Dreaming in Patients with Temporal Lobe Epilepsy: A Focus on Bad Dreams and Nightmares

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Abstract

Nightmares and bad dreams occur more frequently in patients with temporal lobe epilepsy (TLE) than in normal individuals. This quantitative pilot study explored the relationship between seizure activity and dreaming in patients with TLE, compared to the dreams, bad dreams and nightmares of a control population. Groups were categorized by epilepsy variables (TLE and non-TLE) and gender. Patients with temporal lobe epilepsy completed self-report questionnaires concerning their epilepsy and dreaming, and this data was compared to dreaming data from the control group using ANCOVAs. The results showed that females have significantly higher scores than males on several variables, including *dreams per week*, *bad dream distress* and *nightmare distress*. However, no significant main effects or interactions were found for the variables *bad dream frequency* and *nightmare frequency*, which contradicts the study's hypotheses. It is possible that this lack of differences was due to TLE patients being on antiepileptic drugs, which whilst controlling seizures, may have suppressed or eliminated the effects of bad dreams and nightmares.

Keywords: temporal lobe epilepsy, dreaming, bad dreams, nightmares, gender differences.

Dreaming in Patients with Temporal Lobe Epilepsy:
A Focus on Bad Dreams and Nightmares

Nightmares and bad dreams occur more frequently in patients with temporal lobe epilepsy (TLE) than in normal individuals and in patients with generalized seizures (Silvestri & Bromfield, 2004). Temporal lobe epilepsy is a type of epilepsy characterized by the incidence of complex partial seizures (CPS). Complex partial seizures begin focally within the brain (with 60% of CPS originating in the temporal lobes), and generalize secondarily to other areas of the brain, impairing consciousness (Carroll, 2011; Wiebe, Blume, Girvin & Eliasziw, 2001). This is in contrast to *simple* partial seizures, which do not impair consciousness. Importantly, impaired consciousness in temporal lobe epilepsy does not mean an *absence* of consciousness, but merely that consciousness is altered in some way. TLE primarily affects the limbic system, which includes the amygdala, hippocampus, and anterior cingulate cortex (among other structures) (Carroll, 2011). Untreated or poorly controlled temporal lobe epilepsy can lead to sclerosis of the hippocampus and surrounding structures, resulting in cognitive deficits depending on the lateralisation of the cell necrosis. Conversely, brain lesions to the limbic system through brain trauma or infection may cause TLE (i.e., symptomatic epilepsy), and it is often difficult to differentiate the aetiology of the epilepsy (Carroll, 2011).

Recurring nightmares in patients with TLE seem to correlate with reports of disturbed sleep and nocturnal arousals that impair daytime concentration and the performance of daily tasks (Bazil, 2004). In this context, nightmares are defined as very disturbing dreams that wake the dreamer from sleep, whereas bad dreams are very disturbing dreams which do not awaken the sleeper (Cipolli, Bonanni, Maestri, Mazzetti, & Murri, 2004; Levin & Nielsen, 2009; Spoormaker, Schredl, & van den Bout, 2006; Zadra & Donderi, 2000). The arousals from sleep experienced during nightmares may be due to the intense negative emotions experienced during such dreams (Zadra, Pilon, & Donderi, 2006), emotions which most commonly include fear, grief, or anger (Zadra & Donderi, 2000). These nocturnal arousals may indicate that nightmares involve more negative affect than bad dreams, and that nightmares cause more distress than bad dreams.

Like most dreams, nightmares typically occur in the rapid eye movement (REM) phase of sleep (Silvestri & Bromfield, 2004). Levin and Nielsen (2009) report that more than 85% of adults experience at least one nightmare in the period of a year, with between 8% and 29% of adults experiencing monthly nightmares and 2-6% experiencing weekly nightmares. In

comparison to normal dreams, nightmares are predominantly visual and vivid, and often follow a complex plot (Spoormaker et al., 2006).

Prevalent nightmare themes include threats to survival, security or self-esteem, and the five most common nightmare themes are falling, being pursued, finding oneself paralyzed, being late, and the deaths of loved ones (Spoormaker et al., 2006). Research has linked nightmares to stress and physical complaints, and frequent, long-term nightmares have a detrimental effect on overall wellbeing (Spoormaker et al., 2006; Zadra & Donderi, 2000).

A significant amount of evidence suggests that the limbic system is central to emotional processing, and therefore it has been implicated in the intensely negative emotional aspect of nightmares. Levin and Nielsen (2009) mention that the anterior limbic system is most likely central to nightmares, although they emphasize that this system is unlikely to be the only area involved. The amygdala (a brain structure that is part of the limbic system) is thought to be the area of the brain that involves negative emotions, as fMRI scans have shown that it is active when participants report experiencing fear (Hamann, Ely, Hoffman, & Kilts, 2002). If this part of the brain were active during nightmares and bad dreams, it would explain the predominant presence of fear and negative emotions in nightmares.

The role of the limbic system in negative emotions is of particular interest when looking at temporal lobe epilepsy, which involves an over-activation of the limbic system during seizures. The hippocampus, which is a part of the limbic system that deals with memory, has also been implicated in the experience of nightmares, although its exact role is unclear (Bazil, 2004). In addition, Kim et al. (2012) comment that the amygdala might have a role to play in seizure activity in patients with mesial TLE, and that enlargement of the amygdala is occasionally found in these patients.

Nocturnal seizures, nightmares and TLE

Bazil (2004) mentions sleep disturbances as one of the various disorders (e.g., anxiety and depression) that are co-morbid with epilepsy. Research has shown that there is a relationship between sleep cycles and seizure activity (Bazil, 2004; Kwan, Yu, Leung, Leon, & Mychaskiw, 2009; Piperidou et al., 2008). Researchers understand this relationship most clearly in the context of sleep deprivation, which is a predictor of increased seizure activity. Bazil (2004) and Kwan et al. (2009) report that in general, epilepsy-related sleep disturbances are associated with a lower quality of life. Nofzinger et al. (2004) and Vandekerckhove and Cluydts (2010) observed that in normal participants there is selective increased blood flow to the paralimbic and limbic areas - particularly the amygdala and anterior cingulate cortex - during REM sleep, whereas the frontal areas of the brain remain relatively inactive.

Therefore, the hyperactivity of the limbic system during REM sleep should promote nocturnal seizures in TLE patients. Instead, however, REM sleep seems to inhibit focal seizure activity, for reasons as yet unknown (Bazil, 2004; Silvestri & Bromfield, 2004). Additionally, recent research has found that in certain epileptic syndromes, seizures occur exclusively in the early stages of NREM sleep (Bazil, 2004).

Bazil (2004) also found that around 20% of seizures occur during sleep, although the majority are unwitnessed and therefore often remain undiagnosed and untreated. Seizures that occur during sleep can stimulate the temporal lobe (and the limbic system), possibly increasing the number of nightmares and bad dreams in individuals who experience them. Most nocturnal seizures disrupt sleep, and even brief seizures can have a lasting impact on sleep structure (Bazil, 2004).

Dream researchers such as Silvestri and Bromfield (2004) posited that nightmares in patients with TLE are in fact equivalent to nocturnal subclinical ictal activity. In their study, they found that all of the 25 nocturnal episodes (e.g., confusional arousals, nightmares, sleepwalking) documented in TLE patients corresponded to "ictal evidence of a TLE seizure" (p. 370) as shown on EEG recordings, which lasted for 3 minutes on average. Recurrent nightmares are also common in the TLE population. Silvestri and Bromfield (2004) suggest that recurrent nightmares in TLE patients are evidence of these nocturnal seizures, especially if they are identical in theme and content .The link between nightmares and TLE seems to be that the same area of the brain (the limbic system) is involved with both phenomena. Over-activation of the limbic system during a TLE seizure may produce the "nightmare" experience, which would explain the extreme negative content of recurrent nightmares in TLE.

Cipolli et al. (2004) also looked at dream experience during REM and NREM sleep in patients with complex partial seizures. They found that NREM dream recall was frequently lower in patients with complex partial seizures compared to normative scores of healthy individuals (approximately 30% versus 50%), and that there was no difference between TLE patients and normative scores in dream recall in REM sleep. However, these authors did not explain how the normative scores were calculated, and did not include a control group of patients without TLE in their study. These authors did not find any differences between patients in terms of nightmare frequency. The patients selected for this study by Cipolli et al. (2004) differed substantially from those selected for the study by Silvestri and Bromfield (2004). Although the patients had experienced complex partial seizures (CPS), they were all on medication for between 1-6 years, and did not have any seizures during the time of the study. Furthermore, in order to participate in the study, patients had to be without cognitive

deficits, psychiatric disorders (such as anxiety or depression), or brain lesions. Therefore, these exclusion criteria adopted by Cipolli et al. (2004) may account for their lack of findings regarding nightmares, whereas Silvestri and Bromfield (2004) did not have these exclusion criteria and found ictal evidence of nocturnal arousals and nightmares.

Bonanni, Cipolli, Iudice, Mazzetti and Murri (2002) also conducted a study on dreaming in patients with complex partial seizures. Exclusion criteria for this study were that patients had to have been on antiepileptic drugs (AEDs) for at least a year, and that those patients were without psychiatric disturbances and cognitive deficits. This study compared dream recall frequency in patients with either CPS or generalised seizures, and concluded that the former had better dream recall. However, the exclusion criteria mentioned above may have influenced this result, as Silvestri and Bromfield (2004) found that patients with TLE who were not on medication often had poor dream recall following a nocturnal seizure. Solms (1997) found that recurrent nightmares in some of his patients with TLE were resolved with anticonvulsive medication or surgery.

