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Original article

Translation, development, and validation of the Arabic version of the SLEEP-50 questionnaire

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Abstract: *Background and aim:* The SLEEP-50 is a comprehensive self-report questionnaire consisting of 50 items, aimed at screening for a wide range of sleep disorders within the general population. This tool is particularly useful for identifying sleep-related issues that often go undiagnosed but significantly impact daily functioning and quality of life. Given its comprehensive nature, the SLEEP-50 can be utilized in both clinical and research settings to screen for potential sleep disorders and aid in early detection. By focusing on the most prevalent sleep issues, it allows healthcare professionals to make more informed decisions about further diagnostic assessments and interventions. Translating the SLEEP-50 questionnaire into different languages, such as Arabic, is highly important for several reasons such as cultural and linguistic barriers, especially with non-English speaking population. The need for an Arabic version of the SLEEP-50 is further underscored by the limited availability of validated sleep assessment tools in the region. Therefore, the aim of this study was to translate the SLEEP-50 scale into the Arabic language and review it for content and face validity following the scale development steps. *Methods:* The content validity assessment of the Arabic language version of the Sleep-50 scale consisted of three phases: (phase 1) translating the items from English to the Arabic language, (phase 2) judging the items for content validity, and (phase 3) judging the Arabic language Sleep-50 scale for face validity. *Results:* There was high agreement among seven experts who were invited to review the content of the Arabic version of the SLEEP-50 scale. Face and content validity showed high agreement among the targeted samples, which shows minimum correction because the translation was based on the pre-validated scale. *Conclusions:* The Arabic version of SLEEP-50 underscores the importance of cross-cultural adaptation in sleep medicine and highlights the need for similar efforts across other languages (www.actabiomedica.it).

Key words: SLEEP-50, sleep disorders, translation and validation, scale development, reliability

Introduction

Sleep disorders, a group of medical conditions affecting sleep quality, duration, or timing, are a common yet often overlooked health concern. sleep is critical for physical health, mental well-being, and overall quality of life. Sleep disorders reduce the quantity and quality of sleep and contribute to many physical and mental health issues (1). According to the American Academy of Sleep Medicine (AASM), there are more than 80 sleep disorders, including insomnia, sleep apnea, restless leg syndrome, narcolepsy, circadian rhythm disorders, and more (2). These disorders can significantly impact one's functioning, mood, cognitive abilities, and long-term health. Sleep disorders are prevalent worldwide, with millions of people affected by various types

of conditions, including insomnia, sleep apnea, restless leg syndrome (RLS), narcolepsy, and circadian rhythm sleep disorders. According to the World Health Organization (WHO), up to 40% of the global population experiences some form of sleep disorder at some point in their lives (3). The most common of these disorders is insomnia, which affects approximately 10-30% of the global population, with some studies suggesting higher numbers, especially among older adults and those with pre-existing health conditions (4). Obstructive sleep apnea (OSA) is another common sleep disorder with a significant global burden. Benjafield et al. 2019 estimate that around 1 billion adults worldwide aged 30-69 suffer from OSA, with moderate to severe cases affecting around 425 million individuals (5). Restless leg syndrome (RLS) is reported to affect 5-10% of the population globally, with women being more likely to suffer from the condition than men. The condition often goes undiagnosed or misdiagnosed, as symptoms can be confused with other medical issues (6). Narcolepsy, although rare, affects about 1 in 2,000 people globally (7). In Saudi Arabia, the prevalence of sleep disorders mirrors global trends, but certain factors, such as lifestyle, cultural practices, and environmental influences, may increase the risk of specific conditions. Several studies have examined the prevalence of sleep disorders in different population groups, including adults, children, and healthcare workers. Insomnia is one of the most prevalent sleep disorders in Saudi Arabia. A study conducted by Alotair and BaHammam 2018, found that approximately 37.4% of Saudi adults reported symptoms of insomnia, with women being more affected than men. The high prevalence of insomnia in Saudi Arabia is linked to factors such as stress, unhealthy sleeping habits, and chronic medical conditions. Furthermore, obstructive sleep apnea (OSA) is another significant sleep disorder in Saudi Arabia (8). A study conducted by Wali et al. 2017 estimated that about 8.5% of the Saudi population suffers from OSA, with a higher prevalence in men and individuals with multi-independent risk factors including age, gender, obesity, and hypertension (9). As obesity rates continue to rise in Saudi Arabia due to sedentary lifestyles and unhealthy diets, the prevalence of OSA is also expected to increase (10). The Saudi healthcare system has been taking steps to improve the diagnosis and management of OSA through public awareness campaigns and increased access to sleep clinics. The use of electronic devices late at night, along with social and cultural practices, such as staying up late and altering sleep patterns during Ramadan, contribute to circadian misalignment (11). Addressing these disorders requires education on healthy sleep hygiene practices and raising awareness about the risks of prolonged sleep disruptions. The World Health Organization (WHO) has recognized sleep disorders as a condition requiring attention, given their association with various chronic diseases, including cardiovascular diseases, obesity, and diabetes (12). In the field of sleep medicine, accurate assessment and diagnosis are paramount. The SLEEP-50 questionnaire, developed in the early 2000s, emerged as a comprehensive tool designed to evaluate a wide spectrum of sleep disorders. This instrument covers the diagnostic criteria for the most common sleep disturbances and provides an invaluable resource for clinicians and researchers alike (13).

