

**VALIDATION OF THE MALAY VERSION OF THE
MANNHEIM DREAM QUESTIONNAIRE AMONG
THE MALAYSIAN POPULATION**

DR MUHAMMAD FARHAN BIN NORDIN

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Contents

| | |
|--|-----------|
| ACKNOWLEDGEMENTS | ii |
| ABSTRAK (BAHASA MELAYU) | iv |
| ABSTRACT | vi |
| CHAPTER 1 INTRODUCTION | 1 |
| 1.1 Introduction..... | 1 |
| 1.2 Justification of Study | 3 |
| 1.3 Study Objectives | 3 |
| 1.4 Methodology..... | 4 |
| 1.5 Dissertation organisation | 6 |
| CHAPTER 2 RESEARCH PROPOSAL | 7 |
| 1. Study protocol submitted for ethical approval | |
| CHAPTER 3 MANUSCRIPT | 52 |
| 3.1 Abstract..... | 53 |
| 3.2 Introduction..... | 55 |
| 3.3 Method..... | 59 |
| Test-retest reliability | 63 |
| 3.4 Results..... | 63 |
| 3.5 Discussion..... | 70 |
| 3.6 Conclusion | 73 |
| 3.7 Reference | 74 |
| Appendices | 81 |

ABSTRAK

Pengenalan: mimpi adalah satu fenomena yang biasa dialami oleh semua orang sepanjang kehidupan mereka. Setakat ini, terdapat kekurangan bukti mengenai soalselidik yang mampu mengukur pengalaman mimpi di kalangan rakyat Malaysia. Antara soalselidik yang boleh mengukur pengalaman mimpi dan sikap seseorang terhadap mimpi adalah Mannheim Dream Questionnaire (MADRE). Justeru, ada keperluan untuk mengesahkan versi Bahasa Melayu skala ini supaya penyelidikan lanjut mengenai ciri-ciri mimpi rakyat tempatan dan faktor-faktor berkaitan.

Objektif: Kajian ini bertujuan untuk mengesahkan Soalselidik Mimpi Mannheim versi Bahasa Melayu (M-MADRE).

Metod: Satu kajian keratan rentas yang melibatkan 412 peserta yang berusia 18 tahun dan keatas dijalankan antara bulan Ogos sehingga Oktober 2020 melalui borang soalselidik dalam talian. M-MADRE telah diterjemah ke Bahasa Melayu secara terjemahan hadapan dan ke belakang oleh sekumpulan panel pakar. Indeks Pengesahsahihan Kandungan (Content Validation Index) telah dijalankan untuk mengesahkan kandungan di dalam soalselidik ini. Versi terakhir M-MADRE telah diselaraskan dan diuji ke atas 31 peserta dulu. Peserta yang telah bersetuju menyertai kajian telah mengisi soal-selidik Kertas Maklumat Sosio-demografi Pelajar dan Soalselidik Mimpi Mannheim versi Bahasa Melayu (M-MADRE). Analisa data merangkumi penilaian pengesahan konstruk dengan menggunakan analisa faktor penerokaan dan pengesahan, kebolehpercayaan komposit dan kebolehpercayaan uji-uji semula.

Dapatan: Kajian ini menunjukkan model terakhir M-MADRE yang paling bersesuaian dengan data terdiri daripada tiga faktor utama dengan 21 soalan, berbanding versi Parsi dalam Bahasa Inggeris yang terdiri daripada 6 faktor dan 24 soalan. Dapatan menunjukkan kesesuaian indeks yang memuaskan (RMSEA=0.062, CFI=0.936, TLI=0.927, SRMR= 0.054), nilai Cronbach

alpha yang memuaskan ($\alpha=0.86-0.93$) dan kebolehpercayaan uji-uji semula yang cemerlang (ICC=0.95).

Kesimpulan: Kajian menunjukkan skala M-MADRE dengan model 3 faktor utama dan 21 soalan memiliki ciri-ciri psikometrik yang memuaskan. Skala ini adalah sah dan mempunyai kebolehpercayaan untuk digunakan bagi menilai ciri-ciri mimpi dan sikap terhadap mimpi dalam kalangan rakyat Malaysia.

