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A Survey Focusing on Lucid Dreaming, Metacognition, and Dream Anxiety in Medical Students

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ABSTRACT

Introduction: The aim of this study was to examine the level of lucidity and its relation with metacognitive beliefs and dream anxiety in medical students.

Methods: Nine hundred sixteen medical students were enrolled in the study. The participants were assessed with the Lucidity and Consciousness in Dreams Scale (LuCiD), the Metacognition Questionnaire-30 (MCQ-30), and the Van Dream Anxiety Scale (VDAS).

Results: There was no significant difference in mean total lucidity score between females and males, but there were some significant sex differences in subscales of lucidity, and control was significantly higher in male students, while realism, thought, and dissociation were significantly higher in female students. In addition, females had more dream anxiety levels, higher total MCQ-30 scores, and higher cognitive confidence and uncontrollability scores according to Metacognition Questionnaire-30 than males. We also found that the mean lucidity level was positively correlated with the mean total metacognition score and the mean total dream anxiety level.

Discussion: Our results suggest that female medical students tend to have more realistic dreams (p=0.018), have more logical thoughts during dreaming (p=0.011), and have a more dissociative experience during dreaming (p=0.028), while male medical students have more controlled dream events (p=0.002). There seem to be differences according to lucidity features between sexes, and the relationship between subdomains of lucidity and metacognition might lead to new therapeutic approaches to several psychiatric disorders such as anxiety disorders.

Keywords: Lucid dream, dream anxiety, metacognition

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INTRODUCTION

Dreaming is a state characterized by delusional thought, bizarre or peculiar dream pattern with gaps, deficiencies in judgment and metacognition, and complete lack of insight (1,2). Mota Rolim et al. (2) reviewed the studies of Hobson et al. (3) and Muzur et al. (4) and reported that hypofrontality could reduce self-awareness and induce delusional thoughts and deficiencies in rational judgment, both in REM sleep and in episodes of psychosis. Inactivation of frontal and parietal cortical circuits is associated with lack of waking memory, self-awareness, and insight during REM sleep (5).

In contrast to dreaming, lucid dreaming (LD) is a phenomenon in which dreamers can be aware of dreaming and sleeping, which resembles metacognitive activity during sleep (5,6). Furthermore, non-lucid dreamers are reported to suffer from metacognitive deficits (6). The core criterion of lucidity is the insight of the dreamer into the virtual reality of the dream plot (5). According to Voss et al. (6), LD is a hybrid state that has features similar to both REM sleep and wakefulness. During LD, higher levels of 40-Hz gamma band were detected in the frontal and fronto-lateral regions than during in non-lucid REM sleep (6). The lucid dreamers usually rate higher than non-lucid dreamers in subdomains of the Lucidity and Consciousness in Dreams Scale (LuCiD) such as insight, control, thought, dissociation, and positive emotion (5). According to the Dream Lucidity Questionnaire, frequent lucid dreamers report greater awareness about the unreality of dream objects and characters and greater awareness of their sleeping physical body (7).

Studies on the prevalence of LD are increasing. In a Brazilian sample, 77% of participants experienced LD at least once in their lifetime. Thinking and imagining about dreams during the day and meditation practice that allows greater mental control are contributing causes of LD. Also age, gender, some drugs and foods, stress, insomnia, too much study and work, and sexual intercourse are associated factors (8). In addition, Stumbrys et al. (9) have reported that lucid dream phenomenology might be different between sexes.

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Dream anxiety seems to be related with LD, and this is an important concept that might be measured by investigating nightmare frequency and distress (10). Some studies have researched the treatment of nightmares through lucid dream induction (11,12). Although induction of LD is relatively difficult, the benefits of acquiring this ability include the disappearance of nightmares and decreased anxiety symptoms in patients suffering from posttraumatic stress disorder (13).

