

Cross-Cultural Adaptation And Psychometric Validation Of The Youth Self-Rating Insomnia Scale (Ysis) Into Bangla

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KEYWORDS

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ABSTRACT:

Background: Insomnia in adolescence is common and half of adolescents with insomnia also report comorbid psychiatric disorders. Insomnia has many adverse general and mental health impacts in adolescents in different domains like physical health, school performance, behavioral and cognitive function, delinquency, substance use, depression, self-harm behavior, suicidal ideation, etc. There is lack of any structured instrument for assessment of insomnia in adolescents in the Bangladesh context.

Aim of the study: The goal of this study was to adapt and determine the psychometric properties of the Youth Self-Rating Insomnia Scale (YSIS) Bangla version in a sample from Bangladeshi adolescents.

Methods: This was a cross-sectional validation study that took during the period of October 2021 to September 2023. Beforehand, study approval was granted by Institutional Review Board (IRB). At first, Bangla adaptation of the scale was done by following standard procedures – forward translation, synthesis, backward translation, expert committee review and pretesting. By purposive sampling, a total of 84 adolescents with insomnia complaint were enrolled from Bangabandhu Sheikh Mujib Medical University. After taking their informed written consent, sociodemographic and relevant information like age, sex, family type, educational level, history of mental illnesses, etc. were collected. Then they were requested to fill Bangla adapted version of YSIS. Data were collected by face-to-face interview and analyzed using SPSS 26.0 and CBID software.

Result: The expert committee approved the Bangla version of the YSIS questionnaire. Internal consistency was assessed using Cronbach's alpha and yielded a high value of $\alpha = 0.935$, indicating good reliability. Each item of the questionnaire exhibited strong positive correlations (above 0.7) with the total score. Confirmatory factor analysis supported both a one-factor and a two-factor model based on satisfactory comparative fit index (CFI) and Tucker-Lewis Index (TLI) values (>0.90). However, the chi square/df and Root Mean Square Error of Approximation (RMSEA) values suggested that the model fit was not ideal. To explore the underlying structure of the observed measurements, an exploratory factor analysis using the principal component analysis method was conducted. It revealed a one-factor solution with eigenvalues exceeding 1.0, which was further supported by parallel analysis. Together, this factor structure accounted for 69.8% of the variance. No changes were made to the item structure since removing any item did not significantly impact the Cronbach's alpha value.

Conclusion: Considering all the results, the YSIS Bangla questionnaire was deemed valid and reliable.

