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ORIGINAL RESEARCH

Development of the Sleeping Pills Receptivity and Involuntariness Scale-6 (SPRIS-6) to Assess Acceptance of Hypnotics Use

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Background: Assessing an individual's acceptance of sleep medications is valuable for clinicians, as it may be the starting point for discussing the treatment of insomnia, whether pharmacologically or nonpharmacologically. This study developed a rating scale for measuring psychological receptivity to hypnotics and validated it in a general population.

Methods: We conducted an anonymous survey in a general Korean population. First, we developed a rating scale for psychological receptivity to hypnotic use using exploratory factor analysis (EFA) in Sample I (N = 300), followed by confirmatory factor analysis (CFA) in Sample II (N = 300). Convergent validity was assessed using the Insomnia Severity Index (ISI), Glasgow Sleep Effort Scale (GSES), Adaptive Cognition and Behaviors about Sleep-6 (ACBS-6), and Acceptance and Action Questionnaire-II (AAQ-II).

Results: From the EFA, six survey items were selected from the collected items. The CFA among Sample II showed a good fit for the two-factor model (Factor 1: Involuntary nature of insomnia; Factor 2: Acceptance of sleep medication use) of our Sleeping Pills Receptivity and Involuntariness Scale-6 (SPRIS-6) (comparative fit index = 0.99, Tucker–Lewis index = 0.99, root-mean-square-error of approximation = 0.02, and standardized root-mean-square residual = 0.02). According to the multi-group CFA, the two-factor structure of the SPRIS-6 measures psychological receptivity to sleep medications in the same way, regardless of whether or not participants reported insomnia. Using McDonald's coefficient of 0.80, the two-factor structure of the SPRIS-6 demonstrated good internal consistency. Linear regression analysis showed that the ISI score was positively influenced by the SPRIS-6 ($\beta = 0.16$, $p = 0.002$), GSES ($\beta = 0.49$, $p = 0.001$), and AAQ-II ($\beta = 0.18$, $p = 0.001$), whereas it was inversely influenced by the ACBS-6 ($\beta = -0.10$, $p = 0.037$).

Conclusion: The SPRIS-6 is a reliable and valid rating scale that measures psychological receptivity to sleep medication use.

Keywords: insomnia, sleep, cognition, hypnotics and sedatives

Introduction

Insomnia is a multifactorial disorder influenced by physiological, psychological, and environmental factors.[1] The 3P model of insomnia indicates that chronic insomnia is caused by perpetuating factors that persist even when the precipitating factors have been resolved.[2] However, in some cases, insomnia symptoms may be caused by a decrease in brain function due to aging.[3] Slow wave sleep is reported to decrease with aging,[4] showing a notable atrophy in the medial prefrontal cortex.[5] In older adults, melatonin secretion is reduced due to declining neuronal morphology and function.[6] Prolonged-release melatonin (PRM) has been recommended as a treatment option for insomnia in people over 55[7] and in children with autism spectrum disorder,[8] which supports the theory that insomnia could result from a decline in brain function. In light of this evidence, certain patients may require the use of hypnotics for an extended period, as insomnia may be unavoidable. According to the practice guidelines for insomnia,[9] Cognitive-Behavioral Therapy for Insomnia (CBT-I) should be performed before hypnotics are administered. If insomnia symptoms persist despite the removal of precipitating factors and the provision of solutions through CBT-I, hypnotics may be effective in managing insomnia in patients with insomnia. However, clinical practice guidelines suggest that hypnotics can be used over the short term (≤4 weeks)[10,11] and PRM for a maximum of 13 weeks.[12] However, many patients need to take hypnotics for

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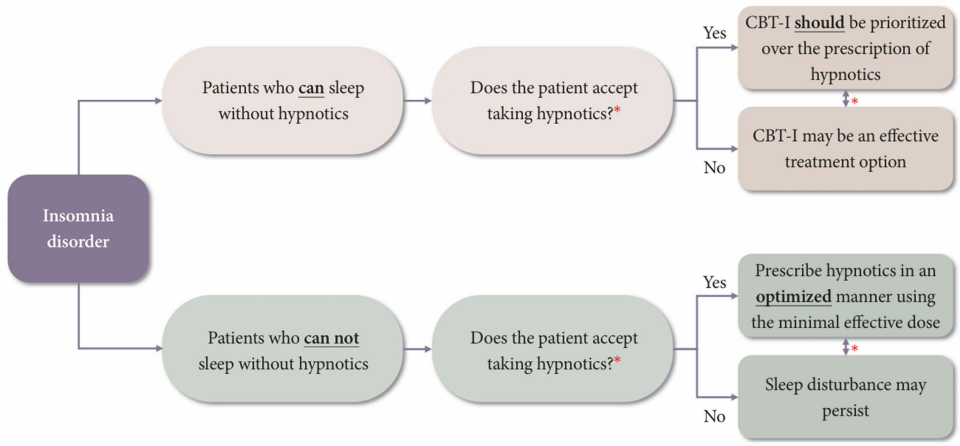