During their clerkship and internship, medical students are frequently be faced with the above-mentioned conditions, including fluctuating sleep/wake up time, high levels of stress, excessive periods of study and work (particularly at times close to exams), and insomnia. We have hypothesized that there is a sex differences regarding some aspects of lucidity and that lucidity that involves metacognitive activity during sleeping is related to pathological metacognition while awake and to heightened dream anxiety levels. The aim of this study was to examine the level of lucidity, metacognition, and dream anxiety in medical students using the Lucidity and Consciousness in Dreams Scale, the Metacognition Questionnaire-30 (MCQ-30), and the Van Dream Anxiety Scales (VDAS).

METHODS

Participants

We invited 1,116 medical students ranging from their first year of study to students doing their internship to enroll in the study. Some 200 medical students declined the invitation. Of those who agreed to participate (N=916), 450 were from the medical schools of Cerrahpasa and Istanbul, while data for the remaining 466 medical students were obtained via a Google survey from around Turkey. We placed the same questionnaires into an online Google survey and sent the link to the student mail groups in various medical faculties. All participants were asked to fill out the questionnaire according to their past dreams without focusing on any specific dream type or time period.

Upon giving written/oral informed consent for enrolling in the study, all students were asked to fill out the questionnaires. The research was performed in accordance with the Helsinki Declaration's criteria.

Lucidity and Consciousness in Dreams scale

The construction of the Lucidity and Consciousness in Dreams scale was based on theoretical considerations and empirical observations. Exploratory factor analysis of the data identified the following eight factors that were validated using confirmatory factor analysis: lucid insight (insight) (Cronbach's alpha=0.91); control over thought and actions in dreams (control) (Cronbach's alpha=0.90); logical thought (thought) (Cronbach's alpha=0.82); perceptual realism (realism) (Cronbach's alpha = 0.79); memory access to elements of waking life (memory) (Cronbach's alpha=0.66); dissociation (Cronbach's alpha=0.56); negative emotion (Cronbach's alpha=0.68), and positive emotion (Cronbach's alpha=0.87). The LuCiD scale consists of 28 questions, each of which has a 5-point Likert-type response. (5). We excluded four questions related to Positive and Negative Emotions that translated poorly in Turkish.

Meta-Cognitions Questionnaire-30

We used an adapted version of the 65-item Meta-Cognitions Questionnaire, which consisted of 30 questions (14). The MCQ-30 comprises the following five factors: i) positive beliefs about worry (the belief that worrying helps to solve problems and avoid unpleasant situations); ii) negative beliefs about the uncontrollability of thoughts and danger (the belief that it is necessary to control ones' worrying in order to function well as a person and beliefs about the mental and physical dangers of worrying); iii) cognitive confidence (assessing confidence in attention and memory); iv) beliefs about the need to control thoughts (i.e., superstitions that imply that an individual could be punished for having or not having certain thoughts); and v) cognitive self-consciousness (the tendency to focus attention on thought processes). The four-point Likert response scale was the same as used in the original MCQ, and the points on the scale were defined as follows: 1 (do not agree), 2 (agree slightly), 3 (agree moderately), and 4 (agree very much). The possible scores of the questionnaire were 30-120 points, with higher scores indicating pathological metacognitive activity.

Tosun and Irak (15) conducted an adapted study of the MCQ-30 in Turkish among college students. In their study, the inter-item correlations for the MCQ-30 ranged from 0.09 to 0.764, which were consistent with the original form. The MCQ-30 indicated good test-retest reliability for items (0.40-0.94) and subscales (0.70-0.85). The Cronbach's alpha coefficient was 0.86 for the full scale and supported good internal consistency.

The Van Dream Anxiety Scale

The VDAS contains 17 self-rated questions to evaluate nightmare frequency and dream anxiety caused by frightening dreams during the preceding month. Four questions collect clinical information only and are not used in the scoring of VDAS. Twelve questions examine nightmare frequency; difficulty in falling asleep after a nightmare; fear of sleeping because of anticipated nightmare; trouble sleeping; nightmare recall frequency; daytime sleepiness; daytime anxiety; difficulty in routines; familial distress; social distress; psychological disturbances; and memory/concentration difficulties. These 12 questions are scored from 0 to 4 points. One question asks about somatic symptoms (shortness of breath, dizziness, exhaustion, palpitation, sweating, shivering, nausea, having stomach ache, tightness in chest, dry mouth, fear of death, and sore throat). Each of the 12 symptoms is scored from 0 to 4 points. If the total score is 0-10, the sum score of this questionnaire is 0; 11-20=1; 21-30=2; 31-40=3; and 40-48=4.

