Personality and Dream Recall: The Relationship between Personality and Dream Recall Frequency

by

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Abstract

This study explores the relationships between the Big Five personality traits (Extraversion, Agreeableness, Conscientiousness, Neuroticism, and Openness to Experience) (McCrae & John, 1992) and dream recall frequency (DRF), as well as with the dream subsets of nightmares and lucid dreaming. I also assessed the influence of creative suggestion and gender. Participants were given a dream diary to take home, as well as a series of questionnaires, in order to assess their dreams (Schredl, 2003). The results suggested that Conscientiousness, Neuroticism, and Openness to Experience are the only Big Five traits significantly correlated with DRF, and that gender and creative suggestion are not correlated with DRF.

Keywords: Dream recall frequency, Big Five personality, Extraversion, gender, creative suggestion

Personality and Dream Recall: The Relationship between Personality and Dream Recall Frequency

The study of dreams has been the focus of much contention and confusion over the years. One area within dream research which has been of interest within recent studies is dream recall frequency (DRF) (Tonay, 1993; Wolcote & Strapp, 2002; Schredl & Göritz, 2017; Watson, 2001; Brand & Beck, 2011). DRF is the number of dreams that an individual remembers the next morning. This is different from the number of dreams people have, measuring only the dreams they can recall. Many factors contribute to this measure, as dream memory is too complex to put into one variable. Feelings are heavily involved in dreams, as are imagery, colors, etc. On occasion, there is also the dream memory where people can remember that a dream occurred, but nothing else. This form of dream memory is still part of DRF, but it is much different from any other dream memory. DRF is significantly easier to measure than dream content, though content is not impossible to measure, as DRF can be split into measurable variables much more simply. In addition, DRF has been found to have significant associations with other areas of interest. The present study will attempt to explore the relationships which may exist between DRF and personality.

Personality

In order to effectively explore the relationship between personality and DRF, one must have a way to measure personality. McCrae and John (1992) thoroughly identify and explain a system of personality assessment titled the Five-Factor Model. The

assessment test for this model is called the Big Five Personality Test. The model splits personality into five major categories: Extraversion (warmth, gregariousness, assertiveness, activeness, excitement seeking, and positivity), Agreeableness (contains trust, straightforwardness, altruism, compliance, modesty, and tender-mindedness), Conscientiousness (competence, order, dutifulness, achievement striving, self-discipline, and deliberation), Neuroticism (anxiety, hostility, depression, self-consciousness, impulsiveness, and vulnerability), and Openness to Experience (fantasy, aesthetics, feelings, actions, ideas, and values). Each of these factors is assessed on a scale. McCrae and John note that such a model of personality has a wide range of potential applications, as it can elicit discussion between researchers who follow different approaches, to provide a comprehensive measure of personality, and do all of this in as few as five scores. Thus, future researchers can strengthen their results efficiently with a measure which does not exclude any personality factors. This provides more conclusive data regarding the relationship between personality and another variable than a different method which does not include all the personality factors.

Personality and Dreams

Freud believed in the interpretation of dreams, signifying that the content of dreams was influenced by the individual's inner psyche, often including the thoughts and feelings which are suppressed (Freud, 1953). He claims that sleeping puts the mind into a relaxed state where "undesired ideas" are likely to present themselves to the dreamer, which are transformed into visual and auditory representations (Freud, 1953). He writes that dreams are not random or absurd but have a significant meaning which

can be determined, thus suggesting that dreams have something to offer us, giving us a deeper insight into our unconscious lives (Freud, 1953).

If Freud is correct in this theory, then it would powerfully explain the connection between personality and dreams. Neurotic people, for instance, are often much more anxious, hostile, and vulnerable (McCrae & John, 1992). Such individuals then, may be more likely to have repressed thoughts and feelings due to their anxiety provoking nature, and thus have more dreams with frightening content. Also, such individuals might not recall as many dreams because they may be more prone to repressing the "undesired ideas" (Freud, 1953) within them.

Conscientious people, on the other hand, may have an entirely different experience with dreams, if Freud's theories are true. Conscientious people are much more orderly, competent, and self-disciplined, and are therefore very self-aware (McCrae & John, 1992). These individuals may be more likely to already acknowledge the "undesired ideas" (Freud, 1953) and have dealt with them in an orderly manner, thus having them less likely to show up in dreams. They may also, because they are more aware of their own internal self, be more likely to recall their dreams and not suppress anything.

As one can see, personality's relationship with DRF is one potential area the Five-Factor Model could aid in exploring. Many studies have explored the relationship between these variables and have found significant correlations between them. Tonay (1993) used 87 college students, from ages 17-45 years of age, 75% females, and looked

at the connection between DRF and adjustment, anxiety, attitude toward dreams, ego strength, introspectiveness, social introversion, fantasy-proneness, metaphorical scope, repression, and suggestibility. The study employed seven different personality tests to assess the participants on these measures, consisting of the Rogers California Psychological Inventory – Minnesota Multiphasic Personality Inventory (CPI-MMPI) test (Rogers, 1966), Attitude Toward Dreams Scale (ATDS) (Cernovsky, 1984) , 9-point Cernovsky Frequency of Dream Recall Scale (CFDRS) (Domhof & Gerson, 1987), Self-Consciousness Scale (SCS) (Fenigstein, 1975), Symbolic Equivalents (Schaefer, 1971), Creative Imagination Scale (CiS) (Barber & Wilson, 1978), and the Fantasy Questionnaire (Wilson & Barber, 1981). The Rogers test, ATDS, and CFDRS were administered prior to the testing session. The participants were then asked to rate DRF over past 5 years. The testing then began and the participants were given the rest of the tests. In between the CIS and the Fantasy Questionnaire, they were asked to draw the floor plan of their house when they were 8. The results of the study indicated that there was no significant difference between scores of males and females. Overall, the study concluded that those who recall dreams more often are not necessarily more introverted, anxious ($r = -.02$), repressed ($r = .08$), introspective ($r = .08$), suggestible ($r = .02$), or maladjusted ($r = .12$). Those who have a positive attitude toward dreams ($r = .56$, $p > .01$) and a cognitive visual imagery orientation ($r = .25$, $p < .05$) are more likely to recall their dreams. A separate study, however, Waterman (1991), however, found that DRF decreases with age. If this is the case, the results from Tonay (1993) could be skewed, as it contains a wide age range (17-45 years) in its participants, and thus does not effectively account

for age as a variable. Future studies, then, should be sure to decrease this range so that their age is controlled.

The relationship between DRF and personality was further explored by Wolcote and Strapp (2002), who used 173 undergraduate participants (74 males and 99 females, with an average age of 21) to test relationships and differences between DRF and dream detail. Dream detail refers to the *vividness* of the dream, as opposed to purely the number of dreams recalled. Due to the inconsistency of prior research between DRF and personality, especially introversion and Type A, this study explored these relationships more, hypothesizing that DRF would be more associated with the introversion/extraversion scale, while dream detail would be more associated with Type A/Type B personality scale (Bone, 1968; Farley et al., 1971; Koulack et al., 1993; Tonay, 1993; Ward et al., 1973). Because of prior findings suggesting a positive correlation between having a positive attitude towards dreaming and dream recall behaviors (e.g. journaling) with dream recall itself (Belicki, 1987; Cernovsky, 1984; Tonay, 1993), Wolcote and Strapp (2002) also hypothesized that such behaviors would be associated with DRF, while positive attitudes toward dreaming would be associated with dream detail. The usefulness of dream journaling may also be supported through a study done by Bachner and Raffetseder (2012), which suggested that dream socialization (the act of telling others about dreams) is correlated with DRF in adolescence and adulthood. Dream journaling, though different from dream socialization in that it is primarily private, is similar in that it acts to put the dreams into words and solidify it in memory. Lastly, Wolcote and Strapp (2002) explored the role of gender, as gender has been

shown to play an influential part in personality and dream recall (Berlicki, 1987; Cernovsky, 1984; Tonay, 1993). They hypothesized that there would be and interaction between the two genders when comparing scores on DRF, dream detail, attitude, and behavior, when taking personality into account. Participants were administered a set of questions which consisted of self-report assessments on DRF, dream detail, attitude, interest in dreams, behavior associated with dreams, and personality. Participants also estimated their DRF and dream detail.

The results of the study first suggested that DRF was correlated with a higher number of nightmares (r = .32), while dream detail was not (r = .02). Secondly, the dream recall behaviors of telling others (r = .45) and interpreting dreams (r = .18) was correlated with DRF, while the act of writing down dreams was not (r = -.03). Relatedly, having a positive attitude towards dreaming was correlated with dream detail (r = .21). Thirdly, in opposition to the original hypothesis, introversion and extraversion had no correlation to DRF (r = .03) or dream detail (r = .12), although it was discovered that extraverts were more likely to report lucid dreaming (x^2(l, *N* = 170) = 5.37, *P* < .02) and also have a more positive attitude toward dreaming (*F*(1*,* 163) = 6.93, *p* = .009). Fourth, Type A/Type B personality was found to be correlated to dream detail (r = .25), but not DRF (r = -.08), with Type B exhibiting more dream detail. Fifth, in regards to gender, there was no correlation to DRF or dream detail. Females were found to have a higher number of nightmare (females: M = 2.06, SD = 1.14; males: M = 1.48, SD = 1.17), and therefore, the number of nightmares was significantly different between genders (*F(*1*,* 163) = 6.91, *p* < .009). However, it may have just been that females were more likely

	Males	Females
Mean	1.48	2.06
SD	1.17	1.14

Gender Mean and SD for nightmares

to report nightmares than males were, as the number of dreams reported and the number of dreams occurring are not synonymous. In addition, females were found to be less likely to report lucid dreams, thus indicating a correlation between lucid dreaming and gender. However, it should be noted that this does not mean that females recall more dreams, just that they report more. Male extraverts were also more likely to write down dreams than male introverts (extravert: M ≈ 5; introvert: M ≈ 2.5), while females were not (extravert: M ≈ 2.5; introvert: M ≈ 3.2), thus showing a Gender X Extraversion/Introversion interaction with writing down dreams ($F(1, 160) = 4.48$, $p < .03$). It is interesting to note that, while no correlation was found between gender and DRF or dream detail, gender was still found to play a significant role in dreaming, especially in regard to dream recall behaviors. Since dream recall behaviors were found to be correlated with a higher DRF, gender still may be an influential variable indirectly.