Kirschner (1999) found that AEDs have an effect on dreaming and dream recall. Specifically, AEDs tend to reduce the frequency of nightmares, and dreams in general become less vivid and less emotive. Therefore, seizure activity appears to result in more dreams, bad dreams, and nightmares, and anti-epileptic drugs (AEDs) – which suppress seizure activity – seem to have the opposite effect. Consequently, the dream reports of TLE patients on medication might be significantly different to those of TLE patients who have poorly controlled epilepsy. The result is a discrepancy in findings between studies: most studies that look at the dreams of TLE patients who are medicated do not find a prevalence of recurring nightmares and bad dreams.

Furthermore, none of the abovementioned studies by Bonanni et al. (2002), Cipolli et al. (2004), and Silvestri and Bromfield (2004) considered gender differences in dreaming and nightmares. Numerous studies (Levin & Nielsen, 2007; Nielsen et al., 2000; Nielsen, Stenstrom, & Levin, 2006; Schredl, 2006) have shown that there are well-established gender differences in dreaming, and particularly in nightmare frequency. According to Levin and Nielsen (2007), women of all ages consistently report nightmares at significantly higher rates than do men. However, these authors do highlight that it is unclear how many of the nightmares reported by women are trauma-related, and that there may be reporting biases in women and men regardless of actual experience of nightmares. Nevertheless, the gender difference in dreaming is clear, and Levin and Nielsen (2007) claim that the gender difference in nightmare frequency is evident even in childhood and increases significantly in adolescence. For example, Levin and Nielsen (2007) mention one particular study that looked

at the nightmare frequency of pre-adolescents (aged 5-11 years) and found no gender differences by age. However, in another study that focused on adolescents at age 16, 40% of girls reported disturbing dreams compared to 20% of boys (Levin & Nielsen, 2007).

One explanation for the gender differences in nightmare frequency is that nightmares are a function of processes in the brain (likely involving the limbic system) that are linked with the emergence of depression in young adolescent girls (Levin & Nielsen, 2007). The link between nightmares and disordered emotions is not a new one, with areas of the limbic system (e.g., amygdala, hippocampus, anterior cingulate cortex) being implicated in both psychiatric disorders such as major depression and anxiety, and nightmares (Levin & Nielsen, 2007). Considering these significant gender differences in nightmare frequency, and the possible link to disordered brain processes, it is surprising that previous study on nightmare frequency (e.g., studies by Bonanni et al. (2002), Cipolli et al. (2004), and Silvestri and Bromfield (2004)) in patients with TLE have not looked at these differences.

Therefore, there seems to be a need for nightmare research in TLE patients that considers gender as an important independent variable (i.e., a factor). There is also a clear need for dreaming studies that focus on TLE patient samples to include control groups consisting of participants without epilepsy.

Aims and Hypotheses

The specific aims of this study were (1) to investigate quantitative sleep and dreaming characteristics in patients with TLE compared to a large control group; and (2) to investigate if there were any effects with regards to gender and epilepsy on quantitative aspects of sleep and dreaming. These aims were influenced by a substantial body of research on the gender differences in nightmare frequency, and by the need to explore differences in nightmare frequency in TLE patients versus a healthy control population.

Therefore, the hypotheses were as follows:

H_1: Nightmare frequency will be higher in females than males across both groups (TLE and non-TLE).

H_2: Nightmare frequency will be higher in female patients with TLE than in the other groups.

H_3: There will be a significant effect between nightmare distress and gender across both TLE and non-TLE groups.

Methods

Participants

Two groups of participants were used: (a) patients with TLE (n = 10) sampled from a student population and from a private medical hospital, and (b) a control group of non-TLE, healthy participants, from a student population (n = 517). Participants with any serious medical or psychological conditions as self-reported on the questionnaire, as well as participants who were taking any prescription medications for any condition (again as self-reported on the questionnaire), were excluded from the final control group sample. Table 1 shows the descriptive statistics for the TLE sample, which includes demographic information such as the age, gender, and race of participants, as well as epilepsy variables such as age of seizure onset, duration of epilepsy, and seizure lateralization.

For the TLE sample, the average age was M = 22.40 (SD = 6.40), with an average female age of M = 20.00 (SD = 1.30) and an average male age of M = 25.00 (SD =8.57). The average age of onset of seizures overall was M = 12.90 (SD = 8.49) years old, with M = 14.20 (SD = 12.03) for males and M = 11.60 (SD = 3.64) for females. The average duration of epilepsy in the TLE sample overall was M = 114.00 (SD = 48.41) months, with M = 130.00 (SD = 55.90) for males and M = 98.00 (SD = 39.25) for females.

Participants in the TLE group were sampled using non-random convenience sampling and were accessed in two ways. Firstly, two of the participants were patients at a private medical hospital in Cape Town who were awaiting epilepsy surgery for their TLE. A neurologist at the hospital recommended patients for the study based on their diagnosis of TLE. The author visited these patients in the neurology ward of the hospital and they were invited to participate in a dreaming study. Secondly, the majority of the participants with TLE (n = 8) were students who were accessed via an email that was sent out to the entire population of the University of Cape Town, inviting students with TLE to participate in a study on dreaming. All patients included in the final sample had a diagnosis of TLE confirmed by their neurologist.

The control group (n = 517) participated in the study for course credit and were recruited at the University of Cape Town, using simple random sampling. The average age of the control sample was M = 20.51 (SD = 3.04). The control group consisted of n = 100 males and n = 417 females. The difference in number of males and females reflects the gender difference in numbers within the population of psychology students at UCT. The average

ages in the control group were $M = 21.18$ ($SD = 3.41$) years for the males and $M = 20.35$ ($SD = 2.93$) years for the females.

Table 1

Descriptive Statistics for TLE group (n = 10)

Px #	Age	Gender	Race	Handedness	Seizure Lateralization	Age Onset*	Duration**	Epilepsy Medication (mg/day)	Other Medication (mg/day)	Other Conditions	Epilepsy Type
1	21	Male	White	Not Established	Left	5	192	None	Citalopram 30	Major depression	Symptomatic
2	40	Male	White	Not Established	Left	35	60	Lamotrigine 400	None	None	Symptomatic
3	24	Male	White	Left	Left	12	144	Lamotrigine 400	None	None	Idiopathic
4	19	Male	White	Right	Right	12	84	Lamotrigine 250	Warfarin, Ethipramine***	Left hemiplegia	Symptomatic
5	21	Male	White	Right	Right	7	168	Carbamazapine 400	None	None	Idiopathic
6	20	Female	White	Right	Uncertain	13	84	None	Methylphenidate 30	None	Idiopathic
7	21	Female	White	Right	Left	11	120	Oxcarbazapine 1800	None	None	Idiopathic
8	18	Female	White	Ambidextrous	Bilateral	12	72	Carbamazapine 800 Lamotrigine 175	Methylphenidate 72	ADD	Uncertain
9	21	Female	White	Right	Left	16	60	Lamotrigine 75	Cyproterone acetate 35	Generalized Anxiety	Idiopathic
10	19	Female	White	Right	Left	6	156	Levetiracetam 1500	None	None	Symptomatic

* Age of seizure onset

** Duration of epilepsy in months

*** Dosages unknown

Given that eight of the 10 participants with TLE were recruited from a university population, the control and epilepsy groups were also closely matched for level of education. Although the epilepsy group was exclusively white, it is unlikely that race group would affect dreaming. For example, neither Pagel and Vann (1992) nor Pagel, Vann, and Altomare (1995) found any racial/ethnic variations in dreaming.

Design

A fully between-groups factorial design was adopted, with two independent variables. The first independent variable was whether or not individuals had TLE (i.e., patients with TLE versus control participants). Gender was included as the second independent variable because of the large body of research that identifies differences between males and females in terms of dream frequency and type. The dependent variables were self-reported scores regarding a number of sleep and dream characteristics, as measured by a dreaming questionnaire (e.g., dream colour, dream vividness, frequency of nightmares, etc).

Measures

Epilepsy-Related Factors Questionnaire (ERF). The Epilepsy-Related Factors Questionnaire (ERF) was developed specifically for use in this study (see Appendix A) and was used to collect data on several epilepsy-related variables, including (a) seizure lateralization, (b) age of onset of epilepsy; (c) duration of epilepsy, measured from age of onset to the present; (d) type, number and dosage of antiepileptic medication (AEDs), (e) type, number and dosage of other medications, (f) other conditions, and (g) aetiology of the epilepsy (genetic/idiopathic vs. structural/metabolic; i.e., symptomatic).

Dreaming Questionnaire (DRM-Q). This questionnaire is a self-report measure that looks at several variables related to sleep, dreaming, bad dreams and nightmares (see Appendix B). It contains 11 core items measuring various quantitative characteristics of a person's dreams. The 11 core items are repeated three times: once for normal dreams; once for bad dreams; and once for nightmares. The questionnaire is thus composed of 33 core items in total. Additional items were added to measure a number of sleep- and dream-related variables (such as number of hours of sleep per night, awakenings per night and number of dreams per week, for example). All the variables were measured on a 5-point Likert scale; with the exception of one item (*vividness*) which was measured using a 6-point Likert scale. The bad dream and nightmare frequency items were 8-point scales ranging from '1 = Never'

through to ‘8 = More than once a week’. The bad dream and nightmare distress items were 7-point category scale items with the endpoints defined as ‘1 = very little’ and ‘7 = very much’. The questionnaire was developed specifically for use in this study, and was based on the Sleep and Dreaming Questionnaire (SDQ) of Levin (1994, as cited in Levin & Nielsen, 2007).

Procedure

The control group completed the DRM-Q online, with completion time estimated at between 45-60 minutes. For the eight patients with TLE recruited from UCT, data on the characteristics of their epilepsy was recorded via self-report in a clinical interview conducted by a neuropsychological researcher that lasted approximately 30 minutes, with the data being recorded on the *Epilepsy-Related Factors Questionnaire* (see *Measures* sub-section below). These eight patients then completed the DRM-Q online. For the remaining two patients (sourced from the private hospital), the patients filled in the *Epilepsy-Related Factors Questionnaire* themselves while in the hospital ward, and the information they provided was confirmed by their neurologist at the hospital. The author was present during the completion of these questionnaires in order to assist the participant with any questions. Completion of the questionnaires took between 60-120 minutes, and following the completion of the above questionnaires, the participants were provided with the author’s contact details and a full debriefing.