The VDAS has a good level of internal consistency (Cronbach's alpha=0.87). Pearson correlation coefficients for the questions ranged from 0.48 to 0.93 in the validation study (10).

Statistical Analysis

Statistical analysis was performed with Statistical Package for the Social Sciences for version 20.0 (IBM Corp.; Armonk, NY, USA). The normality of data was tested using the Kolmogorov-Smirnov test. The data were then analyzed with Student's t-test, the Mann-Whitney U-test, and the chi-square test. Correlations were assessed with Pearson's correlation test. A p-value <0.05 was accepted as statistically significant.

RESULTS

The mean age of the participants was 21.55±2.63 years, and males were significantly older than females (21.80±2.85 vs. 21.38±2.79, respectively (p=0.019). There were 379 male and 537 female medical students in the sample. The mean total lucidity score was 56.22±15.46 points according to the LuCiD scale. The mean subitem scores were as follows: insight, 13.68±5.46; control 10.02±5.36; thought 8.75±3.01; realism 8.65±2.73; memory 9.90±3.61; and dissociation, 5.22±3.52 points. Male and female medical students differed significantly in control (10.66±5.62 vs. 9.57±5.14, p=0.002), thought (8.45±3.21 vs. 8.97±2.85, p=0.011), realism (8.39±2.84 vs. 8.83±2.64, p=0.018) and dissociation (4.92±4.00 vs. 5.43±3.12, p=0.028) (Table 1).

The mean total metacognition score was 73.89±14.04 points according to the MCQ-30. The mean subitem scores were as follows: 13.87±4.36 for positive beliefs about worry; 14.69±4.53 for negative beliefs about uncontrollability; 13.23±4.79 for cognitive confidence; 14.58±3.99 for beliefs about the need to control thoughts; and 17.31±3.74 for cogni-

tive self-consciousness. Male and female medical students differed significantly according to MCQ-30 total points (72.14±15.83 vs. 74.76±13.27, p=0.007) and the subitems of cognitive confidence (12.25±4.83 vs. 13.93±4.65, p<0.0001) and negative beliefs about uncontrollability (13.88±4.49 vs. 15.27±4.48, p<0.0001) (Table 2).

The mean VDAS score was 57.00±23.61, and the dream anxiety score was significantly higher in females than males (22.75±9.59 vs. 24.23±9.47, p=0.021).

There were significant positive correlations between the total and subitem scores in LuCiD and the total and subitem scores of the MCQ-30. The mean total LuCiD score was significantly correlated with the following subitems of the MCQ-30: positive beliefs (r=0.143 and p<0.0001), negative beliefs (r=0.163 and p<0.0001), uncontrollability (r=0.111 and p=0.001), and self-consciousness (r=0.221 and p<0.0001) while no significant correlation was detected between the mean total LuCiD score and the cognitive confidence score (r=0.012 and p=0.720). The VDAS total score was positively correlated with total LuCiD score and with the subitems of thought and dissociation in LuCiD (Table 3).

DISCUSSION

We found that the mean lucidity score was 56.22±15.46 points among the medical students. Although the mean total lucidity score was insignificant between sexes, we revealed some significant sex differences in subscales of lucidity such as control was significantly higher in males, while realism, thought, and dissociation were significantly higher in female students. In addition, the females had higher dream anxiety levels and higher total MCQ-30 scores, and higher cognitive confidence and uncontrollability scores according to the MCQ-30 than the males. Interestingly, we found that the mean lucidity level was positively associated with the mean total metacognition and mean total dream anxiety levels.