	Males	Females
Extrovert	5	2.5
Introvert	2.5	3.2

Gender means: introversion/extraversion

Blagrove and Akehurst (2000) elaborated on the relationship between DRF and personality using different variables, and suggested something much different from any of the previous studies mentioned. They employed 93 participants (47 males, 46 females, with a mean age of 21 years). Each participant answered a question asking how many dreams, on average, one can remember in a month, took personality and suggestibility scales, and rated themselves on the bipolar Profile of Mood States (Lorr & McNair, 1980) . They then were assessed on numerous personality variables consisting of need for cognition (the degree of intrinsic desire to engage in cognitive activity without external motivation), morningness-eveningness (partiality to work in the morning versus the evening), hypochondriasis (degree of somatic awareness), social desirability (aspiration for social approval), and neuroticism.

The results of the study included a small correlation between neuroticism and DRF (M = 5.35, SD = 3.08, r = .20), as well as between suggestibility and DRF (M = 6.51. SD = 3.25, r = .21). However, on the whole, there was little relationship found between personality and DRF, and those traits that were correlated had a much smaller correlation than expected. The researcher proposes several possible explanations for these outcomes. The first explanation suggests that perhaps DRF is more determined by physiology than personality. A second explanation speculates that retrospective questionnaires, like the ones used in the study, are not an effective measure of DRF, and suggests diaries as an appropriate alternative. They suggested that future studies on personality and DRF should avoid retrospective questionnaires, using a more immediate approach to cataloguing the dreams, such as a questionnaire taken immediately upon

awakening. This is supported by Robert and Zadra (2008), who compared prospective nightmare frequency assessment (narrative and checklist logs) with retrospective assessment (annual and monthly estimates). The study came to the conclusion that retrospective methods underestimate nightmare frequency as compared with daily narrative logs, with the exception of one-month retrospection, indicating the imprecision of retrospective questionnaires as an assessment tool. The third explanation Blagrove and Akehurst (2000) gives for their results, suggests that using personality traits to predict DRF may not always work depending on the individual and/or situation. As the study did not measure DRF within the same exact situation for each participant, the results may have been influenced by situational variables. The fourth explanation suggests that different results may have been collected if a more longitudinal approach had been used, covering numerous situations. The final explanation postulates that perhaps DRF is a single variable within a larger group of variables, and that DRF may be best studied within the larger whole. Based on these explanations, future research should use a wide range of participants, or narrow the range down to one or two categories of person, collecting the data over a long period of time on not only DRF but also its surrounding variables, and not simply rely upon retrospective questionnaires as an assessment tool.

Perhaps a more effective study done on the relationship between personality and DRF is Schredl and Göritz (2017), which explored the connection between DRF, attitude toward dreams, and the Big Five Personality traits. Though this study did not employ a more immediate measure of DRF for the participants, it did employ a widely

used and acknowledged personality test with agreed upon traits (Big Five personality test), and also looked at DRF's relationship within a larger context, including nightmare frequency. The study consisted of 2492 participants (1437 female, 1055 males, and an average age of 48 years) who were assessed on DRF, attitude toward dreams, and the traits of the Big Five Personality Test. DRF was assessed through a 7-point-Likert scale (1 = never, 2 = about once a month, 3 = about 2-3 times a month, 4 = about once a week, 5 = several times a week, 6 = almost every morning 7), while nightmare frequency was assessed through an 8-point-Likert scale (which contained a broader range: 0 = never, 1 = less than once a year, 2 = about once a year, 3 = about 2-4 times a year, 4 = about once a month, 5 = about 2-3 times a month, 6 = about once a week, 7 = several times a week).

The results of the study suggested a relationship between DRF with Openness to Experience (M = 2.04, SD = .64, r = .193). Attitude toward dreams was related to Openness to Experience (M = 2.04, SD = .64, r = .375) and Conscientiousness (M = 2.96, SD = .62). In addition, a relationship was shown to exist between attitude toward dreams and Neuroticism, Extroversion, Agreeableness, and Conscientiousness. DRF was also shown to be correlated with neuroticism, specifically through nightmare frequency. This study then, unlike the study by Blagrove and Akehurst (2000), indicates a relationship between DRF and personality, as well as attitude toward dreams. The study notes, however, that the correlation with Openness to Experience may be explained by the fact that those who have a greater Openness to Experience may, in turn, be more

likely to participate in such an experiment. If this is the case, it would therefore follow that the results of the study have limited external validity.

Differing conclusions, however, were developed by Watson (2001), who brought contrary and new thoughts to the current discussion. Watson used 193 undergraduates (45 males, 124 female) who then took several tests measuring the Big Five personality traits, sleep quality and quantity, morningness/eveningness, schizoid and dissociative measures, as well as sleep and dream experience. The study continued over the course of 14 weeks, in which the participants tracked their sleep schedule daily, as well as their DRF, alcohol and caffeine consumption, and exercise.

The results suggested that only Openness to Experience had a significant relationship with dream recall ($r = .22$), and that all the other traits had no connection whatsoever, which is in direct conflict with Schredl and Göritz (2017), who also included all the traits. Watson (2001) also indicated, however, that those with higher imagination, absorption, and fantasy-proneness were more likely to recall their dreams ($r = .29$).

Gender

Brand and Beck (2011) conducted a study, which, while not directly measuring personality, did measure areas which are deeply connected to personality, such as gender, creativity, and stress. The study used 5580 participants, (3711 females, 1869 males, with a mean age of 18.23 years). They completed an online questionnaire that assessed their sleep, perceived stress levels, dreams, and creativity. The Insomnia

Severity Index (Bastion, 2001) and the Pittsburgh Sleep Quality Index (Buysse, 1989) were used to assess the sleep quality. Stress was assessed through a self-administered questionnaire. Dreams were assessed through the participants responding to three statements as follows: 1) “the day after I usually remember dreams”, 2) “what I dream always has something to do with me”, and 3) “the day after, dreams usually have an impact on my mood.” Creativity was likewise assessed through the participants’ responses to a single statement as follows: “Generally, I am a creative person; I like painting, drawing, writing, or fantasizing.” This study took note of the continuity hypothesis, which is elaborated on in Schredl (2010) and Domhoff (1996), and postulates that humans continue to live out their waking life cognitive processes while asleep. The study had five hypotheses about the results, each based on previous supportive research (Schredl & Piel (2008), Schredl (2010), Schredl & Doll (1998), Schechter (1965), Belicki (1986)): 1) females would have a greater recall frequency (Schredl, 2008), (Schredl, 2010), 2) higher stress would be correlated with greater dream recall (Schredl, 2010), (Domhoff, 1996), 3) more awakenings would be associated with greater dream recall (Schredl, 2008), 4) higher dream recall would be associated with greater creativity (Schechter, 1965), (Belicki, 1986), and 5) dreams would affect the following day’s mood (Schredl, 1998).

The results of the study suggested that females do recall their dreams more often than males ($w(3,029.32) = 6.49$, $p = .001$), thus reinforcing the first hypothesis. The results also indicated that dream recall is positively correlated with creativity (M = 1.78, SD = 1.95, r = .29), thus supporting the fourth hypothesis. In addition, the data

Sample	High	Low
1	Nightmare	Nightmare

dreams suggested that can affect the following day's mood (39% of participants claiming this was the case), thus supporting the fifth hypothesis. The difference found between males and females in this study goes directly against Tonay (1993), which found no difference between the genders. However, the age range in Brand and Beck (2011) is much more constricted, while Tonay (1993) employed participants from ages 17-45 years, and thus may have depleted any differences which do exist as well as increased the generalizability of the results. These results are also fascinating where it concerns gender, as they are in direct conflict with Wolcote and Strapp's (2002) results showed no correlation between gender and DRF.

Nightmares

Gender may play an even more significant role in DRF, however, being associated with the subsets of DRF. Brand and Beck (2011), Wolcote and Strapp (2002), Schredl and Erlacher (2004), and Schredl and Göritz (2017) all explored the role of gender in DRF. Wolcote and Strapp (2002) suggested a relationship between gender and nightmare frequency. Continuing on this line of thought, Schredl and Reinhard (2008) performed a meta-analysis of gender differences in dream recall, examining 175 different independent studies. The results suggested that in the literature females do indeed recall dreams more than do males, though the difference is small. Age was also found to influence dream recall in gender differences.

Mean	3.93	2.86
SD	1.48	0.89

Mean and SD for High/Low Nightmare (Levin, 1994)

Thus, in order to get a more accurate assessment of gender differences in DRF, the meta-analysis results suggest it is important to compare participants close in age. Schreld and Reinhard (2008) further suggested that these gender differences in dream recall could potentially be due to different dream socializations for each gender. This means that each gender may have a different way of socializing about their dreams, or that each gender socializes about their dreams a different amount.

On a related note, Levin (1994) showed that females display greater nightmare frequency than do males (50% greater chance of having a nightmare, $x^2 = 21.99$). Granted, Levin (1994) only used a retrospective questionnaire, and thus could not effectively measure nightmare frequency, as rather he measured the participant's average estimates on nightmare frequency. It is still important to note, however, that a greater estimate of nightmare frequency could imply a greater chance of recall as well, just as a greater number of dreams could potentially lead to a greater number of recalled dreams. In addition, Levin (1994) suggested that high nightmare sufferers display a higher DRF than do low nightmare sufferers (Sample 1: $t = 3.32$, $p < .01$), which is supported by Levin (1991) ($t = 3.94$, $p < .001$).

Furthermore, nightmare frequency has been found to be associated with personality as well (Wolcote, et al. 2002, Schredl et al. 2017). Schredl (2003) further explores the relationship between nightmare frequency and personality. He used a total of 444 participants (376 female, 68 male, with a mean age of 24). DRF was measured on a seven-point scale, with nightmare frequency, which was assessed twice, being measured by both a self-developed questionnaire and the LISST ((Landecker Inventar für Schlafstörungen) Test (Weeß & Schürmann, 1997). In addition, each participant kept a dream diary, in which they were instructed to record their dreams as well as rate their emotions of the dream. Personality was assessed through the NEO-PI-R (Revised NEO Personality Inventory) Test (Ostendorg & Angleitner, 1994), Absorption Scale (Tellegen & Atkinson, 1974), and Boundary Questionnaire (Hartmann, 1991). Sleep quality was also measured using both the SF-B ((Schlaffragebogen B) Sleep Questionnaire (Weeß & Schürmann, 1997) (24 – item test measuring sleep quality, morning refreshment, and sleep somatic symptoms) and the LISST Test (Weeß & Schürmann, 1997) (a 75 – question, 6 – point Likert scale test, used to expose sleeping disorders). The study was done over the course of two-weeks.