Figure 1 Psychological receptivity to the use of sleep medications in the Multimodal Optimized Treatment for Insomnia Framework. The Multimodal Optimized Treatment for Insomnia Framework is a structured approach to optimize insomnia management. It begins by categorizing patients with insomnia disorders into two groups: those who can sleep without hypnotics and those who cannot sleep without hypnotics. This classification facilitates decision-making for recommending either cognitive-behavioral therapy for insomnia or sleep medications. *Assessing patients' preference to taking sleep medications.
Notes: Adapted with permission from *Chung S. Multimodal Optimized Treatment for Insomnia Framework (MOTIF): A Better Strategy for the Optimal Prescription of Hypnotics. Sleep Med Res 2015;16:129–132.*[13]

longer periods of time to achieve adequate sleep. This discrepancy has resulted in physicians forcing patients to discontinue medications without considering whether they could improve their sleep quality without it. Evidence that insomnia can be caused by functional impairment of the brain suggests that the scope of non-pharmacological treatments is limited. Thus, clinicians should classify patients with insomnia into those who can and cannot sleep without the use of hypnotic medications. In the clinical assessment of patients who are unable to sleep without the aid of hypnotics, it is advisable to permit the use of sleeping pills in an appropriate manner, at least at a low dosage, not restricted to 4 weeks.[13]

Within this context, we propose the Multimodal Optimized Treatment for Insomnia Framework (MOTIF).[13] The framework was developed to help clinicians decide whether to continue prescribing or persuade patients to stop sleep medication by exploring whether patients can or cannot sleep without medications and their acceptance of sleep medication use (Figure 1). To apply this framework, it is important to measure the psychological receptivity of patients with insomnia to hypnotic use. The Insomnia Treatment Acceptability Scale (ITAS) is a rating scale designed to measure one's acceptability to treatments for insomnia.[14] It has items for the acceptability of behavioral treatments for insomnia (ITAS-B)[15] and pharmacological treatment (ITAS-M). The ITAS-M assesses broader treatment-related attitudes, such as willingness, perceived suitability, and expected treatment outcomes. However, the ITAMS-M is different from the scale that we need to develop, which can capture one's beliefs about the involuntary nature of insomnia and psychologically accept sleep medication use to improve sleep quality. For clinicians to help patients continue or stop sleep medications, we need to know patients' beliefs about their insomnia and their acceptance of medication use.

Thus, this study developed a rating scale to measure psychological receptivity to hypnotics, which can capture one's beliefs about the involuntary nature of insomnia and the need for medication to achieve better sleep quality.

Methods

Participants and Procedures

We conducted an anonymous online survey in a general Korean population registered in the professional survey system of the survey company, EMBRAIN. This scale was developed to evaluate the attitudes of patients with insomnia toward sleep medications and to assess the general population's acceptance of sleeping pills. Therefore, this study was conducted using a sample from the general population. The survey was performed in two parts among general population: from October 31 to November 7, 2024 (Sample I) and from November 9 to 14, 2024 (Sample II). The sample sizes for Samples I and II were estimated based on the Central Limit Theorem[16] by allocating 25 samples to 12 cells (two sexes × six age groups: 18–20, 21–30, 31–40, 41–50, 51–60, and 61–70 years) in each sample group, with a target of 300

individuals in each sample. The e-survey form included collected information on the participants' age, sex, marital status, past psychiatric history, and current sleep disturbance, as well as their responses to rating scales. Participants could begin the survey after they selected "yes" to the questions regarding agreement to participate in this study. Their past psychiatric history was assessed by their response to the question, "Have you experienced or been treated for depression, anxiety, or insomnia?" Their insomnia symptoms were assessed by their response to the question, "Do you currently have sleep disturbances?" If the answer was "yes", it was followed by the question, "Do you have a problem with falling asleep, maintaining sleep, or both?"