Ethical Considerations

For the participants who completed the questionnaire online, the nature of the study, as well as the risks and benefits of the study were all described at the beginning of the questionnaire. At the end of the provision of the study information, participants then had to answer a question in the online questionnaire asking whether they gave their consent to participate in the study or not. All participants gave their consent to participate. Participants were informed that their participation was entirely voluntary, and that they could withdraw from the study at any time without any negative repercussions, by contacting the author, whose contact details were listed at the beginning of the questionnaires (both online and paper versions). There were no overt physical or psychological risks associated with participation in the study. After participants completed the study, the researcher gave them a full debriefing, in which the aims and hypotheses of the study were explained. The study was conducted with ethical approval from the ethics committee of the Psychology Department at the University of Cape Town, as well as permission from the private hospital, the ethics

board of the private hospital, and the neurologist at the hospital. Numbers were assigned to participants that linked them to their data, and all data was kept in secure files in order to ensure confidentiality, and all information was available only to the author, her supervisor, and co-supervisors.

Data Analysis

A principal components analysis (PCA) of the core 33-items of the DRM-Q (11 questions each for dreams, bad dreams and nightmares) was run in order to investigate the underlying component structure of the questionnaire. This was conducted in order to determine which of the questionnaire's components could be used in subsequent analyses. These subsequent analyses included a number of 2 (group: TLE vs. control) X 2 (gender: male vs. female) factorial ANCOVAs, which were run with the component scores identified via the PCA as dependent variables. *Age* was included as a covariate due to a statistically significant interaction effect between *group* and *gender* when *age* was entered as a dependent variable in a 2 (group: TLE vs. control) X 2 (gender: male vs. female) factorial ANCOVA (see *Results* section below). The covariate tables for *age* can be seen in Appendix C. Any significant interaction effects were followed up using *post-hoc* pairwise comparisons.

Results

Principal Components Analysis

Cronbach's alpha for the 33 core items of the DRM-Q was .90, which indicated a very good reliability of the questionnaire. Therefore, the DRM-Q was proven sufficiently reliable and the principal components analysis (PCA) was done. The PCA was conducted on the 33 items with orthogonal rotation (varimax). The analysis yielded nine components with eigenvalues greater than 1, which together accounted for 71% of the variance: (a) Aggression to self (ATS), (b) Aggression to others (ATO), (c) Affectedness + Meaning, (d) Dysphoric Dream Vividness + Intensity (i.e., Bad Dreams + Nightmare Vividness and Intensity), (e) Colourfulness, (f) Realism, (g) Movement, (h) Dream Vividness, and (i) Dream Intensity. Table 2 shows the factor loadings after varimax rotation.

The reliabilities of the individual components ranged from good (.73) to very good (.90), indicating sufficient reliability for each individual component. The minimum communality value was .59, with a maximum communality value of .82. Given that all communality values were above the necessary minimum of .50, this indicated that the component structure was a good fit to the current set of variables (Field, 2009). The Kaiser-

Meyer-Olkin measure of sampling adequacy was .839, which is above the minimum of .50, and therefore this value is considered *good*. Bartlett's test of sphericity was statistically significant ($p < .001$), and therefore a PCA was an appropriate analysis to run on this data. Component scores were formed by summing scores on the items that comprised the components, with the exception of the DRM vividness and the DRM intensity components, which were made up of individual items only.

Analysis of Variance (ANOVA)

To investigate if there were any age differences between the groups, a 2 (group: epilepsy vs. control) X 2 (gender: male vs. female) factorial ANOVA with *age* as the dependent variable was run. The results indicated a significant main effect for *gender* [$F(1, 523) = 9.20$, $p = .003$, $\eta^2 = .017$], with the male participants having a higher average age ($M = 23.09$; $SE = 0.71$) than the female participants ($M = 20.07$; $SE = 0.70$). A significant interaction effect between *group* and *gender* was also evident [$F(1, 523) = 4.83$, $p = .028$, $\eta^2 = .009$], while no significant main effect for *group* was found [$F(1, 523) = 2.71$, $p = .100$, $\eta^2 = .005$]. Pairwise comparisons to investigate the interaction effect indicated that males with TLE had a greater average age ($M = 25.00$, $SE = 1.39$) than males in the control group ($M = 21.18$, $SE = 0.31$) ($p = .007$). Males in the control group also had a greater average age than females in the control group ($M = 20.34$, $SE = 0.15$) ($p = .016$), and males in the TLE group also had a greater average age than females in the TLE group ($M = 19.80$, $SE = 1.39$) ($p = .008$). It should be noted that Levene's test for homogeneity of variance was statistically significant for the ANOVA [$F(3, 523) = 5.84$, $p < .001$], so the statistically significant effects might have constituted Type I errors. Nonetheless, the conservative approach of including *age* as a covariate in all subsequent analyses was taken in order to control for any effects that it may have had on the results.

Analysis of Covariance (ANCOVA)

Factorial ANCOVA on Dreaming and Sleep Variables.

The next statistical analyses conducted were 2 (group: epilepsy vs. control) X 2 (gender: male vs. female) factorial ANCOVAs, with *age* included as a covariate. Table 3 is a summary of the descriptive statistics for the sleep and dreaming variables. Descriptive statistics reported in the text differ from those reported in Table 3, as the in-text statistics were corrected for *age* as a covariate. Unless otherwise stated, Levene's test for homogeneity of variance was not statistically significant (i.e., $p > .05$).

The assumption of homogeneity of regression slopes was upheld for all analyses with the exception of the analysis for *quality of sleep.* As a result, a factorial ANOVA without *age* as a covariate was run for this variable. The results are summarized in Table 4. For *group*, the only statistically significant effect was for *awakenings per night,* [$F(1, 522) = 3.85$, $p = .050$, $\eta^2 = .007$] with the TLE group ($M = 1.90$; $SD = 0.88$) reporting a higher amount of awakenings per night than the control group ($M = 1.20$; $SD = 1.14$). No other statistically significant main effects for *group* were evident (see Table 4).

The main effects for *gender* yielded statistically significant results for three variables: (a) *dreams per week* [$F(1, 446) = 5.32$, $p = .022$, $\eta^2 = .012$]; (b) *bad dream distress* [$F(1, 521) = 12.04$, $p < .001$, $\eta^2 = .023$]; and (c) *nightmare distress* [$F(1, 412) = 11.51$, $p < .001$, $\eta^2 = .027$]. For *dreams per week,* females ($M = 2.76$; $SD = 1.84$) scored higher than males ($M = 2.33$; $SD = 1.95$). For *bad dream distress*, females ($M = 3.63$; $SD = 1.69$) also scored higher than males ($M = 2.91$; $SD = 1.64$). Finally, for *nightmare distress*, females ($M = 4.08$; $SD = 1.98$) scored higher than males ($M = 3.31$; $SD = 1.96$).

Statistically significant interaction effects were evident for two variables: (a) *bad dream distress*, [$F(1, 521) = 5.34$, $p = .021$, $\eta^2 = .010$] and (b) *nightmare distress,* [$F(1,412) = 6.00$, $p = .015$, $\eta^2 = .014$]. These interaction effects were followed up with *post-hoc* pairwise comparisons, which were also done using age as a covariate. For *bad dream distress,* in the control group, females reported more distress ($M = 3.62$; $SE = 0.08$) than males did ($M = 2.95$; $SE = 0.17$) ($p < .001$). In the TLE group, females with TLE reported more distress ($M = 5.50$; $SD = 0.84$) than did males with TLE ($M = 2.20$; $SE = 0.75$) ($p = .003$). For the females, the female TLE group ($M = 5.50$; $SE = 0.84$) reported higher distress than the female control group ($M = 3.62$; $SD = 0.08$) ($p = .026$). No statistically significant difference was found for males, with the males with TLE ($M = 2.19$; $SE = 0.76$) having similar amounts of bad dream distress to the males in the control group ($M = 2.95$; $SE = 0.17$) ($p = .327$). Therefore, overall, females score higher than males in *bad dream distress*; but females with TLE score higher than females without TLE – whereas there was no difference between males across groups (TLE vs. control).

For *nightmare distress*, pairwise comparisons showed that in the control group, female controls ($M = 4.05$; $SE = 0.11$) reported higher levels of *nightmare distress* than did male controls ($M = 3.37$; $SE = 0.21$) ($p = .005$). In the TLE group, females with TLE also reported a higher level of nightmare distress ($M = 6.50$; $SE = 0.98$) than males with TLE did ($M = 2.25$; $SE = 0.98$) ($p = .003$). Finally, females in the TLE group reported a higher level of nightmare distress ($M = 6.50$; $SE = 0.98$) than females in the control group ($M = 4.05$; $SE =$

0.11) (p = .014), although there was no difference in level of distress reported by males in the control group (M = 3.38; SE = 0.21) compared to males with TLE (M = 2.35; SE = 1.00) (p = .312). Therefore, females score higher than males across both groups with respect to nightmare distress, but females with TLE score higher than females in the control group. In addition, there are no differences between males in the TLE and control groups concerning levels of nightmare distress. It is worth noting that the pattern of results for both of the interaction effects (*gender X group*, for *bad dream distress*; *gender X group*, for *NM distress*) was the same. **Factorial ANCOVA on DRM-Q Variables.**

The next statistical analyses that were run were 2 (group: epilepsy vs. Control) X 2 (gender: male vs. female) factorial ANCOVAs on the DRM-Q component scores. *Age* was again entered as a covariate, with the exception of the analysis for *dysphoric dream vividness+intensity*, for which the assumption of homogeneity of the regression slopes was not upheld. Table 5 presents the descriptive statistics for this analysis. Descriptive statistics reported in the text again differ from those reported in Table 5, as the in-text statistics are corrected for *age* as a covariate. There were no main effects for *group*. However, there were two main effects for *gender*: (a) *meaning + affectedness*, [$F(1, 407) = 8.91$, p = .003, η^2 = .022], and (b) *movement* [$F(1, 404) = 5.12$, p = .024, η^2 = .013]. For *meaning + affectedness*, females scored higher (M = 16.43; SD = 5.02) than males did (M = 14.91; SD = 4.88), and for *movement*, females also scored higher (M = 10.34; SD = 2.21) than males did (M = 10.15; SD = 2.42).

