Validity, Reliability and factor analysis the Persian adaption of Mannheim Dream questionnaire (MADRE)

Masoud Shahabian[1], Elham Kargar[1], Niyosha Sahbaie Ferdosi[2], Fatemeh Tajik[3], Farangis Javdani Sorayani[4], Samane Akhtar Moghadam[1], Mohamad Ebadi Rad[5], Haniye Jahantiq[6], Vajihe Gholamalizade[7]

[1] Elmpajooh Technologists of Future Business Company, Knowledge Based Candidate, Mashhad, Iran

[2] Medical Student, Faculty of Medicine, Azad University of Mashhad, Mashhad, Iran

[3] Medical Student, Faculty of Medicine, Azad University of Tehran, Tehran, Iran

[4] Mcs Student of Tourism, Higher education center of Qeshm, Qeshm, Iran

[5] Ph.D. Student of counseling, department of counseling, Faculty of Psychology and Education, Kharazmi University, Tehran, Iran

[6] Hygiene & Medical Branch of Quchan, Mashhad University of Medical Science, Mashhad, Iran

[7] Msc Student, Aerospace Engineering Department, Sharif university of Technology, Tehran, Iran

Summary. We conducted this study to assess the validity and reliability of the Persian version of Mannheim Dream (MADRE) questionnaire. The study population included students of School of Psychology, Ferdowsi University of Mashhad, Iran, who were selected randomly through the convenience sampling method. Reliability of the tool was evaluated by test–retest and Cronbach's alpha methods. The Persian scale demonstrated good test-retest reliability (69%), and Cronbach's alpha coefficient for the whole questionnaire was calculated at 0.85. Overall, 24 items with high reliability were retained from the final version of the questionnaire. Based on factor analysis, the following six factors emerged: concept of dream, effects of dreams on waking life, timing, experience and feelings, childhood memories, and articles and entries available. Our findings indicated that the Persian version of the MADRE questionnaire is a valid and reliable instrument.

Keywords: Dream recall, Nightmares, Lucid dreaming, Attitude towards dreams, Retest reliability

1. Introduction

Sleep is a state of mind and body, in which consciousness is altered, interaction with surroundings is decreased, and sensory activities and voluntary muscles are relatively inhibited. Dreaming is a subjective experience occurring in the inner world of the individual and its recall is a major issue in sleep research; however, if not recalled after awakening (Schredl, 2010c; Schredl, Berres, Klingauf, Schellhaas, & Göritz, 2014), access to dream content would be highly challenging (Schredl, 2010a).

Considering that humans spend one-third of their lifetime sleeping, understanding the features of sleep is essential

(Domhoff, 2003). There is insufficient consensus regarding the importance of dreams as they happen in an unconscious state. Dreams are interpreted differently; some psychologists believe dreams are meaningful (Kets de Vries, 2014) and they can be used for therapeutic purposes (Barrett & McNamara, 2012). In this regard, investigating dream content, attitudes towards dreams, general dream characteristics, and the effects of dreaming on waking life is highly critical.

Some studies have assessed the effects of various variables such as age, gender, and income on dream recall frequency (Laxhmi, Münch, Blatter, Knoblauch, & Cajochen, 2009), the effect of personality characteristics and daytime mood on attitudes towards dreams (Beaulieu-Prevost & Zadra, 2007; Köthe & Pietrowsky, 2001), gender difference in literature for dream interpretation and sharing dreams (Curci & Rimé, 2008; Schredl et al., 2014), and the ability of dreams to solve emotional problems (Van de Castle, 1994). Also, the study of dream reports using dream content analysis techniques is a common research topic (Schredl, 2010b).