For Samples I and II, 9517 enrollment emails were sent to participants registered with the survey panels. Of these, 1519 users accessed the survey link and 640 completed the survey. For each of Samples I and II, 300 participants were selected, resulting in 600 responses, excluding the responses of the fastest 5% of respondents in each quota based on the response time. Additionally, responses were excluded if the average time spent between questions was more than three times the overall average time.

Measures

Development of the Scale for Psychological Receptivity to Sleep Medication Use

This scale was developed in accordance with the following processes: 1) identifying the purpose of the scale, 2) formulating appropriate items, 3) removing redundant items, 4) conducting psychometric tests and reducing the number of items, and 5) finalizing the scale.[17]

Thus, the scale measures a person's psychological receptivity to the use of hypnotic medication. The literature was reviewed, and items were collected. In addition, clinical interviews were conducted with patients with insomnia, and the words used by patients with reference to the acceptability of hypnotic medication use were collected by a psychiatrist and sleep specialist (S.C). The authors, who were psychiatrists or psychologists, discussed appropriate items that could be used to assess psychological receptivity to hypnotics and compiled a final list of 10 items. Item responses were rated on a 0–10 Likert scale (0 = strongly disagree, 10 = strongly agree). The final score was the average score of all selected items, with a higher average score reflecting a higher psychological receptivity to sleep medications. To reduce redundant items, exploratory factor analysis (EFA) was conducted using Sample I, followed by confirmatory factor analysis (CFA) using Sample II.

The original Korean versions of the items were developed, and an English version was created using a translation and back translation process. Two bilingual experts translated the Korean version of the scale into English, and two bilingual experts re-translated the English versions into Korean. Another expert compared the original Korean text with the back translated text. Finally, an expert in sleep medicine (S.C.) reviewed the final English version.

Insomnia Severity Index (ISI)

The ISI is a self-report rating scale used to identify the severity of insomnia.[18] This scale has seven items, which can be scored on a 5-point Likert scale. Higher total scores indicate more severe insomnia. The Korean version of the scale was used.[19] Cronbach's alpha for the reliability of internal consistency in Sample II was 0.841.

Glasgow Sleep Effort Scale (GSES)

The GSES is a self-report rating scale that can assess an individual's preoccupation with sleep.[20] It includes seven items that can be scored on a 3-point Likert scale from 0 (not at all) to 2 (very much). Higher total scores reflect higher levels of sleep preoccupation. We used the validated Korean version of the scale in this study.[21] Cronbach's alpha among the participants in Sample II was 0.852.

Adaptive Cognition and Behaviors About Sleep-6 (ACBS-6)

The ACBS-6 is a self-report rating scale that was developed to assess an individual's level of sleep-related adaptive cognition and behavior.[22] It includes six items that can be rated on a Likert scale of 0–10 (0 = strongly disagree, 10 = strongly agree). Higher averaged scores indicate higher levels of sleep-related adaptive cognition and behavior. In this study, the original Korean version of this scale was used. Cronbach's alpha among the participants in Sample II was 0.734.

Acceptance and Action Questionnaire-II (AAQ-II)

The AAQ-II is a self-report rating scale to measure psychological inflexibility.[23] The AAQ-II consists of seven items rated on a 7-point Likert scale (1 = never true, 7 = always true). Three items (1, 6, and 10) were reverse scored. Higher overall scores indicate higher psychological inflexibility. In this study, we used the Korean version of the scale,[24] and Cronbach's alpha for the reliability of internal consistency in Sample II was 0.784.

Ethical Statement

The Institutional Review Board of the Asan Medical Center approved the study protocol (2024–1243). The requirement for written informed consent was waived because the online survey was conducted anonymously. The study was conducted according to the criteria set by the Declaration of Helsinki.

Statistical Analyses

First, using Sample I (N = 300) as the baseline, we performed EFA on the 10 collected items, followed by CFA on Sample II (N = 300). All of the participants in Sample I (N = 300) were checked for skewness and kurtosis within ± 2 to ensure that they met normality assumptions.[25] The Kaiser–Meyer–Olkin (KMO) measure and Bartlett's test of sphericity were used to check the adequacy of the sampling and suitability of the data. EFA was conducted to extract items from the 10 collected items using maximum likelihood estimation. A parallel analysis was conducted to retain the number of factors by comparing eigenvalues generated from randomly simulated datasets of the same size with those generated from the actual data, with the 95th percentile of the simulated eigenvalue distribution taken as the threshold for retention. CFA was used with diagonally weighted least squares estimation to explore good model fits for the developed scale, defined as a standardized root-mean-square residual (SRMR) value of 0.05, a root-mean-square-error of approximation (RMSEA) value of 0.10, a comparative fit index (CFI), and a Tucker–Lewis index (TLI) value of 0.90.[26] Multi-group CFAs using configural, metric, and scale-invariant models were performed to determine whether the developed scale measured psychological receptivity to the use of sleep medications among participants reporting insomnia.

