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Validity and Reliability of the Dysfunctional Beliefs and Attitudes about Sleep Scale-10 in Iranian Clinical Population

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Abstract

Background: Dysfunctional cognitions and attitudes about sleep are considered as one of the most important factors underlying insomnia.

Objectives: The current study aimed at investigating the validity and reliability of the dysfunctional beliefs and attitudes about sleep scale-10 (DBAS-10) in an Iranian clinical population.

Methods: The clinical sample consisted of 120 patients with insomnia disorder referred to the sleep disorders clinic at Baharloo hospital in Tehran in 2015. The control group (n = 120) included a community sample volunteered to participate in the study. Sleep Diary, Pittsburgh Sleep Quality Index, Insomnia Severity Index, Pre-Sleep Arousal Scale, and Depression, Anxiety, Stress Sacle-21, were used to assess concurrent validity. Test-retest and Cronbach' alpha were conducted to examine the reliability of the scale. Construct validity of the scale was investigated via confirmatory factor analysis.

Results: The current study findings indicated that DBAS-10 had appropriate test-retest reliability (r = 0.83) and internal consistency (Cronbach' alpha = 0.82). Total score of DBAS-10 was significantly associated with PSQI (r = 0.34), ISI (r = 0.45), the cognitive subscale of PSAS (r = 0.36), and depression (0.34), anxiety (r = 0.34) and stress (r = 0.39) subscales of DASS-21. Factor analysis indicated that the Espie et al. (2000) model had significantly better fitness in comparison with the Edinger and Wohlgemuth (2001) model. The cutoff point, sensitivity, and specificity of the scale were 6.7%, 74.17% and 87.50%, respectively.

Conclusions: The Persian version of DBAS-10 had proper psychometric properties for Iranian clinical population.

Keywords: Attitude, Mental Health, Psychometrics, Sleep

1. Background

Insomnia includes difficulty with initiation or maintenance of sleep or early morning awakening associated with significant distress or clinical disturbance (1). It is associated with major problems in different domains such as physical (e.g. hypertension), occupational (e.g. job loss), and mental health (e.g. depression) (2). Many studies showed that insomnia is more prevalent in females rather than males (3). Gender differences in insomnia could be attributed to many factors such as psychiatric problems, social and cultural factors, symptom endorsement, and coping strategies (3).

Among different factors underlying insomnia, dysfunctional cognition and attitudes toward sleep are considered as one of the most important ones (4). Consequently, assessment of these unhelpful cognitions and challenging them are important interventions in cognitive behavior therapy for insomnia (CBT-I) (5).

DBAS-10 is a self-monitoring measure that can be used for assessment and therapeutic purposes: the assessment of dysfunctional cognitions and planning cognitive therapy sessions for insomnia (6, 7). The original version of DBAS was designed based on the theoretical conceptualization and clinical practice related to insomnia. It comprises 30 items and 5 subscales including: 1. "misconceptions about the causes of insomnia"; 2. "misattributions or amplifications of its consequences"; 3. "unrealistic sleep expectations"; 4. "control and predictability of sleep"; and, 5.

"faulty beliefs about sleep promoting practices" (6). The revised version of the scale entitled "Personal Beliefs and Attitudes about Sleep Scale" includes 28 items and 5 subscales (consequences, control/ predictability, unrealistic expectations, causal attributions and sleep-promotion practices) (8). In the new version, the wording of some of the sentences is changed. Items 7 and 26 are removed. The reliability of the 2 subscales, unrealistic expectations, and faulty attributions are reported to be low (8). Overall, the subscales suggested by Morin are supported only by a few factor analysis studies (9, 10).

The 16-item version of the scale was designed later (11). The factor structure of the 16-item version is similar to that of the 30-item version and measures 4 factors; i e, "perceived consequences of insomnia", "worry or helplessness about sleep", "expectations related to sleep"and "medication". The 16-item version showed reasonable reliability and validity in research and clinical populations (11).