The results of the study suggested a correlation between neuroticism ($M = 99.53$, $SD = 23.69$) and nightmare frequency (LISST: $r = .301$, $p = .0001$). Stress ($M = 1.84$, $SD = .85$) of the participant was also found to have a strong connection with nightmare frequency (LISST: $r = .372$, $p = .0001$).

Lucid Dreaming

As discussed earlier, Wolcote and Strapp (2002) suggested that extroverts display a greater likelihood of having lucid dreams. Schredl and Erlacher (2004), however, found no correlation between any of the Big Five Personality traits and lucid dream frequency. Schredl and Erlacher (2004) used 444 participants (376 female, 68 male, with a mean age of 23.5). Each participant completed an eight-point scale questionnaire on dreams, with DRF being recorded with a 7-point-Likert scale. The study used the NEO-PI-R personality test (Ostendorg & Angleitner, 1994), which included the Big Five Personality traits, as well as the Absorption scale (Tellegen & Atkinson, 1974) and Boundary Questionnaire (Hartmann, 1991). The participants completed the questionnaires for two weeks, after which the experimenters completed data analysis.

The results of the study suggested no correlation between the Big Five Personality Traits and lucid dream frequency, contrary to the Wolcote and Strapp (2002) study. However, the results did suggest a small but significant correlation between individual factors of Openness to Experience, such as fantasy ($M = 22.0$, $SD = 4.4$, $r = .115$), as well as associated factors, such as thin boundaries ($M = 289.7$, $SD = 43.2$, $r = .116$), absorption ($M = 21.6$, $SD = 5.7$, $r = .131$) and imagination ($M = 51.0$, $SD = 10.8$, $r = .133$), with lucid dream frequency. Doll and Gittler (2009), on the other hand, provided supporting evidence for the correlation between extraversion and lucid dreaming. While Schredl and Erlacher (2004) signified no significant correlation between extraversion and lucid dreaming ($r = .034$), Doll and Gittler (2009) found that more frequent lucid dreamers display higher assertiveness, which, the article notes, is closely related to

extraversion. Wolcote and Strapp (2002), suggested that males are more likely to lucid dream, while Schredl and Erlacher (2004) employed mostly females, which may have affected the outcome, and thus decreased the external validity. Schredl and Erlacher (2004) found no significant gender difference ($z = .5$, $p = .6023$), but one has to wonder if this outcome is due to the unbalanced sample in terms of gender.

Creativity

Brand and Beck (2011), as already discussed, had results that suggested that creativity is correlated with DRF. Similarly, Watson (2001) and Tonay (1993), suggested that imagination and fantasy-proneness are correlated with DRF. This idea was further explored in Schredl (1995). This study used 44 participants (32 females, 12 males, with a mean age of 23). The participants underwent testing either through individual meetings or with groups with a maximum of 20 participants. The testing consisted of the verbal creativity test (VKT) (Schoppe, 1975), as well as a series of questionnaires of self-assessment on creativity, areas concerning creative actions, interest in creativity actions, and DRF.

The results of the study suggested a correlation between creativity and DRF (self-assessment: $r = .31$). In addition, the study indicated a relationship between verbal skills and DRF ($r = .32$), as well as visual skills and DRF (painting: $r = .55$; modeling clay: $r = .40$; interior decoration: $r = 26$). Schredl posited that the relationship between verbal skills and DRF may be due to the fact that the process of writing down one's dreams, retelling the dream to another individual, or just actively remembering it, requires that one has

verbal skills. Therefore, those who recall dreams better will often display greater verbal skills as well. Brand and Beck (2011) gave supporting evidence to this same idea, except reversed, where verbal and creative skills lead to increased dream recall, suggesting that creativity is positively correlated with dream recall among adolescents.

The dream subscale most closely related to creativity is frequency of lucid dreaming, as it requires that one actively controls or creates the dream as it is occurring, or at least has the impression of doing so. Blagrove and Hartnell (2000) explored the relationship between lucid dreaming frequency and creativity. The study used 56 participants (32 male, 24 female, with a mean age of 23), which were split into three groups: frequent lucid dreamers, occasional lucid dreamers and non-lucid dreamers. The participants' creativity levels were assessed through Gough's (1979) adjective checklist. The participants were given a booklet in which they were instructed to approximate their dream frequency. They were then told the definition of *lucid dream* and were instructed to say whether they have experienced one and how often. Everyone was then asked to write one of their dreams.

The results of the study showed that those who had higher lucid dream frequency also had higher self-reported creativity levels ($M_{frequent} = 9.82$, $M_{infrequent} = 8.93$, $M_{none} = 6.50$) suggesting a correlation between lucid dreaming and creativity.

In contrast, nightmares are another subscale of dreaming, of which seems to have little to no correlation with creativity. Levin and Galin (1991) investigated the relationship between nightmare frequency and creativity. The study used 79

participants (37 males, 42 females, with a mean age of 19.2). Participants in the nightmare condition exhibited a minimum of one nightmare per month, with those in the control group exhibiting only three per year. Participants then went through a series of tests and questionnaires including: Rorschach (Frick & Guilford, 1959), Remote Associates Test (Mednick, 1962), and Hartmann Boundary Questionnaire (Hartmann, 1989).

The results of the study, though mixed, showed little conclusive evidence for a positive correlation between creativity and nightmare frequency. Some extreme cases with participants, however, were suggested to potentially be in alignment with this hypothesis, indicating that the hypothesis, while is valid in extreme cases, has limited support.

Chivers and Blagrove (1999) explored the relationship between psychopathology and nightmare frequency. There were 124 participants (thirty-two male, ninety-two female, with a mean age of 28.5) who were instructed to record, upon waking, whether they had a dream, whether the dream was a nightmare, and how many nightmares they had. They also each completed a series of tests, including the Creativity Personality Scale (Gough, 1979).

The results of the study suggested no correlations between creativity ($M = 3.9$, $SD = 4.0$, $r = .06$), extraversion ($M = 6.8$, $SD = 3.3$, $r = -.13$), and neuroticism ($M = 4.8$, $SD = 3.6$, $r = .08$) with nightmare frequency, though a correlation was found between

creativity and DRF (r = .21), which is in line with Brand and Beck (2011), Watson (2001), Tonay (1993), and Schredl (1995).

The study's assessment of the dreams, however, was limited, with only three questions being asked, which were mostly vague. In addition, the participants were never instructed to record the content of their dreams upon awakening, which acts to consolidate dream memories (Bachner & Raffetseder ,2012; Wolcote & Strapp, 2002), which could have affected the results, as they may have forgotten parts of their dreams. This may also play a part in why retrospective questionnaires are not as effective at dream assessment as questionnaires given immediately after the dreamers awaken, as Genarro and Marzano (2012) suggested. A greater number of questions, and more specific questions, as well as an inclusion of a dream diary, may have been helpful in further understanding where the dreams should be placed on the dream – nightmare scale, and thus, better understand the relationship between personality and nightmare frequency.

Creative Suggestion

Creativity and reading have many similar elements which can be explored. Kelly and Kneipp (2009) explored the relationship between fiction reading and creativity. The study used 225 students (180 female, 45 male, with a mean age of 27.5) who were assessed for reading and creativity. The study discovered that pleasure reading had a positive correlation with creativity (r = .28), and that assigning reading of factual information in the form of fiction could increase learning in students over purely factual

information. The study was limited, however, in that it consisted mostly of educated females. These results further reinforce the idea that fiction reading and creativity are correlated, specifically that the more one reads for pleasure, the greater one's creative capacity.

Schredl and Erlacher (2007) found that dreams can stimulate creativity in waking life. Two samples were used. Participants in the first sample took an 8-point scale questionnaire regarding creative dream frequency, and a similar questionnaire to assess nightmare frequency. DRF was measured using a 7-point scale questionnaire for the first samples as well. The second sample, however, took an online questionnaire regarding lucid dreaming, which included a question on creative dream frequency, nightmare frequency, and DRF. Participants in the second sample also recorded a case showing how past dreams affected creativity. Personality was assessed using the German version of the NEO Personality Inventory Revised (NEO-PI-R) (Ostendorg & Angleitner, 1994), Absorption scale (Tellegen & Atkinson, 1974), and the Boundary Questionnaire (Hartmann, 1991). Creativity was assessed through a 12-point Likert scale questionnaire. The first sample took the questionnaires over a two-week period. The second sample returned their online questionnaire within an eight-month period.

It was found that DRF was positively correlated with creative dream frequency (Paper questionnaire: female: $M = 2.12$, $SD = 1.65$; male: $M = 2.15$, $SD = 1.57$; Online questionnaire: female: $M = 2.40$, $SD = 2.32$; male: $M = 2.44$, $SD = 2.35$; $r = .29$, $p < .0001$). Creative activity in waking life was also positively correlated to creative dream frequency ($r = .3$). Therefore, creativity in waking life may have an influence on creativity

in dream life. Perhaps, this influence could run two-ways: creativity influences dreams, and dreams influence creativity. If this is the case, future studies should take this into account when measuring the effect of one on the other, indicating that the influence may not be fully attributable to one variable. In addition, considering the findings of Kelly and Kneipp (2009) which found a positive correlation between pleasure reading and creativity, perhaps creative-oriented activities such as fiction reading could work to stimulate the mind in its creative capacity, and thus act as creative suggestion.

In turn, Mourgues and Preiss (2014) provided supporting evidence. This study tested the hypothesis that that those with reading disabilities will display a heightened sense of creativity; a hypothesis that attempts to refute the results of Kelly and Kneipp (2009). This study's evidence for this hypothesis, however, was non-existent. Rather the results indicated a positive correlation between reading ability and creativity (Reading Comprehension: M = 4.79, SD = 1.63, with Rebus Puzzle: r = .229), as well as between verbal ability and creativity (Word and Pseudoword Decision Task: M = 50.54, SD = 12.74, with Rebus Puzzle: r = .315). These results are in line with the previous study (Kelly & Kneipp, 2009), and suggest that future studies employing this relationship should use participants close to, or on the same, reading level, to obtain a more accurate measure. In addition, one can draw the conclusion that since reading ability is correlated with creativity, and creativity is correlated with DRF (Brand a Beck, 2011; Watson, 2001; Tonay, 1993; Schredl, 1995), then reading ability must have some interaction with DRF as well.