Second, under the item-response theory (IRT) approach, both the Rasch model and the graded response model (GRM) were employed to measure the item-level properties of the scale, leading to a rigorous evaluation of how well each item reflected the underlying latent traits of the scale. In the Rasch model, we examined how closely the actual item responses matched the expected responses based on the infit mean square (MnSq) and outfit MnSq values. The infit and outfit MnSq values <0.5 and >1.7 were considered as the model misfit, with values closer to 1 indicating the item's nearly perfect alignment with the construct to be measured.[27] Moreover, person and item separation indices with their corresponding reliability coefficients were used to assess the scale's discriminative ability at varying levels of the latent trait as well as to check the consistency in item difficulty parameters. Reliability coefficients >0.80 and separation indices ranging from 1.5 to 3.0 represent the measurement precision and consistency, providing information about the overall robustness of the scale.[28]

In the GRM framework, we examined the item discrimination and difficulty parameters of the scale. For discrimination parameters, the suggested cutoffs ranging from 0.1 to 0.34 indicated very low; 0.35 to 0.64, low; 0.65 to 1.34, moderate; 1.35 to 1.69, high; and >1.70, very high discrimination.[29] Item difficulty parameters reflect participants' item response patterns in each category with 50% probability across the varying ability ranges of the latent trait. In addition, item information curves (IICs) and the test information function (TIF) of the scale were examined to gather information on the latent continuum. The R package "mirt" version 1.4.2[29] was used to determine the Q3 coefficients and the R package "ltm" version 1.2.0[30] was applied for the GRM.

Third, McDonald's omega was used to establish the reliability of internal consistency (Sample II). The convergent validity of the scale developed was assessed against preexisting scales, such as the ISI, GSES, ACBS-6, and AAQ-II, using Pearson's correlation coefficients. A linear regression analysis was conducted using the enter method to test whether the developed scale, GSES, ACBS-6, and AAQ-II contributed to the ISI score. JASP software version 0.14.1.0 (JASP team, Amsterdam, The Netherlands) was used for statistical analysis.

Results

General Population Sample

Factor Analysis

Table 1 presents the demographic characteristics of Samples I and II. EFA was conducted using Sample I (N = 300). Before this analysis, the assumption of normality was verified based on the skewness and kurtosis of all items within ± 2, as shown in Table 2. Sampling adequacy and data suitability were confirmed based on the KMO measure (0.820) and

Table 1 Clinical and Demographic Characteristics of the Participants (N = 600)

Variable	Sample I (N = 300)	Sample II (N=300)	P-value
	Mean ± SD, N (%)		
Male, n (%)	150 (50.0%)	150 (50.0%)	1.000
Age (years)	48.7 ± 16.8	48.9 ± 16.7	0.857
Marital status			
Single	92 (30.7%)	105 (35.0%)	0.715
Married, with children	171 (57.0%)	161 (53.7%)	
Married, without children	24 (8.0%)	19 (6.3%)	
Other	13 (4.3%)	15 (5.0%)	
Psychiatric history			
Have you experienced or treated depression, anxiety, or insomnia? (Yes)	62 (20.7%)	46 (15.3%)	0.089
Now, do you have sleep disturbances? (Yes)	82 (27.3%)	87 (29.0%)	0.650
Initiation problem	14 of 82 (17.1%)	17 of 87 (19.5%)	0.903
Maintenance problem	37 of 82 (45.1%)	37 of 87 (42.5%)	
Both	31 of 82 (37.8%)	33 of 87 (37.9%)	
Symptoms rating			
Insomnia Severity Index	10.8 ± 5.8	10.4 ± 5.4	0.345
Glasgow Sleep Effort Scale	4.2 ± 3.2	3.9 ± 3.1	0.222
Adaptive Cognition and Behaviors about Sleep-6	4.9 ± 1.7	5.0 ± 1.6	0.990
Acceptance and Action Questionnaire-II	33.8 ± 9.8	32.4 ± 9.9	0.077

Table 2 Item-Level Properties of the Scale (Sample I, N = 300)

Items	Mean	SD	Skewness	Kurtosis	EFA Factor Loading	
					F1	F2
I think it is acceptable to take sleeping pills to sleep better.	5.60	2.75	−0.51	−0.57	0.85	–
I do not think sleeping pills are any more dangerous than drinking alcohol heavily.	4.98	2.74	−0.26	−0.77	0.86	–
I do not think sleeping pills are stronger in effect than anesthetic injections.	5.63	2.59	−0.48	−0.39	0.80	–

(*Continued*)

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Table 2 (Continued).