INTRODUCTION

Sleep is a fundamental behavioral process, particularly crucial during adolescence, a period marked by rapid neurodevelopment and psychological transformation. Adolescents typically spend one-third or more of their day asleep, with sleep-related brain activity playing a vital role in cortical maturation, cognitive function, and emotional regulation [1]. Beyond its developmental contributions, sleep serves essential physiological functions including metabolic regulation, immune response, thermoregulation, cardiovascular stability, and respiratory efficiency, thereby maintaining systemic and cerebral homeostasis. Sleep also supports cognitive and psychological processes such as learning, memory consolidation, problem solving, creativity, and emotional regulation [2]. In Bangladesh, the National Mental Health Survey 2018–2019 reported a sleep-wake disorder prevalence of 0.6% among adolescents (0.7% in boys, 0.5% in girls), underscoring the clinical significance of sleep disturbances in this demographic [3]. According to the International Classification of Sleep Disorders, 3rd Edition (ICSD-3), insomnia disorder is characterized by difficulty initiating sleep (DIS), difficulty maintaining sleep (DMS), or early morning awakening (EMA), despite adequate sleep opportunity, leading to significant daytime impairment. Similarly, the DSM-5 defines insomnia as dissatisfaction with sleep quantity or quality, linked to sleep initiation, maintenance, or early awakening issues, accompanied by distress or functional impairments in academic, occupational, or social domains [4]. For a diagnosis of chronic insomnia, both classifications require symptoms to occur at least three times a week for a minimum duration of three months. Insomnia is notably prevalent in adolescents, particularly in older age groups, and its frequency is comparable to other psychiatric conditions like depressive disorders [5]. Furthermore, sleep disturbances are frequently comorbid with mental health disorders, amplifying their adverse impact [5,6]. Insufficient and poor-quality sleep in adolescents has far-reaching consequences across physical, emotional, and cognitive domains. It is associated with systemic inflammation, academic underachievement, cognitive dysfunction, behavioral issues, delinquency, substance abuse, depressive symptoms, self-harm behaviors, and suicidal ideation [7-12]. Recommended sleep durations vary with age, ranging from 9–11 hours for 6–13 years, 8–10 hours for 14–17 years, and 7–9 hours for older adolescents [13]. Approximately 10% of adolescents meet DSM-5 diagnostic criteria for insomnia, while over 33% report experiencing at least some insomnia symptoms [14]. Despite the availability of several assessment tools such as the Insomnia Severity Index (ISI), Pittsburgh Sleep Quality Index (PSQI), and Athens Insomnia Scale (AIS), most are not tailored for adolescents [15]. Tools like the Pediatric Sleep Questionnaire and the Sleep Habits Survey exist but lack adolescent-specific design [16-18]. To address this gap, the Youth Self-Rating Insomnia Scale (YSIS), an 8-item self-administered questionnaire, was developed to assess insomnia severity among adolescents [15]. The YSIS evaluates sleep symptoms through a Likert-type scale measuring aspects like sleep initiation, maintenance, satisfaction, and impact on daily functioning. The present study aims to evaluate the psychometric properties of the YSIS in Bangladeshi adolescents attending a tertiary care hospital.

METHODOLOGY & MATERIALS

This cross-sectional validation study was conducted at the Outpatient and Inpatient Departments of Psychiatry, the Child and Adolescent Mental Health Clinic of the Department of Psychiatry, and the Department of General Pediatrics at Bangabandhu Sheikh Mujib Medical University (BSMMU), Dhaka. The study was carried out over a two-year period, from October 2021 to September 2023, and focused on evaluating the psychometric validity and reliability of the Bangla version of the Youth Self-Rating Insomnia Scale (YSIS-B) among adolescents with sleep complaints. A total of 90 participants were approached, and 80 were enrolled through purposive sampling.

Inclusion criteria

- Age: 11 years to 18 years.
- Adolescents with insomnia due to any cause (primary, psychiatric and physical illness)
- Those who could read and interpret the Bengali language

Exclusion criteria

- Patient who was illiterate, could not read and interpret Bangla

Ethical Considerations

The study protocol was approved by the Institutional Review Board (IRB) of BSMMU. Written informed consent was obtained from parents or legal guardians, along with assent from adolescents. Participant confidentiality and anonymity were strictly maintained throughout the study.

Data Collection Procedure

The data collection process was conducted through structured, face-to-face interviews in a clinical setting. Adolescents aged 11 to 18 years with self-reported sleep-related concerns were invited to participate. At the outset, the researcher greeted both the adolescents and their parents or guardians, followed by a clear explanation of the study's objectives, procedures, and ethical considerations. Participants were informed about their right to withdraw at any stage without any consequences. After obtaining written informed consent from the guardians

and assent from the adolescents, interviews were conducted in a private setting to ensure confidentiality and comfort. A semi-structured questionnaire was used to gather socio-demographic and relevant background information, including age, sex, religion, education level, family type, and family history of psychiatric illness. This instrument was developed based on a comprehensive literature review, expert consultation with psychiatrists, and clinical observation to ensure that the domains and categories were both comprehensive and culturally appropriate. Following the interview, participants were provided with the Bangla version of the Youth Self-Rating Insomnia Scale (YSIS) to complete. The YSIS is a self-administered, time-efficient screening tool comprising eight items that assess insomnia symptoms and their severity over the past month. Upon completion of the questionnaire, the researcher collected the responses and thanked each participant for their cooperation. The entire process, including the interview and questionnaire completion, took approximately 10 minutes per participant.