The SLEEP-50 questionnaire is a widely recognized tool for assessing various sleep disorders, including insomnia, apnea, narcolepsy, and circadian rhythm disorders. Originally developed in English, its comprehensive nature allows for a broad assessment of sleep-related issues (13). Given the diverse linguistic and cultural contexts globally, there's a growing need for the SLEEP-50 to be available in multiple languages, ensuring its applicability and relevance across different populations. The translation and validation of the SLEEP-50 into Arabic not only serves a significant Arabic-speaking population but also contributes to cross-cultural research in sleep medicine. The Arabic-speaking world, with its rich cultural diversity and vast geographical spread, presents unique challenges and opportunities in sleep medicine. The prevalence and presentation of sleep disorders in Arabic-speaking populations might be influenced by distinct cultural practices, lifestyle factors, and environmental conditions. Moreover, the Arabic language, with its various dialects and its significant linguistic depth, requires careful consideration to ensure that the translated version of the SLEEP-50 is understood uniformly across different regions. An accurate translation ensures that the questionnaire is appropriate and meaningful for the target population. Furthermore, by making the

SLEEP-50 available in different languages, including Arabic, it becomes accessible to a wider population. In addition to maintaining the psychometric properties of the original, ensuring that it accurately assesses sleep disorders. Also, translating the SLEEP-50 into multiple languages facilitates cross-cultural research on sleep disorders, researchers can gather data from diverse populations, contributing to a global understanding of sleep-related issues and their implications for health, well-being, and quality of life. Therefore, this study aimed to translate the SLEEP-50 scale into the Arabic language and review it for content and face validity following the scale development steps.

Methods

Instrumentation

The content validity assessment of the Arabic language version of the Sleep-50 scale consisted of three phases: (phase 1) translating the items from English to the Arabic language, (phase 2) judging the items for content validity, and (phase 3) judging the Arabic language Sleep-50 scale for face validity.

Phase 1: Translating the items from English to Arabic language

The translation process of the English version of the Sleep-50 scale to Arabic language was based on the process of across-cultural adaptation of self-reported measures guidelines as proposed by E. Beaton et al. 2000 (14). The process was coordinated by a coordinator, and it was consisted of multiple steps (Figure 1).

STEP 1: Two faculty members translated the English items of the Sleep-50 scale to the Arabic language. For the original Sleep-50 items, see Table 1. The translation of the Sleep-50 scales to the Arabic language included items, responses, and instructions. The two translators reported the challenges and uncertainties of their translations.

STEP 2: The content review coordinator then synthesized the results based on the two versions of the translation from both translators and created one version of the Arabic scale.

STEP 3: The content review coordinator then translated the items back to English to make sure the translated version reflects the same scale content.

