct factors were examined in relation to DRF. Graph 1-1 shows the relationship between amount of reported sleep and DRF for this group. Analysis using one-way ANOVA shows a significance of 0.491. Use of paired sample T-Test shows a correlation value of  $r = -0.736$  between reported amount of sleep and DRF supporting the evidence in Graph 1-1. Both of these values are considered statistically significant and have a negative correlation, meaning the less sleep a person reported the higher their DRF.



**Graph 1-1:** Relationship between reported amount of sleep and DRF for Control Group.

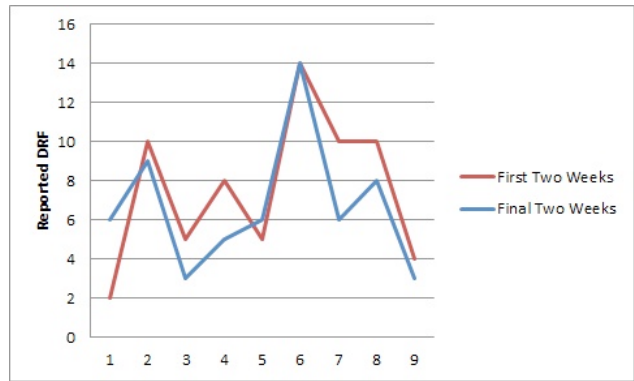
<u>Pairs</u>	<u>N</u>	<u>r</u>	<u>Sig.</u>
Extreme Emotion and DRF	9	0.632	0.705
Enough Sleep and DRF	9	-0.736	0.491
Video Games and DRF	9	0	0

**Table 1-1:** Paired Sample T-Test Correlations (r) and One-Way ANOVA Significance Values for Control Group.

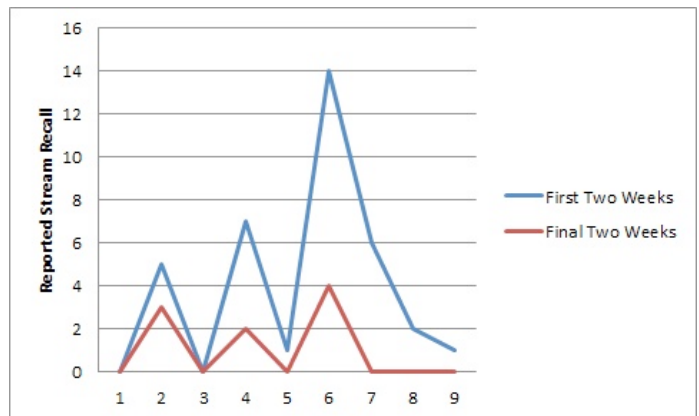
The second factor examined was the relationship between reported feelings of extreme emotions and DRF. One-way ANOVA shows a significance of 0.705 and the paired sample T-Test shows a

correlation value of  $r = 0.632$ . While this does show a positive correlation between reported feelings of extreme emotion and DRF, it is not statistically significant. The third factor examined is the use of Video Games. Since the control group was required to abstain from video game play, there are no results for this parameter. Data pairs are shown in Table 1-1.

This group experienced an overall decline in both dream and stream recall over the course of this six-week study. Graph 1-2 and Graph 1-3 illustrates these changes from the first two weeks to the final two weeks. While the decline in DRF was not significant ( $p = 0.134$ ), the decline in stream recall was ( $p = 0.028$ ).



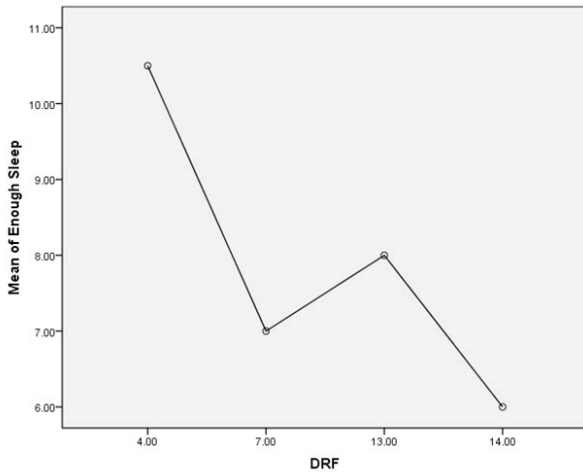
**Graph 1-2:** Change from first two weeks to final two weeks in reported DRF for Control Group.