Items	Mean	SD	Skewness	Kurtosis	EFA Factor Loading	
					F1	F2
Insomnia is caused by abnormalities in brain function.	5.29	2.38	−0.31	−0.33	–	0.63
Sleep is not something I can control.	4.57	2.54	0.03	−0.64	–	0.54
Sleep does not happen by willpower; instead, it is regulated by the brain.	5.28	2.57	−0.23	−0.55	–	0.79
I think that sleeping well is a skill.	6.55	2.60	−0.83	0.20	–	–
Not everyone can sleep well without sleeping pills.	6.52	2.53	−0.65	−0.01	–	–
It is natural to sleep less as you grow older.	4.27	3.01	0.06	−1.16	–	–
I am naturally someone who does not need much sleep.	3.43	2.75	0.47	−0.75	–	–

Bartlett's sphericity ($p < 0.001$) for Sample I. Using parallel analysis, we identified two factors with actual eigenvalues (3.70 and 1.28) greater than the simulated 95th percentile (1.30 and 1.21). Each factor contained three items: Factor 1 (Involuntary nature) included the items "Insomnia is caused by abnormalities in brain function", "Sleep is not something I can control", and "Sleep does not happen by willpower; instead, it is regulated by the brain". Factor 2 contained the items "I think it is acceptable to take sleeping pills to sleep better", "I do not think sleeping pills are any more dangerous than drinking heavy alcohol", and "I do not think sleeping pills are stronger in effect than anesthetic injections". Based on the factors, we named the scale as Sleeping Pills Receptivity and Involuntariness Scale-6 (SPRIS-6).

As shown in Table 3, a CFA was conducted on Sample II (N = 300) to determine whether the two-factor model of the scale fit well with the model. Its standardized loadings ranged from 0.58 to 0.90, and five items demonstrated strong validity (loadings >0.7). The two-factor structure of our scale, the SPRIS-6, was supported by model fit indices (CFI = 0.99, TLI = 0.99, RMSEA = 0.02, and SRMR = 0.02). The results of the multi-group CFA with a configural, metric, or scale-invariant model showed that the two-factor structure of the SPRIS-6 measured psychological receptivity to the use of sleep medications in the same way, regardless of whether participants reported having insomnia or not.

IRT and Rasch Analysis

The item-level properties of the 11-point SPRIS-6 using the Rasch model revealed that the infit and outfit MnSq values for Factor 1 ranged between 0.62 and 1.39, and those for Factor 2 ranged from 0.83 to 1.16, as shown in Table 4,

Table 3 Factor Loadings of Sleeping Pills Receptivity and Involuntariness Scale-6 From Confirmatory Factor Analysis (Sample II, N = 300)

Factor-Item	Estimate
	Sample II
Factor 1: Involuntary nature of insomnia	
1. Insomnia is caused by abnormalities in brain function.	0.58
2. Sleep is not something I can control.	0.79
3. Sleep does not happen by willpower; instead, it is regulated by the brain.	0.90
Factor 2: Acceptance of sleep medication use	
4. I think it is acceptable to take sleeping pills to sleep better.	0.75
5. I do not think sleeping pills are any more dangerous than drinking alcohol heavily.	0.89
6. I do not think sleeping pills are stronger in effect than anesthetic injections.	0.80

Table 4 Item-Level Psychometric Properties Using the Rasch Model of Item-Response Theory (Sample II)

Item	Item Fit		Reliability		Separation Index	
	Infit Mean Square	Outfit Mean Square	Item	Person	Item	Person
Factor 1: Involuntary nature of insomnia						
Item 1 **Item 2** **Item 3**	1.39 1.01 0.66	1.27 0.90 0.62	0.84	0.80	2.32	2.03
Factor 2: Acceptance of sleep medication use						
Item 4 **Item 5** **Item 6**	1.16 0.87 1.04	1.12 0.83 0.98	0.78	0.81	1.91	2.10

suggesting that the scale items can effectively measure the underlying latent construct. In addition, for the involuntary nature of insomnia (Factor 1), the item (2.32) and person (2.03) separation indices with their corresponding reliability coefficients (0.84 for item and 0.83 for person) were found to be excellent, suggesting the measurement precision and consistency of Factor 1 in discriminating individuals across the latent construct. For Factor 2 (acceptance of sleep medication use) of the SPRIS-6, the separation indices (item = 1.91, person = 2.10) along with the respective reliability coefficients (item = 0.78, person = 0.81) showed good measurement precision and robustness, indicating the indistinct ability of Factor 2 items to provide information across varying levels of the latent trait.