Kata Kunci: analisis faktor, Mimpi, Mimpi buruk, Pengesahan, Malaysia

ABSTRACT

Background: Dream is a common phenomenon that people experienced throughout their lives. So far, there is no validated questionnaire available to assess dream experiences for the Malaysian population. One of the established tools available to measure dream experience and the attitude towards the dream is Mannheim Dream Questionnaire (MADRE). Therefore, there is a need to validate the Malay version of MADRE to explore dream experiences among the local population and their associated factors.

Objective: The study aims to validate the Malay version of the Mannheim Dream Questionnaire (M-MADRE)

Method: A cross-sectional study involving 412 participants from 18 years and above was conducted from August 2020 until October 2020 via an online questionnaire form. M-MADRE was initially translated from the simplified English translated Persian Version of MADRE into Malay using forward and backward translation procedures by experts. Content Validation Index was done to ensure M-MADRE has good content validity. The finalized version of M-MADRE was harmonized and pre-tested on 31 participants. Study participants then completed the socio-demographic questionnaire and M-MADRE questionnaire. Data were analyzed using SPSS version 26 and RStudio software for construct validity by performing exploratory factor analysis, confirmatory factor analysis, construct reliability, and test-retest reliability.

Result: In this study, the final model of M-MADRE most fitting the data comprises 3 factors with 21 items, compared to Persian Version with 24 items and 6 factors. The findings revealed acceptable fit indices (RMSEA=0.062, CFI=0.936, TLI=0.927, SRMR=0.054), overall Cronbach's alpha are acceptable (0.86-0.93), and excellent test-retest reliability (ICC = 0.95).

Conclusion: The study revealed that a 3-factor model with 21 items of Malay Version of MADRE has good psychometric properties. The scale is valid and reliable to measure dream experience and attitude towards dreams among the Malaysian population.

Keywords: Factor Analysis, Dream, Nightmare, Validity, Malaysia

CHAPTER 1 INTRODUCTION

1.1 Introduction

The dream is a common phenomenon experienced by the general population. There are several figures about the prevalence of dream components, especially nightmares and lucid dreams. Several studies on lucid dream frequency show that 57% of 840 German athletes and 75% of 295 undergraduate students experienced lucid dreams at least once in their lifetime (1,2). Generally, about 1.3 to 3.9% of children experienced nightmares. The majority of nightmares increase throughout adolescence and continue to grow in adults, where 6% of the population had nightmares at least monthly, and 1-2% had frequent nightmares (3). Based on the study by Schredl *et al.*, men reported higher frequency of creative dreams while women tend have more nightmares and more prone to be distressed by it (4,5).

Dream plays a significant role in our life. Few studies have shown that dreams influence our wakefulness in several ways, such as causing distress or provides creative ideas. Dreams, especially nightmares, also can affect or predict the outcome of psychiatric conditions. In psychotic disorder, nightmares may serve as signs of early psychotic decompensation and are associated with the risk of suicidal attempts among schizophrenia (6,7). The cohort study by Thompson *et al.* (8) showed a significant association between nightmares at 12 years old and psychotic experiences at 18 (OR=1.62). In patients with depression, nightmares are associated with severe symptoms and higher suicidal risks (9–12). patients with Borderline Personality Disorder suffered a greater rate of nightmares, dream anxiety, and disturbed sleep quality, and childhood nightmares may increase risks of BPD symptoms in early adolescence (13,14). A cross-sectional study done in Mannheim, Germany, found that 4.62% of adults with Attention

Deficit and Hyperactivity Disorder (ADHD) had a frequent nightmare (once a week) compared to 1.77% of the controls (15).