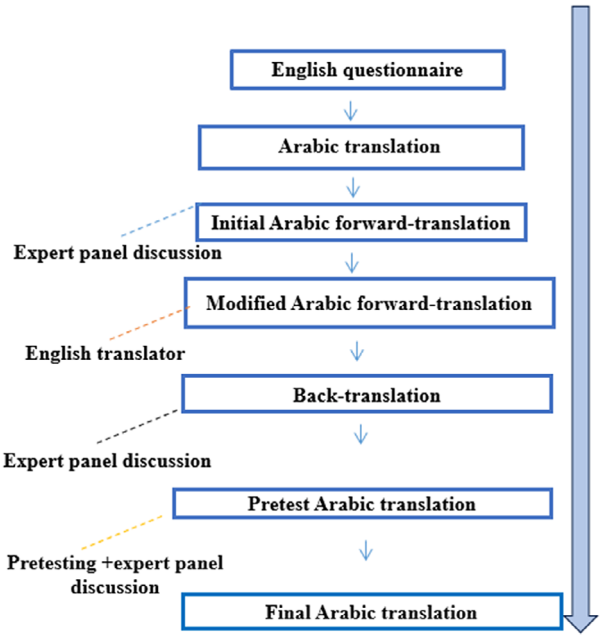

Figure 1. Five different translations were developed during the translation process.

Phase 2: Judging the items for content validity

A modified Delphi method was utilized to evaluate the content of the scale. Seven content experts rated their agreement on the Arabic translation of the scale from the English language and rated their agreement on the inclusion of each item. To be invited as a content reviewer in this study, the expert must have one of the following criteria: a doctorate or master's degree in the field of sleep medicine, papers published in the field of sleep medicine, or clinical experience in the field of sleep medicine or sleep studies.

The modified Delphi process involved two rounds:

Round 1: The Arabic items of the Sleep-50 scale were presented to the experts as nine subscales. See Table S3 for the Arabic version of the

Table 1. SLEEP-50 original items*

Sleep Apnea
1. I am told that I snore.
2. I sweat during the night.
3. I am told that I hold my breath when sleeping.
4. I am told that I wake up gasping for air.
5. I wake up with a dry mouth.
6. I wake up during the night while coughing or being short of breath.
7. I wake up with a sour taste in my mouth.
8. I wake up with a headache.
Insomnia
9. I have difficulty in falling asleep.
10. Thoughts go through my head and keep me awake.
11. I worry and find it hard to relax.
12. I wake up during the night.
13. After waking up during the night, I fall asleep slowly.
14. I wake up early and cannot get back to sleep.
15. I sleep lightly.
16. I sleep too little.
Narcolepsy
17. I see dreamlike images when falling asleep or waking up.
18. I sometimes fall asleep on a social occasion.
19. I have sleep attacks during the day.
20. With intense emotions, my muscles sometimes collapse during the day.
21. I sometimes cannot move when falling asleep or waking up.
Restless Legs/PLMD.
22. I am told that I kick my legs when I sleep.
23. I have cramps or pain in my legs during the night.
24. I feel little shocks in my legs during the night.
25. I cannot keep my legs at rest when falling asleep.
Circadian Rhythm Sleep Disorder
26. I would rather go to bed at a different time.
27. I go to bed at very different times (more than 2 hr difference).
28. I do shift work.
Sleepwalking
29. I sometimes walk when I am sleeping.
30. I sometimes wake up in a different place than where I fell asleep.
31. I sometimes find evidence of having performed an action during the night I do not remember.
Nightmares
32. I have frightening dreams (if not, go to Item 37).
33. I wake up from these dreams.
34. I remember the content of these dreams.
35. I can orientate quickly after these dreams.
36. I have physical symptoms during or after these dreams (e.g., movements, sweating, heart palpitations, shortness of breath).
Factors Influencing Sleep
37. It is too light in my bedroom during the night.
38. It is too noisy in my bedroom during the night.
39. I drink alcoholic beverages during the evening.
40. I smoke during the evening.
41. I use other substances during the evening (e.g., sleep or other medication).
42. I feel sad.
43. I have no pleasure or interest in daily occupations.
Impact of Sleep Complaints on Daily Functioning
44. I feel tired at getting up.
45. I feel sleepy during the day and struggle to remain alert.
46. I would like to have more energy during the day.
47. I am told that I am easily irritated.
48. I have difficulty in concentrating at work or school.
49. I worry whether I sleep enough.
50. Generally, I sleep badly.