Mota Rolim et al. (8) found that 77% of their subjects had LD at least once in their life, while 44% had up to ten episodes of LD. We calculated that the mean LuCiD score in the validity and reliability study in which the sample group is a normal population was 33.04 points. In our study, we found a relatively higher mean LuCiD score compared to the mean score that Voss found (5). This is consistent with the proposition of having more stress, insomnia, and irregular sleep-wake cycles among medical students

Table 1. The comparison of total LuCiD and subitem scores between male and female medical students

Medical students (n=916)	Male (SD) n=537	Female (SD) n=379	p
Total LuCiD score[1]	56.26±(17.09)	56.19±(14.21)	0.945
• Insight[1]	13.82±(5.80)	13.58±(5.20)	0.506
• Control[2]	10.66±(5.61)	9.57±(5.14)	0.002*
• Thought[1]	8.45±(3.21)	8.97±(2.85)	0.011*
• Realism[1]	8.39±(2.84)	8.83±(2.64)	0.018*
• Memory[1]	10.02±(3.76)	9.82±(3.50)	0.399
• Dissociation[2]	4.92±(4.00)	5.43±(3.12)	0.028*

LuCiD: lucidity and consciousness in dreams scale
[1]Student's t-test; [2]Mann-Whitney U-test; *p<0.005; SD: standard deviation

Table 2. The comparison of total MCQ-30 and subitem scores between male and female medical students

Medical students (n=916)	Male (SD) n=537	Female (SD) n=379	p
Total MCQ score	72.14±(15.83)	74.76±(13.27)	0.007*
• Positive beliefs	14.12±(4.68)	13.70±(4.12)	0.150
• Negative beliefs	14.78±(4.15)	14.43±(3.87)	0.192
• Cognitive confidence	12.25±(4.83)	13.92±(4.65)	<0.0001**
• Uncontrollability	13.88±(4.49)	15.27±(4.48)	<0.0001**
• Cognitiveself-consciousness	17.11±(4.25)	17.45±(3.34)	0.180

MCQ: meta-cognitions questionnaire
With student's t-test; *p<0.005; **p<0.001; SD: standard deviation

Table 3. The correlation between total scores and subitem scores of the LuCiD, MCQ-30, and VDAS scale

LuCiD	Total MCQ-30	Positive beliefs	Negative beliefs	Cognitive confidence	Uncontrollability	Self-consciousness	VDAS
Total score	r=0.184 p<0.0001**	r=0.143 p<0.0001**	r=0.163 p<0.0001**	r=0.012 p=0.720	r=0.111 p=0.001*	r=0.221 p<0.0001**	r=0.086 p=0.010*
Insight	r=0.082 p=0.014*	r=0.080 p=0.016*	r=0.062 p=0.061	r= -0.005 p=0.891	r=0.041 p=0.212	r=0.111 p=0.001*	r=0.004 p=0.902
Control	r=0.079 p=0.017*	r=0.075 p=0.023	r=0.104 p=0.002*	r= -0.001 p=0.975	r=0.018 p=0.585	r=0.086 p=0.009*	r=0.058 p=0.081
Thought	r=0.169 p<0.0001**	r=0.106 p=0.001	r=0.149 p<0.0001**	r= -0.035 p=0.289	r=0.132 p<0.0001**	r=0.255 p<0.0001**	r=0.096 p=0.004*
Realism	r=0.192 p<0.0001**	r=0.125 p<0.0001**	r=0.134 p<0.0001	r= 0.038 p=0.252	r=0.147 p<0.0001**	r=0.226 p<0.0001**	r= -0.004 p=0.898
Memory	r=0.180 p<0.0001**	r=0.156 p<0.0001**	r=0.139 p<0.0001**	r= -0.006 p=0.864	r=0.117 p<0.0001**	r=0.230 p<0.0001**	r=0.049 p=0.138
Dissociation	r=0.084 p=0.011*	r=0.041 p=0.22	r=0.088 p=0.008*	r=0.067 p=0.043*	r=0.049 p=0.140	r=0.039 p=0.244	r=0.250 p<0.0001**

LuCiD: lucidity and consciousness in dreams scale; MCQ-30: meta-cognitions questionnaire-30; VDAS: van dream anxiety scale
With spearman's correlation test; *p<0.005, **p<0.001

compared to the general population. However, having a normal population group as a comparator would be more explanatory to support our first hypothesis. The prevalence of LD (at least once in their lifetime) was higher in males than females in the general population in an online survey (75% vs. 68%, $\chi 2=10.2$ and $p=0.001$). However, the design of our study did not allow us to determine the prevalence rate of LD. In our study, we unexpectedly found no difference between male and female students according to the mean total LuCiD score (56.26±17.09 vs. 56.19±14.21, $p=0.945$). Although there were some significant differences between sexes according to the subitems of LuCiD, the lucidity level seems similar between sexes.