A subject closely related to creativity is art. Djikic and Oatley (2009) explored the correlation between art and personality, and further supports the idea of creative suggestion. The study used 166 undergraduate participants (112 female, 54 male, with a mean age of 19.5 years), who were split into control and experimental groups. Each participant was instructed to complete a series of questionnaires (including the Big Five Personality test). The experimental group then read a short story, and the control group read a documentary style interpretation of the same story. Each story was tested, and participants deemed the first story to be more artistic. Each participant then completed the questionnaires a second time, to see if anything had changed.

The results suggested that art can have an effect on self-reported personality measures, using questions of the Big Five Personality Inventory as well as an Emotional Checklist on an 11-point scale, with those who read the short story experiencing a greater degree of change in trait ($M_{art} = .77$, $t(164) = - 1.64$, $p = .053$, $R^2 = .016$) and emotional ($M_{control} = .69$, $t(164) = - 2.39$, $p < .009$, $R^2 = .034$) measures than those who read the documentary interpretation. Such results also indicate the suggestibility of creative fiction on the perception of self. Personality factors do play a role in dream recall according to Tonay (1993), Wolcote and Strapp (2002), Blagrove and Akehurst (2000), Schredl and Göritz (2017), Watson (2001). Therefore, the possibility of fiction reading changing the perception of own's own personality could affect the outcome of any study employing personality as a variable. Also, since personality has been shown to be correlated with DRF (Tonay, 1993; Wolcote & Strapp, 2002; Blagrove & Akehurst, 2000; Schredl & Göritz, 2017; Watson, 2001), the suggestibility of fiction on self-

perception may also affect DRF, which further reinforces the idea that fiction can work as creative suggestion on dreams.

Data Collection

Data collection methods for dream research is a heavily discussed subject, as there are few reliable and efficient methods. Questionnaires are used frequently in dream research. Brand and Beck (2011), Wolcote and Strapp (2002), Schredl and Erlacher (2004), Schredl (2003), and Chivers and Blagrove (1999) all use a questionnaire to assess dreaming and DRF in the participants. Genarro and Marzano (2012), however, suggested that questionnaires are less effective when administered retrospectively. Bernstein and Roberts (1995) tested the effectiveness of self-assessment questionnaires for dream assessment.

The results of the study suggested that such assessment methods do provide an adequate measure and the resulting data were in line with previous data (Hall & Van De Castle, 1966). In addition, the study suggests that self-assessment questionnaires are less expensive and more efficient than the usual assessment methods of laboratory reports or dream diaries.

False Memories

It should be noted here that any sort of dream report should be taken cautiously. Dominic and Antonio (2015) discovered that morning dream reports, though primarily trustworthy, can have traces of invention. The study employed two phases, with phase 1 consisting of participants sleeping in the dream lab and being awakened from REM sleep

to recall their dreams. While this happened, pieces of false information were given to the participants. The experimenters wondered whether any of these falsities would be misattributed to the participant's dreams. Phase 2 consisted of two interviews one week apart from each other. The participants only agreed to do the second phase after the first phase was completed. Each interview consisted of recalling their dreams in the lab. When the participant finished recalling the dreams, the interviewer asked if he or she could recall anything else. The second recall session was split into two groups: a hypnotic and non-hypnotic. Both groups were asked to do the same thing as the last recall session, except they were instructed to try to remember every detail. The hypnotic group was hypnotized before the session began. Any dream recalled only during the second phase containing any of the suggested misinformation was considered a false memory. The researchers came to the conclusion that dream memories are at risk of outside suggestion, with false memories being created in 15% of the sample.

Horton and Conway (2009) suggested that dream memory and the act of recalling dreams functions similar to recalling childhood memories, which are known to be unstable. The researchers discovered that dream memories are much more prone to misattribution with childhood memories than a recent memory. One has to wonder whether or not this can work in the opposite direction; that is: can a real-life memory be misattributed to something that happened inside a dream? There appears to be no good way of getting around this problem, as there is no good way to test the reliability

of someone's dreams. This being the case, it is important that future studies account for the possibility that not all of the dream data is accurate.

Hypotheses and Predictions

There is still a great deal unknown regarding dreams and their relationship with personality. The present study includes four hypotheses each with their own set of predictions. The first hypothesis postulates that personality is correlated to DRF (Tonay, 1993; Wolcote & Strapp, 2002; Blagrove & Akehurst, 2000; Schredl & Göritz, 2017; Watson, 2003). The first prediction postulates that those who score higher on Openness to Experience will also have a greater DRF (Schredl & Göritz, 2017; Watson, 2003). Second, those who score higher on Conscientiousness will show higher DRF (Schredl & Göritz, 2017). Throughout all the studies represented, only Openness to Experience and Consciousness had any significant correlation with DRF.

The second hypothesis postulates that personality is correlated with the dream recall subsets (Wolcote & Strapp, 2002; Schredl & Göritz, (2017); Schredl, 2003; Doll & Gittler, 2009)]. The first prediction of this set predicts that Extraversion is positively correlated with lucid dreaming (Wolcote & Strapp, 2002; Doll & Gittler, 2009). The second prediction of this set predicts that there will be a positive correlation between Neuroticism and nightmares (Schredl, 2003; Schredl & Göritz, 2017).

The third hypothesis postulates that there will be a significant difference between experimental (those with creative suggestion) and control groups (those without creative suggestion) with DRF, which is in line with Brand and Beck (2011),

Watson (2003), Tonay (1993), Schredl (1995), and Chivers and Blagrove (1999). Though Kelly and Kneipp (2005) was limited in that it used mostly educated females as participants, the present study will generalize from those results. Brand and Beck (2011) showed a correlation between creativity and DRF. Thus, the first prediction is that those who read creative fiction directly before bed will display greater DRF overall. The second prediction is that they will also display greater number of lucid dreams (Blagrove & Hartnell, 2000). The final prediction in this set predicts that those who read before going to bed will additionally display fewer nightmares (Levin & Galin, 1991).

The final hypothesis posits that there is a significant difference between genders with DRF, which is based on the research of Brand and Beck (2011), Schredl and Reinhard (2008), and Levin (1994). The first prediction anticipates there will be a significant difference between genders on DRF scores (Brand & Beck, 2011; Schredl & Reinhard, 2008). Schredl and Reinhard (2008) provides the best evidence of the correlation between gender and DRF, as it is a meta-analysis, combining evidence over several studies. Wolcote and Strapp (2002) suggested a positive correlation between males and lucid dreaming, while Blagrove and Hartnell (2000) provides evidence for a correlation between creativity and lucid dreaming. The second prediction anticipates that there will be a significant gender difference in DRF scores (including lucid dreaming) between the experimental (creative suggestion) and control groups. If this prediction is met, it would suggest an interaction between gender and treatment group, and that gender and creative suggestibility combined create new effects on DRF. The final

prediction posits that there will be a significant difference between genders on lucid dream frequency (Wolcote & Strapp, 2002) and nightmare frequency (Levin, 1994).

Materials and Methods

Participants

This study used 25 students from the subject pool at Houghton College as well as one individual from the larger community. These participants were volunteers, though they received a small compensation ($10 Amazon gift card) for their participation. The range of age for the participants was 19 - 31, with a mean age of 21. There were 11 males and 14 females. I used randomly assigned participants to the control and experimental groups, with control having 13 participants, and experimental having 12.

Procedure

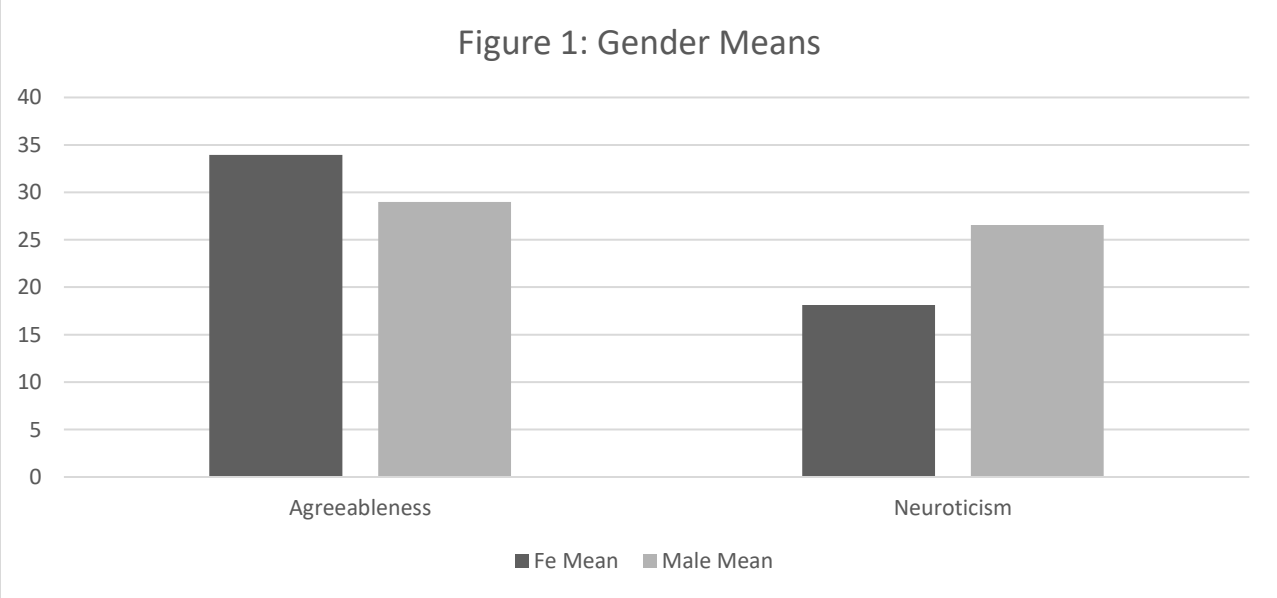
Each participant was asked to complete the Big Five Personality Test at the start of their participation. Each participant was given a number code to mark their scores to avoid placing names with the data. Afterwards, he or she were each instructed to keep a journal in which they would write down as much as they could recall of their dreams within a 2-hour period for the next 2 weeks. In addition, they were asked to answer six 5 – Point Likert scale questions (1 being strongly disagree, 5 being strongly agree) regarding the vividness of the dream, feelings during the dream, and sense of control during the dream, at the end of each journal entry within the 2-hour time frame. In the case that a participant did not have, or could not recall, any sort of dream, they were instructed to write “no dream” in place of the entry. In the case that a participant forgot to write an entry within the 2-hour frame, they were instructed to write “forgot” along with the date in place of the entry. In the case that a participant remembered having a

dream, but could not remember any content, they were instructed to say so in the entry. Since I wanted an overall score of dreams that were remembered, and a subset of that score for dreams not fully remembered, I counted these dreams in the category of both *remembered* and *remembered but not recalled.* Therefore, one measure was contained within the other. In addition to the journal and questionnaire, the participants in the experimental group were also instructed to read from Charles Dickon's *A Christmas Carol* for 10 minutes before sleeping. This book was chosen to act as the creative suggestion variable. I chose this specific book due to its ease of free access online. At the end of the 2 weeks, all participants were instructed to return the journals to me, to which I would then record the data.