Usually, dream recall can be performed by questionnaires and dream diaries (Schredl, 2002) in sleep laboratories after

awakening from rapid eye movement (REM) sleep (Nielsen, 2000). Numerous questionnaires have been developed for various fields of dream study (Schredl et al., 2014) to determine the general dream characteristics and specific dream elements. In some questionnaires, dream diary is used to measure lucid dream, nightmare, and dream recall frequencies (Stumbrys, Erlacher, & Schredl, 2013). One of the questionnaires that assesses various dream aspects is the Mannheim Dream (MADRE) questionnaire, which evaluates the frequency of dream recall, nightmares, and lucid dreams, attitudes towards dreams, reading about dreams, emotional intensity, and effects of dreaming on waking life (Woznicki, 2015).

Various aspects of MADRE questionnaire have been investigated in a large number of studies using different methods. The functionality of this comprehensive dream questionnaire can be assessed by applying it in different samples and contexts. Therefore, a comprehensive review of the literature assessing content quality of the MADRE questionnaire is required. In addition, performing factor analysis for the assessment of correlations between subscales of this questionnaire is necessary. Since reliability of a questionnaire is a prerequisite for valid interpretation of its scores, measuring its reliability is essential (DeVellis, 2016). Considering that standardization of any questionnaire should be performed based on the cultural and sociological characteristics of the society it is being used, we aimed to determine the reliability of the Persian version of MADRE questionnaire in the context of Iran. A previous study confirmed the psychometric properties of this questionnaire.

2. Materials and Methods

The statistical population included all the students of School of Psychology, Ferdowsi University of Mashhad, Mashhad, Iran. Three groups were randomly selected for scale-making (n=288), re-test (n=80), and validation (n=100).

Prior to initiating the study, the necessary coordinations were made with the respective authorities and instructors. Then, the researchers presented to classrooms and distributed questionnaires among students (n=288) and asked them to read the questions carefully and choose the option that most matched their current state. The participants were assured of the confidentiality their information. There were no time limits for completing the questionnaire.

In this study, the reliability of the MADRE questionnaire was assessed by using factor analysis and test-retest meth-

od. The content validity ratio (CVR) and content validity index (CVI) of this questionnaire were confirmed by Shahabian et al. (2017). Therefore, the internal reliability of the items of this scale was appropriate (Shahabian et al., 2017).

In this study, we first translated the MADRE questionnaire, and then it was confirmed by some psychology professors. During the translation process, we tried to customize the items with the cultural context of Iran as much as possible. In the next stage, the questionnaire was randomly distributed among 30 Psychology students. The items of the questionnaire were rated using a 4-point Likert scale (i.e., *never, rarely, sometimes, and more often*). Also, the respondents were asked to mark ambiguous items. Then, the questions were modified if necessary. Then, the questionnaire was completed by the main samples. After completion of data collection, the frequency of responses to each item was calculated. For this purpose, those items that were answered as *never* or *rarely* were considered as no and those that were replied as *sometimes* or *more often* were considered as yes. Items that were rejected by less than 25% or more than 75% of the subjects were changed.

Before performing factor analysis, Kaiser-Meyer-Olkin (KMO) test was performed to determine the adequacy of the sample size. Bartlett's test was used to evaluate the homogeneity of variances across different groups of samples. In the next step, varimax rotation was applied to evaluate the multiple factors extracted from the questionnaire. In this study, items with a loading greater than 0.4 were retained based on the six extracted factors. The structure of the questionnaire was determined using Scree Plot. The internal consistency of the questionnaire was assessed by Cronbach's alpha and test-retest reliability methods one month later in a sample of 80 subjects. Also, item-total correlations were calculated.

3. Results

The value of the Kaiser-Meyer-Olkin (KMO) test was calculated at 0.852 indicating that the obtained data and the sample size were adequate, which allows us to perform factor analysis. This result showed that the variance of the research variables was affected by the common variance of some of the underlying factors. Based on Bartlett's test, the correlation of matrix materials was not equal to zero (χ^2=7915.87; df=300; P=0.001); therefore, it can be expected that the test items have a significant correlation in the samples.

