ORIGINAL ARTICLE

The Development and Validation of The Arabic Scale of Insomnia (ASI)

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Study Objectives: To assess the psychometric parameters of the Arabic Scale of Insomnia (ASI), and to report its descriptive statistics and gender differences.
Methods: Kuwaiti, non-clinical secondary school students (N=5,044), college students (N=2,210) and employees (N = 1,247) were recruited. The ASI has 12 items. Each statement is answered on a 5-point intensity scale, during the most recent month.
Results: Test-retest reliability ranged from 0.70 to 0.83, and the alpha ranged between 0.84 and 0.87, denoting good temporal stability and internal consistency. Criterion-related validity (2 criteria) ranged from 0.57 to 0.94, and the loadings of the ASI onto a general factor of insomnia ranged from 0.92 to 0.95, indicating good convergent and factorial validity. Two factors of the ASI were disclosed: Consequences of Insomnia, and Difficulty in Initiating and Maintaining Sleep. Women had a significantly higher total mean score than that of their male counterparts. Male employees had a lower mean score than adolescents and college students.
Conclusions: The ASI has good reliability and validity. Because of its brevity, it may be recommended for use in research in the prevalence of insomnia. **(Sleep and Hypnosis 2008;10(1):3-10)**

Key words: The Arabic Scale of Insomnia (ASI), reliability, validity, adolescents, college students, adults, Kuwait.

INTRODUCTION

Problems with sleep are commonplace in modern societies. Sleep disorders have been reported to be associated with health problems (1,2), and it is now evident that disturbance in sleep can lead to adverse changes in the functioning of a number of body systems (3). Moreover, there is epidemiologic evidence that sleep disorders may be a risk factor for total mortality (4,5). By the same token, epidemiological, cross-sectional, and longitudinal data suggest a high rate of comorbidity between sleep disturbance and psychopathology, particularly between insomnia, anxiety, and depression (6).

There are more than 70 sleep disorders (7), and insomnia is the single most frequently reported sleep complaint (8). Using the DSM-III-R and ICD-10 psychiatric disorders criteria in a Spanish population of 18-year olds, it was found that insomnia was on the top of the list of the most common disorders (9). Following a similar pattern,

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insomnia had the fifth highest mean score on the Somatic Symptoms Inventory comprised 60 items (10).

Based on the main psychiatric classifications such as the ICSD, ICD-10, and DSM-IV, Ohayon and Guilleminault (11) stated that insomnia manifests itself through difficulty initiating sleep (DIS), or difficulty maintaining sleep (DMS), be it in the form of disrupted sleep (DS) or early morning awakenings (EMA), or nonrestorative or nonrefreshing sleep (N-RS), lasting at least 1 month and causing either distress or daytime consequences.

Insomnia may have grave consequences on work and health (12), including decreased productivity, traffic accidents, and interpersonal problems (13). It has also socio-professional consequences and is correlated with a lower medical status (14). Insomnia can lead to substantial impairment in, and a profound negative impact on, quality of life (3) and functional capacity, including reduced concentration, inferior daytime functioning, listlessness, and difficulties in making decisions (15).

Ohayon and Guilleminault (11) reviewed the epidemiology of insomnia complaints in North America and Western Europe. They concluded that the definition of insomnia symptoms varies considerably across studies, as do the time frame considered and the wording of questions. Most investigations assessed DMS, DIS, and EMA, but defined these terms differently. Few specifically addressed the daytime consequences or distress accompanying insomnia symptomatology (11).

As evidence of the varied estimates on the basis of different definitions of insomnia, Bixler and his colleagues (16) surveyed a significant number of studies and maintained that if the estimate was based upon a complaint of difficulty in sleeping, the estimate ranged from 26.3% to 35.4%. When the question employed was occasional insomnia or insomnia with no duration

restriction, the estimates ranged from 21.0% to 27.0%. However, when estimates became more restrictive in terms of chronicity, then the estimates were lower, in the range of 9.0% to 10.2%. When an estimate of insomnia was obtained from patients, insomnia was reported to be 5.0% as a primary problem and 28.0% as a secondary one. Primary care patients reported insomnia 10% to 19% of the time. Finally, physicians have estimated that 17% of their general outpatients, 72% of psychiatric consults, and 93% of psychiatric inpatients have insomnia (6).