**Graph 1-3:** Change from first two weeks to final two weeks in reported Stream Recall for Control Group

### RIO Group

The relationship between amount of reported sleep and DRF for this group is shown in Graph 2-1. Like the control group, this group experienced a negative correlation of  $r = -0.417$  between reported amount of sleep and DRF. One-way ANOVA shows a significance of 0.617. While neither value is statistically significant, this is still a significant correlation. The relationship between reported amount of extreme emotions and DRF showed a significance of 0.404 and a correlation of  $r = -0.417$ . Both of these values are statistically significant; however, the other test groups did not show a statistical significance in this relationship.



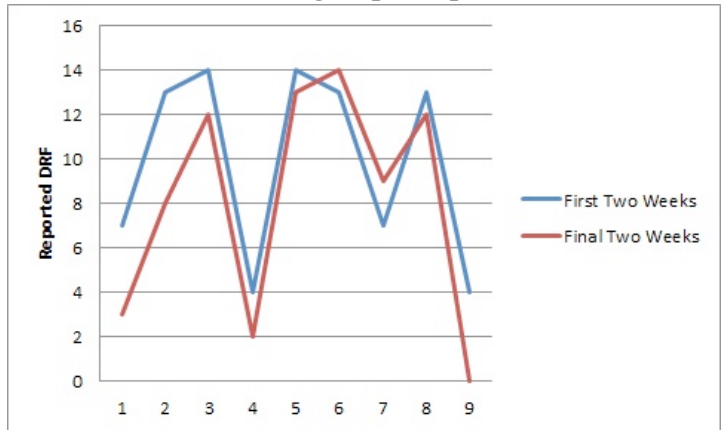
**Graph 2-1:** Relationship between reported amount of sleep and DRF for RIO Group.

Pairs	N	r	Sig.
Extreme Emotion and DRF	9	0.252	0.617
Enough Sleep and DRF	9	-0.417	0.404
Video Games and DRF	9	0	0

**Table 2-1:** Paired Sample T-Test Correlations (r) and One-Way ANOVA Significance Values for RIO Group.

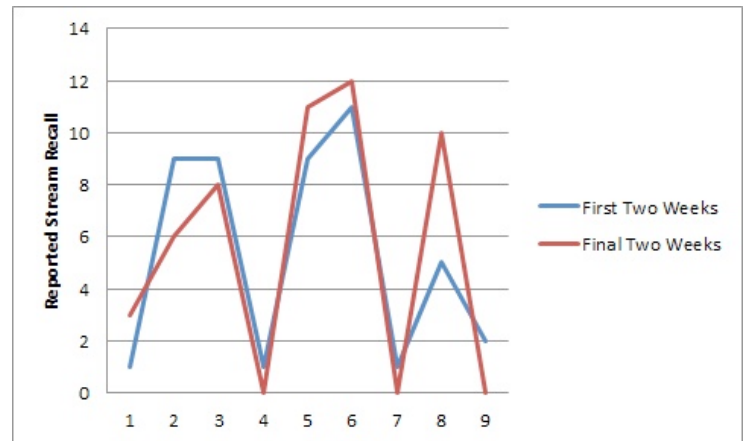
Paired sample T-Tests and ANOVA results are shown in Table 2-1. This group, like the control group, was required to abstain from video game play so there are no results for this category.

This test group experienced a



decrease in DRF ( $p = .017$ ). However, stream recall increased slightly from a mean of 5.33 to 5.67 ( $p = 0.681$ ). The reported changes in DRF and Stream Recall are shown in Graph 2-2 and Graph 2-3. While this increase is not considered statistically significant, it shows that 39.5% in Group B were affected by using RI Techniques ( $t(8) = 1.126, p > 0.05$ ).