Lucid dreams have been studied to investigate their effectiveness in treating nightmares and improving creativity and wakefulness performance; however, there are no conclusive results yet. A systematic review by de Macêdo *et al.* showed that lucid dreams might be a potential aid in treating patients with nightmares; however, there is limited literature and does not provide consistent results (16). Although there are studies that showed lucid dreams may improve creativity and enhance sports performance such as studies done by Erlacher *et al.* and Stumbrys and Daunyt (17,18), there are also studies that lucid dreams do not improve creativity or performance such as a study done by Albert *et al.* (2).

There have been multiple reports of essential decisions, theories, inventions, and arts, which claimed to be inspired by dreams. In certain cultures, shamans use dreams in the healing process, guiding hunting parties or predicting imminent dangers towards their communities (19). Few of the ideas and inventions have their origins from creative dreams such as 'Yesterday' by Beatles, the sewing machine by Elias Howe, Benzene rings by Friedrich August Kekulé von Stradonitz, 'Frankenstein' by Mary Shelly, 'It' by Stephen King, and 'The Strange Case of Dr. Jekyll and Mr. Hyde' by Robert Louis Stevenson (20,21).

There has been little research regarding dream experiences in Malaysia. Nearly all existing studies are limited to qualitative research done about dream experiences in Malaysia, such as dreams regarding prophet, dreams that lead to religious conversion, and themes of dreams among cancer patients (22–24). Dreams and nightmares are common among psychiatric patients, but no local data is available to provide the significance and

severity among general populations and psychiatric patients. To the best of the researcher's knowledge, there is limited published data regarding any tool validated for measuring dream characteristics among the local population in Malaysia.

1.2 Justification of Study

Research on dream characteristics and attitudes towards the dream and their associations with mental illnesses has increased worldwide. There are limited tools, especially validated Malay version questionnaires, to assess dreams and their effect on daily life objectively, therefore necessitating the effort to validate the Malay version of the Mannheim Dream Questionnaire. Reliable and validated Malay version of an objective dream assessment can facilitate patient's verbalization of their dreams, thus enabling exploration into the nature of the dreams, which patients rarely discuss spontaneously.

1.3 Study Objectives

1.3.1 General Objectives

This study aims to validate the Malay version of the Mannheim Dream questionnaire (MADRE).

1.3.2 Specific objectives:

1. To translate the Mannheim Dream questionnaire (MADRE) to Malay Version Mannheim Dream questionnaire (M-MADRE)
2. To determine the construct validity of the Malay Version Mannheim Dream questionnaire (M-MADRE) using Exploratory Factor Analysis (EFA)
3. To assess the reliability of the Malay Version Mannheim Dream questionnaire (M-MADRE) using Cronbach's alpha

4. To determine the construct validity of Malay Version Mannheim Dream questionnaire (M-MADRE) using Confirmatory Factor Analysis (CFA)
5. To assess the stability of the Malay Version Mannheim Dream questionnaire (M-MADRE).

1.4 Methodology

The English-translated Persian Version of the M-MADRE was translated into Malay by two language experts and reconciled into a single version (25). The translated Malay version was then back-translated to the English version by another language expert who had not viewed the original English version. The translated Malay version was harmonized, Content Validation Index was conducted and pre-tested on 31 respondents in the reference population age group to produce a finalized version for the study. This study was conducted using a cross-sectional method involving 412 participants 18 years old via an online questionnaire form using convenience sampling. Before the data collection process took place, the objectives and importance of the questionnaires and the voluntary basis of participation were informed to all subjects. Participants then were randomly selected from those who consented to be contacted again and left their contact details, either email or phone number. A reminder to repeat the questionnaire and links to the questionnaire were sent the contact details to the participants 14 days from their first attempt. A total of 40 participants repeated the questionnaire as instructed and were given a token of appreciation for their participation. Data entry and analysis were done with SPSS version 26.0 and RStudio software for exploratory factor analysis, confirmatory factor analysis, construct reliability, and test-retest reliability.