Ohayon (17) stated that estimates of the prevalence of insomnia were based on 4 definitions: insomnia symptoms, insomnia symptoms with daytime consequences, sleep dissatisfaction, and insomnia diagnoses. The first definition recognizes that about one-third of a general population presents at least one of them. The second definition shows that the prevalence is between 9% and 15%. The third definition represents 8 -18% of the general population. The last definition sets the prevalence of insomnia diagnosis at 6% according to the DSM-IV classification.

It is particularly noteworthy that the vast majority of the published studies on insomnia were carried out on participants from Western countries. Few previous studies have examined non-Western populations, including the Arab population. In Kuwait, Abdel-Khalek (18) conducted an epidemiologic study of sleep disorders in non-institutionalized secondary school students (N=2,574) to assess prevalence of insomnia, hypersomnia, nightmares, sleep-walking, sleep terrors, and narcolepsy. More recently, Abdel-Khalek (19) constructed the Insomnia Scale (IS) and administered it to 5,044 Kuwaiti adolescents, as well as to 2,210 university undergraduates (20). This author concluded that there is a need to agree upon the methodology, especially the assessment tool, for an epidemiology of sleep disorder research.

The objectives of the current study were to

estimate the psychometric parameters of the Arabic Scale of Insomnia (ASI), previously used with adolescents and university undergraduates (19,20), and to report Arabic results on the ASI as well as to compare between adolescents, college students and employees. It is important to note that these previous results reported the descriptive statistics of the individual items, whereas the present study depended on the total scale scores.

METHOD

Participants

Different samples (N= 8,501) of adolescents, college students and governmental employees took part in the present study (see Table 1). The samples were selected according to their availability. All the samples were convenient, non-paid Kuwaiti volunteers. These participants, as a whole, were neither disturbed clinical cases nor diagnosed institutionalized patients, but rather, were presumably healthy individuals. That is, they were not selected from hospitals or clinics. However, no psychiatric assessment was conducted to support that these participants had no mental illness. The mean age of adolescents was 15.99±1.47, while that for college students was 20.07±2.42, and that for employees was 34.76±8.22.

Fourth Edition DSM-IV (21), and the Revised International Classification of Sleep Disorders (ICSD) (7), several items have been drafted in Arabic by the present researcher to assess insomnia. A number of PhD. staff members and Master Degree students in the Department of Psychology at Kuwait University were asked to review each item and to determine its appropriateness and correctness of phrasing. Following this, a limited number of items were either deleted or modified. In a pilot study, the preliminary version was administered separately to two small samples of secondary school and university students as a pre-test. Then, further minor modifications were carried out.

The final version of the Insomnia Scale comprised 12 statements. Participants were requested to respond to each item on a 5-point scale as follows: 0: No, 1: A little, 2: Moderate, 3: Much, and 4: Very much. They were instructed to answer the ASI items according to their subjective evaluation, on the basis of their perceived severity during the past month. The total score can range from 0 to 48, and a high score denotes high insomnia. The ASI was translated into English and checked by several Ph.D. psychologists and linguists and the cross-language equivalence has been adequately demonstrated (see the Appendix).

Table 1. Different Samples Shared in the Study

	Adolescents		College Students		Employees	
	Boys	Girls	Men	Women	Men	Women
Pilot Study	10	10	10	10	-	-
Test-Retest Reliability	60	60	70	71	-	-
Alpha Reliability	300	300	200	200	200	200
Criterion and Factorial Validity	99	97	60	65	-	-
Descriptive Statistics	2523	2521	1056	1154	713	534

The Arabic Scale of Insomnia (ASI)

On the basis of the literature, and the diagnostic criteria of both the Diagnostic and Statistical Manual of Mental Disorders,

Procedure

The ASI, along with other questionnaires, was administered to participants in group sessions of 30 to 35 participants in their

classrooms, during regular school or university hours. The scales were administered to each group in a single session of around 30 minutes. The pupils and students provided verbal agreement to

General Factor of Insomnia". The loadings of the ASI onto this factor ranged between 0.92 and 0.95 among male and female adolescents and college students, showing good factorial validity (see Table 2).