In this study, factor analysis was used for analysis of the items. In the first step, six factors were extracted, Ei-

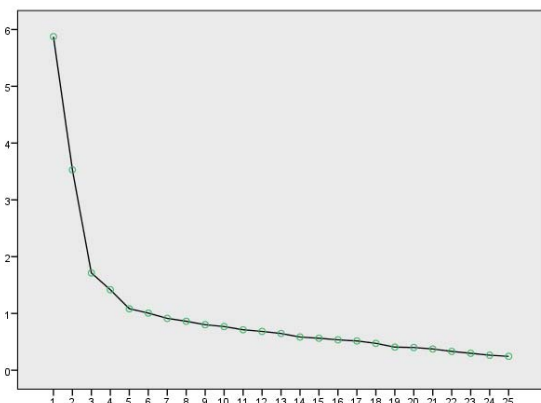*Figure 1*. Scree Plot of factors of MADRE questionnaire

Table 1. Characteristics of the six-factor structure of MADRE questionnaire

Factors	Eigen values	Variance	Cumulative variance
Dream concept	3.98	15.91	15.91
Effects of dreams on waking life	3.37	13.45	29.41
Timing	2.31	9.22	38.63
Experience and feel	2.02	8.08	46.73
Childhood memories	1.48	5.94	52.67
Articles and entries available	1.45	5.81	58.48

Table 2. Rotation matrix of MADRE questionnaire based on varimax

No.	Items	1	2	3	4	5	6
1	How often have you recalled…				0.616		
2	How intense are your…		0.418				
3	What is the emotion…		-0.474		0.449		
4	How often have you….		0.825				
5	If you currently experience….		0.739				
6	Do you experience….		0.806				
7	How much of your….		0.793				
8	How often did you…					0.476	
9	How much do you experience…			0.714			
10	If you have experienced lucid…		0.403	0.529			
11	How often do you record…			0.713			
12	How often do your dreams…			0.642			
13	How often do your dreams give….				0.619		
14	How often do your dreams help….						0.697
15	How often do you experience Déjà….						0.558
16	Have you ever read something….	0.729					
17	Did the literature about dreaming….	0.560			0.477		
18	How much meaning to you attribute….	0.710					
19	How strong is your interest…	0.658					
20	I think that dreams are meaningful….	0.619					
21	I want to know more about….	0.601					
22	If somebody can recall and….	0.645					
23	I think that dreaming is in genera….	0.744					
24	A person who reflects on her/his….				0.514		
25	Do you have the impression that...				-0.842		

gen values of which are shown in Diagram 1. Based on the mentioned diagram, a six-factor structure was emerged by varimax rotation and load factor of each item was specified. These six factors were named dream concept, the effects of dreams on waking life, timing, experience and feelings, childhood memories, and articles and entries available, respectively. We first observed a rapid decline in Eigen values of four factors followed by a moderate reduction.

The study of metacognition variance among the samples was 58.48% of the variance of all the scores of greater than 1 (Eigen value). The values of the six extracted factors are shown in Table 1. Based on the mentioned table, the greatest value belonged to the first factor, which was equal to 3.98 and constituted 15.91% of total variance.

In the next step, varimax rotation was applied to evaluate the factors extracted from the questionnaire. Component matrix after varimax rotation is shown in Table 2, showing the 25 items with load factors of greater than 0.4 based on the six extracted factors. Based on Table 2, the first factor was the only factor on which items 16 to 23 had the maximum positive factor score. The second factor was the only factor on which items 2, 4, 5, 6, and 7 had the maximum positive factor score, and the third factor was the only factor on which items 9-12 had the maximum positive factor score. The fourth was the only factor on which items 1, 3,

13, and 24 had the maximum positive factor score. The fifth factor was the only factor on which item 8 had the maximum positive factor score. Finally, the sixth factor was only factor on which items 14 and 15 had the maximum positive factor score. Item 25 was deleted because it had no load factor.