In a study that explored LD phenomenology, it was found that women had taken a less active role in developing dream plots than men during LD (16). This finding might be one of the possible explanations for having more control subscale points in males compared with females. Interestingly, females showed higher scores in dreaming according to the subdomains of thought, which indicates logical thought, and realism, which means perceptual realism, and dissociation. We found no other study in the literature on sex differences regarding subdomains of lucidity. Although we were unable to explain such differences between the sexes, we considered that the above-mentioned lucidity differences between the sexes might be associated with metacognitive and dream anxiety differences between the sexes. However, we did not investigate the possible influences of current menstrual cycle, reproductive hormone profile, or oral contraceptive use on lucidity. According to the literature, lucid control dreaming is suggested to be a metacognitive activity, and the amount and type of metacognition seem similar both in dreaming and waking states (17). In the present study, the female students also had a higher level of cognitive confidence, which indicates poor confidence in their attention and memory, and a higher level of negative beliefs about the conviction that it is necessary to control ones' worrying in order to function well (12). Thus, we considered that females who have poor cognitive confidence and an inability to control thoughts according to the MCQ-30 are also more liable to think about the experiences and activities of others and themselves while dreaming (subdomain thought). Additionally, females who felt in danger because of worrying thoughts and believed that it was necessary to control the worrying thoughts (according to their answers on the MCQ-30) also had realistic dreams in which similar feelings, thoughts, and experiences would feature both in dreaming and waking. Reality monitoring refers to the processes involved in distinguishing whether information has an internal or external source, and the realism subdomain of LuCiD might be reminiscent of a disturbance in reality monitoring (18). Both the reality monitoring and the capability of LD are related to the functions of the orbitofrontal cortex (OFC) (19,20). Interestingly, increases and decreases in anterior-medial OFC activity were found respectively in the premenstrual phase and in the postmenstrual phase during the recognition of negative vs. neutral auditory stimuli, while an inverse pattern was shown in lateral OFC activity (21). Thus, the menstrual phase of female participants during application of questionnaires and scales might confound the sex difference findings by influencing the reality monitoring capability via the OFC. In the current study, the level of dissociation in dreaming was higher in females than males. Dissociation has been described as an inability to integrate experiences in the usual way, which presents as experiences of depersonalization and derealization (22). The dissociation subdomain of LuCiD is similar to derealization and depersonalization experiences in waking, and no significant differences were reported regarding derealization and/or depersonalization between males and females (23).

In agreement with previous studies, we found that the dream anxiety level of females was higher than that of males (24,25,26). Several factors might explain why females have more dream anxiety compared with males, including higher rate of dream recall frequency in females, greater vulnerability to depression, more frequent childhood trauma history, and lower androgen levels, all of which have been reported to attenuate sympathetically mediated components of the integrated central stress response (25,27,28,29,30). People who suffer from nightmares can become lucid in their dreams by performing daily exercises (31). Thus, the induction of LD might be a new therapeutic technique as a conciliatory interaction with threatening dream figures aiming to reduce dream anxiety levels, which has recently been revealed to reduce nightmare frequency as an add-on treatment to Gestalt therapy (11).

From the whole sample, we have shown that lucidity scores increase as metacognitive beliefs and dream anxiety scores increase. To our knowledge, our study is the first to investigate the relationship between lucidity, metacognition and dream anxiety. Interestingly, the dorsolateral prefrontal cortex has been suggested to be a common brain region for metacognitive processes and LD in functional magnetic resonance imaging studies (1,32).