1.4.1 Flow Chart Methodology

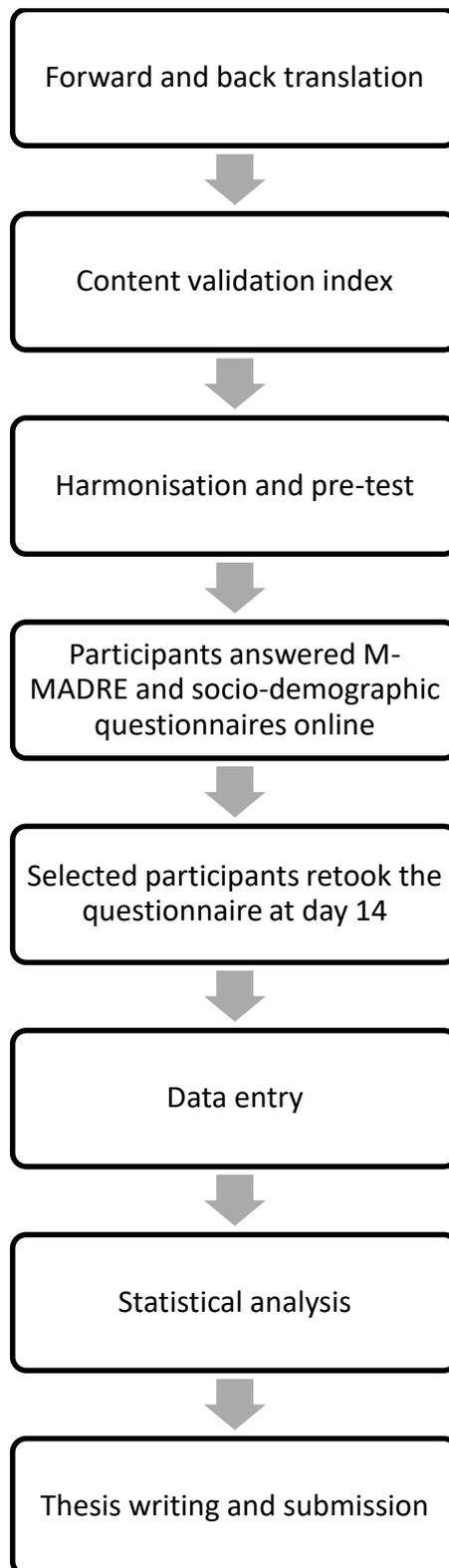


Figure 1: flow chart methodology

1.5 Dissertation organisation

This dissertation is arranged according to Format B Manuscript Ready based on the guidelines by Postgraduate Office, School of Medical Sciences (2016). In Chapter 2, the study protocol that was submitted for ethical approval is presented. Chapter 3 is the manuscript of Validation of the Malay Version of the Mannheim Dream Questionnaire Among Malaysian Population that is being prepared for submission to Malaysian Journal of Medical Sciences (MJMS). The appendices contain the validated questionnaires. The raw data is included in the attached CD.

CHAPTER 2 RESEARCH PROPOSAL

2.1 Introduction

2.2 Background

Dream is one of the most commonly experienced phenomena by humans all across the world and culture. It was defined by mental activity, usually in the form of an imagined series of events, occurring during certain phases of sleep (26). our dreams can be divided in multiple ways, whether pleasant dreams, nightmares, lucid dreams, or creative dreams.

Many patients with psychiatric illnesses reported experiencing dreams, and some of them told about nightmares. Nightmares are frequent complaints among psychiatric outpatients. It was associated with multiple major psychiatric illnesses such as major depressive disorder, post-traumatic stress disorder, psychotic disorder, and borderline personality disorder. Research in the Netherlands showed that about 62% of psychiatric outpatients experienced nightmares at least once in one month (27). The presence of nightmares can also predict the outcome of the illness, such as depression and borderline personality disorders.

Lucid dreaming is one of the controversial topics in dream research. Several researchers had tried to prove its effectiveness in treating nightmares and post-traumatic stress disorder. Although some researchers warned about the possible unknown complications of lucid dreaming, it showed some promises in the pilot study that it may improve sports performance and treating nightmares.