*Spoormaker VI, Verbeek I, van den Bout J, Klip EC. Initial validation of the SLEEP-50 questionnaire." Behavioral sleep medicine.2005.3(4): 227-46. doi:10.1207/s15402010bsm0304_4. reprinted by permission of the publisher (Taylor & Francis Ltd, http://www.tandfonline.com) and authors of the original validated SLEEP-50.

items. The content experts evaluated each item for wording, layout, clarity, and relevance to the scale's domains based on the original English version of the sleep-50 scale that was provided to the experts. For the evaluation of relevance, content experts were asked to evaluate the item's relevance to the preassigned subscale using a 4-point Likert scale: 1 = *not relevant*, 2 = *relevant, needs major revision*, 3 = *moderately relevant, needs minor revision*, and 4 = *very relevant, no modification*.

In this step, 86% of the experts should agree on each item to be included after Round 1, unless the experts suggested modifications to improve the translation. In case of modifications, even the items with lower

rates of agreement were included for Round 2 evaluation.

Round 2: Items with high agreement rates between the experts from Round 1 were included for Round 2 evaluation. Items that were modified based on experts' suggestions were also included for Round 2 evaluation. In Round 2, each item was presented to the experts with a dichotomous scale that has two options for inclusion: YES or NO (Table S2).

Phase 3: Judging the Arabic sleep-50 scale for face validity

Face validity includes evaluating the appearance of the instrument to the layperson. Face validity assessment in this study was conducted by asking a group of the targeted population (adults living in KSA and their mother language is Arabic) to give their feedback after completing the survey questions online. Participants of the face validity assessment were asked to read the survey instructions and answer the survey online using their smart phones. Feedback was obtained from the participants by asking whether the items were clear and easy to read, and if the online survey was easy to navigate.

Statistical analysis

Two groups with different ages were used for measuring the questionnaire reliability, group 1 (n=30); and group 2 (n=26). The data was collected using QuestionPro and the excel sheet was used for statistical analysis. IBM SPSS Statistics 29 was used for the reliability analysis of the scale. Face and Content validity analysis was performed for the scale. Kappa statistic was performed to measure the agreement between the raters. Descriptive analysis and frequency tables were measured for each item. Test-Retest reliability was measured by dividing the samples randomly into 2 groups and compared the measurements using non-parametric method, Mann-Whitney U test. The items with significant differences were revised and modified for the second pilot study. To measure the internal consistency, Cronbach alpha coefficient was performed for each domain. Cronbach alpha was estimated for each domain for pilot 1 and revised the scales with a low coefficient value. The analysis was repeated for pilot 2 also. The Spearman correlation coefficient was estimated to measure the individual items and domain total correlation. Split-half reliability was also measured for each domain. Normality was tested to choose the appropriate statistical tests for the test-retest reliability. P value <.05 was considered as statistically significant.

Results

Results of the content validity assessments

Seven experts have been invited to review the content of the Arabic version of the Sleep-50 scale. Items from Round 1 evaluation were selected and modified based on the feedback from the content experts. The I-CVI was calculated for each item. Scale-CVI was also calculated for each subscale (Table 1). Items with an I-CVI of ≥ 0.86 were directly included in the scale for the Round 2 evaluation. Items with low I-CVIs were also included in the scale if they were modified to be rated in Round 2 evaluation. In Round 2 evaluation, the same panel of experts evaluated the items and rated their agreement on items' relevance to the concept of the scale after modifications. I-CVI was calculated for each item in the scale. Also, Scale-CVI was calculated for all the subscales (Table S1). In Round 2 of the valuation, all the items received high I-CVIs ≥ 0.86 and all were included in the final version of the scale (Table S2). Furthermore, the final version of the survey demonstrated good internal consistency for the overall scale ($\alpha = 0.81$).

Results of the face validity assessments

The face validity assessments for the Arabic language version of the scale were conducted by seven participants. The face validity evaluation included evaluating the items and the demographic questions. The participants of the face validity assessments suggested

the following: make the wording of the demographic questions neutral for both male and female participants, change word choice in items # 20,27,43, and 48. Also they suggested to enlarge the typing font of the items to be easier to read. After the modifications, all the items were clear and easy to read as established by all the face validity participants. The participants also confirmed that the online survey portal was easy to navigate, and they faced no issues answering the questions.