To better analyze the data for this study, I recorded each of the participants' booklet questionnaire scores from 0 – 4 (0 being strongly disagree, 4 being strongly agree). I also recorded each of their Big Five Personality scores using the rubric the test provided.

Results

There was found to be no significant differences overall between genders, though there were differences for individual measures (Agreeableness: M = 31.76, SD = 5.44, t = 2.56, t-crit = 2.07, df = 23; Neuroticism: M = 21.84, SD = 8.4, t = -2.93, t-crit = 2.07 df = 23). No significant difference was found overall between treatment group scores, or with any individual measures. Significant means for gender can be seen in figure 1.



Correlational Analysis

There were no significant correlations found between Extraversion and dream recall, nightmares, or lucid dreaming, though there was a negative correlation with Openness to Experience (r =-0.42, P = 0.04). There were no correlations found between Agreeableness and number of dreams recalled, nightmares, or lucid dreaming, though there was a negative correlation found with dream vividness (r = -0.31, P = 0.13). There

was a positive correlation found between Conscientiousness and number of dreams *remembered* (r = 0.44, P = 0.03) and number of dreams *remembered but not recalled* (r = 0.3, P = 0.15). With Neuroticism, there were negative correlations found with vividness (r = -0.42, P = 0.04), nightmares (r = -0.44, P = 0.03), and lucidity (r = 0.61, P = 0.001). Openness to Experience was only found to be correlated with Extraversion, as already mentioned, as well as nightmares (r = -0.35, P = 0.09).

In addition, there were correlations found to exist for vividness with nightmare frequency (r = 0.61, P = 0.001), vividness with *remembered* dreams (r = 0.51, P = 0.01), vividness with lucid dreaming (r = 0.58, P = 0.002), nightmares with lucid dreaming (r = 0.47, P = 0.02), nightmares with *remembered* dreaming (r = 0.47, P = 0.02), lucid dreaming with *remembered* dreaming (r = 0.46, P = 0.02), *remembered* dreaming with *remembered but not recalled* dreams (r = 0.37, P = 0.07), and *remembered but not recalled* dreams with age (r = -0.33, P = 0.11). All the correlations can be seen in Figure 2.

	Extra	*Agree*	*Consc*	*Neur*	*Open*	*Viv 1*	*Viv 2*	*NM 1*	*NM 2*	*Luc 1*	*Luc 2*	*rem dreaming*	*no recall*	*forgot*	*Age*
Extra	1														
Agree	0.07444	1													
Consc	-0.06383	-0.21335	1												
Neur	0.180466	**-0.30901**	0.181973	1											
Open	**-0.41812**	-0.22427	0.11069	-0.16705	1										
Viv 1	-0.15407	0.148785	0.283053	**-0.42312**	-0.25271	1									
Viv 2	-0.22453	-0.0648	0.204014	**-0.3804**	0.003321	**0.331009**	1								
NM 1	0.172268	-0.03135	0.059693	**-0.34364**	**-0.35124**	**0.609685**	**0.463461**	1							
NM 2	0.041467	0.066323	0.018643	**-0.44241**	-0.16552	**0.566085**	**0.452306**	**0.855684**	1						
Luc 1	0.110588	-0.05793	0.178222	**-0.38658**	0.032004	**0.455793**	**0.48335**	**0.595026**	**0.705209**	1					
Luc 2	-0.04962	0.159701	-0.06642	**-0.61881**	-0.06024	**0.57945**	0.280686	**0.400798**	**0.529858**	**0.558783**	1				
rem drear	0.105513	0.206125	**0.439993**	-0.22137	**-0.36429**	**0.514937**	**0.544699**	**0.47351**	**0.471486**	**0.45643**	**0.382699**	1			
no recall	0.123527	-0.08706	**0.301209**	0.169473	-0.00619	-0.24538	-0.07869	-0.25019	-0.29175	-0.24014	-0.20245	**0.374405542**	1		
forgot	0.005965	-0.06989	-0.18289	0.069105	**-0.37586**	0.017309	-0.11581	0.094108	-0.00327	-0.13142	0.023224	-0.018210321	0.107253	1	
Age	-0.17285	-0.05856	-0.12576	0.090133	0.153101	-0.00729	0.108166	0.117182	0.073014	-0.01666	-0.12654	-0.061006331	**-0.32566**	0.048181	1

Figure 2

Interaction

A two-way ANOVA test was performed to see whether there was an interaction between gender and treatment for each of the dream measures (vividness, nightmares, lucid dreaming, *remembered*, *remembered but not recalled*, and number of times the participant forgot to record). There was found to be no significant interactions for any of the measures. The complete list of the means, standard deviations, and interactions can be seen in Appendix I.

Discussion

The results of this study suggest that personality is correlated with DRF, though differently than expected. Only the personality traits of Conscientiousness, Neuroticism, and Openness to Experience are correlated with DRF, while Extraversion and Agreeableness are not. All these correlations, except for Conscientiousness, are negative. Therefore, most of the predictions here are backwards, where those expected to have a greater DRF actually have less. Therefore, while the hypothesis that personality is correlated with DRF is true, the correlation is different than expected, and is contrary with the previous research of Tonay (1993), Wolcote and Strapp (2002), Blagrove and Akehurst (2000), Schredl and Göritz (2017), and Watson, (2003), which suggest a more positive correlation between traits and DRF. These findings could be due to several influence factors, such as personality, physiology, and stress, which are discussed further on.

The second hypothesis, that personality is correlated with the dream subsets, was also indicated to be correct, though the correlation was also not as predicted. Neuroticism was negatively correlated with both nightmares and lucid dreaming, and Openness to Experience was negatively correlated with nightmares. This suggests that those who are more neurotic or open to new experiences will, in turn, experience fewer nightmares and lucid dreams. None of the other personality traits had any correlation with the dream subsets. These findings are surprising, especially those regarding Neuroticism and Openness to Experience. It would be logical to assume, using Freud's theories of dream interpretation (Freud, 1951), that those who are more anxious, and

neurotic would have more anxiety ridden dreams, and that those who are more open to new experiences would have more creative, lucid dreams, but this is not the case in the present study.

The third hypothesis, that there would be a significant difference between DRF scores for control and experimental groups was also discredited by the results, with not a single significant difference, either positive or negative. These findings are not congruent with the previous research of Brand and Beck (2011), Watson (2003), Tonay (1993), Schredl (1995), and Chivers and Blagrove (1999), which did suggest that creative suggestion can influence DRF. Furthermore, there was found no significant difference between groups for nightmares or lucid dreaming. This goes against the findings of Blagrove and Hartnell (2000), which did suggest the that creativity influences lucid dreaming, as well as Levin and Galin (1991), which suggested that, though only in extreme cases, creativity can influence nightmares. These findings are also surprising. One could postulate that since creativity has such an influence on waking life, that it would have the same or similar influence on dream life, and that dream life is just a continuation of waking life (Schredl, 2010; Domhoff, 2006). Also, since it has been shown that dreams can have an influence on creativity in waking life, one could assume it would work the other way. However, none of these ideas appear to be the case in the present study.

There were no significant differences found between the two genders on DRF scores, and thus the findings were contrary to the final hypothesis. This also goes against the previous research of Brand and Beck (2011), and Schredl and Reinhard

(2008), which both did find a difference. Wolcote and Strapp (2002) found no significant difference between genders, but the study was decided to be not as reliable due to its use of retrospective questionnaires, which Genarro and Marzano (2012) suggested was not an effect tool of assessment. This is interesting in light of the fact that the present study avoided retrospective questionnaires, and still had the same results. In addition, Tonay (1993) had similar findings, but was also deemed not as reliable due to its wide age range. Yet, the present study held a stricter age range, and still came to the same conclusions. Perhaps the age range must be even stricter in future research. The prediction that there would be an interaction between gender and treatment group on the dream measures was also shown to be unsupported (see Appendix I). This goes against Wolcote and Strapp (2002) and Blagrove and Hartnell (2000), which, combined, suggested a correlation between gender, creativity, and lucid dreaming. Moreover, there were no significant differences found between genders on lucid dreaming or nightmare scores, which is conflicting with the final prediction. These findings also are not congruent with the previous research of Wolcote and Strapp (2002), which did indicate that gender influenced lucid dream frequency, or Levin (1994), which suggested that gender can influence nightmare frequency.

There were several other correlational findings apart from the hypotheses which were interesting and may have many ramifications. Vividness was found to be correlated with both nightmare frequency and lucid dream frequency. This is interesting in that it implies that both dream subsets employ a great deal of vivid imagery. Vividness was also found to be correlated with the number of dreams *remembered*,

which could imply that vivid imagery makes a dream more memorable. Wolcote and Strapp (2002) described vividness as a part of dream detail, a measure closely related to dream recall (or the number of dreams remembered). The present study combined the two, using both vividness and number of dreams *remembered* as individual factors of an overall measure of dream recall. Therefore, it would make sense that my study would indicate a correlation between the two.

The present study also discovered a correlation between nightmares and number of dreams *remembered*, as well as between lucid dreaming and number of dreams *remembered*. This finding implies that the dream subsets both have a high likelihood of being recalled. As already discussed, both these dream subsets were found to have a correlation with vividness, which could explain this phenomenon, since vividness was also found to have a correlation with number of dreams *remembered*. It is clear there is a greater deal of interaction between these variables than I initially expected.

The present study also found a correlation between nightmares and lucid dreaming, which is interesting in that it suggests that both the dream subsets are connected to each other somehow. This connection between the two could be explained by the vividness which both were shown to be correlated with, the individual's level of neuroticism which both were shown to share a negative correlation with, or perhaps some unknown factor which was not measured.