Statistical Analysis

Data were entered and analyzed using SPSS version 27. Descriptive statistics were used for demographic variables. Internal consistency was assessed using Cronbach's alpha and item-total correlation. Content validity was evaluated via the Content Validity Index (CVI) at both item (I-CVI) and scale (S-CVI) levels. Construct validity was examined through Confirmatory Factor Analysis (CFA) using fit indices including Chi-square/df, RMSEA, CFI, and TLI. Exploratory Factor Analysis (EFA) was conducted using principal component analysis with scree plot and parallel analysis. Sampling adequacy for factor analysis was confirmed using the Kaiser-Meyer-Olkin (KMO) test and Bartlett's test of sphericity.

RESULT

The study included 84 adolescents, evenly distributed between the 11–14 and 15–18 age groups, with a mean age of 14.52 ± 2.32 years. Gender distribution showed 44% male and 56% female participants. Educational background indicated that the majority were at the secondary level, followed by primary and higher secondary levels; none reported having no education. Most adolescents came from nuclear families and resided in urban areas. The dominant religion was Islam, with a small proportion identifying with other religions (Table 1). Table 2 presented the item characteristics of the YSIS Bangla version. All items demonstrated strong correlations with the total score, ranging from 0.78 to 0.87. The item difficulty initiating sleep had the highest mean score, while daytime functioning impairment had the lowest. Internal consistency remained high across all items, with Cronbach's alpha if item deleted values ranging from 0.92 to 0.93. Table 3 confirmed the overall reliability of the scale, showing a Cronbach's alpha of 0.935 and a standardized alpha of 0.938, indicating excellent internal consistency. Content validity findings in Table 4 revealed that most items received the highest relevance rating from expert reviewers. Item-CVI scores were either 1 or 0.83, supporting strong content validity for the Bangla version of the scale. Table 5 showed that the confirmatory factor analysis provided acceptable model fit indices for both the single and two-factor models. The RMSEA, CFI, and TLI values demonstrated good model adequacy despite a significant chi-square value. Table 6 summarized the results from the parallel analysis, where only the first factor had an initial eigenvalue exceeding the randomly generated ones, supporting a one-factor solution. Figure 1 illustrated standardized parameter estimates from the two-factor model, with all item loadings above 0.70 and a high inter-factor correlation. Figure 2 represented the scree plot analysis, where only one component had an eigenvalue greater than one. Exploratory factor analysis confirmed that this single factor explained 69.8% of the total variance. Table 7 highlighted the factor structure, with factor loadings ranging from 0.796 to 0.88 and extracted communalities between 0.634 and 0.774, indicating a strong and coherent underlying construct.

Table 1: Sociodemographic characteristics of responding adolescents (N=84)

Characteristic	Frequency (n)	Percentage (%)
Age group (year)		
11-14	42	50
15-18	42	50
Mean ± SD	14.52±2.32	
Gender		
Male	37	44
Female	47	56
Education		
No education	0	0
Primary	17	20
Secondary	51	61
Higher secondary	16	19
Family type		
Nuclear	68	81

Extended	16	19
Residence		
Urban	54	64.3
Rural	30	35.7
Religion		
Islam	77	91.7
Others	7	8.3

Table 2: Distribution of item characteristics of YSIS Bangla version

Item	Mean±SD	Correlation coefficient with total score	Cronbach's alpha if item deleted
Poor sleep quality	3.13±1.09	0.86	0.93
Sleep dissatisfaction	3.06±1.05	0.8	0.93
Difficulty initiating sleep	3.3±	0.78	0.93
Difficulty maintaining sleep	2.62±1.39	0.87	0.92
Early morning awakening	2.5±1.47	0.82	0.93
Sleep insufficiency	2.92±1.47	0.85	0.93
Unrefreshing sleep	2.56±1.5	0.87	0.92
Daytime functioning impairment	2.14±1.42	0.84	0.93