Table 2. Reliability and Validity of the Total Score of the ASI

Psychometric Parameter	Adolescents		College Students	
	Boys	**Girls**	**Men**	**Women**
One Week Test-Retest	.70	.76	.81	.83
Cronbach Alpha	.86	.87	.84	.87
Criterion-Related validity				
The Arabic Sleep Disorders Scale	.85	.87	.93	.94
The Sleep Questionnaire	.56	.57	.75	.76
Factorial Validity	.95	.92	.93	.94

Note. Alphas for both male and female employees was .90.

offer themselves as subjects after the aims of the study were outlined. There were no refusals. Assurances were made that anonymity would be maintained. As for the sample of employees, the ASI was answered either in individual testing sessions or in a very small groups (< 6).

RESULTS

Table 2 presents the 1-week interval test retest reliability. For the total 12 scale items, the test-retest reliabilities ranged between 0.70 and 0.83, and those for Cronbach alphas ranged between 0.84 and 0.87, showing good temporal stability and internal consistency.

The Arabic Sleep Disorders Scale (22) and the Sleep Questionnaire by Jenkins and his colleagues (5) were used as criteria for the ASI. Table 2 shows also that the correlations between the ASI total scores and the two criteria were statistically significant and ranged from 0.56 to 0.94. This result displays good convergent validity of the ASI. The inter-correlations between the ASI and the last-mentioned two criteria were computed and subjected to a principal components factor analysis. Based on the eigenvalue criterion of greater than or equal to 1.0 only one factor was retained and labeled "A

The correlation matrix (12 x 12) of the ASI items among the combined samples (N=8,501) was subjected to a principal components factor analysis with iteration. The eigenvalue criterion of greater than or equal to 1.0 was followed in order to identify the number of factors to be retained. Then, the orthogonal (Varimax) and oblique (Oblimin) rotation of axes were applied (23). It was noticed that the differences between the two last-mentioned solutions were negligible. It was then decided to base the findings on the varimax solution as shown in Table 3.

Table 3. The Orthogonal (Varimax) 2 Factors of the ASI in a Combined Sample of Kuwaiti Adolescents, College Students, and Employees (N=8,501).

Items No.*	Factor I†	Factor 2‡	h2
1	.251	.705	.560
2	.206	.848	.761
3	.005	.830	.697
4	.224	.500	.300
5	.421	.273	.252
6	.443	.422	.374
7	.542	.419	.470
8	.704	.320	.598
9	.713	.226	.559
10	.688	.315	.572
11	.772	.001	.601
12	.761	.003	.588
Eigenvalue	3.48	2.85	6.33
% of Variance	29.03	23.74	52.77

*See the items in the Appendix.
†Labeled "Consequences of insomnia".
‡Labeled "Difficulty of initiating and maintaining sleep".

Based on the salient loading > 0.4, inspection of Table 3 shows that the first factor may be labeled the Consequences of Insomnia, while the second factor may be labeled Difficulty in Initiating and Maintaining Sleep. The explained percentage of variance (i.e., 52.77%) is quite suitable. It is predictable, in a scale purported to assess a complex phenomenon like insomnia, that some of the items (number 6 and 7) should have salient loadings for both factors. These items represent a problem when depending on the factor scale or score. It is worth noting that the correlations between the two extracted factors were 0.64.

DISCUSSION

The objectives of the present study have been successfully fulfilled. The current series of investigations on the ASI adequately demonstrated the good psychometric properties of the scale. As for reliability, the 1-week test-retest and Cronbach's alpha ranged between 0.70 and 0.90 (see Table 2). These coefficients demonstrated the high temporal stability and internal consistency. Kline (24,25) maintained that the minimum level of acceptable reliability is 0.7. Therefore, it is safe to conclude that the ASI can be described as a reliable scale.

Table 4. Mean (M), Standard Deviation (SD), and t Ratio on the ASI in Kuwaiti Males and Females

Sample	Males			Females			t	p
	N	M	SD	N	M	SD		
Adolescents	2523	12.76	8.87	2521	14.26	9.26	5.87	.0001
College Students	1056	13.29	8.00	1154	14.15	8.42	2.48	.013
Employees	713	10.87	8.87	534	14.49	8.94	7.10	.0001
All	4292	12.58	8.70	4209	14.26	8.99	8.76	.0001