Discussion

Previous studies have highlighted the importance of valid and reliable tools for assessing sleep disorders in different populations. For instance, questionnaires such as the Pittsburgh Sleep Quality Index (PSQI) (15), Epworth Sleepiness Scale (ESS) (16), and Berlin Questionnaire (17), have been widely used to evaluate various sleep disorders like insomnia, obstructive sleep apnea (OSA), and excessive daytime sleepiness. However, these tools were primarily developed for Western populations, which poses challenges when adapting them to different linguistic and cultural contexts. The development and validation of the Arabic version of the SLEEP-50 questionnaire in this study directly address the need for culturally relevant sleep disorder assessment tools in the Arab-speaking world. Research into sleep disorders in the Arab region has underscored the need for comprehensive tools that cover a wide range of sleep-related issues. Prior studies have utilized translated versions of the PSQI and ESS in Arabic-speaking populations, (18,19), demonstrating that these tools are useful for assessing general sleep quality and excessive daytime sleepiness. However, they are limited in scope compared to the SLEEP-50, which covers a broader spectrum of disorders, including insomnia, OSA, circadian rhythm disorders, and parasomnias. Previous attempts at translating sleep questionnaires often faced challenges related to cultural nuances, emphasizing the need for thorough cross-cultural adaptation methods, such as those applied in this study. The translation, development, and validation of the Arabic version of the SLEEP-50 questionnaire is a significant step toward addressing the growing need for culturally appropriate sleep disorder assessment tools in the Arab-speaking world. Sleep disorders are a prevalent issue globally, and Saudi Arabia is no exception, with conditions like insomnia, obstructive sleep apnea (OSA), and circadian rhythm disorders widely observed. The Arabic version of the SLEEP-50 fills a critical gap by providing a comprehensive tool tailored to the linguistic and cultural needs of the Arab population, where sleep disorder assessment tools are currently limited. Furthermore, the Delphi method used in this study for expert review and validation has been similarly employed in prior studies to adapt sleep questionnaires for non-English speaking populations. For instance, the adaptation of the Insomnia Severity Index (ISI) for use in Arabic populations involved expert reviews to ensure cultural relevance and accuracy (20).

In this study, the translation process followed established cross-cultural adaptation guidelines, ensuring that the Arabic version reflects the original content while being understandable and relevant to the target population. The use of expert reviews through the Delphi method ensured the content validity of the scale, with adjustments made based on expert feedback. The high content validity index (CVI) scores in both rounds of evaluations underscore the accuracy and appropriateness of the translation. Similarly, face validity showed a high agreement among the targeted samples with minimum correction because the translation was based on a pre-validated scale. Face validity assessment provided valuable insights into the user experience, ensuring that the questionnaire is easy to understand and navigate for the general population. This study aligns with the broader global of adapting healthcare tools for use in non-English speaking populations. By providing an Arabic version of the SLEEP-50, this research supports efforts to improve sleep health literacy, early diagnosis, and intervention in sleep disorders. Furthermore, it facilitates cross-cultural research, allowing for comparisons between Arabic-speaking populations and those in other regions, contributing

to a better understanding of sleep disorders and their impact on health.

Conclusion

The Arabic version of the SLEEP-50 questionnaire is a validated and culturally adapted tool that meets the linguistic needs of the Arabic-speaking population. Through multi-phase process of translation, content review, and face validation, the study confirms that the Arabic SLEEP-50 is user-friendly. This tool has the potential to improve the diagnosis and management of sleep disorders across the Arab world, contributing to better health outcomes. Also, it led the way for future research into sleep disorders in Arabic-speaking populations, enabling researchers and clinicians to more effectively address these conditions within the region. The successful development of this tool underscores the importance of cross-cultural adaptation in the field of sleep medicine and highlights the need for similar efforts across other languages and regions. Moreover, further studies are needed to provide evidence of the internal consistency reliability of the Arabic version of the SLEEP-50 scale. The next step for our research team is to conduct a study to screen sleep disorders in the general population of the Kingdom of Saudi Arabia using the newly developed scale and to assess the internal consistency reliability of the Sleep-50 items.

Ethic Approval: This study was approved by the Standing Committee for Research Ethics on Living Creatures (SCRELC) in IAU IRB number (IRB- 2023-10-160).

Conflict of Interest: Each author declares that he or she has no commercial associations (e.g. consultancies, stock ownership, equity interest, patent/licensing arrangement etc.) that might pose a conflict of interest in connection with the submitted article.

Authors Contribution: N.F: Principal investigator, supervising, drafting, editing, and revision. A.A: Content and Face validity, drafting, data analysis, and investigation. T.S: Analyzing and interpreting data. Y.D: Editing, data analysis, revision.