Table 3: Internal consistency of YSIS Bangla version

Reliability statistics		
Number of items	Cronbach's alpha	Standardized Cronbach's alpha
8	0.935	0.938

Table 4: Content validity of YSIS Bangla version

Item	Number of very relevant response	Item-CVI
Poor sleep quality	6	1
Sleep dissatisfaction	5	0.83
Difficulty initiating sleep	6	1
Difficulty maintaining sleep	6	1
Early morning awakening	6	1
Sleep insufficiency	5	0.83
Unrefreshing sleep	6	1
Daytime functioning impairment	6	1

Table 5: Goodness of fit indicators of YSIS Bangla version

YSIS Bangla	Chi-square	df	P	Chi-square/df	RMSEA	CFI	TLI
Full scale (single factor)	88.9	20	0	4.44	0.204	0.993	0.991
Full scale (two factor)	88.4	19	0	4.65	0.21	0.993	0.99

Table 6: Parallel analysis

Factor	Initial eigenvalues in sample	Randomly selected eigenvalues
1	5.59	1.47
2	0.8	1.28
3	0.42	1.14
4	0.4	1.04
5	0.28	0.92
6	0.2	0.82
7	0.16	0.71
8	0.11	0.59

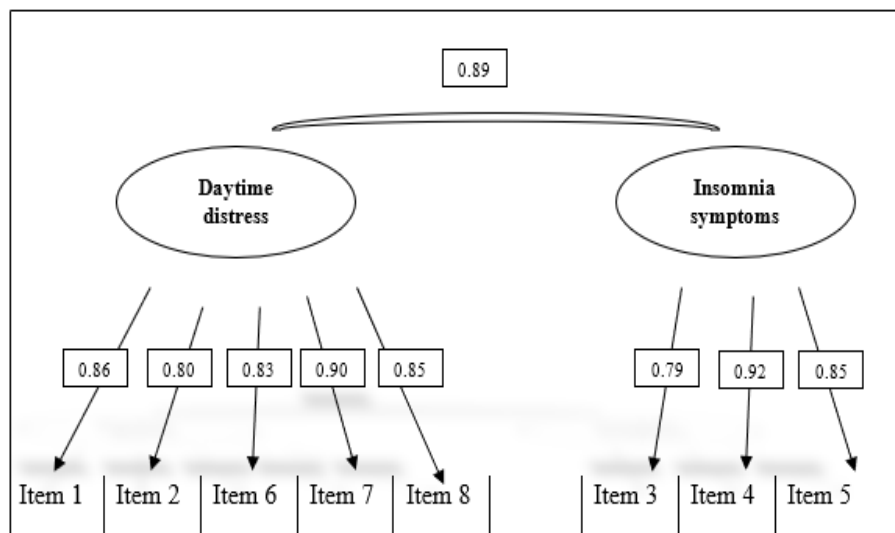


Figure 1: Standardized parameter estimates from confirmatory factor analysis (N=84)