The IRT analysis using the GRM framework indicated that Factors 1 and 2 of the SPRIS-6 have discriminating values (mean α = 3.17; Supplementary Table 1, Figures 2 and 3), reflecting high to very high discriminating power to provide information about the latent traits and effectively distinguish among individuals across the underlying constructs. Moreover, the difficulty parameters (b coefficients) and TIFs, as demonstrated in Supplementary Table 1 and Figure 3A and B, indicate that SPRIS-6 items in both factors provided information about the latent trait across a moderate spectrum of ability ranges with theta values ranging between ± 2.0. However, inspection of the IICs depicted in Figure 2A and B shows that items 4, 5, and 6 of Factor 2 provide the highest level of information (>4 for item 5 and ≥2 for items 4 and 6) regarding the latent trait. For items 1, 2, and 3 of Factor 1, items 2 and 3 provided a sufficient amount of information (>4 for item 3 and =3 for item 2). However, item 1 exhibited a very limited and uniform level of

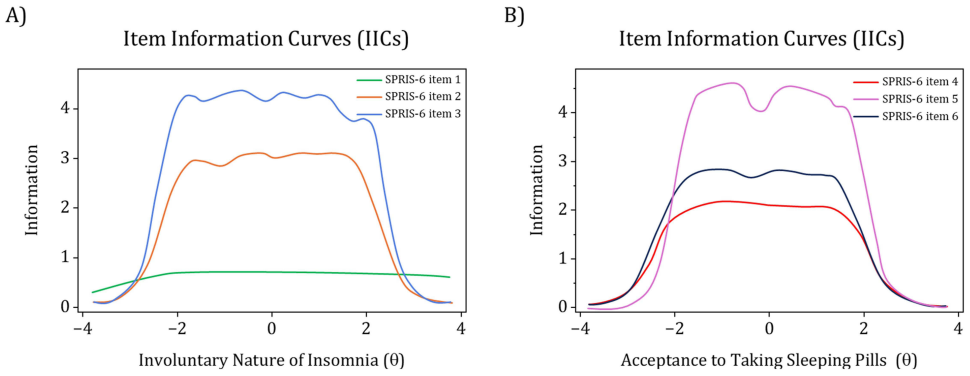

Figure 2 Item information curves for Factor 1: Involuntary nature of insomnia (items 1, 2, and 3; (**A**)) and Factor 2: Acceptance of sleep medication use (items 4, 5, and 6; (**B**)) of the SPRIS-6.

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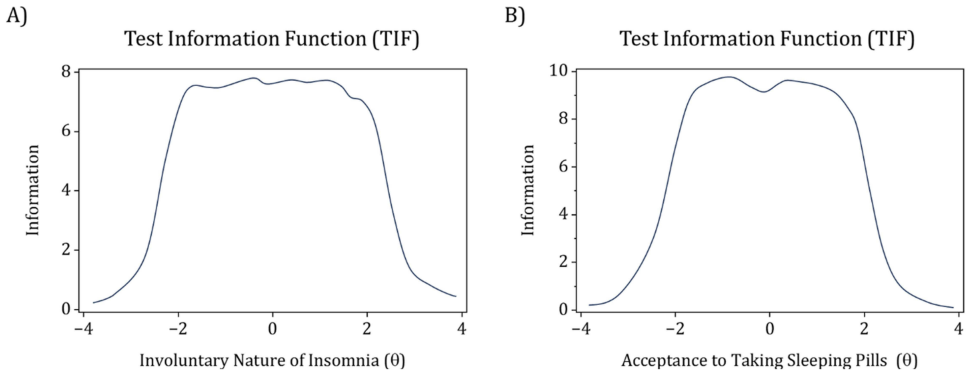

Figure 3 Test information functions (TIFs) of Factor 1: Involuntary nature of insomnia (items 1, 2, and 3; (**A**)) and Factor 2: Acceptance of sleep medication use (items 4, 5, and 6; (**B**)) of the SPRIS-6.

information across the latent traits with indistinct abilities. This observation suggests the need to collapse response categories and ensure sampling heterogeneity in future studies.