**Graph 2-2:** Change from first two weeks to final two weeks in reported DRF for RIO Group.



**Graph 2-3:** Change from first two weeks to final two weeks in reported Stream Recall for RIO Group.

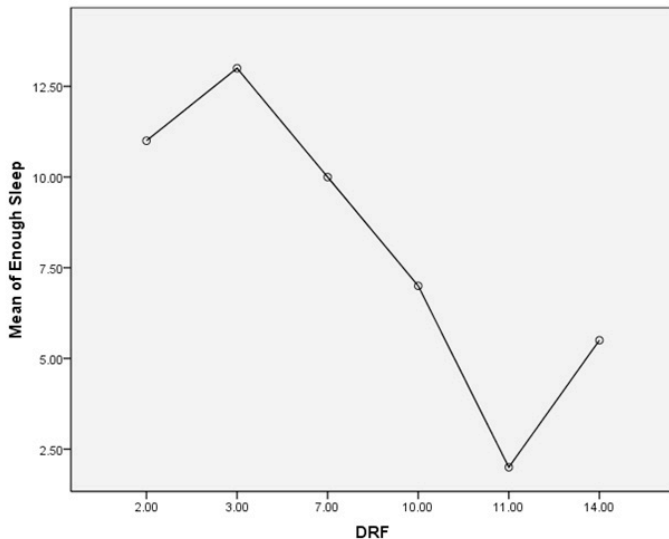
### RI/VG Group

Participants in this group show a correlation between the reported amount of sleep and DRF of  $r = -0.632$ . One-way ANOVA analysis shows the significance of this

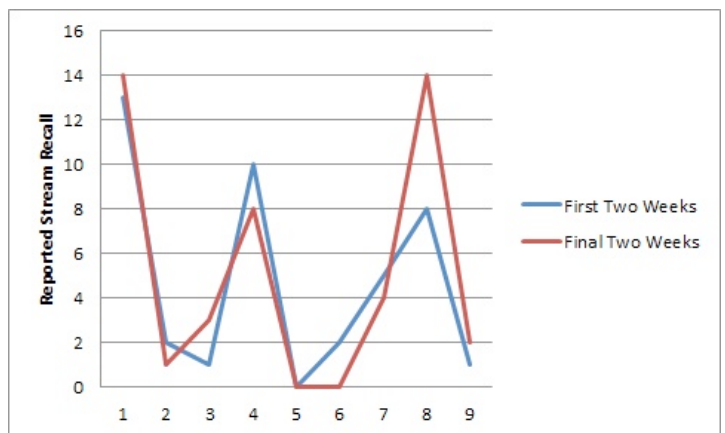
relationship is 0.555. Graph 3-1 illustrates this relationship. Like the RIO Group, this relationship is not considered statistically significant even though it is significantly correlated. After examining the relationship between reported feelings of extreme emotion and DRF, the correlation is  $r = 0.554$ . ANOVA analysis shows a statistical significance of 0.497.

This test group experienced a decrease in DRF ( $p = .314$ ). However, stream recall increased slightly from a mean of 4.67 to 5.00 ( $p = 0.710$ ). The reported changes in DRF and Stream Recall are shown in Graph 3-2 and Graph 3-3. While this increase is not considered statistically significant, it shows that 4.5% in Group B were affected by using RI Techniques ( $t(8) = 0.617, p > 0.05$ ).