Despite most of the general population and psychiatric patients experience dreams, there is limited research regarding this topic in our country. There is a lack of tools in the Malay language that can be used to assess dream components and their effects.

One of the most widely used instruments to assess dreams and their components is the Mannheim Dream Questionnaire (MADRE). The MADRE was developed by Schredl *et al.* in 2014 to elicit some form of dream history, including dream recall, nightmares, lucid dreaming, attitude towards dreams, and the effects of dreams on waking life (5). MADRE contains 21 items that assessed the frequency of dreams, nightmares, lucid dreams, and creative dreams and their impact on waking life. The item that evaluates subjects' attitudes towards dreams is further subdivided into eight items. It has been translated in different studies into many languages, including the French version (28,29) and the Italian version (30) Shahbalian *et al.* translated this questionnaire to Persian version. They simplified it into 26 items with a 5-point Likert scale (31). Shahbalian *et al.* then further simplified the Persian version of the questionnaire into 24 items after validation study in 2018 (32).

The Simplified Persian version of the Mannheim Dream Questionnaire achieved excellent internal consistencies among students (Cronbach's $\alpha=0.85$) (32). The load factor of the 24 items was ranging between 0.42 and 0.82, and the retest reliability was calculated at 69%. Despite dreams being one of the common phenomena and possibilities for future research, this tool has not been validated in Malay for the Malaysian population.

Literature Review

2.3 Dreams: its types and meaning

The dream is one of the most commonly experienced phenomena by humans all across the world and culture. It was defined by mental activity, usually in the form of an imagined series of events, occurring during certain phases of sleep (26). It is a very personal experience that is only accessible if the dreamer recalls the dream experience upon awakening. In his dream researches, Schredl *et al.*, in 2007 and 2014 (5,33), further divided dream experiences into several types which are:

- i. Nightmares - dreams with strong negative emotions that result in awakening from the dreams. The dream plot can be recalled very vividly upon awakening.
- ii. Lucid Dreams - In a lucid dream, one is aware that one is dreaming during the dream. Thus, it is possible to wake up deliberately, influence the action of the dream actively, or observe the course of the dream passively.
- iii. Creative Dreams – dream images used for art, work, or similar areas; dreams that solved a problem; dreams that provided the impetus to do something that the dreamer otherwise had difficulty doing; and dreams contain emotional insights.

2.4 Dream prevalence among general populations and psychiatry patients

The dream is a common phenomenon experienced by the general population. There are several figures about the prevalence of dream components, especially nightmares. Generally, about 1.3 to 3.9% of children experienced nightmares, and the majority of nightmares increase throughout adolescence and continues to grow in female adults (3). In the adult population, 6% had nightmares at least monthly, and 1-2% had frequent

nightmares. Several types of research are done in other countries to assess the prevalence of nightmares and lucid dreams.

Table 1: Prevalence of Dreams

| Author | Year | Study population | Description of the studies | Questionnaire | Results |
|---------------------|------|----------------------------|---|---|---|
| Li <i>et al.</i> | 2010 | Study in Hong Kong | The 2-phase cross-sectional study involving 8558 adults from Hong Kong and subsequently followed by a detailed clinical evaluation of the psychopathology and personality profile of 252 subjects | Phase one – Nightmare component of Sleep Questionnaire Phase 2 – DSM VI, Depression Anxiety Stress Scale, Eysenck Personality Questionnaire, Beck Depression Inventory, State/Trait Anxiety Inventory, and Recent Life Changes Questionnaire | The prevalence of frequent nightmares was 5.1%. The risk of developing a psychiatric disorder was 5.74 times higher in those with recurring nightmares. |
| Swart <i>et al.</i> | 2013 | A study in the Netherlands | A cross-sectional study among 498 subjects that came for psychiatric outpatient treatment | Nightmare subscale of SLEEP 50 Questionnaire | 29.9% of psychiatric outpatients experienced nightmares, and women experienced significantly more nightmares than men. 66.7% of PTSD patients experienced nightmares. |