Espie et al. identified 10 items of DBAS that were highly sensitive to cognitive-behavioral therapy. Principal component analysis (PCA) indicated 3 factors for the 10-item scale (DBAS-10): beliefs about the immediate negative consequences of insomnia, beliefs about the long-term negative consequences of insomnia, and beliefs about the need to control insomnia (9). The study showed that DBAS-10 had a more robust principal component in comparison with DBAS-30 (9). Edinger and Wohlgemuth also examined the psychometric properties of DBAS-10. Their study showed that the 10-item version of scale had acceptable internal consistency and significant association with the 30-item version, and had the ability to distinguish between individuals with normal sleep and insomnia. In addition, using orthogonal, Varimax rotation method, 3 DBAS-10 subscales were identified, which were somewhat different from those of the previous findings (12).

In Iranian populations, the scale was standardized among college students and the results confirmed the good internal consistency and test-retest reliability of the scale (13). Nevertheless, psychometric properties of the scale are not examined in any Iranian patient populations.

2. Objectives

The current study aimed at examining the psychometric properties of the DBAS-10 in an Iranian clinical population. To the authors best knowledge, no confirmatory factor analysis is conducted with regard to the factor structure indicated by the 2 previous studies (9, 12). Therefore, the first important aim of the current study was to retest the proposed factor structure of DBAS-10. Moreover, no study examined the validity and reliability of the DBAS-10 in clinical population of Iran. If it is shown that the scale has satisfactory reliability and validity in a clinical population, it can then be used by researchers and clinicians in order to assess dysfunctional beliefs about sleep and evaluate the outcome of CBT-I studies in an Iranian clinical population. Also, no study examined the cutoff point, sensitivity, and specificity of the DBAS-10. By developing cutoff points for DBAS-10, it can be used as a screening tool to detect individuals with significant dysfunctional beliefs about sleep. The study also aimed at assessing the effect of gender differences on DBAS-10 total score. In general, the current study aimed at validating the Persian version of DBAS-10 in an Iranian clinical population. It was expected that the psychometric properties of DBAS-10 (validity and reliability) would be confirmed. Further, it was expected that the Persian version of DBAS-10 would indicate possible gender differences.

3. Materials and Methods

3.1. Participants

The 120 patients with insomnia disorder were recruited from Sleep Disorders Clinic of Baharloo hospital in Tehran from April to October 2015. The DSM-V criteria for insomnia disorder (sleep latency or waking after sleep onset more than 30 minutes, which occurs 3 times per week, lasting for at least 3 months and makes clinically significant distress) and score above 5 in the Pittsburgh Sleep Quality Index (PSQI) were considered as the inclusion criteria. Since DSM-V does not differentiate primary insomnia from insomnia secondary to medical and psychiatric condition or other sleep disorders, all types of insomnia regarding DSM-V criteria were included in the study. Exclusion criteria were the use of medication known to affect sleep and evidence of significant cognitive impairment (e g, dementia).

The control group consisted of 120 normal sleepers who responded to the study recruitment advertisements and met research diagnostic criteria for normal sleepers (14). They did not complain about sleep or daily symptoms of insufficient sleep, had a regular sleep/wakefulness schedule, did not have any evidence of medical conditions or psychiatric disorders disturbing sleep, primary sleep disorder, and sleep disturbance due to substance intoxication or withdrawal. Furthermore, they agreed with the statement that "I am a good sleeper" and had a score lower than 5 in PSQI.

Out of the total patient sample, 30 participants completed the DBAS-10 twice with a 3-week interval for test-retest reliability purposes. The test-retest subsample (33.3% males, 30% single) had a mean age of 33.3 years old, and were recruited randomly from the patient participants. This subsample was included in the main study analyses.