Then, there was an interaction effect for *gender X group*, for *meaning + affectedness* [$F(1, 407) = 5.00$, p = .026]. Pairwise comparisons were performed using age as a covariate to investigate this interaction effect, which showed several statistically significant differences. In the control group, female controls had higher scores (M = 16.38; SE = 0.28) than male controls (M = 14.99; SE = 0.55) (p = .026), and in the TLE group, females with TLE had higher scores (M = 21.53; SE = 2.49) than males with TLE (M = 12.11; SE = 2.52) (p = .008). Furthermore, females with TLE (M = 21.53; SE = 2.49) had higher scores than female controls (M = 16.38; SE = 0.28) (p = .040), although males with TLE (M = 12.11; SE = 2.52) did not have higher scores than male controls (M = 14.99; SE = 0.55) (p = .264). Once again, it is evident that females scored higher than males, in both the TLE and control groups; but females with TLE scored higher than females without TLE. In contrast, males with TLE did not score higher than males without TLE. The factorial ANOVAs identified an interaction effect for *gender X group* for *movement*, and pairwise comparisons were done to investigate the nature of the interaction.

According to the pairwise comparisons, there were no significant differences between female controls (M = 10.34; SE = 0.13) and male controls (M = 10.28; SE = 0.25) (p = .834). However, in the TLE group, females with TLE had higher scores for *movement* (M = 11.01; SE = 1.12) than males (p = .024). However, for males, the male controls had higher scores (M = 10.28; SE = 0.25) than the male TLE group (M = 7.39; SE = 1.14) (p = .013). Finally, females with TLE (M = 11.01; SE = 1.12) did not score higher than female controls (M = 10.34; SE = 0.13) (p = .553). Therefore, for participants with TLE, females score higher than males; but males without TLE scored higher than males with TLE.

The last interaction effect was for *gender X group* for *DRM intensity*. Pairwise comparisons indicated that the females with TLE (M = 3.80; SE = 0.42) scored higher than males with TLE (M = 2.62; SE = 0.42) (p = .047). However, female controls (M = 3.02; SE = 0.05) did not score higher than male controls (M = 3.12; SE = 0.09) (p = .310). There were also no differences between females with TLE (M = 3.80; SE = 0.42) and female controls (M = 3.02; SE = 0.05) (p = .063), and no differences between males with TLE (M = 2.62; SE = 0.42) (p = .047) and male controls (M = 3.12; SE = 0.09) (p = .239).

Table 2

Component Structure of the DRM-Q After Varimax Rotation

Variable	DRM-Q Component	Comp1	Comp2	Comp3	Comp4	Comp5	Comp6	Comp7	Comp8	Comp9
BD ATS	1. Aggression to self	**.804**	.164	.038	.168	-.032	-.007	.076	.062	.017
BD ATS Intensity	1. Aggression to self	**.802**	.196	.059	.247	.043	-.034	.134	.018	-.044
NM ATS Intensity	1. Aggression to self	**.776**	.170	.110	.240	.035	.065	.102	.028	-.171
NM ATS	1. Aggression to self	**.760**	.195	.080	.232	-.091	.073	.125	.065	-.142
DRM ATS Intensity	1. Aggression to self	**.760**	.085	.188	.023	.015	.049	.099	.013	.290
DRM ATS	1. Aggression to self	**.744**	.057	.122	-.149	.047	.063	.052	-.102	.262
BD ATO Intensity	2. Aggression to others	.170	**.822**	.093	.035	.027	-.084	.075	.059	-.113
BD ATO	2. Aggression to others	.109	**.817**	.013	-.016	.012	.016	.139	.063	-.005
NM ATO	2. Aggression to others	.111	**.782**	.065	.030	-.023	.101	-.015	-.086	-.078
NM ATO Intensity	2. Aggression to others	.231	**.770**	.085	.131	.016	-.014	-.060	.038	-.076
DRM ATO Intensity	2. Aggression to others	.109	**.688**	.113	-.050	.014	-.055	.105	-.048	.364
DRM ATO	2. Aggression to others	.042	**.669**	.046	-.158	.002	.049	.048	-.139	.481
BD Affectedness	3. Meaning-affectedness	.031	.013	**.818**	.232	-.018	-.062	-.022	-.015	.144
BD Meaningfulness	3. Meaning-affectedness	.166	.189	**.773**	-.040	.102	.155	.086	.116	-.136
NM Affectedness	3. Meaning-affectedness	.171	.010	**.758**	.300	-.013	.075	-.032	-.153	.057
DRM Affectedness	3. Meaning-affectedness	.005	.010	**.752**	.104	.029	-.040	.060	.128	.197
NM Meaningfulness	3. Meaning-affectedness	.199	.146	**.746**	-.017	.153	.235	.094	-.056	-.110
DRM Meaningfulness	3. Meaning-affectedness	.095	.186	**.571**	-.088	-.008	.210	.193	.475	-.102

Component Structure of the DRM-Q After Varimax Rotation

Variable	DRM-Q Component	Comp1	Comp2	Comp3	Comp4	Comp5	Comp6	Comp7	Comp8	Comp9
NM Vividness	4. Dysphoric Dream Vividness-Intensity	.150	-.037	.117	**.694**	.264	.270	.113	.006	-.054
BD Intensity	4. Dysphoric Dream Vividness-Intensity	.255	.051	.198	**.656**	.055	.183	.134	.178	.117
BD Vividness	4. Dysphoric Dream Vividness-Intensity	.109	-.042	.063	**.644**	.346	.171	.152	.298	.084
NM Intensity	4. Dysphoric Dream Vividness-Intensity	.381	.084	.213	**.618**	.098	.073	.134	-.129	-.061
BD Colourfulness	5. Colourfulness	.000	.012	.076	.117	**.880**	.089	.070	.030	.122
NM Colourfulness	5. Colourfulness	.003	.019	.116	.191	**.828**	.068	.099	-.076	-.010
DRM Colourfulness	5. Colourfulness	-.018	.023	-.041	.093	**.750**	.095	.061	.334	-.107
BD Realism	6. Realism	.065	-.045	.173	.225	.101	**.811**	.079	.039	.110
NM Realism	6. Realism	.154	.009	.121	.293	.146	**.775**	.104	-.146	.104
DRM Realism	6. Realism	-.080	.041	.017	.040	.061	**.723**	.025	.387	-.114
BD Movement	7. Movement	.144	.107	.018	.181	.103	.048	**.810**	.037	-.011
DRM Movement	7. Movement	.148	.031	.104	-.010	.095	.001	**.789**	.092	.257
NM Movement	7. Movement	.207	.100	.096	.270	.058	.209	**.655**	-.092	-.202
DRM Vividness	8. Dream Vividness	.032	-.139	.068	.303	.347	.108	-.011	**.659**	.164
DRM Intensity	9. Dream Intensity	.173	.017	.160	.354	.058	.199	.110	.291	**.520**
	Eigenvalue	4.22	3.76	3.62	2.67	2.46	2.22	1.99	1.31	1.19
	% Variance	12.80	11.40	10.96	8.07	7.44	6.72	6.03	3.96	3.61
	a	.90	.87	.86	.81	.82	.78	.73	n/a	n/a

Note. Alpha values are not reported for the *dream vividness* and *dream intensity* components as these are comprised of only one item each.

Component Structure of the DRM-Q After Varimax Rotation

Variable	DRM-Q Component	Comp1	Comp2	Comp3	Comp4	Comp5	Comp6	Comp7	Comp8	Comp9

DRM = Dream; *BD* = Bad dream; *NM* = Nightmare; *ATS* = Aggression to Self; *ATO* = Aggression to Others

Table 3

Descriptive Statistics for Sleep and Dreaming Variables, by Gender

	Temporal Lobe Epilepsy				Control			
	Male		Female		Male		Female	
Variable	*n*	*M (SD)*	*n*	*M (SD)*	*n*	*M (SD)*	*n*	*M (SD)*
Hours of sleep per night	5	8.00 (*1.41*)	5	7.00 (*0.71*)	100	6.71 (*1.41*)	417	6.91 (*1.29*)
Quality of sleep	5	3.20 (*0.84*)	5	4.20 (*0.84*)	100	3.67 (*1.08*)	417	3.67 (*1.02*)
Awakenings per night	5	2.00 (*1.00*)	5	1.80 (*0.84)*	100	0.94 (*1.01*)	417	1.26 (*1.15*)
Dreams per week	5	1.20 (*1.10*)	5	3.60 (*2.30*)	83	2.40 (*1.97*)	358	2.75 (*1.84*)
Dreams per night	5	1.20 (*0.45*)	5	1.60 (*0.55*)	99	1.25 (*0.52*)	414	1.35 (*0.58*)
Ease of dream recall	5	3.40 (*1.14*)	5	2.60 (*1.82*)	100	2.70 (*1.06*)	417	2.85 (*1.13*)
Entirety of dream recall	5	2.40 (*0.90*)	5	3.20 (*1.10*)	100	2.77 (*1.02*)	417	2.82 (*1.02*)
Bad dream frequency	5	3.60 (*2.20*)	5	3.60 (*2.20*)	100	4.20 (*1.57*)	417	4.59 (*1.42*)
Bad dream distress	5	2.20 (*1.79*)	4	5.50 (*0.58*)	100	2.95 (*1.64*)	417	3.62 (*1.69*)
Nightmare frequency	5	3.40 (*2.89*)	4	4.50 (*1.00*)	100	3.05 (*1.57*)	417	3.06 (*1.67*)
Nightmare distress	4	2.25 (*1.89*)	4	6.50 (*0.58*)	64	3.37 (*1.96*)	325	4.05 (*1.98*)

Note: Sample sizes differ for some variables due to missing data from some participants for those variables.