Cronbach's alpha was applied to determine the internal consistency of the questionnaire and its item-total correlations. The mean score of each item is shown in Table 3. Based on that table, the means of items ranged between 1.61 and 3.96. Cronbach's alpha of the questionnaire was calculated at 0.85, showing a high reliability. Cronbach's alpha of each item was within the range of 0.83-0.84; therefore, no need for deleting any items. Also, the retest reliability of the questionnaire was calculated at 69%, which was relatively high.

4. Discussion

This study aimed to determine the validity and reliability of the Persian version of the MADRE questionnaire, which is standardized in various languages and contexts. In this study, the final version of MADRE was assessed and its validity and reliability were confirmed in an Iranian population.

The reliability of the MADRE questionnaire was assessed to show the level of correlation among scores of individual

Table 3. Mean scores of items, item-total correlations, and alpha if item deleted values

No.	Items	Mean	SD	Correlation with total score	Cronbach's alpha
1	How often have you recalled…	3.24	1.18	0.54	0.83
2	How intense are your…	3.21	1.10	0.56	0.83
3	What is the emotion…	2.43	1.12	0.14	0.84
4	How often have you….	2.34	1.12	0.3	0.84
5	If you currently experience….	2.64	1.31	0.37	0.83
6	Do you experience….	2.25	1.26	0.34	0.83
7	How much of your….	2.00	1.11	0.3	0.84
8	How often did you…	2.14	1.07	0.37	0.84
9	How much do you experience…	1.61	1.02	0.36	0.84
10	If you have experienced lucid…	2.77	1.21	0.6	0.83
11	How often do you record…	2.45	1.15	0.53	0.83
12	How often do your dreams…	2.36	1.11	0.56	0.83
13	How often do your dreams give….	3.14	1.23	0.42	0.83
14	How often do your dreams help….	2.00	1.11	0.39	0.84
15	How often do you experience Déjà….	2.68	1.16	0.47	0.83
16	Have you ever read something….	3.35	1.03	0.62	0.83
17	Did the literature about dreaming….	3.41	1.17	0.57	0.83
18	How much meaning to you attribute….	3.30	1.10	0.58	0.83
19	How strong is your interest…	3.73	1.18	0.5	0.83
20	I think that dreams are meaningful….	2.81	1.24	0.47	0.83
21	I want to know more about….	3.96	1.10	0.39	0.84
22	If somebody can recall and….	3.10	1.22	0.52	0.83
23	I think that dreaming is in genera….	3.25	1.13	0.56	0.83
24	A person who reflects on her/his….	2.67	1.21	0.43	0.83

items with one another. All the items were properly translated and had high quality, and the content validity of all the items was appropriate. Cronbach's alpha reliability of the questionnaire was calculated at 0.85. Also, its retest reliability was relatively high. Factor analysis was performed on this 25-item questionnaire and one item with low reliability was removed. Inconsistency in the confirmation of the number of questions in the Persian version of MADRE can be caused by cultural differences and dissonance in perceptions of respondents. The first factor was dream concept and consisted of eight items, which explained 15.9% of variance in the MADRE questionnaire scores. These items were about the concept of dream, dreamer's interest in the dream, and dreamer's attitude toward dreams. The second factor encompassed five items on the effects of dreams on waking life, which explained 13.4% of variance in the questionnaire scores. These items dealt with the frequency of nightmares, feelings, and the nightmare's effects on waking life. Timing factor was the third extracted factor, which contained items on dream diaries and dream recall. Experience and feelings, childhood memories, and articles and entries available were the fourth, fifth, and sixth factors, respectively.

A Persian adaptation of the MADRE questionnaire was designed by Shahabian et al. in 2017. They evaluated the validity and reliability of this scale. Reliability of the Per-

sian version of the MADRE questionnaire was confirmed through the calculation of Cronbach's alpha coefficient, and its content validity was approved by a panel of 15 experts (Shahabian et al.). Although it is believed that there are no certain criteria for selecting a number of items, it is largely dependent on the view of the researchers in addition to considering Eigen values (Bush, 1973). In our study, a six-factor structure was emerged and the number of items contained in each factor was less than five. According to Commery, the existence of at least five items is one of the essential characteristics of each factor in a three-factor structure (Comrey & Lee, 2013). In our study, the correlation of the extracted factors was high. Schredl et al. in 2014 reported a high retest reliability for the items of the MADRE questionnaire (Schredl et al., 2014).