This study has several limitations; it deals only with medical students without any comparator, it had a self-reported questionnaire-based design, there was a lack of laboratory evidence such as polysomnography, and the participants did not respond to questions about their dreams right after awakening in the morning. Obtaining knowledge of menstrual phase, reproductive hormone profile, and oral contraceptive use would also be valuable.

This study is the first to study this phenomenon in Turkey, and it is the first study to investigate lucidity in medical students. Furthermore, we investigated the relationship between lucidity and metacognition in awakening for the first time. It remains unclear whether there are differences between sexes in terms of lucidity subdomains or relationships between the subdomains of lucidity and metacognition. Further investigation into the relationship between lucidity and metacognition might lead to new therapeutic approaches.

Ethics Committee Approval: Authors declared that the research was conducted according to the principles of the World Medical Association Declaration of Helsinki "Ethical Principles for Medical Research Involving Human Subjects" (amended in October 2013).
Informed Consent: Written informed consent was obtained from patients who participated in this study.

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REFERENCES

1. Dresler M, Wehrle R, Spoormaker VI, Koch SP, Holsboer F, Steiger A, Obrig H, Samann PG, Czisch M. Neural correlates of dream lucidity obtained from contrasting lucid versus non-lucid REM sleep: a combined EEG/fMRI case study. Sleep 2012; 35:1017-1020. [CrossRef]