| | | | | | |
|-----------------|------|--------------------|--|---|---|
| Sandman et al | 2013 | A study in Finland | Eight independent cross-sectional population surveys conducted in Finland from the year 1972 to 2007 among 69813 adults and war veterans aged 25 to 74 | National FINRISK study | 3.5% of the men and 4.8% of the women reported frequent nightmares. Participants with war experiences reported more recurring nightmares and symptoms of insomnia, depression, and anxiety than participants without such experiences |
| Erlacher et al. | 2012 | A study in Germany | A cross-sectional study among 840 athletes from various sports about the frequency of lucid dreams and its effect on their performance in wakefulness | Competitive Sports, Sleep, and Dreams Questionnaire | 56.55% of athletes experienced lucid dreams at least once, and 41.89% are frequent lucid dreamers. About 37 participants believed that the rehearsals during lucid dreams improved their performance in wakefulness |

2.5 Implications of Dreams

Dream plays a significant role in our life. Few studies have shown that dreams influence our wakefulness in several ways, such as causing distress or provides creative ideas. Dreams, especially nightmares, also can affect or predict the outcome of psychiatric

conditions. Lucid dreams have been studied in searching for the treatment of nightmares and as a rehearsal to performance in wakefulness. There are also several anecdotes from histories that theories, inventions, novels, and songs inspired by creative dreams.

2.5.1 Nightmares and mental health

This table shows the correlation between dreams, namely nightmares, with psychiatric disorders including psychotic disorders, major depressive disorders, anxiety disorders, post-traumatic stress disorders, personality disorders, and their complications.

. Table 2: Nightmares and mental health

| Author | Year | Study population | Description of the studies | Questionnaire | Results |
|---------------------|------|---|---|--|---|
| Simor <i>et al.</i> | 2012 | 35 Subjects with frequent nightmares and 35 matched controls in Hungary | Experimental studies between nightmare sufferers and control in performing different neuropsychological tasks | - Emotional Go/NoGo - Emotional Stroop task - Verbal Fluency task. | Nightmare subjects have impaired executive functioning, evidenced by longer reaction times in the Emotional Go/NoGo and Emotional Stroop tasks. they also committed more perseveration errors and showed less fluent word generation in |

| | | | | | |
|------------------|------|--|--|---|--|
| | | | | | the Verbal Fluency task |
| Levin and Daly | 1998 | A 40-year-old woman with paranoid schizophrenia | A case report about a woman with schizophrenia whose two witnessed psychotic relapses in the hospital was immediately preceded by intense and vivid nightmare attacks | Nil | Nightmares may serve as signs of psychotic decompensation in schizophrenia |
| Li <i>et al.</i> | 2014 | 388 outpatients diagnosed with schizophrenia-spectrum disorders in Hong Kong | 8-year Longitudinal study about the relationship of sleep disturbances among patients with schizophrenia spectrum disorder and association with risk of suicide attempts | - Sleep questionnaire - Case notes information | Comorbidity of nightmares and insomnia was associated with the risk of suicide attempt over follow-up (adjusted HR = 11.10, 95% confidence interval: 1.68–73.43, P < 0.05) |
| Thompson et al | 2015 | 4720 individuals from a UK birth cohort | Cohort study regarding the relationship between common parasomnias in childhood, namely nightmares, night terrors, and sleepwalking, reported both in early childhood and at the age of 12 to later psychotic experiences reported at 18 | -Avon Longitudinal Study of Parents and Children (ALSPAC) - Psychosis-Like Symptoms semi-structured interview (PLIKSi) | a significant association between the presence of nightmares at 12 and psychotic experiences at 18 when adjusted for possible confounders and psychotic experiences at 12 (OR=1.62, 95% CI 1.19–2.20). |