Declaration on the use of AI: None.

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Supplementary files

Table S1. Items' Content validity items and Scale content validity items for each Subscale from Round 1.

SLEEP-50 Arabic Version		
Item #	**Items**	**I-CVI**
Sleep Apnea		
1	I am told that I snore.	**0.86**
2	I sweat during the night.	**0.57**
3	I am told that I hold my breath when sleeping.	**0.86**
4	I am told that I wake up gasping for air.	**0.71**
5	I wake up with a dry mouth.	**0.57**
6	I wake up during the night while coughing or being short of breath.	**0.57**
7	I wake up with a sour taste in my mouth.	**0.29**
8	I wake up with a headache.	**1.00**
S-CVI/Ave = 0.68.		
Insomnia		
9	I have difficulty in falling asleep.	**0.86**
10	Thoughts go through my head and keep me awake.	**0.43**
11	I worry and find it hard to relax.	**1.00**
12	I wake up during the night.	**0.71**
13	After waking up during the night, I fall asleep slowly.	**0.43**
14	I wake up early and cannot get back to sleep.	**1.00**
15	I sleep lightly.	**0.71**
16	I sleep too little.	**1.00**
S-CVI = 0.78.		
Narcolepsy		
17	I see dreamlike images when falling asleep or waking up.	**0.71**
18	I sometimes fall asleep on a social occasion.	**0.71**
19	I have sleep attacks during the day.	**0.71**
20	With intense emotions, my muscles sometimes collapse during the day.	**0.43**
21	I sometimes cannot move when falling asleep or waking up.	**0.71**
S-CVI= 0.65.		
Restless Legs/PLMD		
22	I am told that I kick my legs when I sleep.	**0.86**
23	I have cramps or pain in my legs during the night.	**0.71**
24	I feel little shocks in my legs during the night.	**0.71**
25	I cannot keep my legs at rest when falling asleep.	**0.71**
S-CVI= 0.75.		

Table S1 (*Continued*)

SLEEP-50 Arabic Version		
Item #	**Items**	**I-CVI**
Circadian Rhythm Sleep Disorder		
26	I would rather go to bed at a different time.	**0.86**
27	I go to bed at very different times (more than 2 hr difference).	**0.71**
28	I do shift work.	**1.00**
S-CVI= 0.86.		
Sleepwalking		
29	I sometimes walk when I am sleeping.	**1.00**
30	I sometimes wake up in a different place than where I fell asleep.	**1.00**
31	I sometimes find evidence of having performed an action during the night I do not remember.	**0.71**
S-CVI= 0.90.		
Nightmares		
32	I have frightening dreams (if not, go to Item 37).	**0.86**
33	I wake up from these dreams.	**0.57**
34	I remember the content of these dreams.	**0.86**
35	I can orientate quickly after these dreams.	**0.71**
36	I have physical symptoms during or after these dreams (e.g., movements, sweating, heart palpitations, shortness of breath).	**0.86**
S-CVI= 0.77.		
Factors Influencing Sleep		
37	It is too light in my bedroom during the night.	**0.86**
38	It is too noisy in my bedroom during the night.	**1.00**
39	I drink alcoholic beverages during the evening.	**0.86**
40	I smoke during the evening.	**0.71**
41	I use other substances during the evening (e.g., sleep or other medication).	**0.43**
42	I feel sad.	**1.00**
43	I have no pleasure or interest in daily occupations.	**0.86**
S-CVI= 0.82.		
Impact of Sleep Complaints on Daily Functioning		
44	I feel tired at getting up.	**1.00**
45	I feel sleepy during the day and struggle to remain alert.	**1.00**
46	I would like to have more energy during the day.	**0.86**
47	I am told that I am easily irritated.	**1.00**
48	I have difficulty in concentrating at work or school.	**0.86**
49	I worry whether I sleep enough.	**0.57**
50	Generally, I sleep badly.	**1.00**
S-CVI= 0.90.		
I-CVI= item content validity index: the number of experts giving a rating of either 3 or 4 (relevance) divided by the total number of experts. S-CVI Ave= average of the I-CVIs.		

Table S2. Items' Content validity items and Scale content validity items for each Subscale from Round 2.