3.2. Measures

3.2.1. Dysfunctional Beliefs and Attitudes About Sleep Scale-10

The DBAS-10 (9) is a short-form of DBAS-30 (8) that assesses dysfunctional cognitions about insomnia. The items of DBAS-10 were chosen considering their changes before and after cognitive behavior therapy (9). The items are responded based on a 10-point visual analogue scale (VAS) (0 = completely disagree, 10 = completely agree). The results of previous studies showed an internal consistency of .69 and its ability to distinguish between normal sleepers and insomniacs. Factor analysis confirmed that DBAS-10 consisted of 3 factors (9). Internal consistency and test-retest (with a 2-week interval) reliability of DBAS-10 in an Iranian college student population were 0.84 and 0.83, respectively (13).

3.2.2. Insomnia Severity Index

ISI (7) is a 7-item self-report measurement designed to assess individuals' perception of sleep. ISI measures difficulties with initiation and maintenance of sleep, satisfaction with current pattern of sleep, interference with daily functioning, noticeability of the disturbance attributed to sleep problems, and level of distress or worry due to sleep problems. ISI is responded on a 5- point Likert scale (0 = never, 5 = very much). The score ranges from 0 to 28. The Internal consistency of ISI was 0.74 and contains 3 factors: effect, intensity, and satisfaction (15). ISI had proper psychometric properties among Iranian clinical populations (Cronbach' alpha = 0.82, correlation coefficient of item-total ranging from 0.56 to 0.91.) (16).

3.2.3. Pittsburgh Sleep Quality Index

PSQI (17), a 19-item inventory, measures 7 components of the quality of sleep (i e, subjective quality of sleep, sleep latency, duration, efficiency, disturbances, use of sleep medication, and daily dysfunction in performance). Each component is rated on a scale from 0 to 3. PSQI scores range 0 to 21 with a cutoff point of 5, which discriminates bad sleepers from good ones. PSQI has good internal consistency (α = 0.83) and test-retest reliability (r = 0.85). The sensitivity and specificity of PSQI were reported 89.6% and 86.5%, respectively (17). The Persian version of PSQI was studied in Iranian populations and the observed Cronbach' alpha for patients and control groups were 0.52 and 0.78, respectively. Furthermore, it had appropriate sensitivity and specificity (94% and 72%, respectively) and was correlated with the general health questionnaire-12 (GHQ-12; r = 0.54) (18).

3.2.4. Pre-Sleep Arousal Scale

PSAS (19), with 16 items, was designed to evaluate somatic and cognitive aspects of arousal. It is answered on a 5-point Likert scale. The scale, with the ability to distinguish individuals with insomnia from those with normal sleep, showed good internal consistency (α = 0.76 for physical subscale and α = 0.84 for cognitive subscale) (19). The validity and reliability of PSAS were investigated among 30 Iranian college students. Internal consistency of the total scale, somatic, and cognitive subscales were 0.85, 0.84, and 0.72, respectively. Test-retest reliability (with a 2-week interval) for total score, cognitive, and somatic subscales was 0.88, 0.86 and 0.93, respectively (20). In the current study, cognitive subscale of PSAS (PSAS-C) was used to assess the convergent validity of DBAS-10.

3.2.5. Depression, Anxiety and Stress Scale-21

DASS (21) is used to assess negative affectivity (depression, anxiety, and stress). Previous studies showed that DASS-21 was psychometrically sound with reliability coefficients of 0.82, 0.90, and 0.93 for depression, anxiety and stress, respectively (22). The Persian version of DASS-21 exhibited good internal consistency (Cronbach's alpha 0.75 - 0.87) and test-retest reliability (0.78 - 0.81) in an Iranian population (23).

3.3. Sleep Diary

SD is a self-report measurement, providing information about the pattern and quality of sleep from one night to another. SD may collect sleep-related information for several weeks. The principal variables assessed by SD (24) consist of total time spent in bed (TIB), total actual sleep time (TST), sleep onset latency (SOL), early morning awakening (EMA), total time of wakening after sleep onset (WASO), and sleep efficiency (SE). A study conducted by Lichstein et al. revealed a significant association between sleep diaries and polysomnography, on WASO, SE, and TST (25). In the current study, the participants were asked to complete the SD for 2 weeks.