Reliability and Evidence Based on Relations to Other Variables

With a McDonald's value of 0.80, the two-factor structure of the SPRIS-6 presented good internal consistency for the Sample II. We investigated the convergent validity of the SPRIS-6 with existing rating scales and found that Factors 1 and 2 and the total score of the SPRIS-6 were significantly correlated with the GSES, ACBS-6, and AAQ-II, as shown in Table 5. To identify the factors contributing to insomnia severity, we conducted a linear regression analysis using the enter method. The ISI score was positively affected by the SPRIS-6 ($\beta = 0.16$, $p = 0.002$), GSES ($\beta = 0.49$, $p < 0.001$), and AAQ-II ($\beta = 0.18$, $p < 0.001$), and it was negatively influenced by the ACBS-6 ($\beta = -0.10$, $p = 0.037$, Supplementary Table 2).

Discussion

We developed a rating scale that could be used to assess an individual's psychological acceptance of hypnotic medication use and developed the six-item scale, SPRIS-6. The SPRIS-6 is a two-factor model with two subscales (Factor 1: Involuntary nature of insomnia; Factor 2: Acceptance of sleep medication use). According to our findings, the SPRIS-6 is a valid and reliable scale. There was an acceptable McDonald's omega (0.80), and the two-factor structure was supported by the model fit indices (CFI = 0.99, TLI = 0.99, RMSEA = 0.02, and SRMR = 0.02) in the general population. Using the SPRIS-6, the degree of psychological receptivity to the use of hypnotic medication was measured in the same way, regardless of whether the participants reported insomnia or not. The development and validation of the SPRIS-6 offers

Table 5 Pearson's Correlation Coefficients for the Variables (Sample II)

Variables	Age	ISI	SPRIS-6 Factor 1	SPRIS-6 Factor 2	SPRIS-6 total Score	GSES	ACBS-6
ISI	−0.15*						
SPRIS-6 Factor 1	0.04	0.28**					
SPRIS-6 Factor 2	0.06	0.28**	0.33**				
SPRIS-6 total score	0.06	0.35**	0.80**	0.83**			
GSES	−0.11	0.62**	0.28**	0.26**	0.33**		
ACBS-6	0.28*	−0.02	0.24**	0.33**	0.35**	0.09	
AAQ-II	−0.23	0.46**	0.37**	0.20**	0.35**	0.45**	−0.01

Notes: *p < 0.05, **p < 0.01.
Abbreviations: ISI, Insomnia Severity Index; SPRIS-6, Sleeping Pills Receptivity and Involuntariness Scale-6; GSES, Glasgow Sleep Effort Scale; ACBS-6, Adaptive Cognition and Behaviors about Sleep-6; AAQ-II, Action and Acceptance-II.

clinicians a valuable tool for assessing the psychological acceptance of hypnotic use in the general population. This scale enables a more precise exploration of public perceptions regarding sleep medications, potentially guiding educational, intervention, and policy initiatives aimed at promoting responsible use of hypnotics.

Under the IRT approach, both the Rasch and GRM models revealed that the newly developed SPRIS-6 had acceptable fit statistics for both factors with respect to item-level properties such as infit and outfit MnSq values, separation indices and corresponding reliability coefficients, and discrimination and difficulty parameters. These properties indicate the measurement precision of the tool, suggesting that the scale items can effectively differentiate between individuals across a moderate spectrum of latent traits. The difficulty parameters showed that the participants responded to each response category of the scale items at varying ability ranges in the case of the involuntary nature of insomnia (Factor 1) and acceptance of sleep medication use (Factor 2). However, one of the Factor 1 items did not provide sufficient information and exhibited indistinct abilities across the underlying traits to be measured. This may be due to the under-reporting of some categories in that item, suggesting merging the response categories to obtain more precise information regarding the latent trait across distinct and varying ability ranges for Factor 1. However, using diverse samples in future validation studies, along with the reevaluation of response categories and the assessment of item functioning, will provide further insight into whether robust psychometric properties and measurement precision will be identified in future studies, as observed in the present study.