SLEEP-50 Arabic Version		
Item #	**Items**	**I-CVI**
Sleep Apnea		
1	I am told that I snore.	**1.00**
2	I sweat during the night.	**0.86**
3	I am told that I hold my breath when sleeping.	**1.00**
4	I am told that I wake up gasping for air.	**0.86**
5	I wake up with a dry mouth.	**0.86**
6	I wake up during the night while coughing or being short of breath.	**0.86**
7	I wake up with a sour taste in my mouth.	**0.86**
8	I wake up with a headache.	**1.00**
S-CVI/Ave= 0.91.		
Insomnia		
9	I have difficulty in falling asleep.	**1.00**
10	Thoughts go through my head and keep me awake.	**1.00**
11	I worry and find it hard to relax.	**1.00**
12	I wake up during the night.	**1.00**
13	After waking up during the night, I fall asleep slowly.	**1.00**
14	I wake up early and cannot get back to sleep.	**1.00**
15	I sleep lightly.	**1.00**
16	I sleep too little.	**1.00**
S-CVI= 1.00		
Narcolepsy		
17	I see dreamlike images when falling asleep or waking up.	**1.00**
18	I sometimes fall asleep on a social occasion.	**1.00**
19	I have sleep attacks during the day.	**1.00**
20	With intense emotions, my muscles sometimes collapse during the day.	**1.00**
21	I sometimes cannot move when falling asleep or waking up.	**1.00**
S-CVI= 1.00		
Restless Legs/PLMD		
22	I am told that I kick my legs when I sleep.	**1.00**
23	I have cramps or pain in my legs during the night.	**1.00**
24	I feel little shocks in my legs during the night.	**0.86**
25	I cannot keep my legs at rest when falling asleep.	**1.00**
S-CVI= 0.97.		
Circadian Rhythm Sleep Disorder		
26	I would rather go to bed at a different time.	**1.00**
27	I go to bed at very different times (more than 2 hr difference).	**1.00**
28	I do shift work.	**1.00**
S-CVI= 1.00.		

Table S2 (*Continued*)

SLEEP-50 Arabic Version		
Item #	**Items**	**I-CVI**
Sleepwalking		
29	I sometimes walk when I am sleeping.	**1.00**
30	I sometimes wake up in a different place than where I fell asleep.	**0.86**
31	I sometimes find evidence of having performed an action during the night I do not remember.	**1.00**
S-CVI= 0.95.		
Nightmares		
32	I have frightening dreams (if not, go to Item 37).	**1.00**
33	I wake up from these dreams.	**1.00**
34	I remember the content of these dreams.	**1.00**
35	I can orientate quickly after these dreams.	**1.00**
36	I have physical symptoms during or after these dreams (e.g., movements, sweating, heart palpitations, shortness of breath).	**1.00**
S-CVI= 1.00		
Factors Influencing Sleep		
37	It is too light in my bedroom during the night.	**0.86**
38	It is too noisy in my bedroom during the night.	**1.00**
39	I drink alcoholic beverages during the evening.	**1.00**
40	I smoke during the evening.	**1.00**
41	I use other substances during the evening (e.g., sleep or other medication).	**1.00**
42	I feel sad.	**1.00**
43	I have no pleasure or interest in daily occupations.	**1.00**
S-CVI= 0.98.		
Impact of Sleep Complaints on Daily Functioning		
44	I feel tired at getting up.	**1.00**
45	I feel sleepy during the day and struggle to remain alert.	**1.00**
46	I would like to have more energy during the day.	**1.00**
47	I am told that I am easily irritated.	**1.00**
48	I have difficulty in concentrating at work or school.	**0.86**
49	I worry whether I sleep enough.	**1.00**
50	Generally, I sleep badly.	**1.00**
S-CVI= 0.98.		
I-CVI= item content validity index: the number of experts giving a rating of either 3 or 4 (relevance) divided by the total number of experts. S-CVI Ave= average of the I-CVIs.		

Table S3. The validated Arabic translation of the SLEEP-50 scales.