3.4. Considerations

The study was approved by the ethical committee of the Tehran University of Medical Sciences (code: 92-03-178-24607-264321). Written consent was obtained from all participants. Participants were informed that their participation was voluntary and that they could discontinue at any time.

3.5. Statistical Analysis

The structural equating modeling (26) was used to evaluate the measurement model fitness using confirmatory factor analysis (CFA) (27) (Table 1). All standardized factor loadings and indicator t values were larger than 0.4 and 2.58, respectively. The fit of the model is assessed using the following goodness-of-fit indices (28): χ^2 which is very sensitive to sample size and non-normality of the data. A non-significant χ^2 implies the goodness-of-fit of the model to the data; RMSEA (the root mean square error of approximation) is a fit measure based on population error of approximation. A RMSEA value below 0.08 indicates a close fit and values below 0.10 represent reasonable errors of approximation in the population; CFI that is a comparative fit index and represents the proportionate improvement in model fit by comparing the target model with a baseline model, and non-normed fit index (NNFI). In the current study, goodness-of-fit was evaluated using the following statistics: NNFI, CFI, and AGFI (adjusted goodness of fit index) higher than 0.90; normal chi-square (normed-chi-square (NC: less than 2) (29); SRMR and RMSEA and its 90% confidence interval (< 0.08) (30).

In addition, the internal consistency of the DBAS-10 and its subscales was examined using Cronbach's alpha. The convergent validity was evaluated by examining the correlations between the DBAS-10, ISI, PSQI, and PSAS-C scores. In addition, mean inter-item correlation coefficients were computed for DBAS-10. Given the number of correlations and comparisons, the P values were adjusted based on Bonferroni procedure: an initial α of 0.05 was divided by the number of measures (Table 2).

3.6. Procedure

The previous translated version of the DBAS-10 was used in the current study (13). Participants were asked to complete the DBAS-10, ISI, PSQI, PSAS-C, DASS-21, and SD scales.

The participants were interviewed by the sleep medicine specialists. All measures were administered by trained clinical psychologists; 130 individuals were originally invited to participate in this study, and 120 accepted the invitation to take part (92% response rate).

4. Results

The mean age of the patient group (44.2% male) was 43.30 years old (range: 17 - 70). They were predominantly married (77.5%) and the majority of them had completed secondary school (62.7%). Participants' occupational status was reported as housewife (54%), employee (43.7%), and student (2.3%). The average TST,TIB and SE as computed from the sleep diary was 4.1 hours, 7.8 hours, and 52.5%, respectively. The mean insomnia duration was 9.19 years (SD = 9.79) with a mean age of insomnia onset of 33.89 years (SD = 13.98). The mean age of the normal group (41.8% male), was 37.6 years old (age range: 17 - 74). Of this sample, 36.4% were single and 41.8% completed secondary school. In terms of occupational status, 41% reported being working, 48.5% being at home or retired, and 10.5% being student.

4.1. Data Screening and Cleaning

Due to the fact the missing data ratio was less than 3%, list-wise deletion with no imputation of data was used. The assumption of normality was violated in most items skewness > 2; kurtosis > 7) (31), and no transformation was performed due to the large sample size (32). Regarding non-normality of data and large sample size, a robust weighed list squares (RWLS) estimation method was employed as it is less sensitive to the lack of normality of ordinal data.

4.1.1. Aim 1: Factor Structure of DBAS

The results of the fit estimates for all models are presented in Table 1. The one-factor model (M1) and the 3-factor orthogonal model (M2) did not meet the previously specified fit criteria; and the 3-factor oblique model (M3), and the 3-factor oblique and correlated errors model (M4) were adequately fit to the data. M3 was proposed by Espie et al. and M4 was a modification of M3 by freed error covariance.