The SPRIS-6 score contributed positively to insomnia severity in the linear regression analysis, in parallel with the GSES score (on sleep effort or preoccupation with sleep). The results suggest that someone who is unable to sleep well may accept the use of sleep medication. Furthermore, the positive contribution of the GSES to the ISI shows that it is feasible that individuals seeking more sleep may be prone to accepting hypnotics. However, many individuals with insomnia exhibit resistance to hypnotics. Several studies in the medical literature suggest that patients with insomnia are afraid to take hypnotics, largely due to fear of addiction, loss of natural sleep, and drug-related side effects.[31–33] Many people are concerned about or dissatisfied with pharmacological insomnia treatments due to these concerns. We developed an SPRIS-6 to measure such responses. Based on the MOTIF,[13] it is necessary to categorize patients with insomnia into those who can sleep without hypnotics and those who cannot. Following this classification, patients' receptivity to the use of hypnotic medication may be a critical factor in determining appropriate treatment strategies. Patients who cannot sleep without medication and refuse to take hypnotics may experience sleep disturbances. However, CBT-I may be the best option for patients who can sleep without medication and refuse to take sleeping pills. If patients who cannot sleep without medication accept the use of hypnotic medication, clinicians have a duty to prescribe them appropriately, at least at a low dosage and as needed. However, if patients who can sleep without medication accept hypnotics, clinicians should monitor and instruct them to receive CBT-I instead of hypnotics alone. This study only developed the scale using a sample from the general population. It cannot identify whether participants can be classified into one group or another. This implies that the positive contribution of the SPRIS-6 to the ISI can vary according to the sample characteristics. Further studies on clinical insomnia samples are required.

A significant positive correlation was found between the SPRIS-6 and the ACBS-6 in this study. The ACBS-6[22] was designed to measure adaptive cognition and behaviors regarding sleep. Adaptive sleep-related cognition refers to a relatively positive attitude toward sleeplessness. This cognition could be linked to the statement, "I do not require sleeping pills". Conversely, adaptive cognition may lead to the decision to take sleeping pills. The ACBS-6 score contributed inversely to the ISI score in the linear regression analysis, despite the positive contribution of the SPRIS-6. While adaptive sleep-related cognition may be related to decreased insomnia severity, the receptivity to the use of sleeping pills may be related to increased insomnia severity. However, this complex relationship needs to be explored among individuals with insomnia symptoms in future studies, as this study was conducted among the general population.

Psychological inflexibility, as measured by the AAQ-II, was significantly and positively correlated with the SPRIS-6 in this study. According to the Acceptance and Commitment Therapy framework, psychological flexibility and acceptance are critical for stress reduction; therefore, we expected an inverse association between psychological receptivity to the use of sleep medications and AAQ-II scores. In addition, a positive correlation was found between the SPRIS-6 and ISI. These results suggest that individuals with higher stress levels or severe insomnia may be more likely to use sleep

medications. These results may be due to the fact that over 70% of the participants in this study did not have insomnia. They may not perceive the need to accept the use of sleep medications because they do not experience the condition. These findings require further investigation in subsequent studies involving individuals with insomnia.

This study had certain limitations. First, this study was conducted among the general population, and participants' insomnia was assessed using a single, simple question. While this approach may introduce bias due to the absence of a formal diagnosis or detailed assessment, the study's primary objective was to develop a rating scale to measure individuals' acceptance of sleep medication use. Consequently, the survey was administered to a sample of the general population. However, future studies will require a more detailed assessment of insomnia. Second, this was a cross-sectional survey and not a longitudinal follow-up study design. Thus, we could not determine the causal relationship between psychological receptivity to the use of hypnotic medication and insomnia severity. Third, the anonymous online survey could have limitations due to bias in the participants' responses. It might be necessary to assess such biases, although a range of rating scales in the sleep medicine field have been validated using anonymous samples.[34,35]

In conclusion, we developed the SPRIS-6 to assess an individual's psychological acceptance to the use of hypnotics. It is a reliable and valid rating scale based on a two-factor structure. The findings indicate that the SPRIS-6 effectively measures receptivity to sleep medication consistently across individuals, irrespective of whether they report insomnia. This scale will assist clinicians in assessing patients' receptivity to the use of hypnotic medication. This may serve as a starting point for discussions between clinicians and patients regarding the prescription or discontinuation of sleep medications.

Data Sharing Statement

The data will be made available by the authors upon reasonable request.

Author Contributions

Conceptualization: Seockhoon Chung and Mohd. Ashik Shahrier. Data curation: Seockhoon Chung. Formal analysis: Seockhoon Chung and Mohd. Ashik Shahrier. Methodology: Seockhoon Chung and Mohd. Ashik Shahrier. Funding: Seockhoon Chung. Writing—original draft: Seockhoon Chung and Mohd. Ashik Shahrier. Writing—review and editing: Seockhoon Chung and Mohd. Ashik Shahrier.

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Disclosure

The authors have no competing interests to declare.

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