| | | | | | |
|------------------------|------|---|---|--|--|
| | | | years using data from a large UK birth cohort | | |
| Li <i>et al.</i> | 2012 | 421 subjects from psychiatry outpatient clinic in Hong Kong | A 4-yr prospective observational study investigating the prevalence and clinical, psychosocial, and functional correlates of residual sleep disturbances among patients with depression that are in remission | -Sleep questionnaire -Hospital Anxiety and Depression Scale -NEO personality inventory -Short Form-12 Health Survey | 9.3% patient in remission has frequent nightmares after one year of remission. Patients in remission with residual nightmares were younger and scored higher on neuroticism and anxiety subscales. Residual nightmares was associated with suicidal ideation (odds ratio = 8.40; 95% confidence interval 1.79-39.33) |
| Sjöström <i>et al.</i> | 2009 | 165 patients that were admitted in medical or psychiatric wards for suicidal attempt in Sweden. | A prospective study investigating sleep disturbance, particularly insomnia and nightmares, risks repeating suicide attempts in 2 years. | -Uppsala Sleep Inventory -Comprehensive Psychopathological Rating Scale (CPRS) Self-Rating Scale for Affective Syndromes | Frequent nightmares predicted repeat suicidal attempt (OR=3.15) |
| Duval <i>et al.</i> | 2013 | 352 female undergraduate volunteers in Canada | Cross-sectional study about nightmare frequency, nightmare distress, and psychopathology in female victims of childhood maltreatment | - Childhood Trauma Questionnaire - Nightmare Distress Questionnaire - State-Trait Anxiety Inventory - Beck Depression Inventory | 53.1% of subjects reported a history of childhood abuse and neglect. Women reporting more severe forms of maltreatment |

| | | | | | |
|--------------------------|------|--|--|---|--|
| | | | | | reported higher frequencies of disturbing dreams, higher levels of nightmare distress, and increased anxiety. |
| R. Nadorff <i>et al.</i> | 2013 | 673 students from the mid-Atlantic United States | A cross-sectional study among students who reported insomnia and nightmare and their relationship with suicidal risk | <ul style="list-style-type: none"> - Disturbing Dreams and Nightmare Severity Index - The Insomnia Severity Index - Center of Epidemiological Studies Depression Scale - PTSD Checklist - Suicidal Behaviors Questionnaire | Insomnia symptoms and nightmare duration were significantly associated with suicide risk independent of current insomnia symptoms or nightmares |
| Marinova <i>et al.</i> | 2014 | 52 inpatients in a psychiatric ward in Sofia, Bulgaria | A cross-sectional study among patients with depression and bipolar disorder regarding suicidal risks in the clinical setting | <ul style="list-style-type: none"> - Hamilton Depression Rating Scale - Direct interview | Depressed unipolar depression patients suffering from nightmares showed significantly higher suicide risk |
| Semiz <i>et al.</i> | 2008 | 88 subjects with Borderline Personality Disorder (BPD) with 100 matched controls in Turkey | Cross-sectional study regarding nightmare disorder (ND) and sleep quality among patients with (BPD) | <ul style="list-style-type: none"> - Van Dream Anxiety Scale - Pittsburgh Sleep Quality Index - Dissociative Experience Scale - Traumatic Experience Checklist | BPD patients suffered a significantly greater rate of nightmares, elevated levels of dream anxiety, and disturbed sleep quality than did controls. Borderline patients with ND exhibited more significant psychopathology as compared to those without ND. |

| | | | | | |
|-----------------------|------|--|--|---|--|
| Lereya <i>et al.</i> | 2017 | 6050 UK adolescents that completed Childhood Interview for DSM-IV BPD | prospective study regarding associations between nightmares and sleep onset and maintenance problems during childhood and BPD symptoms at 11 to 12 years | - Avon Longitudinal Study of Parents and Children (ALSPAC) - UK Childhood Interview for DSM-IV Borderline Personality Disorder Strengths and Difficulties Questionnaire | Childhood nightmares may potentially increase the risk of BPD symptoms in early adolescence. |
| Schredl <i>et al.</i> | 2016 | 65 adult patients with attention deficit and hyperactivity disorder (ADHD) and 934 controls in Mannheim, Germany | A cross-sectional study comparing the frequency of nightmares between patients with ADHD and normal population | - Nightmare Section of MADRE | 4.62 % of the patients had frequent (once a week) nightmares compared to 1.77 % of the controls. |