There are different highly reliable scales for assessing various aspects of dreams such as Dream Re-call Frequency (DRF) (Schredl, 2004) and Nightmare Frequency (NF) scales (Stumbrys et al., 2013). MADRE is a standard scale that assesses different aspects of dreams and has a high retest reliability in all subscales, especially in attitudes towards dreams, sharing dreams, re-call frequency, and nightmare frequency (Schredl et al., 2014). In this study, we measured retest reliability of the Persian version of this questionnaire, which was relatively high.

Recently, various tools have been developed to measure different aspects of dreams. Among them, MADRE is a proper tool for the assessment of different aspects of dreams, such as the frequency of dream recall, nightmares, and lucid dreams, attitude towards dream, reading about dreams, emotional intensity, and effects of dreaming on waking life.

The use of dream questionnaires to measure dream recall frequency and various aspects of dream is common in dream research. Based on previous studies, there is a weak association between the content derived from dream questionnaires and content obtained from the analysis of dream reports (Bernstein, Belicki, & Gonzalez, 1995; Schredl, 2002). This problem is more prominent in the case of low dream recallers (Schredl, 2002). Therefore, further studies should be performed to evaluate the psychometric properties of the questionnaires assessing dream content.

The items of MADRE scale are suitable for measuring inter-individual differences based on the obtained frequency distribution. A previous study confirmed the psychometric properties of this questionnaire. Based on one study, gender plays a role in dream recall, such that women reported more negative emotional states and nightmares than men did (Schredl & Reinhard, 2008, 2011). Also, one study showed an indirect correlation between age and the frequency of dream recall, nightmare, and lucid dreaming (Schredl & Erlacher, 2011). That is to say, older participants suffered from nightmares more relative to younger persons. Age at the onset of the first lucid dream was assessed in some studies (Schredl, Henley-Einion, & Blagrove, 2012; Voss, Frenzel, Koppehele-Gossel, & Hobson, 2012), which showed that lucid dreams are more common in childhood and adolescence. Also, the frequency of creative dreams and attitude towards dreams decrease with advancing age (Schredl, 2004).

The inter-correlation between questionnaire and diary measures was assessed in a study by Schredl et al., which presented a high correlation between questionnaire items measuring aspects of dream content and diary data. Dream diary content was inconsistent over time and unrelated to personality traits (Schredl, 2002). With this background in mind, although MADRE scale is a reliable tool, more studies should be performed for further improvement of this scale.

5. Conclusion

In our prior study, we measured the content validity and reliability of the Persian version of MADRE questionnaire. In the present study, the content validity, retest reliability, and Cronbach's alpha reliability of the Persian version of the MADRE questionnaire were confirmed. We recommend applying the MADRE questionnaire in different contexts and samples such as patients with sleep, mental, or nightmare disorders.

Acknowledgments

Conflicts of interest

There are no conflicts of interest.

References

Barrett, Deirdre, & McNamara, Patrick. (2012). Encyclopedia of sleep and dreams: the evolution, function, nature, and mysteries of slumber (Vol. 1): ABC-CLIO.

Beaulieu-Prevost, D., & Zadra, A. L. (2007). Absorption, psychological boundaries and attitude towards dreams as correlates of dream recall: two decades of research seen through a meta-analysis. Journal of Sleep Research, 16, 51-59.

Bernstein, DM, Belicki, K, & Gonzalez, D. (1995). The development and assessment of the reliability and validity of a dream content questionnaire (DCQ). Sleep Research, 25, 138.

Bush, GW. (1973). Cross-cultural research methods.

Comrey, Andrew L, & Lee, Howard B. (2013). A first course in factor analysis: Psychology Press.