I also found a correlation between number of dreams *remembered* and the number of dreams *remembered but not recalled*. This is easy to explain however, in that the second measure was contained within the first in this study. I wanted to both know the number of dreams *remembered* overall, as well as a subset of that number. Therefore, the *remembered* dreams section contained all the dreams which had any degree of recall, while the *remembered but not recalled* section only contained those dreams which lacked any recalled content.

There are many possible explanations for the unexpected results regarding the relationship between personality and DRF. First, there could be more factors involved in DRF which I did not measure or account for. Blagrove and Akehurst (2000) suggested that using personality to predict DRF may only work depending on the situation. However, since everyone in the present study came from a different background, and likely were in a variety of life situations, there was very little control over this variable. Though this study did mostly only use undergraduates as participants (except for one community member), and though all the participants lived near the school, there were still many individual differences I did not account for, such as socioeconomic status, race, familial background, social status, etc. Future researchers should therefore identify as many of these potential threats to validity as they can and account for them.

Also, the personality traits which were tested with the Big Five personality test may have also influenced the outcome. Specifically, in regard to Freud's theories of dream interpretation, this could be true. According to Freud, "undesired ideas" (Freud, 1951) present themselves in dreams (Freud, 1951). Therefore, personality types more

likely to suppress thoughts and desires may in turn have more dreams with these "undesired ideas" (Freud, 1951) being fulfilled. In addition, these same people may not recall as many dreams simply because they suppress the "undesired ideas" (Freud, 1951) within them. The latter explanation may clarify the present study's finding that Neuroticism is negatively correlated with nightmares, because those who are more neurotic may be more likely to suppress the content of their dreams.

Schredl and Göritz (2017) suggested that those who score higher on Openness to Experience may in turn be more likely to volunteer for a psychological experiment. In order to keep this potential threat from becoming realized, it is important for future studies be sure to include a significant number of participants who score both high and low on Openness to Experience. The same could be said of the other four traits. Those who are more extraverted, for example, are identified as being assertive and active (McCrae and John, 1992). Both these traits may make a person more likely to decide on joining a study, as one would feel much more comfortable doing so than someone who does not share these traits. Those who score higher on Agreeableness are described as trusting and generous (McCrae & John, 1992). These individuals may then be more likely to participate purely out of desiring to help a fellow student. Conscientiousness contains the traits of reliability, organization, and efficiency (McCrae & John, 1992). Therefore, those who were more conscientious in the present study may have been more likely to follow the instructions, and thus produce more reliable results. Those who score higher on Neuroticism are described as anxious, tense, and hostile (McCrae & John, 1992). Students who had a higher Neuroticism score may have been less apt to sign up for a

psychology experiment, as it is often a new, and potentially, frightening experience. Due to all these possibilities, the present study may not have obtained an accurate sample of the population, and thus the results may not be as externally valid.

One must also acknowledge that some participants may have chosen not to be honest in their dream journal for some unknown reason. Those who were more neurotic, for instance, might have mentally acknowledged the content of their dream, but did not want to share it with the experimenter, and thus changed things within the journal. This could be true for conscientious people as well, who are very aware of their faults and desire other's not to see them. If one of their dreams contained something undesirable, these participants may have changed them so that no one else would know. Therefore, the actual dream journal and questionnaires may not be a completely accurate account of the participants' DRF.

The present study also didn't account for differences in physiological traits between participants. Blagrove and Akehurst (2000) postulated that physiology may have played a role in the results their study reached, possibly an even bigger role than personality. This could be just as true for the present study, as I did not analyze or even acknowledge the possible brain physiological traits which may have had an influence DRF, nightmare frequency, or lucid dream frequency.

In addition, studies have also shown a difference between the dreams that appear during REM sleep and NREM sleep (Anch, 1988). REM sleep is reported to result in more dreams than NREM (Anch, 1988), though this could just be more "recalled"

dreams. NREM sleep has been shown to result in dreaming, though the dreaming is different between the two stages (Anch, 1988). REM sleep often results in dreams containing complicated sensory stories, while dreams from NREM sleep often contain still scenes or detached thoughts (Anch, 1988). Researchers believe this difference between dreams for the two sleep stages may be due to REM sleep having both heightened neuron firing and a different pattern of firing than of NREM sleep (Anch, 1988). This could have played into the present study, as it implies that there are more kinds of dreaming than my study identified. The dream content often differs between REM and NREM sleep (Anch, 1988), and this difference may have been apparent in the present study's dream journals. Participants often would only write two or three lines for a dream, indicating the location and the surrounding people, but neglecting a sense of time or direction. The same participants would then later record a dream that filled the entire page, with multiple characters and shifts in the "story", different scenes, and overall complexity. This difference may be in part due to NREM and REM sleep. It could be that there is a difference in vividness between these two stages as well, which might explain why REM dreams are recalled more. This is an area of study which should be researched more in-depth to better understand DRF.

There were several complications with the data collection which may have influenced the resulting data and analyses as well. Four people didn't write down dreams, so I either used intuition to decide the number they fully recalled and partially recalled, or I used the average as their score. One participant lost two pages, so I simply did not record them. One participant did not put down their age, so I used the average

age of the study as their age. All these data complications may have affected the results negatively, and future researchers should apply safeguards against them, or at least develop more sophisticated protocol on how to deal with them if they do arise. In order to protect these complications from happening, future researchers could provide more in-depth explanations to the participants or send out reminder emails. Better protocol to deal with these discrepancies if they do occur may entail only using averages as the missing DRF scores, which would at least provide more consistent numbers than if one followed my example and used both intuition and averaging. Future researchers could also provide the participants with a less fragile booklet in order to diminish the probability of losing pages.

Another potential influence on the study which may have assisted in creating the unexpected data was the uneven distribution of gender. There were three more females than there were males, and since some studies (Brand & Beck, 2011; Schredl & Reinhard, 2008) do suggest a gender difference on DRF, this may have influenced the internal validity of the study. In addition, the treatment groups were split unevenly in participant number, as well as unevenly between genders within the treatment groups. There were 13 participants in the control group (eight female, five male) and 12 in the experimental group (six female, six male). This unevenness between and within groups also affects the studies internal validity. Future studies, therefore, should use more equal numbers for both genders and groups.

Furthermore, the present study only employed 25 participants. A larger sample size could potentially have produced different results, possibly results more congruent

with the hypotheses and predictions. For example, some of the correlations were very close to being significant, such as conscientiousness with vividness (r = 0.28), and a few more participant scores could possibly have pushed such correlations into the significant range. However, even if more participants were used, and certain correlations became significant, these correlations would still likely be weak. Regardless, future researchers would be wise to use a larger sample size for their studies in order to produce a more accurate result.

Also, while this study used a stricter age range than some studies (Tonay, 1993), it was still wider (19 yrs. – 31 yrs.) than I had initially hoped for (18 yrs. – 21 yrs.). Waterman (1991) and Schredl and Reinhard (2008) suggested a correlation between age and DRF. According to Waterman (1991), DRF decreases with age. This could have skewed the results, as the study's age range spanned 12 years, and I didn't have an even number of participants in each age group. I furthermore discovered a negative correlation between dreams *remembered but not recalled* and age, which may be a result of the study's wide age range and uneven split. If this is true, then this study, and similar studies, would produce a more valid result using as strict an age range as possible. Future researchers should take this into account and perhaps require that participants be a certain age to participate.

In addition, although Blagrove and Akehurst (2000) suggested that future research should employ a longer period of time for data collection, I chose to remain with a two-week time, as it would have been impossible to complete the study using a longer period given the time I had to work within. This decision should be considered

when analyzing the study's results and implications, and future research should, if possible, lengthen the testing period.

Schredl (2003) suggests a connection between stress and nightmare frequency, a relationship which could affect the results of the present study. However, due to the lateness of my discovering this connection, I was not able to explore this relationship. Therefore, the results of this study should be read with this in mind, and future studies should implement this variable as something to explore.

It should also be noted that some of the data may not be completely accurate due to invented memories, which Dominic and Antonio (2015) and Horton and Conway (2009) suggested. This could suggest that some of the participants misattributed dream memories for real-life memories, or real-life memories for something that happened in a dream. However, in order to effectively handle this complication, I would have had to know every little detail about each participant's past life, which is a much too ambitious task for the present study to take on, so the study continued as it was.

Despite the complications the present study encountered, it did provide supporting evidence for the hypothesis that personality is correlated with DRF in several ways. Conscientiousness, Neuroticism, and Openness to Experience are the only Big Five traits which showed a significant correlation with DRF, with Neuroticism also being correlated with lucid dreaming and nightmares, and Openness to Experience being correlated with only nightmares. There was no supporting evidence in this study for the other hypotheses. Both gender and creative suggestion were not shown to not have any

influence on DRF. Future studies looking for similar findings should take care not to create the same complications and errors that this study did, and thus ensure a greater internal validity. They should ensure that each participant understands the instructions, they should provide stronger booklets, use a longer experimental run time, a stricter age range, and obtain equal numbers between genders and treatment groups. In addition, future studies could magnify the study by adding more variables to be explored, such as stress, physiology, and individual situations. Doing so would not only increase the research's validity by including variables which were neglected in the present study, but also gain information on these variables and add to the literature surrounding them.

References

Anch, A. M. (1988). *Sleep: A scientific perspective*. Englewood Cliffs, NJ: Prentice Hall.

Bachner, J., Raffetseder, P., Watz, B., Schredl, M. (2012) The effects of dream socialization in childhood on dream recall frequency and the attitude toward dreams in adulthood: A retrospective study. *International Journal of Dream Research, 5,* 102-107.

Barber, T. X., Wilson, S. C. (1978). The Barber suggestibility scale and the creative imagination scale: Experimental and clinical applications. *The American Journal of Clinical Hypnosis, 21*, 84-108.

Bastien, C. (2001). Validation of the Insomnia Severity Index as an outcome measure for insomnia research. *Sleep Medicine,* 2, 297-307.

Beaulieu-Prévost, D., Zadra, A. (2015). When people remember dreams they never experienced: A study of the malleability of dream recall over time. *Dreaming*, *25*, 18-31.

Belicki K. (1986) *Recalling dreams: An examination of daily variation and individual differences.* In: Gackenbach J, ed. Sleep and Dreams. New York, NY: Garland, 187–206.