Item #	Items
	مقياس انقطاع التنفس أثناء النوم
1	أخبرني أحدهم أنني أشخر
2	أتعرق أثناء النوم ليلا
3	أخبرني أحدهم بأن نَفَسي ينقطع اثناء النوم
4	أخبرني أحدهم بأنني استيقظ وأنا آخذ نفس عميقاً باحثا عن الهواء
5	استيقظ وفمي وحلقي جافين
6	أستيقظ ليلاً بسبب الكحة أو بسبب ضيق في التنفس
7	عند الاستيقاظ أحس بطعم حامض في فمي
8	أشعر بصداع عندما استيقظ
	مقياس الأرق
9	أجد صعوبة في الدخول في النوم
10	تراودني الأفكار وتبقيني مستيقظاً
11	أعاني من القلق والصعوبة في الاسترخاء
12	أستيقظ أثناء النوم ليلا
13	عندما استيقظ أثناء الليل لا أستطيع العودة للنوم بسهوله
14	أستيقظ مبكِّرا وأجد صعوبة في العودة للنوم
15	أنام نوماً خفيفا
16	أنام قليلاً جداً
	مقياس النوم القهري
17	أرى صوراً تشبه الحلم عند الدخول في النَّوم، أو عند الاستيقاظ
18	يغلبني النوم أحيانا أثناء المناسبات الاجتماعية
19	لديّ نوبات نوم مفاجئة أثناء النهار
20	حين أواجه مشاعر حادة (انفعال شديد)، ترتخي عضلاتي أحيانا أثناء النهار ممَّا يجعلني أسقط
21	أحياناً لا أستطيع الحركة عند الدخول في النوم أو عند الاستيقاظ
	مقياس تململ الساقين
22	أخبرني أحدهم بأنَّني أقوم بتحريك ساقيَّ (أركل) عندما أكون نائماً
23	لدي تشنجات أو ألم في الساقين أثناء النوم ليلا
24	أشعر بتنميل (صعقات او صدمات كهربائية خفيفة) في ساقي أثناء النوم ليلا
25	لا أستطيع إبقاء ساقيَّ ساكنتين (بدون حركة) عند الدخول في النوم ليلا
	مقياس اضطرابات الساعة البيولوجية
26	أفضل الذهاب إلى السرير للنوم في أوقات مختلفة
27	أتوجه إلى السرير للنوم في أوقات مختلفة (قد يصل الفرق إلى أكثر من ساعتين)
28	أنا أعمل بنظام الورديات/ المناوبات
	مقياس المشي أثناء النوم
29	أحياناً أمشي عندما أكون نائما
30	أحياناً أستيقظ في مكان مختلف عن المكان الذي خلدتُ الى النوم فيه
31	أحياناً أجد دليلاً على القيام بعمل أثناء النوم ليلا، إلا أنّي لا أتذكَّره عندما أستيقظ

Table S3 (*Continued*)

Item #	Items
	مقياس الكوابيس
32	لديّ أحلامٌ مخيفةٌ – (إذا لم يكن لديك اذهب للفقرة رقم ٣٧)
33	استيقظ بسبب الاحلام المخيفة
34	أتذكر تفاصيل هذه الأحلام المخيفة
35	أستطيع العودة إلى وعيي الطبيعي فور الاستيقاظ من هذه الأحلام المخيفة
36	تظهر لديَّ أعراض جسدية أثناء الأحلام المخيفة أو بعدها (على سبيل المثال: الحركة والتعرق وخفقان القلب وضيق التنفس)
	مقياس العوامل المؤثرة على النوم
37	إضاءة الغرفة التي أنام بها شديدة أثناء الليل
38	هناك إزعاج شديد في الغرفة التي أنام بها أثناء الليل
39	أتعاطى المشروبات الكحولية اثناء المساء
40	أدخن السجائر أثناء المساء
41	استخدم مواد أخرى (عقاقير) أثناء المساء (مثل أدوية النوم أو غيرها)
42	أشعر بالحزن
43	لا أشعر بالمتعة أو الاهتمام بوظائفي اليومية
	مقياس تأثير مشاكل النوم على الوظائف اليومية
44	أشعر بالتّعب عند الاستيقاظ من النَّوم
45	أشعر بالنُّعاس أثناء النهار، وأجد صعوبةً في البقاء مستيقظاً
46	أود ان يكون لدي مزيد من الطاقة أثناء اليوم
47	أخبرني أحدهم بأنَّه من السهل استفزازي
48	أجد صعوبة في التركيز أثناء العمل أو الدراسة
49	أشعر بالقلق ما إذا كنت أنام بشكل كافي
50	بشكل عام، نومي سيِّئ