Table 4

Factorial ANCOVA Results for Sleep and Dreaming Variables

	Group			Gender			Group X Gender		
Variable	*F*(*df*)	*p*	η^2	*F*(*df*)	*p*	η^2	*F*(*df*)	*p*	η^2
Hours of sleep per night	2.79 (1, 522)	.095	.005	1.00 (1, 522)	.316	.002	2.14 (1, 522)	.144	.004
Quality of sleep*	0.01 (1, 523)	.929	.000	2.31 (1, 523)	.130	.004	2.30 (1, 523)	.131	.004
Awakenings per night	**3.85 (1, 522)**	**.050**	**.007**	0.43 (1, 522)	.515	.001	0.14 (1, 522)	.705	.000
Dreams per week	0.09 (1, 446)	.760	.000	**5.32 (1, 446)**	**.022**	**.012**	2.99 (1, 446)	.084	.007
Dreams per night	0.27 (1, 518)	.603	.001	1.93 (1, 518)	.165	.004	0.73 (1, 518)	.395	.001
Ease of dream recall	0.58 (1, 522)	.446	.001	1.31 (1, 522)	.252	.003	2.22 (1, 522)	.137	.004
Entirety of dream recall	0.00 (1, 522)	.979	.000	1.84 (1, 522)	.176	.004	1.38 (1, 522)	.240	.003
Bad dream frequency	3.04 (1, 522)	.082	.006	0.28 (1, 522)	.600	.001	0.10 (1, 522)	.749	.000
Bad dream distress	0.97 (1, 521)	.326	.002	**12.04 (1, 521)**	**< .001**	**.023**	**5.34 (1, 521)**	**.021**	**.010**
Nightmare frequency	2.19 (1, 521)	.139	.004	1.25 (1, 521)	.265	.002	1.11 (1, 521)	.293	.002
Nightmare distress	1.00 (1, 412)	.318	.002	**11.51 (1, 412)**	**< .001**	**.027**	**6.00 (1, 412)**	**.015**	**.014**

Note. Statistically significant effects are highlighted in boldface.

*ANCOVA results without *age* as a covariate are reported due to violation of the assumption of homogeneity of regression slopes.

Table 5

Descriptive Statistics for DRM-Q Variables, by Gender

	Temporal Lobe Epilepsy				Control			
	Male		Female		Male		Female	
Variable	*n*	*M (SD)*	*n*	*M (SD)*	*n*	*M (SD)*	*n*	*M (SD)*
Aggression towards self	4	14.00 (*4.16*)	4	21.00 (*2.94*)	82	17.21 (*5.68*)	322	16.43 (*5.32*)
Aggression towards others	4	11.25 (*2.22*)	4	11.00 (*4.24*)	80	12.61 (*5.26*)	320	11.03 (*4.19*)
Meaning+Affectedness	4	12.50 (*5.80*)	4	21.50 (*3.79*)	82	15.02 (*4.84*)	322	16.36 (*5.01*)
DD Vividness+Intensity	4	14.75 (*7.23*)	4	16.25 (2.75)	81	15.54 (3.87)	322	15.53 (3.56)
Colour	4	8.00 (3.74)	4	8.00 (2.58)	81	8.84 (2.49)	322	8.68 (2.78)
Realism	3	9.00 (3.00)	4	7.25 (2.63)	82	8.07 (3.12)	321	8.71 (2.92)
Movement	4	7.50 (1.73)	4	11.00 (2.71)	80	10.29 (2.38)	321	10.33 (2.21)
DRM vividness	5	2.80 (0.84)	5	3.80 (1.64)	100	3.66 (1.24)	417	3.73 (1.09)
DRM intensity	5	2.60 (1.14)	5	3.80 (0.45)	100	3.12 (0.96)	417	3.02 (0.93)

Table 6

Factorial ANCOVA Results for DRM-Q Components

	Group			**Gender**			**Group X Gender**		
Variable	*F*(*df*)	*p*	η^2	*F*(*df*)	*p*	η^2	*F*(*df*)	*p*	η^2
Aggression to self	0.19 (1, 407)	.659	.000	2.20 (1, 407)	.139	.005	3.64 (1, 407)	.057	.009
Aggression to others	0.23 (1, 403)	.643	.001	0.27 (1, 403)	.604	.001	0.21 (1, 403)	.644	.001
Meaningfulness+affectedness	0.40 (1, 407)	.527	.001	**8.91 (1, 407)**	**.003**	**.022**	**5.00 (1, 407)**	**.026**	**.012**
Dysphoric dream vividness+intensity*	0.00 (1, 407)	.979	.000	0.32 (1, 407)	.572	.001	0.33 (1, 407)	.564	.001
Colourfulness	0.48 (1, 406)	.488	.001	0.03 (1, 406)	.857	.000	0.00 (1, 406)	.998	.000
Realism	0.04 (1, 405)	.846	.000	0.28 (1, 405)	.600	.001	1.14 (1, 405)	.285	.003
Movement	1.88 (1, 404)	.171	.005	**5.12 (1, 404)**	**.024**	**.013**	**4.83 (1, 404)**	**.029**	**.012**
Dream vividness	1.13 (1, 522)	.288	.002	2.01 (1, 522)	.156	.004	1.56 (1, 522)	.213	.003
Dream intensity	0.21 (1, 522)	.648	.000	3.18 (1, 522)	.075	.006	**4.59 (1, 522)**	**.033**	**.009**

Note. Statistically significant effects are highlighted in boldface.

*ANCOVA results without *age* as a covariate are reported due to violation of the assumption of homogeneity of regression slopes.

Discussion

This study sought to investigate quantitative sleep and dreaming characteristics in patients with TLE compared to healthy controls, and to investigate whether there were any effects with respect to gender and epilepsy on these quantitative aspects of sleep and dreaming. These objectives were born out of a need evidenced in the literature for nightmare research in TLE patients to consider gender as an important independent variable, along with the clear need for dreaming studies that focus on TLE patients to include control groups consisting of participants without epilepsy.

Several statistically significant results were obtained. A main effect was found for the variable *number of awakenings per night*, with the TLE group reporting more nocturnal awakenings than the control group. This result seems to indicate that epilepsy is having some effect on the sleep and dreaming of the individuals with TLE, and that it may be responsible for nocturnal awakenings. This supports research done by Bazil (2004), Kwan et al. (2009), and Silvestri and Bromfield (2004), which showed that patients with epilepsy often have disordered sleep.

This finding is especially interesting given that Silvestri and Bromfield (2004) hypothesized that the nocturnal arousals in patients with TLE are actually subclinical seizures, and that nightmares, which are often the cause of nocturnal awakenings, could be the result or presentation of nocturnal seizures. The study conducted by Silvestri and Bromfield (2004) supported this hypothesis by finding corresponding EEG evidence of ictal activity for nocturnal awakenings in patients with epilepsy. Although there were no EEG recordings taken from patients with TLE to record their brain activity during sleep in this study, based on the results of the study by Silvestri and Bromfield (2004), it may be that the main effect observed for the TLE group for *number of times woken up per night* was due in part to nocturnal seizure activity.

A main effect was also found for *dreams per week*, with females reporting more dreams than males. One explanation for this gender difference is the fact that females demonstrate better episodic emotional memory than males (Levin & Nielsen, 2007), so females may remember bad dreams and nightmares more frequently than males do. Main effects were also found for *bad dream distress* and *nightmare distress*, with females reporting more distress for both bad dreams and nightmares. Levin and Nielsen (2007) mentioned that the gender difference in the affect of bad dreams and nightmares may be due to gender differences in coping styles. They state that women tend to favour emotion-focused coping, whereas men tend to favour disengagement and avoidance when it comes to negative

experiences such as nightmares. These authors also mention that women tend to adopt ruminative coping styles, which means that they focus their attention on negative events when they experience them (Levin & Nielsen, 2007). Men may not use ruminative coping styles as much as women do, and therefore may not experience as much distress from bad dreams and nightmares.

Interaction effects were found for both *bad dream distress* and *nightmare distress*, and pairwise comparisons showed that females with TLE experience more distress concerning bad dreams and nightmares than do females in the control group. No significant effects were found for males between groups. These results suggest that the epilepsy itself is having some kind of effect on dreaming, as significant effects were found across groups and within the same gender. It has been established that females have a predisposition towards negative dreams (Levin & Nielsen, 2007) and it may be that the TLE is exacerbating this underlying gender-based predisposition. In other words, it is possible that TLE is more likely to cause negative effects on dreaming for females than it is for males, due to the predisposition females already have towards bad dreams and nightmares. From these results it seems as if the third hypothesis (namely, that there will be a significant effect between nightmare distress and gender across both TLE and non-TLE groups) is supported.

With regards to the DRM-Q variables, the finding show that there were main effects for gender on the variables *meaning + affectedness* and *movement*, with females in both the TLE and control group reporting higher scores than males. For *meaning + affectedness*, this could once again be due to more general gender differences, such as women favouring emotional coping styles and having better emotional episodic memory, for example. The gender effect for *movement* may again be because women seem to experience more negative dreams than men do, and may remember them better. However, it is interesting that this specific variable is significant, as opposed to *dream colourfulness* or *dream vividness*. Thematic analysis of dream narratives that focuses on nightmares may reveal more about this difference.