Bernstein, D. M., Roberts, B. (1995). Assessing dreams through self-report questionnaires: Relations with past research and personality. *Dreaming*, *5*, 13-27.

Blagrove, M., Akehurst, L. (2000). Personality and dream recall frequency: Further negative findings. *Dreaming*, *10*, 139-148.

Blagrove, M., Hartnell, S. (2000). Lucid dreaming: associations with internal locus of control, need for cognition and creativity. *Personality and Individual Differences*, *28*, 41-47.

Bone, R. N. (1968). Extroversion, neuroticism and dream recall. *Psychological Reports*, 922.

Brand, S., Beck, J., Kalek N., Gerber, M., Kirov, R., Pühse, U., Hatzinger, M., Holsboer-Trachsler, E. (2011) "Dream Recall and Its Relationship to Sleep, Perceived Stress, and Creativity Among Adolescents." *Journal of Adolescent Health*, *49*, 525–531.

Buysse, D. J., Reynolds, C. F., Monk, T. H., Berman, S. R., Kupfer, D. J. (1989). The Pittsburgh sleep quality index: A new instrument for psychiatric practice and research. *Psychiatry Research, 28*, 193-213.

Cernovsky, Z. Z. (1984). Dream recall and attitude toward dreams. *Perceptual and Motor Skills*, *58*, 911-914.

Chivers, L., & Blagrove, M. (1999). Nightmare frequency, personality and acute psychopathology. *Personality and Individual Differences*, 27, 843-851.

De Gennaro, Luigi; Marzano, Cristina; Cipolli, Carlo; Ferrara, Michele. (2012) How we remember the stuff that dreams are made of: Neurobiological approaches to the brain mechanisms of dream recall. *Behavioral Brain Research*, *226*, 592-596.

Djikic, M., Oatley, K., Zoeterman, S., & Peterson, J. B. (2009). On Being Moved by Art: How Reading Fiction Transforms the Self. *Creativity Research Journal*, *21*, 24-29.

Doll, E., Gittler, G., Holzinger, B. (2009). Dreaming, lucid dreaming and personality. *International Journal of Dream Research, 2*, 52-57.

Domhoff, B., Gerson, A (1967). Replication and critique of three studies on personality correlates of dream recall. Journal of Consulting Psychology, *31*, 431.

Domhoff G. W., Hall C. S. (1996) *Finding meaning in dreams: A quantitative approach*. New York, NY: Plenum.

Farley, F. H., Schmuller, J., Fishback, T. J. (1971). Dream recall and individual differences. *Perceptual and Motor Skills*, *33*, 379-384.

Fenigstcin, A, Scheier, M., Buss, A (1975). Public and private self-consciousness: Assessment and theory. *Journal of Consulting and Clinical Psychology, 43*, 522-527.

Freud, S. (1953). *The interpretation of dreams*. Hogarth Press.

Frick, J., Guilford, J., Christensen, P., Merrifield, P. (1959). A Factor-Analytic Study of Flexibility in Thinking. *Educational and Psychological Measurement, 19*, 469-496.

Gennaro, L. D., Marzano, C., Cipolli, C., Ferrara, M. (2012). How we remember the stuff that dreams are made of: Neurobiological approaches to the brain mechanisms of dream recall. *Behavioural Brain Research*, *226*, 592-596.

Gough, H. G. (1979). A creative personality scale for the adjective check list. *Journal of Personality and Social Psychology*, *37*, 1398 – 1405.

Hall, C. S., Van De Castle, R. L. (1966). *The content analysis of dreams*. East Norwalk, CT: Appleton-Century-Crofts.

Hartmann, E. (1991). *Boundaries in the mind: A new psychology of personality*. Basic Books, NY: Diane Pub.

Horton L. C., Conway A. M. (2009) The Memory Experiences and Dreams Questionnaire (MED-Q): A Validated Measure of Dream Remembering. *Imagination, Cognition and Personality*, *29*, 3-29.

Koulack, D., Nesca, M., Stroud, B. M. (1993). Laboratory sleep patterns and dream content of Type A and B scoring college students. *Perceptual and Motor Skills*, *77*, 216-218.

Kelly K. E., Kneipp L. B. (2009) Reading for Pleasure and Creativity Among College Students. *College Student Journal*, *43*, 1137-1144.

Levin, R., Galin, J., Zywiak, B. (1991). Nightmares, boundaries, and creativity. *Dreaming*, *1*, 63-74.

Levin, R. (1994). Sleep and dreaming characteristics of frequent nightmare subjects in a university population. *Dreaming*, *4*, 127-137.

Lorr, M., McNair, D. M. (1980). *Profile of Mood States Bipolar form (POMS-BI).* San Diego: Educational and Industrial Testing Service.

Mccrae, R. R., John, O. P. (1992). An Introduction to the Five-Factor Model and Its Applications. *Journal of Personality*, *60*, 175-215.

Mednick, S. (1962) The associative basis of the creative process. *Psychological Review, 69,* 220-232.

Mourgues, C. V., Preiss, D. D., Grigorenko, E. L. (2014). Reading Skills, Creativity, and Insight: Exploring the Connections. *Spanish Journal of Psychology, 17*.

Ostendorf, F., & Angleitner, A. (1994). A comparison of different instruments proposed to measure the Big Five. *European Review of Applied Psychology / Revue Européenne de Psychologie Appliquée*, *44*, 45-53.

Robert, G., Zadra, A. (2008). Measuring nightmare and bad dream frequency: impact of retrospective and prospective instruments. *Journal of Sleep Research*, *17*, 132-139.

Rogers, D. A (1966). *Rogers condensed CPl-MMPI*. Palo Alto: Consulting Psychologists Press.

Schaefer, C. E. (1971). *Similes Test Manuel*. Goshen, NY: Research Psychologists Press.

Schechter N, Schmeidler G.R., Staal M. (1965) Dream reports and creative tendencies in students of arts, sciences and engineering. *Journal of Consulting Psychology*, *29*, 415–21.

Schoppe, K. J. (1975) *Verbaler Kreativitäts-Test (VKT) (Verbal creativity test).* Göttingen: Hogrefe.

Schredl M. (2010) Characteristics and contents of dreams. *International Review of Neurobiology*, *92*, 135–54.

Schredl, M. (1995). Creativity and Dream Recall. *The Journal of Creative Behavior*, *29*, 16-24.

Schredl, M. (2003). Effects of state and trait factors on nightmare frequency. *European Archives of Psychiatry and Clinical Neuroscience*, *253*, 241-247.

Schredl M. (2010) Explaining the gender difference in dream recall frequency. *Dreaming*, *20*, 96–106.

Schredl M, Doll E. (1998) Emotions in diary dreams. *Conscious and Cognition*, *7*, 634–46.

Schredl, M., Erlacher, D. (2004). Lucid dreaming frequency and personality. *Personality and Individual Differences*, *37*, 1463-1473.

Schredl, M., Erlacher, D. (2007). Self-Reported Effects of Dreams on Waking-Life Creativity: An Empirical Study. *The Journal of Psychology*, *141*, 35-46.

Schredl, M., Göritz, A. S. (2017). Dream recall frequency, attitude toward dreams, and the Big Five personality factors. *Dreaming*, *27*, 49-58.

Schredl, M., Iris R. (2008) Gender differences in dream recall: a meta-Analysis. *Journal of Sleep Research*, *17*, 125–131.

Schredl M, Piel E. (2008) Interest in dream interpretation: A gender difference. *Dreaming, 18*, 11–5.

Tellegen, A., Atkinson, G. (1974) Openness to absorbing and self-altering experiences ("absorption"), a trait related to hypnotic susceptibility. *Journal of Abnormal Psychology, 83*, 268–277.

Tonay, V. K. (1993). Personality correlates of dream recall: Who remembers? *Dreaming*, *3*, 1-8.

Ward, C. D., Ward, K. M., Randers-Pehrson, S. B., Runion, L. (1973). Birth order and dreams. *Journal of Social Psychology*, *90*, 155-156.

Waterman, D., 1999. Aging and memory for dreams. *Perceptual and Motor Skills*, *73*, 355–365.

Watson, D. (2003). To dream, perchance to remember: Individual differences in dream recall. *Personality and Individual Differences*, *34*, 1271-1286.

Weeß, H.G., Schürmann, T., Steinberg, R. (1997) Landecker Inventar zur Erfassung von Schlafstörungen (LISST). Unveröffentlichter Fragebogen des Schlafmedizinischen Zentrums Klingenmünster.

Wilson, S. C. & Barber, T. X. (1981). *The fantasy-prone personality: Implications for understanding imagery, hypnosis, and para-psychological phenomena. In E. Klinger (Ed.), Imagery: With concepts, results, and applications.* New York: Plenum Press.

Wolcott, S., Strapp, C. M. (2002). Dream recall frequency and dream detail as mediated by personality, behavior, and attitude. *Dreaming*, *12*, 27-44.