2. Mota-Rolim SA, Araujo JF. Neurobiology and clinical implications of lucid dreaming. Med Hypotheses 2013; 81:751-756. [CrossRef]
3. Hobson JA, Pace-Schott EF, Stickgold R. Dreaming and the brain: toward a cognitive neuroscience of conscious states. Behav Brain Sci 2000; 23:793-842; discussion 904-1121. [CrossRef]
4. Muzur A, Pace-Schott EF, Hobson JA. The prefrontal cortex in sleep. Trends Cogn Sci 2002; 6:475-481. [CrossRef]
5. Voss U, Schermelleh-Engel K, Windt J, Frenzel C, Hobson A. Measuring consciousness in dreams: the lucidity and consciousness in dreams scale. Conscious Cog 2013; 22:8-21. [CrossRef]
6. Voss U, Holzmann R, Tuin I, Hobson JA. Lucid dreaming: a state of consciousness with features of both waking and non-lucid dreaming. Sleep 2009; 32:1191-1200. [CrossRef]
7. Stumbrys T, Erlacher D, Schredl M. Testing the involvement of the prefrontal cortex in lucid dreaming: a tDCS study. Conscious Cog 2013; 22:1214-1222. [CrossRef]
8. Mota-Rolim SA, Targino ZH, Souza BC, Blanco W, Araujo JF, Ribeiro S. Dream characteristics in a Brazilian sample: an online survey focusing on lucid dreaming. Front Hum Neurosci 2013; 7:836. [CrossRef]
9. Stumbrys T, Erlacher D, Johnson M, Schredl M. The phenomenology of lucid dreaming: an online survey. Am J Psychol 2014; 127:191-204. [CrossRef]
10. Agargun M, Kara H, Bilici M, Cilli AS, Telci M, Semiz UB. The Van Dream Anxiety Scale: a subjective measure of dream anxiety in nightmare sufferers. Sleep Hypn 1999; 4:204-11.
11. Holzinger B, Klosch G, Saletu B. Studies with lucid dreaming as add-on therapy to Gestalt therapy. Acta neurol Scand 2015; 131:355-363. [CrossRef]
12. Spoormaker VI, Gvozdanovic GA, Samann PG, Czisch M. Ventromedial prefrontal cortex activity and rapid eye movement sleep are associated with subsequent fear expression in human subjects. Exp Brain Res 2014;232: 1547-1554. [CrossRef]
13. Tholey PA. Model for lucidity training as a means of self-healing and psychological growth. Gackenbach J, LaBerge S, editörler. Conscious Mind, Sleeping Brain: Perspectives on Lucid Dreaming içinde. 1. ed. New York: Plenum Press; 1988; s. 263-87.
14. Wells A, Cartwright-Hatton S. A short form of the metacognitions questionnaire: properties of the MCQ-30. Behav Res Ther 2004; 42:385-396. [CrossRef]
15. Tosun A, Irak M. Adaptation, validity, and reliability of the Metacognition Questionnaire-30 for the Turkish population, and its relationship to anxiety and obsessive-compulsive symptoms. Turk Psikiyatri Dergisi 2007; 19:67-80.
16. Stumbrys T, Erlacher D, Johnson M, Schredl M. The phenomenology of lucid dreaming: an online survey. Am J Psychol 2014; 127:191-204. [CrossRef]
17. Kahan TL, LaBerge S. Lucid dreaming as metacognition: Implications for cognitive science. Consciousness and cognition 1994; 3:246-264. [CrossRef]
18. Johnson MK, Raye CL, Foley HJ, Foley MA. Cognitive operations and decision bias in reality monitoring. Am J Psychol 1981:37-64. [CrossRef]
19. Neider M, Pace-Schott EF, Forselius E, Pittman B, Morgan PT. Lucid dreaming and ventromedial versus dorsolateral prefrontal task performance. Conscious Cogn 2011; 20:234-244. [CrossRef]
20. Schnider A. Orbitofrontal reality filtering. Front Behav Neurosci 2013; 7:67. [CrossRef]
21. Protopopescu X, Pan H, Altemus M, Tuescher O, Polanecsky M, McEwen B, Silbersweig D, Stern E. Orbitofrontal cortex activity related to emotional processing changes across the menstrual cycle. Proc Natl Acad Sci USA 2005; 102:16060-16065. [CrossRef]
22. Spiegel D, Cardena E. Disintegrated experience: the dissociative disorders revisited. J Abnorm Psychol 1991; 100:366-378. [CrossRef]
23. Maaranen P, Tanskanen A, Honkalampi K, Haatainen K, Hintikka J, Viinamaki H. Factors associated with pathological dissociation in the general population. TAust N Z J Psychiatry. 2005; 39:387-394. [CrossRef]
24. Li SX, Zhang B, Li AM, Wing YK. Prevalence and correlates of frequent nightmares: a community-based 2-phase study. Sleep 2010; 33:774-780. [CrossRef]
25. Sandman N, Valli K, Kronholm E, Ollila HM, Revonsuo A, Laatikainen T, Paunio T. Nightmares: prevalence among the Finnish general adult population and war veterans during 1972-2007. Sleep 2013; 36:1041. [CrossRef]
26. Schredl M, Erlacher D. Frequency of lucid dreaming in a representative German sample. Percept Mot Skills 2011; 112:104-108. [CrossRef]
27. Schredl M, Reinhard I. Gender differences in dream recall: a meta-analysis. J Sleep Res 2008; 17:125-131. [CrossRef]
28. Seedat S, Scott KM, Angermeyer MC, Berglund P, Bromet EJ, Brugha TS, Demyttenaere K, de Girolamo G, Haro JM, Jin R. Cross-national associations between gender and mental disorders in the World Health Organization World Mental Health Surveys. Arch Gen Psychiatry 2009; 66:785-795. [CrossRef]
29. Walker JL, Carey PD, Mohr N, Stein DJ, Seedat S. Gender differences in the prevalence of childhood sexual abuse and in the development of pediatric PTSD. Arch Womens Ment Health 2004; 7:111-121. [CrossRef]
30. Hermans EJ, Putman P, Baas JM, Gecks NM, Kenemans JL, van Honk J. Exogenous testosterone attenuates the integrated central stress response in healthy young women. Psychoneuroendocrinology 2007; 32:1052-1061. [CrossRef]
31. Spoormaker VI, van den Bout J. Lucid dreaming treatment for nightmares: a pilot study. Psychother Psychosom 2006; 75:389-394. [CrossRef]
32. Schmitz TW, Kawahara-Baccus TN, Johnson SC. Metacognitive evaluation, self-relevance, and the right prefrontal cortex. NeuroImage 2004; 22:941-947. [CrossRef]