The chi-squared test was not significant for the 2 models (M4 and M3). The χ^2 statistic is sensitive to sample size (33) and affected by the size of the correlations in the model (34); therefore, an evaluation of fitness indexes among the nested models showed that the modified Espie et al. model, namely 3-factor and correlated errors oblique model (M4; Table 1), was significantly better than the 3-factor oblique model (M3; $D\chi^2 = 12.32$; Ddf = 2, $P < 0.01$). It means that modifying the Espie et al. model by free errors showed good improvements (M4; RMSEA < 0.05). In a comparison between the nested models, $D\chi^2$ revealed that the 3-factor oblique and correlated errors model provided a better fit [M4; S-B χ^2/df = 1.19; CFI = 0.98; NNFI = 0.97; and RMSEA = 0.044 [90% confidence interval (CI) = 0.01 - 0.087].

In addition to the Espie et al. model, Table 1 also presents the results of the fit estimates for a 3-factor oblique model (M5) and its modification (M6), as reported by the Edinger et al. model. The chi-squared test was not significant for the 2 mentioned models. An evaluation of fitness indexes showed that 3-factor oblique and correlated errors model (M6; Table 1) was significantly better than the 3-factor oblique model (M5; $D\chi^2 = 15.66$; Ddf = 2, $P < 0.001$). As $D\chi^2$ revealed, the 3-factor oblique and correlated errors model provided a better fit [M6; S-B χ^2/df = 1.40; CFI= 0.96; NNFI = 0.94; and RMSEA = 0.064 (90%CI = 0.01, 0.11]. The fitness of the 2 modified models (M4 and M6) was compared. As shown in Table 1, an evaluation of fitness indexes among the 3-factor oblique models proposed by Espie et al. and Edinger et al. after modification by freeing error covariance (M4 and M6) showed that M4 (Table 1) had significantly better fitness regarding the parsimony principal ($D\chi^2 = 6.31$; Ddf = 1, $P < 0.01$). In addition, although the difference between models 4 and 6 was somewhat small and vague, both of them had the equal AIC and ECVI. Therefore, model 4 i e, the Espie et al. model was more parsimonious

Table 1. Parameter Estimates and Goodness-of-Fit Indices for DBAS-10[a]

Items Based on the Espie Model	P.E1	Z	P.E2
Beliefs about the immediate negative consequences of insomnia			
1-Need 8 hours of sleep (factor3)	.51	-5.9	.59
2-Need to catch up on sleep loss (factor3)	.37	-1.01	.40
6-Insomnia interferes with daytime functioning (factor1)	.76	-3.66	.75
7-Mood disturbances due to insomnia (factor1)	.65	-2.89	.64
9-Lack of energy due to poor sleep (factor1)	.74	-3.09	.76
Beliefs about the long-term negative consequences of insomnia			
3-Consequences of insomnia on health (factor2)	.40	-5.53	.52
5-Worried about losing control of sleep (factor2)	.61	-3.01	.64
8-One poor night disturbs whole week (factor2)	.52	-1.13	.52
Beliefs about the need for control over insomnia			
4-Trying harder will lead to sleep (factor3)	.40	-2.32	.27
10-No control over nocturnal thoughts (factor2)	.57	-2.06	.55

Model	ECVI	NNFI	SRMR	RMSEA	AGFI	CFI	AIC	S-B χ^2	df	NC
M_1	3.50(2.96-4.12)	.14	.26	.251 (.23 - .28)	.48	.14	342.88	322.88	45	
M_2	1.46(1.19-1.81)	.73	.20	.14 (.11 - .17)	.70	.79	143.09	103.09	35	2.94
M_3	.95 (.81-1.19)	.93	.071	.071 (.020 - .111)	.83	.95	93.99	47.99	32	1.50
$M_{4(a)}$	.87 (.82-1.70)	.97	.068	.044 (.01 - .087)	.86	.98	85.67	35.67	30	1.19
M_5	1.06 (.88-1.32)	.89	.084	.09 (.051 - 1.13)	.80	.92	103.64	57.64	32	1.80
$M_{6(a)}$	.94 (.82-1.15)	.94	.077	064 (.01 - .11)	.83	.96	91.98	41.98	30	1.40