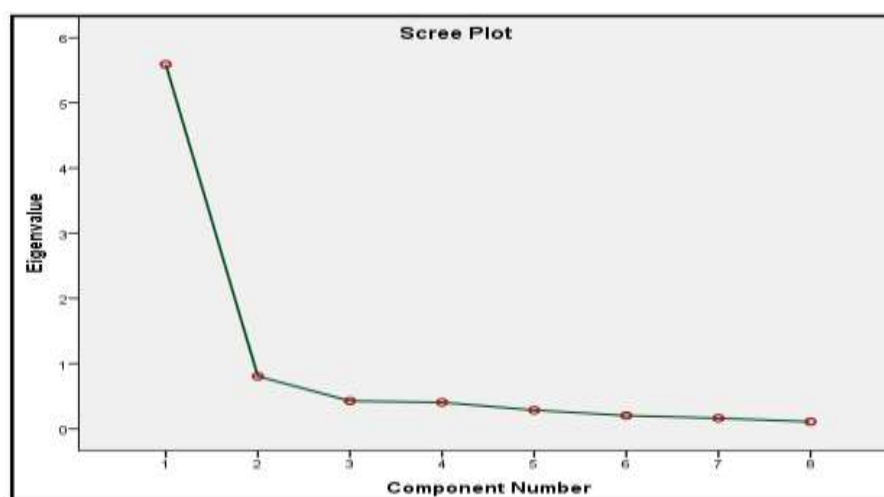


Figure 2: Scree plot analysis of YSIS Bangla version

Table 7: Factor structure of YSIS Bangla version

Item	Factor loading	Extracted communality
Item 1	0.88	0.774
Item 2	0.82	0.672
Item 3	0.796	0.634
Item 4	0.864	0.747
Item 5	0.799	0.639
Item 6	0.833	0.694
Item 7	0.86	0.74
Item 8	0.832	0.692
Percentage of variance explained	69.88	

DISCUSSION

Using reliability and validity analysis techniques in a sample of adolescents with insomnia complaint, YSIS Bangla version could be considered a standardized tool for assessing insomnia [19]. The present study sought to explore whether the YSIS Bangla is an effective measure to assess insomnia in the context of Bangladesh culture. A total of 84 adolescents participated in the YSIS standardization, with a mean age of 14.5 years. Given that the sample was purposively selected from individuals aged 11 to 18, this average aligns with the target demographic. Bangladesh has approximately 36 million adolescents, constituting nearly one-fifth of the national population aged 10–19 years, indicating that the sampled age range represents a significant portion of the adolescent population [20]. Females comprised 56% of the sample. The national sex ratio is 1.024 males per 1,000 females