Appendix I: Means, Standard Deviations, and ANOVA

Vividness:

Descriptive Statistics

Dependent Variable:Viv 1

Gender	Group	Mean	Std. Deviation	N
Female	Control	21.38	8.262	8
	Experiment	21.83	6.646	6
	Total	21.57	7.335	14
Male	Control	18.20	3.899	5
	Experiment	21.50	12.390	6
	Total	20.00	9.263	11
Total	Control	20.15	6.890	13
	Experiment	21.67	9.480	12
	Total	20.88	8.095	25

Tests of Between-Subjects Effects

Dependent Variable:Viv 1

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	45.632[a]	3	15.211	.209	.889	.029
Intercept	10441.203	1	10441.203	143.591	.000	.872
Gender	18.696	1	18.696	.257	.617	.012
Group	21.456	1	21.456	.295	.593	.014
Gender * Group	12.266	1	12.266	.169	.685	.008
Error	1527.008	21	72.715			
Total	12472.000	25				
Corrected Total	1572.640	24				

a. R Squared = .029 (Adjusted R Squared = -.110)

3. Gender * Group

Dependent Variable:Viv 1

Gender	Group	Mean	Std. Error	95% Confidence Interval	
				Lower Bound	Upper Bound
Female	Control	21.375	3.015	15.105	27.645
	Experiment	21.833	3.481	14.594	29.073
Male	Control	18.200	3.814	10.269	26.131
	Experiment	21.500	3.481	14.260	28.740

Tests of Between-Subjects Effects

Dependent Variable:Viv 2

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	47.427[a]	3	15.809	.157	.924	.022
Intercept	8495.008	1	8495.008	84.104	.000	.800
Gender	33.793	1	33.793	.335	.569	.016
Group	12.628	1	12.628	.125	.727	.006
Gender * Group	3.970	1	3.970	.039	.845	.002
Error	2121.133	21	101.006			
Total	10967.000	25				
Corrected Total	2168.560	24				

3. Gender * Group

Dependent Variable:Viv 2

Gender	Group	Mean	Std. Error	95% Confidence Interval	
				Lower Bound	Upper Bound
Female	Control	18.750	3.553	11.361	26.139
	Experiment	21.000	4.103	12.467	29.533
Male	Control	17.200	4.495	7.853	26.547
	Experiment	17.833	4.103	9.301	26.366

Nightmares:

Descriptive Statistics

Dependent Variable:NM 1

Gender	Group	Mean	Std. Deviation	N
Female	Control	15.00	8.783	8
	Experiment	10.00	7.694	6
	Total	12.86	8.420	14
Male	Control	14.00	9.220	5
	Experiment	11.83	8.681	6
	Total	12.82	8.542	11
Total	Control	14.62	8.578	13
	Experiment	10.92	7.879	12
	Total	12.84	8.295	25

Tests of Between-Subjects Effects

Dependent Variable:NM 1

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	98.527[a]	3	32.842	.444	.724	.060
Intercept	3925.105	1	3925.105	53.082	.000	.717
Gender	1.055	1	1.055	.014	.906	.001
Group	78.017	1	78.017	1.055	.316	.048
Gender * Group	12.194	1	12.194	.165	.689	.008
Error	1552.833	21	73.944			
Total	5773.000	25				
Corrected Total	1651.360	24				

a. R Squared = .060 (Adjusted R Squared = -.075)

3. Gender * Group

Dependent Variable:NM 1

Gender	Group	Mean	Std. Error	95% Confidence Interval	
				Lower Bound	Upper Bound
Female	Control	15.000	3.040	8.677	21.323
	Experiment	10.000	3.511	2.699	17.301
Male	Control	14.000	3.846	6.003	21.997
	Experiment	11.833	3.511	4.533	19.134

Descriptive Statistics

Dependent Variable:NM 2

Gender	Group	Mean	Std. Deviation	N
Female	Control	10.75	7.246	8
	Experiment	6.17	6.911	6
	Total	8.79	7.224	14
Male	Control	9.00	4.848	5
	Experiment	6.00	4.195	6
	Total	7.36	4.545	11
Total	Control	10.08	6.264	13
	Experiment	6.08	5.452	12
	Total	8.16	6.115	25

Tests of Between-Subjects Effects

Dependent Variable:NM 2

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	109.027[a]	3	36.342	.968	.426	.121
Intercept	1547.352	1	1547.352	41.219	.000	.662
Gender	5.580	1	5.580	.149	.704	.007
Group	87.352	1	87.352	2.327	.142	.100
Gender * Group	3.808	1	3.808	.101	.753	.005
Error	788.333	21	37.540			
Total	2562.000	25				
Corrected Total	897.360	24				

a. R Squared = .121 (Adjusted R Squared = -.004)

3. Gender * Group

Dependent Variable:NM 2

Gender	Group	Mean	Std. Error	95% Confidence Interval	
				Lower Bound	Upper Bound
Female	Control	10.750	2.166	6.245	15.255
	Experiment	6.167	2.501	.965	11.368
Male	Control	9.000	2.740	3.302	14.698
	Experiment	6.000	2.501	.798	11.202

Lucid Dreams:

Descriptive Statistics

Dependent Variable:Luc 1

Gender	Group	Mean	Std. Deviation	N
Female	Control	15.00	7.801	8
	Experiment	9.83	10.068	6
	Total	12.79	8.877	14
Male	Control	16.20	10.183	5
	Experiment	11.17	6.853	6
	Total	13.45	8.478	11
Total	Control	15.46	8.393	13
	Experiment	10.50	8.241	12
	Total	13.08	8.529	25

Tests of Between-Subjects Effects

Dependent Variable:Luc 1

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	163.373[a]	3	54.458	.723	.550	.094
Intercept	4138.997	1	4138.997	54.926	.000	.723
Gender	9.749	1	9.749	.129	.723	.006
Group	158.035	1	158.035	2.097	.162	.091
Gender * Group	.027	1	.027	.000	.985	.000
Error	1582.467	21	75.356			
Total	6023.000	25				
Corrected Total	1745.840	24				

a. R Squared = .094 (Adjusted R Squared = -.036)

3. Gender * Group

Dependent Variable:Luc 1

Gender	Group	Mean	Std. Error	95% Confidence Interval	
				Lower Bound	Upper Bound
Female	Control	15.000	3.069	8.617	21.383
	Experiment	9.833	3.544	2.463	17.203
Male	Control	16.200	3.882	8.127	24.273
	Experiment	11.167	3.544	3.797	18.537

Descriptive Statistics

Dependent Variable:Luc 2

Gender	Group	Mean	Std. Deviation	N
Female	Control	16.63	11.575	8
	Experiment	19.50	18.684	6
	Total	17.86	14.443	14
Male	Control	15.00	7.810	5
	Experiment	14.33	9.730	6
	Total	14.64	8.477	11
Total	Control	16.00	9.958	13
	Experiment	16.92	14.457	12
	Total	16.44	12.066	25

Tests of Between-Subjects Effects

Dependent Variable:Luc 2

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	93.452[a]	3	31.151	.192	.900	.027
Intercept	6508.547	1	6508.547	40.191	.000	.657
Gender	70.066	1	70.066	.433	.518	.020
Group	7.408	1	7.408	.046	.833	.002
Gender * Group	19.053	1	19.053	.118	.735	.006
Error	3400.708	21	161.938			
Total	10251.000	25				
Corrected Total	3494.160	24				

a. R Squared = .027 (Adjusted R Squared = -.112)

3. Gender * Group

Dependent Variable:Luc 2

Gender	Group	Mean	Std. Error	95% Confidence Interval	
				Lower Bound	Upper Bound
Female	Control	16.625	4.499	7.269	25.981
	Experiment	19.500	5.195	8.696	30.304
Male	Control	15.000	5.691	3.165	26.835
	Experiment	14.333	5.195	3.529	25.137

***Remembered* Dreaming:**

Descriptive Statistics

Dependent Variable:rem dreaming

Gender	Group	Mean	Std. Deviation	N
Female	Control	11.88	3.682	8
	Experiment	11.83	2.639	6
	Total	11.86	3.159	14
Male	Control	9.60	2.881	5
	Experiment	10.00	3.795	6
	Total	9.82	3.250	11
Total	Control	11.00	3.464	13
	Experiment	10.92	3.260	12
	Total	10.96	3.297	25

Tests of Between-Subjects Effects

Dependent Variable:rem dreaming

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	26.052[a]	3	8.684	.776	.520	.100
Intercept	2849.030	1	2849.030	254.694	.000	.924
Gender	25.638	1	25.638	2.292	.145	.098
Group	.195	1	.195	.017	.896	.001
Gender * Group	.296	1	.296	.026	.872	.001
Error	234.908	21	11.186			
Total	3264.000	25				
Corrected Total	260.960	24				

a. R Squared = .100 (Adjusted R Squared = -.029)

3. Gender * Group

Dependent Variable:rem dreaming

Gender	Group	Mean	Std. Error	95% Confidence Interval	
				Lower Bound	Upper Bound
Female	Control	11.875	1.182	9.416	14.334
	Experiment	11.833	1.365	8.994	14.673
Male	Control	9.600	1.496	6.489	12.711
	Experiment	10.000	1.365	7.160	12.840

Remembered but Not Recalled:

Descriptive Statistics

Dependent Variable:no recall

Gender	Group	Mean	Std. Deviation	N
Female	Control	2.625	3.3354	8
	Experiment	3.567	2.8437	6
	Total	3.029	3.0552	14
Male	Control	.800	.8367	5
	Experiment	2.333	2.0656	6
	Total	1.636	1.7477	11
Total	Control	1.923	2.7526	13
	Experiment	2.950	2.4556	12
	Total	2.416	2.6127	25

Tests of Between-Subjects Effects

Dependent Variable:no recall

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	21.392[a]	3	7.131	1.051	.391	.131
Intercept	132.084	1	132.084	19.473	.000	.481
Gender	14.208	1	14.208	2.095	.163	.091
Group	9.305	1	9.305	1.372	.255	.061
Gender * Group	.532	1	.532	.078	.782	.004
Error	142.442	21	6.783			
Total	309.760	25				
Corrected Total	163.834	24				

a. R Squared = .131 (Adjusted R Squared = .006)

3. Gender * Group

Dependent Variable:no recall

Gender	Group	Mean	Std. Error	95% Confidence Interval	
				Lower Bound	Upper Bound
Female	Control	2.625	.921	.710	4.540
	Experiment	3.567	1.063	1.356	5.778
Male	Control	.800	1.165	-1.622	3.222
	Experiment	2.333	1.063	.122	4.544

Forgot to Record:

Descriptive Statistics

Dependent Variable:forgot

Gender	Group	Mean	Std. Deviation	N
Female	Control	.0000	.00000	8
	Experiment	.2083	.40052	6
	Total	.0893	.27045	14
Male	Control	.4000	.54772	5
	Experiment	.5000	.83666	6
	Total	.4545	.68755	11
Total	Control	.1538	.37553	13
	Experiment	.3542	.64366	12
	Total	.2500	.52042	25

Tests of Between-Subjects Effects

Dependent Variable:forgot

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	.998[a]	3	.333	1.270	.310	.154
Intercept	1.866	1	1.866	7.122	.014	.253
Gender	.727	1	.727	2.774	.111	.117
Group	.144	1	.144	.551	.466	.026
Gender * Group	.018	1	.018	.068	.797	.003
Error	5.502	21	.262			
Total	8.063	25				
Corrected Total	6.500	24				

a. R Squared = .154 (Adjusted R Squared = .033)

3. Gender * Group

Dependent Variable:forgot

Gender	Group	Mean	Std. Error	95% Confidence Interval	
				Lower Bound	Upper Bound
Female	Control	-1.110E-16	.181	-.376	.376
	Experiment	.208	.209	-.226	.643
Male	Control	.400	.229	-.076	.876
	Experiment	.500	.209	.065	.935