Abbreviations: a, diagonal error covariance which freed between items including 8 - 5, and 6 – 2; AGFI, adjusted goodness of fit index; AIC, the Akaike information criterion; CFI, comparative fit index; M1, 1-factor model; M2, 3-factor orthogonal model; M3, the Espie et al. 3-factor oblique model; M4, correlated errors model to modifying M3; M5, the Edinger et al. 3-factor oblique model; M6, correlated errors model to modifying M5, NC, normed-chi-square; NNFI, non-normed fit index; P.E1, parameter estimation for the 3-factor Espie et al. model; P.E2, parameter estimation for the 3-factor Edinger et al. model; RMSEA, root mean square error of approximation; SRMR, standardized root mean square residual; Z, Z score for tests of univariate normality.

[a]Values inside the parenthesis are the assigned items into the 3-factor Edinger et al. model.

than model 6, which had an improved goodness-of-fit to offset the reduction of parsimony by 1, hence, selected as the optimal model (35).

4.1.2. Aim2: Reliability, Convergent and Discriminant Validity of DBAS-10

The DBAS-10 demonstrated a moderate internal consistency with the patient group (Cronbach' alpha = 0.82) indicating satisfactory temporal stability of the scale. Out of the total patient sample, 30 participants completed the DBAS-10 twice with a 3-week interval to measure the test-retest reliability. The test-retest subsample (33.3% male, 30% single) had the mean age of 33.3 years old, and were recruited randomly from the patient participants. The results showed a significant correlation coefficient between the 2 administrations ($r = 0.83$, $P < 0.01$).

To examine convergent validity, the DBAS-10 total score was compared with those of ISI, PSQI, PSAS-C, and sleep diary variables. The Pearson correlation coefficients between the study variables are demonstrated in Table 2. As shown, DBAS-10 significantly correlated with the total score of ISI ($P < 0.01$), PSQI ($P < 0.01$), and PSAS-C ($P < 0.01$). Also, correlation coefficients between DBAS-10 and the subscales of DASS (depression, anxiety, and stress) were statistically significant ($P < 0.01$). In addition, the results indicated a significant correlation between DBAS-10 and sleep efficiency ($P < 0.01$), and DBAS-10 and SOL ($P < 0.05$).

To test the discriminant validity of DBAS-10, the independent samples t test was used. The results showed that DBAS-10 discriminated subjects with insomnia from normal sleepers ($t = 10.51$, $P < 0.001$). Moreover, the results indicated that all 3 subscales of DBAS-10 i e, beliefs about the immediate negative consequences of insomnia ($t = 5.49$, $P < 0.001$), beliefs about the long-term negative consequences of insomnia ($t = 13.52$, $P < 0.001$) and beliefs about the need for control over insomnia ($t = 7.69$, $P < 0.001$) significantly

Table 2. Correlations of DBAS-10 With ISI, PSQI, and DASS Subscales and PSAS-C

	SD	M	Inter-Item Correlation	α	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1-Immediate consequences	1.14	39.28	.43	.79	1	.56[a]	.36[a]											
2-Long consequences	6.80	22.60	.32	.58		1	.53[a]											
3-Need for control	5.80	13.95	.30	.46			1											
4-DBAS-10	1.97	75.83	.32	.82				1										
5-ISI								.45[a]	1									
6-PSQI								.34[a]	.54[a]	1								
7-Depression								.34[a]	.34[a]	.23[a]	1							
8-Anxiety								.34[a]	.38[a]	.24[a]	.68[a]	1						
9-Stress								.39[a]	.42[a]	.36[a]	.76[a]	.75[a]	1					
10-PSAS-C								.36[a]	.38[a]	.30[a]	-.50[a]	.52[a]	.60[a]	1				
11-SE								-.31[a]	-.37[a]	-.52[a]	-.15	-.18	-.29[a]	-.08	1			
12-SOL								-.24[b]	.22[b]	.30[a]	.12	.04	.11	.08	-.30[a]	1		
13-WASO								-.00	-.05	.08	.09	.13	.05	.11	-.19	.03	1	
14-EMA								-.18	-.05	.00	-.15	.04	-.02	.09	.12	-.09	-.08	1