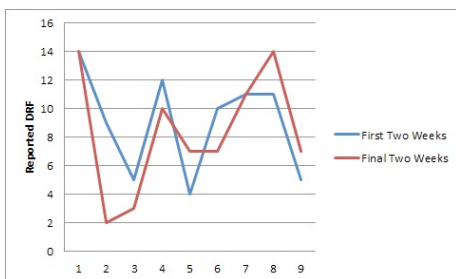
there are indications that amount of sleep has a strong negative correlation with DRF. There was also a significant correlation between feelings of extreme emotion and DRF with over half of all participants being affected ( $\eta^2 = 54.67\%$ ). This correlation changes slightly from the first two weeks to the final two weeks but remains significant. While subjects in Group B and Group C experienced a slight increase in streams, this could be a result of random occurrence and will need to be verified through additional testing. Additional results show 39.5% in Group B were affected by using RI Techniques ( $t(8) = 1.126, p > 0.05$ ) but only 4.5% were affected in Group C ( $t(8) = 0.617, p > 0.05$ ). While the main hypothesis was not supported by these findings, the alternate hypothesis offers an explanation of the results.



**Graph 3-1:** Relationship between reported amount of sleep and DRF for RI/VG Group.



**Graph 3-3:** Change from first two weeks to final two weeks in reported Stream Recall for RI/VG Group.



**Graph 3-2:** Change from first two weeks to final two weeks in reported DRF for RI/VG Group.

Pairs	N	r	Sig.
Extreme Emotion and DRF	9	0.554	0.555
Enough Sleep and DRF	9	-0.632	0.497
Video Games and DRF	9	0	0

**Table 3-1:** Paired Sample T-Test Correlations ( $r$ ) and One-Way ANOVA Significance Values for RI/VG Group.

## DISCUSSION

As the results have shown in this particular study, DRF was not significantly affected by RI Techniques, or video games. However,

The alternative hypothesis concludes the use of RI Techniques in conjunction with video games would prove a conflict of activities resulting in a lower DRF. Since RI



Techniques require evaluating situations throughout the day to discern dreams from reality, use of these techniques while playing video games may result in a blur between the two states. Many participants in Group C reported in their journals that concepts of video games played would appear throughout their dream. This includes visualizations of being a third person shooter in a war zone (ie. Call of Duty) to organizing blocks as they fall from the sky (ie. Tetris). The data used for the original hypothesis supports these findings. Unfortunately, there is no prior research in this area and will need further evaluation to support this conclusion.

The results of this study could be skewed due to a self-selection bias, or a bias entered by experimenters when placing participants in the Video Game group based upon reported time spent playing. In either instance, the results are not significant enough to show they could not occur by chance. Due to the small amount of participants used, outcomes could be skewed negatively, showing a very small percentage of possible effects that are not representative of the population. Results of this study could also be attributed to variables that were not accounted for. The duration of six weeks may have been too long to hold participant interest and therefore results declined due to boredom and fatigue. There was no break offered during the experiment so participants completed requirements six weeks in a row. Another variable not taken into consideration was the length of this study, insofar as it may not have been long enough to allow video game effects to be reliably observed. There could also be factors besides those noted above.

Furthermore, the use of this data in proving the alternate hypothesis could also be nullified by the same biases and explanations offered above. There might also be other factors specific to which and how long each video game was played during the day. While there was only a 20 minute requirement, participants often reported playing for well over an hour each

day. For future studies, additional requirements should include: specified amount of video game play per day; specified game style or particular game; and specified time of day to play (i.e. morning, afternoon, evening). In the event that this study is recreated, recommendations include using at least three times as many active participants, offer a break in data collection between week three and four, and schedule the study during summer break when students are more likely to have free time. Also, providing a break during the experiment could offer participants the chance to recharge and become actively involved again. Alternatively, this break could cause a higher dropout rate. Additional attention should also be paid attention to the RI Techniques used. Because there are so many variations of these techniques, a future experiment should determine which variation is best to use to achieve optimal results.

If possible, recommendations also include testing a specific video game (ie. first person shooter, role playing, etc.) instead of allowing participants to choose which games they would like to play. Moreover, testing a specific game could provide details of whether different types of games have larger effects than others (for example, first person shooters could have a larger effect than role playing games). Additional requirements could also include a specified length of time, single or multiple games, and single or multiple game categories.

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