Interactions for the DRM-Q variables also revealed gendered results for *meaning + affectedness*, with females scoring higher than males in both TLE and control groups, and females with TLE scoring higher than females in the control group. These results support the above-mentioned reasoning with regards to TLE acting on an already pre-existing vulnerability that females have to bad dreams and nightmares. However, males with TLE reported less *meaning + affectedness* than males in the control group, and for *movement*, both males and females in the control group scored higher than their TLE counterparts. Similarly, no difference was found between female and male controls on the variable *dream intensity*. In

addition to this lack of expected results, there is the fact that there were no significant main effects or interaction effects for *bad dream frequency* and *nightmare frequency*, as hypothesized. However, the rejection of these hypotheses can be interpreted differently, as both Kirschner (1999) and Solms (1997) found that the tendency towards experiencing more negative dreams due to TLE, is often reduced or eliminated when the TLE is treated effectively. This is a crucial point when considering the findings in the TLE group, as the majority of the sample were on some form of antiepileptic drugs (AEDs). Seizure activity in TLE can result in increased negative dream phenomena, and since AEDs reduce seizure activity, there is a resultant decrease in negative dream phenomena experienced by individuals with TLE who are on AEDs. Therefore, one of the limitations of this study is that most of the TLE group patients were on AEDs; consequently, larger subsequent studies should include a sleep study using patients with uncontrolled TLE who are not on AEDs. Here, the brain activity of patients can be monitored by EEGs during sleep, which would record any subclinical nocturnal seizures. Additionally, self-reports of dreams from TLE patients in these future sleep studies can then be compared with EEG data of nocturnal seizures, to see whether there are any correlations.

Conclusion

This study investigated quantitative sleep and dreaming characteristics in patients with TLE compared to a large non-TLE control group, and found several main effects and interactions between group, gender, and several variables relating to sleep, dreaming, bad dreams and nightmares. One of the three hypotheses was supported by the results of the study: there was a significant effect between nightmare distress and gender across both TLE and non-TLE groups, with females in both groups reporting higher levels of distress concerning bad dreams and nightmares. These results are supported by a large body of research on gender differences in dreaming and nightmare frequency. There were also main effects and interaction effects for the TLE group versus the controls on certain variables, and it is possible that gender amplified the effect of TLE on dreaming, due to females' predisposition to experiencing negative dreaming more frequently than males.

Unexpectedly, no main effects or interactions were found for the variables *bad dream frequency* and *nightmare frequency*. It is possible that the fact that almost all the TLE participants were on AEDs suppressed or eliminated any effects that their TLE would have had on bad dreams and nightmares. Future studies might involve large samples of patients with TLE who are not on AEDs, and sleep studies where patients with TLE are monitored via

EEG during sleep. Overall, the study yielded several significant results that will hopefully influence further study in the field of dreaming and epilepsy.

References

Bazil, C. W. (2004). Nocturnal seizures. *Seminars in Neurology, 24*, 293-300.

Bonanni, E., Cipolli, C., Iudice, A., Mazzetti, M., & Murri, L. (2002). Dream recall frequency in epilepsy patients with partial and generalized seizures: A dream diary study. *Epilepsia, 43*, 889-895.

Carrol, C., & Benbadis, S. R. (2011). *Complex partial seizures*. Retrieved October 21, 2012 from http://emedicine.medscape.com/article/1183962-overview

Cipolli, C., Bonanni, E., Maestri, M., Mazzetti, M. & Murri, L. (2004). Dream experience during REM and NREM sleep of patients with complex partial seizures. *Brain Research Bulletin, 63*, 407-413.

Hamann, S, B., Ely, T. D., Hoffman, J. M., & Kilts, C. D. (2002). Ecstasy and agony: Activation of the human amygdala in positive and negative emotion. *Psychological Science, 13*, 135-141.

Kim, D. W., Lee, S. K., Chung, C. K., Koh, Y., Choe, G., & Lim, S. D. (2012). Clinical features and pathological characteristics of amygdala enlargement in mesial temporal lobe epilepsy. *Journal of Clinical Neuroscience, 19*, 509-512.

Kirschner, N. T. (1999). Medication and dreams: Changes in dream content after drug treatment. *Dreaming, 9*, 195-200.

Kwan, P., Yu, E., Leung, H., Leon, T., & Mychaskiw, M. A. (2009). Association of subjective anxiety, depression, and sleep disturbance with quality-of-life ratings in adults with epilepsy. *Epilepsia, 50*, 1059-1066.

Levin, R. & Nielsen, T. A. (2007). Disturbed dreaming, posttraumatic stress disorder, and affect distress: A review and neurocognitive model. *Psychological Bulletin, 133*, 482-528.

Levin, R. & Nielsen, T. A. (2009). Nightmares, bad dreams, and emotion dysregulation – A review and new neurocognitive model of dreaming. *Current Directions in Psychological Science, 18*, 84-88. Nielsen, T. A., Laberge, L., Paquet, J., Tremblay, R. E., Vitaro, F., & Montplaisir, J. (2000). Development of disturbing dreams during adolescence and their relation to anxiety symptoms. *Sleep, 23*, 1-10.

Nielsen, T. A., Stenstrom, P., & Levin, R. (2006). Nightmare frequency as a function of age, gender and September 11, 2001: Findings from and Internet questionnaire. *Dreaming, 16*, 145-158.

Nofzinger, E. A., Buysse, D. J., Germain, A., Carter, C., Luna, B., Price, J. C., Meltzer, C. C., Miewald, J. M., Reynolds, C. F., & Kupfer, D. J. (2004). Increased activation of anterior paralimbic and executive cortex from waking to rapid eye movement sleep in depression. *Arch Gen Psychiatry, 61*, 695-702.

Pagel, J. F., & Vann, B. H. (1992). The effects of dreaming on awake behavior. *Dreaming, 2,* 229-237.

Pagel, J. F., Vann, B. H., & Altomare, C. A. (1995). Reported association of stress and dreaming: Community background levels and changes with disaster (Hurricane Iniki). *Dreaming, 5,* 43-50.

Pepiridou, C., Karlovasitou, A., Triantafyllou, N., Terzoudi, A., Constantinidis, T., Vadikolias, K., Heliopoulos, I., Vassilopoulos, Balogiannis, S. (2008). Influence of sleep disturbance on quality of life of patients with epilepsy. *Seizure, 17*, 588-594.

Peterson, N. D .J., Henke, P. G. & Hayes, Z. (2002). Limbic system function and dream content in university students. *The Journal of Neuropsychiatry and Clinical Neurosciences, 14*, 283-288.

Schredl, M. (2006). Nightmare frequency and nightmare topics in a representative German sample. *European Archives of Psychiatry and Clinical Neuroscience, 260*, 565-570.

Silvestri, R. & Bromfield, E. (2004). Recurrent nightmares and disorders of arousal in temporal lobe epilepsy. *Brain Research Bulletin, 63*, 369-376.

Solms, M. (1997). *The neuropsychology of dreams: A clinic-anatomical study*. Mahwah, NJ: Erlbaum.

Spoormaker, V. I., Schredl, M. & van den Bout, J. (2006). Nightmares: from anxiety symptom to sleep disorder. *Sleep Medicine Reviews, 10*, 19-31.

Vandekerckhove, M., & Cluydts, R. (2010). The emotional brain and sleep: An intimate relationship. *Sleep Medicine Reviews, 14*, 219-226.

Wiebe, S., Blume, W. T., Girvin, J. P., Eliasziw, M. (2001). A randomized, controlled trial of surgery for temporal-lobe epilepsy. *N Eng J Med, 354*, 311-318.

Zadra, A. & Donderi, D.C. (2000). Nightmares and bad dreams: Their prevalence and relationship to well-being. *Journal of Abnormal Psychology, 109*, 273-281.

Zadra, A., Pilon, M., & Donderi, D.C. (2006). Variety and intensity of emotions in nightmares and bad dreams. *The Journal of Nervous and Mental Disease, 194*, 249-254.

Appendix A

Epilepsy-Related Factors Questionnaire (ERF)

Epilepsy-Related Factors Questionnaire (ERF)

Department of Psychology

University of Cape Town

PARTICIPANT NUMBER: _____

PATIENT'S NAME: _____ TEL**:** _____

AGE: _____ **GENDER: Male/Female**

RACE: _____

FOLDER NUMBER: _____

TYPE OF EPILEPSY/EPILEPSY DIAGNOSIS:

_____

PLEASE SPECIFY ANY OTHER IMPORTANT INFORMATION ABOUT THE PATIENT IN THE SPACE BELOW (IF ANY):

TO BE COMPLETED BY PATIENT:

1.) At what age did you start having seizures? _____ years of age

2.) About how many seizures do you have a week? _____ seizures per week

3.) How severe would you rate your seizures overall? Please tick ONE of the boxes next to the answers below:

1. Not at all severe [ ]

2. Mild [ ]

3. Moderate [ ]

4. Severe [ ]

5. Very severe [ ]

4.) How well-controlled would you say your seizures are overall? Please tick ONE of the boxes next to the answers below:

1. Not at all controlled [ ]

2. Badly controlled [ ]

3. Moderately controlled [ ]

4. Well-controlled [ ]

5. Very well-controlled [ ]

5.) Since you started having seizures, have there been any periods during which you have been seizure-free (Please circle)?

1. Yes 2. No

If you answered YES to the question above, please indicate below for how many months each of these periods lasted. If there have been more than 10 periods during which you were seizure-free, please use the back of this sheet to indicate these.

Period 1: _____ months

Period 2: _____ months

Period 3: _____ months

Period 4: _____ months

Period 5: _____ months

Period 6: _____ months

Period 7: _____ months

Period 8: _____ months

Period 9: _____ months

Period 10: _____ months

If you answered NO to the question above, please go to the next question.

6.) Are you currently taking any medications for your seizures (please circle)?

1. Yes 2. No

If YES, please write down below what medications you are taking, as well as the daily doses of these medications, in milligrams. If NO, you have reached the end of the questions. Thank you for taking the time to answer them.

Medication 1: _____ Dosage: _____ milligrams per day

Medication 2: _____ Dosage: _____ milligrams per day

Medication 3: _____ Dosage: _____ milligrams per day

Medication 4: _____ Dosage: _____ milligrams per day

Medication 5: _____ Dosage: _____ milligrams per day

PLEASE STOP HERE AND DO <u>NOT</u> COMPLETE ANY OF THE QUESTIONS BELOW.