Abbreviations: DASS, depression, anxiety, stress scale; DBAS-10, dysfunctional beliefs and attitudes about sleep scale-10; EMA, early morning awakening; ISI, insomnia severity index; PSAS-C, pre-sleep arousal scale, cognitive subscale; PSQI, Pittsburgh sleep quality index; SE, sleep efficiency; SOL, sleep onset latency; WASO, total time of awakenings after sleep onset.

[a] $P < 0.01$ (2-tailed).

[b] $P < 0.05$ (2-tailed).

discriminated patient group from the control group.

4.1.3. Aim3: Sensitivity and Specificity of DBAS-10

The ROC curve, which plots sensitivity versus specificity for every possible cutoff point, was obtained. The Youden index was used to evaluate the optimal cutoff point (sensitivity + specificity-1.00). Sensitivity and specificity indices were calculated for all the possible DBAS-10 cutoff points. The ROC curve was calculated to estimate the discriminant capability of the instrument. The DBAS-10 raw scores were analyzed to classify both at-risk and not-at-risk groups. The best DBAS-10 cutoff point was 6.7 with a sensitivity of 74.17% and a specificity of 87.50%, indicating that 12.50% of the not-at-risk group and 74.17% of the at-risk group exceeded the cutoff of 6.7. The area under the curve was 0.85 [(95% CI) = 0.79 to 0.89, $P < 0.001$].

4.1.4. Aim 4: Gender and Dysfunctional Beliefs About Sleep

Independent-samples t test was used to examine gender differences in DBAS-10 score and its subscales. The results showed no significant differences between males and females in DBAS-10 total score ($t = -1.32$, $P = 0.18$). Moreover, no gender difference was observed in subscale 1 ($t = -0.475$, $P = 0.63$), subscale 2 ($t = 0.046$, $P = 0.96$), and subscale 3 ($t = -0.308$, $P = 0.75$) scores.

5. Discussion

The current study aimed at investigating the psychometric properties of the Persian version of DBAS-10 in an Iranian clinical population.

The main objective of the study was to further investigate the factor structure previously proposed by Espie et al. and Edinger and Wohlgemuth. The results showed that the Espie model had significantly better fitness in comparison with that of the Edinger and Wohlgemuth model. In the study by Espie et al. three factors including beliefs about the immediate negative consequences of insomnia, (1, 2, 6, 7, 9), beliefs about the long-term negative consequences of insomnia, (3, 5, 8) and beliefs about the need for control over insomnia (10, 4) were identified (9). Edinger and Wohlgemuth studied 69 individuals with normal sleep and 142 ones with insomnia. They reported 3 emergent factors (factor one = items 6, 7, 9; factor 2 = items 3, 5, 8, 10;

factor 3: items 1, 2, 4) (12). To explain, the sample of Edinger and Wohlgemuth included middle-aged and old-aged individuals while Espie et al. studied adults selected for outpatient treatment of chronic insomnia. The current study was performed on a more extended age range, which was more similar to that of the study by Espie et al. In general, the results obtained by the current study confirmed the 3-factor model proposed by Espie et al. and offered more evidence to their model.

The analyses provided support that the Persian version of DBAS-10 was a reliable scale during time with test-retest reliability of 0.83. Besides, the results showed that the Persian version of DBAS-10 was a measure with appropriate internal consistency (Cronbach's alpha of 0.82) among Iranian clinical populations.