2.5.2 Lucid dreams and mental health

A lucid dream is one of the dream characteristics being researched as there are potentials for the treatment of nightmares and self-enhancements for lucid dreamers. During lucid dreaming, the dreamer is fully aware of their current dream state. Physiologically, a lucid dream is associated with increased neural activity in several neocortical regions, particularly lateral prefrontal, frontopolar, and medial parietal cortices (38). According to Harb *et al.* (39), three lucid dreaming constructs are dream awareness, dream content control, and purposeful waking from a dream. Several studies were conducted to investigate its effectiveness in treating nightmares and improving creativity and performance in wakefulness; however, so far, there are no conclusive results yet.

Table 3: Lucid Dreams and Mental Health

| Author | Year | Study population | Description of the studies | Questionnaire | Results |
|------------------------|------|---|--|---|---|
| Erlacher <i>et al.</i> | 2012 | A study in Germany among 840 athletes from various sports | A cross-sectional survey among athletes about the frequency of lucid dreams and its effect on their performance in wakefulness | Competitive Sports, Sleep, and Dreams Questionnaire | 56.55% of athletes experienced lucid dreams at least once, and 41.89% are frequent lucid dreamers. About 37 participants believed that their rehearsals during lucid dreams improved their performance in wakefulness |
| Albert <i>et al.</i> | 2014 | 295 undergraduate students from Virginia, United States | An experimental study compared lucid dreamers and non-lucid dreamers with the level of creativity after seven days of rehearsal in lucid dreaming. | Remote Association Task | 75% of students had experienced a lucid dream at least once. 59% of respondents had experienced a lucid dream within the past three months. No significant difference in creativity between lucid dreamers or non-lucid dreamers, nor was there any evidence that seven days of pre-sleep autosuggestion increased creativity |
| Stumbrys and Daunyt | 2018 | 40 participants; 20 lucid dreamers and | An experimental study exploring the difference in | - Lucid dreams section of MADRE | Lucid dreamers performed better on a creative |

| | | | | | |
|-------------------------|------|--|---|---|---|
| | | 20 non-lucid dreamers in Lithuania | creativity (drawing) between non-lucid dreamers and lucid dreamers that practiced beforehand in their dreams | -creative generation task | task than non-lucid dreamers |
| Mota <i>et al.</i> | 2016 | 45 patients with psychotic symptoms that experienced lucid dreams and 28 control (non-psychotic psychiatric patients who are lucid dreamers) | A cross-sectional study compared the difference between lucid dreams in patients who underwent psychotic symptoms and non-psychotic patients. This study also compared psychopathology between these two groups | - PANSS - BPRS - automated speech analysis | Psychotic patients experienced more lucid dreams compared to non-psychotic lucid dreamers. No significant difference in psychopathology between psychotic lucid dreamers and non-psychotic lucid dreamers. |
| Harb <i>et al.</i> | 2016 | 33 treatment-seeking Iraq and Afghanistan combat veterans in Pennsylvania | An experimental study comparing a group that receiving Cognitive Behavioral Therapy for insomnia (CBT-I) and Imagery Rehearsal Therapy (IRT) with a group that only received CBT-I | - Iowa Sleep Experiences Survey - Nightmare Frequency Questionnaire - Nightmare Distress Questionnaire - Pittsburgh Sleep Quality Index - PTSD Checklist-Military | After IRT + CBT-I treatment, the control of dream content, but not lucid awareness, increased more than after CBT-I treatment (ES = .68). This increase in dream content control was related to a reduction in nightmare distress |
| de Macêdo <i>et al.</i> | 2019 | Systemic review in 10 articles | Ten articles about lucid dream therapy for nightmare symptoms were | Nil | LD may be a feasible aid in treating patients with nightmares by minimizing |