Thank you for taking the time to complete the questionnaire!

Your participation is very much appreciated!

TO BE COMPLETED BY RESEARCHER:

7.) Does the patient have any other type of neurological disorder besides epilepsy (please circle)? If YES, please specify all disorders:

1. Yes 2. No

Type of disorder(s): _____

8.) Does the patient have any type of psychiatric disturbance (please circle)? If YES, please specify all psychiatric disorders:

1. Yes 2. No

Type of disorders(s): _____

9.) Does the patient have any other family members who also have epilepsy? If YES, please specify the relationship of the family member to the patient, as well as what type of epilepsy the family member has:

Family member 1: _____ Type of epilepsy: _____
Family member 2: _____ Type of epilepsy: _____
Family member 3: _____ Type of epilepsy: _____
Family member 4: _____ Type of epilepsy: _____
Family member 5: _____ Type of epilepsy: _____

10.) Duration of patient's epilepsy (i.e., number of years from seizure onset to present age): _____ years

11.) What is the etiology of the epilepsy (i.e., the cause, e.g., idiopathic, tumour, etc.)? If more than one etiology is suspected, please indicate all suspected etiologies below:

Etiology 1: _____
Etiology 2: _____
Etiology 3: _____
Etiology 4: _____
Etiology 5: _____

12.) Has the epilepsy been localised to a particular part of the brain? If YES, please tick the appropriate box. If more than one applies, please tick all boxes that apply:

1. Localization has not been established [ ]

2. Frontal lobe [ ]

3. Temporal lobe [ ]

4. Occipital lobe [ ]

5. Parietal lobe [ ]

6. Epilepsy is more generalized than local/focal [ ]

13.) How was the above localisation established? Please tick the appropriate box. If the lateralization has been established by more than one means, please tick all boxes that apply:

1. Localization has not been established [ ]

2. EEG [ ]

3. Clinical examination (e.g., neurological or neuropsychological examination, etc.) [ ]

Specify type of clinical examination:_____

4. Other [ ] Please specify: _____

14.) What is the hemispheric lateralisation of the epilepsy? Please tick the appropriate box:

1. Lateralisation has not been established [ ]

2. Right [ ]

3. Left [ ]

4. Bilateral [ ]

15.) How was the hemispheric lateralisation established? Please tick the appropriate box. If the lateralisation has been established by more than one means, please tick all boxes that apply:

1. Lateralisation has not been established [ ]

2. EEG [ ]

3. Clinical examination (e.g., neurological or neuropsychological examination, etc.) [ ]

Specify type of clinical examination:_____

4. Other [ ] Please specify: _____

16.) What is the within-hemisphere localisation of the epilepsy, if any (e.g., lateral temporal lobe epilepsy, mesial temporal lobe epilepsy)? Please tick the appropriate box. If more than one of the following applies, please tick all boxes that apply:

1. Localisation has not been established [ ]

2. Lateral [ ]

3. Mesial [ ]

4. Ventral [ ]

5. Orbital [ ]

6. Other [ ] Please specify: _____

17.) How was the above within-hemisphere localisation established? Please tick the appropriate box. If the localisation has been established by more than one means, please tick all boxes that apply:

1. Localisation has not been established [ ]

2. EEG [ ]

3. Clinical examination (e.g., neurological or neuropsychological examination, etc.) [ ]

Specify type of clinical examination:_____

4. Other [ ] Please specify: _____

18.) Has the epilepsy been localized to any particular brain structure (e.g., hippocampus, amygdala, etc.) (please circle)? If YES, please specify below. If the epilepsy has been localized to more than one brain structure, please specify all brain structures that apply below.

1. Yes 2. No

Brain structure 1: _____

Brain structure 2: _____

Brain structure 3: _____

Brain structure 4: _____

Brain structure 5: _____

19.) How was the above localization to a particular brain structure established? Please tick the appropriate box. If the localization has been established by more than one means, please tick all boxes that apply:

1. Localization has not been established [ ]

2. EEG [ ]

3. Clinical examination (e.g., neurological or neuropsychological examination, etc.) [ ]

4. Other [ ] Please specify: _____

20.) Has it been established that the epilepsy has propagated (spread) to any other brain areas? If YES, please tick to which brain areas the epilepsy has propagated. If the epilepsy has propagated to more than one lobe, please tick all lobes that apply.

1. Left frontal lobe [ ] 2. Right frontal lobe [ ]

3. Left parietal lobe [ ] 4. Right parietal lobe [ ]

5. Left occipital lobe [ ] 6. Right occipital lobe [ ]

7. Left temporal lobe [ ] 8. Right temporal lobe [ ]

9. Epilepsy has **not** propagated to any other brain areas [ ]

10. Epilepsy has propagated to a brain area not mentioned above [ ]

Please specify brain area: _____

21.) How was the above propagation to a particular brain area established? Please tick the appropriate box. If the propagation has been established by more than one means, please tick all boxes that apply:

1. Propagation has not been established [ ]

2. EEG [ ]

3. Clinical examination (e.g., neurological or neuropsychological examination, etc.) [ ]

Specify type of clinical examination:_____

4. Other [ ] Please specify: _____

Appendix B

Dreaming Questionnaire (DRM-Q)

DREAMING QUESTIONNAIRE (DRM-Q)

1.) How many hours of sleep do you usually get a night?
_____hours

2.) How would you rate the quality of your sleep? "Quality of sleep" means how well you think you sleep at night.
1) Very bad [ ]
2) Bad [ ]
3) Average [ ]
4) Good [ ]
5) Very good [ ]

3.) About how many times do you usually wake up during the night?
1) Once [ ]
2) Twice [ ]
3) Three times [ ]
4) Four times [ ]
5) Five times [ ]
6) More than five times. Please say how many times: _____

4.) About how many dreams a week do you usually remember per week (e.g., 3 dreams a week)?
_____ dreams a week

5.) When you wake up in the morning, can you usually remember having:
1) 1 dream a night [ ]
2) 2 dreams a night [ ]
3) 3 dreams a night [ ]
4) 4 dreams a night [ ]
5) More than 4 dreams a night: Please say how many: _____

6.) When you wake up can you usually remember your dreams:

1) Easily [ ]
2) Without much effort [ ]
3) With some effort [ ]
4) With much effort [ ]
5) With great effort [ ]

7.) When you wake up do you usually remember your dreams:

1) Only as a fragment [ ]
2) With many missing parts [ ]
3) With some missing parts [ ]
4) Almost as a whole [ ]
5) Entirely [ ]

8.) How much colour would you say your dreams have?

1) No colour at all [ ]
2) A little bit of colour [ ]
3) A medium amount of colour [ ]
4) A lot of colour [ ]
5) A very large amount of colour [ ]

9.) How vivid would you say your dreams usually are?

1) Very unclear [ ]
2) Unclear [ ]
3) Average [ ]
4) Vivid [ ]
5) Very vivid [ ]
6) Extremely vivid [ ]

10.) How realistic would you say your dreams usually are?

1) Not at all realistic [ ]
2) A little bit realistic [ ]
3) Moderately realistic [ ]
4) Very realistic [ ]
5) Extremely realistic [ ]

11.) How intense would you say your dreams usually are?

1) Not at all intense [ ]
2) Slightly intense [ ]
3) Moderately intense [ ]
4) Very intense [ ]
5) Extremely intense [ ]

12.) How meaningful do you think your dreams usually are?
1) I think my dreams don't have any meaning at all [ ]
2) I think my dreams have a little bit of meaning to them [ ]
3) I think my dreams have a moderate amount of meaning to them [ ]
4) I think my dreams have a lot of meaning to them [ ]
5) I think my dreams have a very large amount of meaning to them [ ]

13.) How much movement is usually in your dreams?
1) There is usually no movement at all in my dreams [ ]
2) There is a little bit of movement in my dreams [ ]
3) There is a moderate amount of movement in my dreams [ ]
4) There is a lot of movement in my dreams [ ]
5) There is a very large amount of movement in my dreams [ ]

14.) How affected are you by your dreams after you have them?
1) My dreams do not affect me at all [ ]
2) My dreams affect me a little bit [ ]
3) My dreams affect me a moderate amount [ ]
4) My dreams affect me quite a lot [ ]
5) My dreams affect me to a very large amount [ ]

15.) About *how often* would you say you are aggressive towards people, animals, or other characters in your dreams?
1) Never [ ]
2) Sometimes [ ]
3) Often [ ]
4) Very often [ ]
5) Always [ ]

16.) About *how intense* would you say that your aggression towards people, animals, or other characters in your dreams is – regardless of how often you are aggressive in your dreams?
1) Not at all intense [ ]
2) Slightly intense [ ]
3) Moderately intense [ ]
4) Very intense [ ]
5) Extremely intense [ ]

17.) About how often would you say that *other characters* (e.g., people, animals, etc.) are aggressive *towards you* in your dreams?
1) Never [ ]
2) Sometimes [ ]
3) Often [ ]
4) Very often [ ]
5) Always [ ]

18.) About how intense would you say that the aggression of other characters (e.g., people, animals, etc.) is towards you in your dreams - regardless of how often other characters are aggressive in your dreams?

1) Not at all intense [ ]
2) Slightly intense [ ]
3) Moderately intense [ ]
4) Very intense [ ]
5) Extremely intense [ ]

19.) "Bad dreams" are disturbing dreams (e.g., frightening, anxious, distressing) in which the unpleasant visual imagery and/or emotions *do not cause you to wake up*. How often do you have bad dreams?