Table 4 sets out the descriptive statistics of the ASI. Reference to this table shows that all the sex-related differences were statistically significant, in which females had higher mean total ASI scores than did their male counterparts. On the one hand, the highest sex-related difference was found among employees, and male employees had the lowest total mean score in proportion to all other male and female groups (see figure 1).
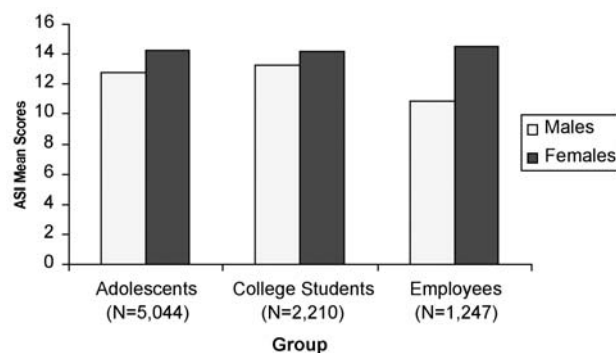
Figure 1. Mean Scores on the ASI in Kuwaiti Males and Females

Concerning validity, the correlations between the total scores on the ASI and two criteria among male and female adolescents and college students ranged from 0.56 to 0.94 (p<.001), denoting good criterion-related and convergent validities against scores on the two criteria. Consistent with these results, the loadings of the total scores on the ASI onto a general factor of insomnia among male and female adolescents and college students ranged between 0.92 and 0.95, denoting good factorial validity (see Table 2).

The factor analysis of the inter-correlations between the 12 individual items of the ASI (12 x 12) in a very large sample (N=8,501) yielded two high-loaded and salient factors, namely: Consequences of Insomnia, and Difficulty of Initiating and Maintaining Sleep, denoting the factorial validity of the ASI at the level of individual items (see Table 3). These two factors are compatible with the same factors based on adolescent and college

student samples (19,20). On the basis of the high correlation coefficient between these two factors, i.e., 0.64, a second-order factor could be strongly hypothesized.

Regarding the sex-related differences, female adolescents, college students, and employees had significantly higher mean total ASI scores than did their male counterparts. Several previous studies supported this finding (16,26-30). The result that females have a significantly higher mean total score on the ASI than their male peers is consistent with the higher mean scores of females as compared to males regarding neuroticism, fear, anxiety, and depression, especially in Arab countries (31-39).

It is interesting to note that the highest sex-related differences on the ASI were among male and female employees. Women in this group had always double roles, i.e., governmental work and work at home, whereas men always had only one role, i.e., governmental work. Playing double roles for women may mean the exposure to plenty of stressful situations. Consistent with this result, is the finding that male employees had

the lowest mean score on the ASI in proportion to all the other male and female groups. They are enjoying their lives without the stress of either studying in school, or in the university, or having the responsibility of work at home.

Specific limitations have to be acknowledged in the current study. Foremost among them is the sample. Notwithstanding its large size (N = 8,501), it was a convenient sample. There is a need to choose a probability population sample. An important next step in this project would be also to test other age groups, namely the old aged. Another important further step in this endeavor would be to explore the relationship between the ASI and psychopathology, especially anxiety and depression. Despite these limitations, present results indicate that the ASI has good psychometric characteristics. Because of its brevity, it may be recommended for use in research in the prevalence of insomnia. It is suitable to suggest exploring the use of the English version of the ASI with native English speaking participants.

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Appendix

The Arabic Scale of Insomnia

Instructions: The following statements relate to your usual sleep habits during the past month. Please read carefully each statement and circle the appropriate number following each, which expresses your sleep habit and feeling in the past month. There is no right or wrong answers. Please answer each item.

	No	A Little	Moderate	Much	Very Much
1. I find it difficult to get to sleep.	0	1	2	3	4
2. My sleep is interrupted and disturbed.	0	1	2	3	4
3. I wake up many times during my sleep.	0	1	2	3	4
4. I wake up early in the morning before getting enough sleep.	0	1	2	3	4
5. I feel depressed when it is time for me to go to bed.	0	1	2	3	4
6. Before I fall asleep I have bad thoughts.	0	1	2	3	4
7. I feel tired when I wake up.	0	1	2	3	4
8. I normally wake up in a bad mood.	0	1	2	3	4
9. I get tense when I wake up.	0	1	2	3	4
10. My interrupted sleep annoys me.	0	1	2	3	4
11. My Interrupted sleep affects my relationship with others.	0	1	2	3	4
12. My interrupted sleep affects my work performance.	0	1	2	3	4