Curci, Antonietta, & Rimé, Bernard. (2008). Dreams, emotions, and social sharing of dreams. Cognition and Emotion, 22(1), 155-167.

DeVellis, Robert F. (2016). Scale development: Theory and applications (Vol. 26): Sage publications.

Domhoff, G William. (2003). The scientific study of dreams: Neural networks, cognitive development, and content analysis: American Psychological Association.

Kets de Vries, Manfred FR. (2014). Dream journeys: A new territory for executive coaching. Consulting Psychology Journal: Practice and Research, 66(2), 77.

Köthe, Martina, & Pietrowsky, Reinhard. (2001). Behavioral effects of nightmares and their correlations to personality patterns. Dreaming, 11(1), 43.

Laxmi, Chellappa Sarah, Münch, Mirjam, Blatter, Katharina, Knoblauch, Vera, & Cajochen, Christian. (2009). Does the circadian modulation of dream recall modify with age? Sleep, 32(9), 1201-1209.

Nielsen, Tore A. (2000). A review of mentation in REM and NREM sleep:"covert" REM sleep as a possible reconciliation of two opposing models. Behavioral and Brain Sciences, 23(6), 851-866.

Schredl, Michael. (2002). Questionnaires and diaries as research instruments in dream research: Methodological issues. Dreaming, 12(1), 17.

Schredl, Michael. (2004). Reliability and stability of a dream recall frequency scale. Perceptual and Motor Skills, 98(3_suppl), 1422-1426.

Schredl, Michael. (2010a). Characteristics and contents of dreams International review of neurobiology (Vol. 92, pp. 135-154): Elsevier.

Schredl, Michael. (2010b). Dream content analysis: Basic principles: Universitätsbibliothek der Universität Heidelberg.

Schredl, Michael. (2010c). Reading books about dream interpretation: Gender differences. Dreaming, 20(4), 248.

Schredl, Michael, Berres, Sabrina, Klingauf, Anna, Schellhaas, Sabine, & Göritz, Anja S. (2014). The Mannheim Dream Questionnaire (MADRE): Retest reliability, age and gender effects. International Journal of Dream Research, 7(2), 141-147.

Schredl, Michael, & Erlacher, Daniel. (2011). Frequency of lucid dreaming in a representative German sample. Perceptual and motor skills, 112(1), 104-108.

Schredl, Michael, Henley-Einion, Josie, & Blagrove, Mark. (2012). Lucid dreaming in children: The UK library study: Universitätsbibliothek der Universität Heidelberg.

Schredl, Michael, & Reinhard, Iris. (2008). Gender differences in dream recall: a meta-analysis. Journal of Sleep Research, 17(2), 125-131.

Schredl, Michael, & Reinhard, Iris. (2011). Gender differences in nightmare frequency: A meta-analysis. Sleep Medicine Reviews, 15(2), 115-121.

Shahabian, Masoud, Taghipour, Ali, Khademi, Gholamreza, Ferdosi, Niyosha Sahbaie, Jahantiq, Haniye, Salmani, Elham Rahmanpour, & Ebadirad, Mohammad. (2017). Validity and reliability assessment of Persian adap-tion of Mannheim Dream questionnaire (MADRE). International Journal of Dream Research, 10(1), 53-58.

Stumbrys, Tadas, Erlacher, Daniel, & Schredl, Michael. (2013). Reliability and stability of lucid dream and nightmare frequency scales. International Journal of Dream Research.

Van de Castle, Robert L. (1994). Our dreaming mind: Ballantine Books.

Voss, Ursula, Frenzel, Clemens, Koppehele-Gossel, Judith, & Hobson, Allan. (2012). Lucid dreaming: An age-dependent brain dissociation. Journal of sleep research, 21(6), 634-642.

Woznicki, Mary. (2015). The Frequencies of Dreams and Nightmares: Examining Dream Content and Environmental Factors. Pennsylvania State University.