1) Never [ ]
2) Once every few years [ ]
3) Once a year [ ]
4) Once every several months [ ]
5) Once a month [ ]
6) More than once a month [ ]
7) Once a week [ ]
8) More than once a week [ ]

20.) Estimate the number of "bad dreams" you have had in the past month: _____

21.) Estimate the number of "bad dreams" you have had in the past year: _____

22.) How concerned or distressed are you over your "bad dreams?" (circle one of the numbers below, from a scale of 1 = very little to 7 = very much)

Very little.....Very much
1 2 3 4 5 6 7

23.) How much colour would you say your "bad dreams" have?

1) No colour at all [ ]
2) A little bit of colour [ ]
3) A medium amount of colour [ ]
4) A lot of colour [ ]
5) A very large amount of colour [ ]

24.) How vivid would you say your "bad dreams" usually are?

1) Very unclear [ ]
2) Unclear [ ]
3) Moderately vivid [ ]
4) Vivid [ ]
5) Very vivid [ ]
6) Extremely vivid [ ]

25.) How realistic would you say your "bad dreams" usually are?
1) Not at all realistic [ ]
2) A little bit realistic [ ]
3) Moderately realistic [ ]
4) Very realistic [ ]
5) Extremely realistic [ ]

26.) How intense would you say your "bad dreams" usually are?
1) Not at all intense [ ]
2) Slightly intense [ ]
3) Moderately intense [ ]
4) Very intense [ ]
5) Extremely intense [ ]

27.) How meaningful do you think your "bad dreams" usually are?
1) I think my bad dreams don't have any meaning at all [ ]
2) I think my bad dreams have a little bit of meaning to them [ ]
3) I think my bad dreams have a moderate amount of meaning to them [ ]
4) I think my bad dreams have a lot of meaning to them [ ]
5) I think my bad dreams have a very large amount of meaning to them [ ]

28.) How much movement is usually in your "bad dreams"?
1) There is usually no movement at all in my bad dreams [ ]
2) There is a little bit of movement in my bad dreams [ ]
3) There is a moderate amount of movement in my bad dreams [ ]
4) There is a lot of movement in my bad dreams [ ]
5) There is a very large amount of movement in my bad dreams [ ]

29.) How affected are you by your "bad dreams" after you have them?
1) My bad dreams do not affect me at all [ ]
2) My bad dreams affect me a little bit [ ]
3) My bad dreams affect me to a moderate extent [ ]
4) My bad dreams affect me quite a lot [ ]
5) My bad dreams affect me to a very large extent [ ]

30.) About *how often* would you say you are aggressive towards people, animals, or other characters in your bad dreams?
1) Never [ ]
2) Sometimes [ ]
3) Often [ ]
4) Very often [ ]
5) Always [ ]

31.) About *how intense* would you say that your aggression towards people, animals, or other characters in your bad dreams is – regardless of how often you are aggressive in your dreams?

1) Not at all intense [ ]
2) Slightly intense [ ]
3) Moderately intense [ ]
4) Very intense [ ]
5) Extremely intense [ ]

32.) About how often would you say that *other characters* (e.g., people, animals, etc.) are aggressive *towards you* in your bad dreams?

1) Never [ ]
2) Sometimes [ ]
3) Often [ ]
4) Very often [ ]
5) Always [ ]

33.) About how intense would you say that the aggression of other characters (e.g., people, animals, etc.) is towards you in your bad dreams - regardless of how often other characters are aggressive in your bad dreams?

1) Not at all intense [ ]
2) Slightly intense [ ]
3) Moderately intense [ ]
4) Very intense [ ]
5) Extremely intense [ ]

34.) "Nightmares" are disturbing dreams (e.g., frightening, anxious, distressing) in which the unpleasant visual imagery and/or emotions *wake you up*. How often do you have nightmares?

1) Never [ ]
2) Once every few years [ ]
3) Once a year [ ]
4) Once every several months [ ]
5) Once a month [ ]
6) More than once a month [ ]
7) Once a week [ ]
8) More than once a week [ ]

35.) Estimate the number of nightmares you have had in the past month: _____

36.) Estimate the number of "nightmares" you have had in the past year: _____

37.) How concerned or distressed are you over your nightmares (circle one of the numbers below, from a scale of 1 = very little to 7 = very much)

Very little.....Very much

1 2 3 4 5 6 7

38.) How much colour would you say your nightmares have?

1) No colour at all [ ]
2) A little bit of colour [ ]
3) A medium amount of colour [ ]
4) A lot of colour [ ]
5) A very large amount of colour [ ]

39.) How vivid would you say your nightmares usually are?

1) Very unclear [ ]
2) Unclear[ ]
3) Average [ ]
4) Vivid [ ]
5) Very vivid [ ]
6) Extremely vivid [ ]

40.) How realistic would you say your nightmares usually are?

1) Not at all realistic [ ]
2) A little bit realistic [ ]
3) Moderately realistic [ ]
4) Very realistic [ ]
5) Extremely realistic [ ]

41.) How intense would you say your nightmares usually are?

1) Not at all intense [ ]
2) Slightly intense [ ]
3) Moderately intense [ ]
4) Very intense [ ]
5) Extremely intense [ ]

42.) How meaningful do you think your nightmares usually are?

1) I think my nightmares don't have any meaning at all [ ]
2) I think my nightmares have a little bit of meaning to them [ ]
3) I think my nightmares have a moderate amount of meaning to them [ ]
4) I think my nightmares have a lot of meaning to them [ ]
5) I think my nightmares have a very large amount of meaning to them [ ]

43.) How much movement is usually in your nightmares?

1) There is usually no movement at all in my nightmares [ ]
2) There is a little bit of movement in my nightmares [ ]
3) There is a moderate amount of movement in my nightmares [ ]
4) There is a lot of movement in my nightmares [ ]
5) There is a very large amount of movement in my nightmares [ ]

44.) How affected are you by your nightmares after you have them?
1) My nightmares do not affect me at all [ ]
2) My nightmares affect me a little bit [ ]
3) My nightmares affect me to a moderate extent [ ]
4) My nightmares affect me quite a lot [ ]
5) My nightmares affect me to a very large extent [ ]

45.) About *how often* would you say you are aggressive towards people, animals, or other characters in your nightmares?
1) Never [ ]
2) Sometimes [ ]
3) Often [ ]
4) Very often [ ]
5) Always [ ]

46.) About *how intense* would you say that your aggression towards people, animals, or other characters in your nightmares is – regardless of how often you are aggressive in your dreams?
1) Not at all intense [ ]
2) Slightly intense [ ]
3) Moderately intense [ ]
4) Very intense [ ]
5) Extremely intense [ ]

47.) About how often would you say that *other characters* (e.g., people, animals, etc.) are aggressive *towards you* in your nightmares?
1) Never [ ]
2) Sometimes [ ]
3) Often [ ]
4) Very often [ ]
5) Always [ ]

48.) About how intense would you say that the aggression of other characters (e.g., people, animals, etc.) is towards you in your bad dreams - regardless of how often other characters are aggressive in your nightmares?
1) Not at all intense [ ]
2) Slightly intense [ ]
3) Moderately intense [ ]
4) Very intense [ ]
5) Extremely intense [ ]

49.) Have you ever had a recurrent dream? A recurrent dream is a dream that when you remember it leaves you with the subjective feeling of having had it before.
1) No [ ]
2) Yes [ ]
3) Uncertain [ ]

50.) Have you had a recurrent dream in the past twelve months?

1) No [ ]
2) Yes [ ]
3) Uncertain [ ]

51.) Have you had a recurrent dream in the past six months?

1) No [ ]
2) Yes [ ]
3) Uncertain [ ]

52.) Are you currently having a recurrent dream?

1) No [ ]
2) Yes [ ]
3) Uncertain [ ]

53.) About how long has your recurrent dream, past or present, gone on for?

1) A week [ ]
2) A month [ ]
3) Several months [ ]
4) A year [ ]
5) More than a year [ ] Please say for how long: _____

54.) Is the dream content in your recurrent dream:

1) Never identical [ ]
2) Rarely identical [ ]
3) Sometimes identical [ ]
4) Often identical [ ]
5) Always identical [ ]

55.) Is the theme in your recurrent dream:

1) Never identical [ ]
2) Rarely identical [ ]
3) Sometimes identical [ ]
4) Often identical [ ]
5) Always identical [ ]

56.) How concerned or distressed are you over your recurrent dream? (circle one of the numbers below, from a scale of 1 = very little to 7 = very much)

Very little.....Very much

1 2 3 4 5 6 7

Appendix C

Covariate Tables for Age

Table 7

Results for Age *as a Covariate for Sleep and Dreaming Variables*

Variable	*F*(*df*)	*p*	η^2
Hours of sleep per night	0.20 (1, 522)	.654	.000
Quality of sleep	1.86 (1, 522)	.173	.004
Awakenings per night	**13.37 (1, 522)**	**< .001**	**.025**
Dreams per week	0.08 (1, 446)	.781	.000
Dreams per night	0.08 (1, 518)	.783	.000
Ease of dream recall	3.48 (1, 522)	.063	.007
Entirety of dream recall	0.22 (1, 522)	.641	.000
Bad dream frequency	0.82 (1, 522)	.365	.002
Bad dream distress	0.01 (1, 521)	.919	.000
Nightmare frequency	1.44 (1, 521)	.231	.003
Nightmare distress	0.37 (1, 412)	.544	.001

Note. Statistically significant effects are highlighted in boldface.

Table 8

Results for Age *as a Covariate for DRM-Q Components*

Variable	*F*(*df*)	*p*	η^2
Aggression to self	0.79 (1, 407)	.373	.002
Aggression to others	0.17 (1, 403)	.685	.000
Meaningfulness+affectedness	0.91 (1, 407)	.341	.002
Dysphoric dream vividness+intensity	0.28 (1, 406)	.598	.001
Colourfulness	0.58 (1, 406)	.445	.001
Realism	0.08 (1, 405)	.774	.000
Movement	0.39 (1, 404)	.535	.001
Dream vividness	0.12 (1, 522)	.728	.000
Dream intensity	0.07 (1, 522)	.799	.000