[20]. Previous studies have noted a higher prevalence of insomnia among females. In 2020, the youth literacy rate in Bangladesh, defined as the percentage of individuals aged 15 to 24 who are literate, was 94.46%, according to World Bank data [21]. Moreover, 81% of the adolescents in the sample lived in nuclear families. The rise in nuclear family structures in Bangladesh has been linked to factors such as increased female literacy, participation in economic activities outside the home, enhanced female mobility, contraceptive use, and urbanization [22]. Among the adolescents, 64.3% were urban residents. Despite Bangladesh being predominantly rural in 2020, with 66% of the population in rural areas, future growth is expected to be exclusively urban. By 2039, the majority of the population is projected to live in urban areas, reflecting ongoing urbanization. A family history of mental illness was reported by one-fourth of respondents. Barsisa et al. found such history in 14.4% of individuals with common mental disorders [23]. Heritability estimates from sibling studies range from 0.30 for major depression to 0.80 for ADHD, and approximately 0.50 for OCD [24]. Family history is more common in neurodevelopmental and severe psychiatric disorders. In reliability assessment, item-total correlation reflects the association between individual items and the total scale score, indicating internal consistency [25]. An item-total correlation of ≥ 0.30 suggests the item reflects similar underlying behaviors, indicating strong internal consistency of the scale [26]. Item analysis of the YSIS revealed strong positive correlations with the total score, with values exceeding 0.70. As no item fell below the 0.30 threshold, all items were retained. Liu et al. also found that all items in the original scale were positively and moderately to highly correlated with the total score [15]. In this study, the Cronbach's alpha for the full scale was 0.935, compared to 0.82 (omega) and 0.80 (Cronbach's alpha) for the original scale [15]. A Cronbach's alpha above 0.70 is typically deemed acceptable for research purposes, and the value obtained in this study exceeds this threshold, indicating strong internal consistency [27]. Face and content validity, considered less robust forms of validity, were assessed using the Content Validity Index (CVI). The Item-CVI (I-CVI) for each YSIS Bangla item was above 0.79, indicating no need for further revisions. The Scale-level-CVI (S-CVI) was calculated as the average of I-CVIs, yielding an S-CVI/Ave of 0.958, confirming excellent content validity for the YSIS Bangla instrument. According to Zamanzadeh et al., an I-CVI above 0.79 indicates item relevance, while values between 0.70 and 0.79 suggest revision, and values below 0.70 necessitate elimination [28]. An S-CVI/Ave of 0.90 or higher indicates excellent content validity [29]. The YSIS Bangla version demonstrated an S-CVI/Ave greater than 0.90, confirming its excellent content validity. Construct validity is typically assessed via confirmatory factor analysis (CFA) or exploratory factor analysis (EFA). While EFA uses models like principal component analysis, CFA is preferred for established scales. In this study, CFA was used to assess construct validity, focusing on model fit and factor loadings. Model fit assessment is crucial in CFA. Key model fit indices in CFA include the chi-square statistic, comparative fit index (CFI), and root mean square error of approximation (RMSEA). The chi-square statistic measures how well the observed data fit the proposed model, while a CFI value greater than 0.90 indicates a good fit [30]. The RMSEA indicates model fit, with values of 0.01, 0.05, and 0.08 representing excellent, good, and mediocre fits, respectively. Some sources consider values up to 0.10 as mediocre. An RMSEA p-value greater than 0.05 suggests poor fit [31]. Another fit statistic, the Tucker-Lewis Index (TLI), ranges from 0 to 1, with values above 0.90 indicating a good fit. These indices together offer insights into model fit in CFA. In our CFA, we tested both a two-factor model (insomnia symptoms and daytime distress) and a one-factor model. The two-factor model showed poor fit, with a chi-square/df value of 4.65 and an RMSEA of 0.210. However, both CFI and TLI values exceeded 0.90, indicating a good fit. The original study reported $\chi^2(18) = 486.24$, $p < 0.01$, RMSEA of 0.067, and CFI of 0.965 [15]. For the one-factor model, the chi-square/df value was 4.44, and the RMSEA was 0.204, suggesting poor fit. However, like the two-factor model, the CFI and TLI values were both above 0.90, suggesting a good fit. Therefore, the CFA results were inconclusive. Consistent with our findings, Liu et al. stated, "The one-factor model did not fit adequately to the data. The fit of the two-factor model was much better, although it was still not adequate" [15]. In exploratory factor analysis, the Kaiser-Meyer-Olkin (KMO) coefficient was 0.868, and Bartlett's test of sphericity produced a p-value of 0.000, indicating that factor analysis was appropriate [32]. Principal component analysis identified a single component with an eigenvalue greater than 1, explaining 69.8% of the variance, suggesting strong relationships among items and their contribution to the construct. Parallel analysis supported a one-component model, as the eigenvalues from the YSIS Bangla dataset exceeded those from randomly generated matrices [33,34]. The adaptation of the Youth Self-Rating Insomnia Scale (YSIS) from Liu et al. was successfully carried out for the adolescent population in Bangladesh, with cultural variations influencing the instrument's applicability [15,35].

Limitations of the study:

- The findings may not be fully representative of all Bangladeshi adolescents due to unaddressed socioeconomic, cultural, and regional differences.
- The scale was applied only to adolescents aged 11 to 18 years, excluding 10- and 19-year-olds as defined by the WHO.
- Alternative factor structures were not explored beyond the one-factor model identified.
- Convergent and discriminant validity were not assessed, limiting the depth of psychometric evaluation.

CONCLUSION

This research successfully adapted and validated the YSIS into the Bangla language for use in assessing insomnia in the adolescent population of Bangladesh. The psychometric properties of the YSIS Bangla were found to be robust, with strong internal consistency and strong content validity.

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Ethical approval: The study was approved by the Institutional Ethics Committee.

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