The correlation between DBAS-10 and the total score of ISI and its subscales including effect, intensity, and satisfaction were significant, which provided evidence for the relationship between dysfunctional cognitions about sleep and an increase in the intensity of insomnia. The relationship between DBAS and subscales of ISI is not studied to date. Nevertheless, this correlation showed that dysfunctional cognitions and attitudes about sleep were associated with the levels of interference of sleep difficulties with daily function, intensity of problems with the initiation and maintenance of sleep and early morning awakening, reduced satisfaction with sleep pattern, and distress level. In addition, partial correlation between DBAS-10 and PSQI means that dysfunctional cognitions about sleep may be related to the quality of sleep in individuals with insomnia.

Another important result of the study was statistically significant association between DBAS-10 and DASS-21. In spite of the significant relationship between DBAS-10 and subscales of DASS-21, mild correlation coefficients suggest that DBAS-10 assesses a construct distinctive of depression, anxiety, and stress, which in turn is confirmative of divergent validity of DBAS-10.

The significant relationship between DBAS-10 and PSAS-C showed that the increase in cognitive arousal was related to dysfunctional beliefs about sleep. In general, moderate correlations between ISI, PSQI, PSAS, and DBAS-10 are indicative of appropriate convergent validity of DBAS-10 in an Iranian clinical population.

To the best of the authors‘ knowledge, the cutoff point, sensitivity, and specificity of DBAS-10 are not investigated to date. The current study provided support for the ability of DBAS-10 to differentiate individuals with insomnia disorder from individuals with normal sleep. Hence, the Persian version of DBAS-10 had proper discriminative validity and acceptable sensitivity and specificity.

With regard to gender, the results of the current study showed no significant difference in DBAS and its subscale scores between the 2 genders. A meta-analysis of 31 studies showed that insomnia significantly affected females more than males (36). Although several studies examined gender differences regarding insomnia, no study evaluated it with regard to dysfunctional beliefs about sleep. The findings of the current study suggested that dysfunctional beliefs about sleep were not related to a specific gender.

5.1. Limitations and Future Directions

The current sample comprised of adults living in a large urban area. Thus, first of all, generalizing these findings to other age groups or to Iranian adults living in the countryside should be done cautiously. Second, considering the lack of standardized structured diagnostic interview of sleep disorders in the Persian language, the participants were only selected through diagnostic interviews conducted by sleep specialists and other self-report measures, and no structured interviews unique to sleep disorders were held with participants. Third, the current study was cross sectional and no causal relationship can be concluded from the findings.

In general, more research is required to evaluate DBAS-10 among different subcultures and age groups in Iran. It would be helpful for future studies to use objective measures such as polysomnography and actigraphy in addition to self-report measures. Further studies are needed to retest the relationship between gender and dysfunctional beliefs about sleep, and reveal the sources of theses gender differences.

5.2. Conclusions

The current study examined an abbreviated version of DBAS in a different culture and language, and indicated promising psychometric properties with regard to reliability and validity. The validation of common sleep instruments is essential to move forward the field of insomnia in Iran. It is hoped that the validation of the Persian version encourages Iranian clinicians and researchers to use it during assessment and treatment, and facilitate the comparison of different studies in this filed.

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Footnotes

Authors' Contribution: Hoda Doos Ali Vand designed the study, interpreted the data, dreafted the manuscript and revised it. Fahimeh Ahmadian Vargahan supervised and conducted data collection, interpreted the data and drafted some parts of the manuscript. Behrooz Birashk supervised the study, provided administrative, technical, and material support, and critically revised the manuscript. Mojtaba Habibi performed the statistical analysis, participated in data interpretation and drafted the results section of the manuscript. Khsoro Sadeghniiat Haghighi participated in data collection and provided administrative, technical and material support. Fatemeh Fereidooni participated in data collection and technical support. All authors read and approved the final manuscript.

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