Validity and Reliability of Bergen Insomnia Scale (BIS) Among Adolescents

Adölesanlarda Bergen Uykusuzluk Ölçeğinin Geçerlik ve Güvenirliği

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ABSTRACT

Objective: The aim of this research was to examine validity and reliability of the Turkish version of the Bergen Insomnia Scale (BIS) in adolescents.

Methods: The scale was applied to a total of 1293 adolescents and 110 students were retested four weeks later. While content and construct validity analyses were carried out for validity of the scale, internal consistency and test-retest analysis was used for the reliability. Content validity of the scale was evaluated by opinions from 10 experts, construct validity via confirmatory factor analysis, internal consistency via Cronbach's alpha reliability coefficient, test-retest results via Pearson's correlation analysis.

Results: Cronbach's alpha reliability coefficient of Bergen Insomnia Scale was found as 0.72. Item – total correlations were ≥0.36 and test-retest correlation was 0.74. Content validity index was found to be 99%, there was agreement between experts, the items in the scale were suitable for our culture, and it represented the structure which was intended to be measured. Confirmatory factor analysis confirmed the structure of BIS consisting of 6 questions and 2 factors.

Conclusion: Bergen insomnia scale was found to be reliable and valid. The scale can be used to measure insomnia in Turkish adolescents.

Keywords: Bergen Insomnia Scale, validity, reliability

ÖZ

Amaç: Bu çalışmanın amacı Bergen Uykusuzluk Ölçeği Türkçe formunun (BUÖ) adölesanlarda geçerlik ve güvenirlik çalışmasını yapmaktı.

Materyal Metot: Ölçek toplam 1293 adölesana uygulandı ve dört hafta sonra 110 öğrenciye tekrar test yapıldı. Ölçeğin geçerliği için kapsam ve yapı geçerliği analizleri, güvenirliliği için iç tutarlılık ve test-tekrar test analizi kullanıldı. Ölçeğin kapsam geçerliği 10 uzmanın görüşü, yapı geçerliği doğrulayıcı faktör analizi, iç tutarlılığı Cronbach alfa güvenirlik katsayısı, test-tekrar test sonuçları Pearson korelasyon analizi ile değerlendirildi.

Bulgular: Bergen Uykusuzluk Ölçeğinin Cronbach alfa güvenirlik katsayısı .72 bulundu. Madde-toplam korelasyonları ≥.36 ve test-tekrar test korelasyonu .74 bulundu. Kapsam geçerliği indeksi .99 bulunarak uzmanlar arası görüş birliği olduğu, ölçekte bulunan ifadelerin kültürümüze uygun olduğu ve ölçülmek istenen yapıyı temsil ettiği belirlendi. Doğrulayıcı faktör analizi BUÖ'nin 6 soruluk 2 faktörlü yapısını doğruladı.

Sonuç: Bergen uykusuzluk ölçeği güvenilir ve geçerli bulundu. Ölçek Türk toplumundaki adölesanlarda uykusuzluğu ölçmek için kullanılabilir.

Anahtar Kelimeler: Bergen uykusuzluk ölçeği, geçerlik, güvenirlik

INTRODUCTION

Insomnia is a chronic problem characterized with difficulty in starting and maintaining sleep and having a quality sleep and as a conclusion disorders in daytime functionality although there is adequate opportunity and possibility for sleep (1). Epidemiological studies on insomnia report quite different data varying between approximately 2% and 48% prevalence. It is thought that this variance is related to the definition of insomnia and variations in collection and interpretation of the data.

According to the diagnosis criteria of the International Classification of Sleep Disorders (ICSD-3) and Diagnostic and Statistical Manual of Mental Disorders (DSM-5), sleep-wake disorder is characterized with one or more of the symptoms of difficulty in starting sleep, difficulty in maintaining sleep, waking up early in the morning are present at least three times a week and at least for three months and with the dissatisfaction with the amount or quality of sleep (1, 2). This dissatisfaction is accompanied by significant disturbance or disorder in daytime functions. When these

standard criteria are used, it is estimated that 6-10% of the adults meet sleep-wake disorder criteria (3).

In the literature, it is reported that adolescents and young people also have sleep related problems (4). In their study carried out with 1807 students with an average age of 15.1 in our country in 2010, Bülbül et al. determined that 17.2% of the student had difficulty in falling asleep, 12.7% had difficulty in waking up in the morning and 9.3% wake up at night frequently and without a reason.

It is stated that most of the individuals who have insomnia problem are not medically diagnosed. In a study conducted in France, it was reported that only 53% of the severe insomnia cases and 27% of the ones who have occasional sleep problems see a doctor specifically for insomnia (3). This result indicates the importance of defining the problem of insomnia within the society.

There are numerous self-report surveys which assess insomnia in the literature. Bergen Insomnia Scale (BIS) based on DSM-4 insomnia diagnosis criteria was developed by Pallesen et al. in 2008. The scale is composed of two factors measuring day-nocturnal symptoms and 6 questions. Since it is short and easy to implement, it is suitable especially for epidemiological studies and screenings. Unlike other scales, Bergen Insomnia Scale specifies that the time passed while falling asleep and waking up in the night is 30 minutes. Moreover, it includes the number of days in which problem is encountered in a week instead of words such as "never", "occasionally" which are included in many scales (5).

Psychometric analyses of the original form of Bergen Insomnia Scale are made in three different samples of student, community and patient samples (5). The scale was used in numerous researches to define insomnia based on self-report in various age and sample groups (6-9).

The aim of this study was to determine validity and reliability of the Turkish form of Bergen Insomnia Scale (BIS) in adolescents.

Methods

This methodological research was made in October 2016 in high schools located in Şişli district of İstanbul. The population of the study is composed of 18817 students studying in high school prep, first, second, third and fourth year students in İstanbul Şişli District. In scale adaptation studies, it is suggested that 10-20 people are taken for each item in the scale and at least 300-500 people are reached if confirmatory factor analysis is to be made (10). For sample selection, schools were listed in 3 layers (Anatolian High School, Vocational and Technical High Schools and Private High Schools) according to school types and schools were selected randomly from each layer by drawing lots. The data was obtained from 503 students from Anatolian high schools, 393 students from vocational and technical high schools and 397 students in private high schools and from 1293 students in total.

For pilot test, data collection tools were implemented to 50 students in total; ten students from each of the first, second and third grade students and 20 students from fourth grade students.

In order to assess time invariance, *retest* was made to 110 students (First Grade = 31, Second Grade = 22, Third Grade = 29, Fourth Grade = 28) from the sample group who have the qualifications four weeks after the first data collection.

Personal Information Form and Bergen Insomnia Scale were used as data collection tool in the study. Personal Information Form consists of 4 questions including age, gender, school type and grade.

Bergen Insomnia Scale

Bergen Insomnia Scale (BIS) is based on official and clinical diagnostic criteria for insomnia (5). A written permission was taken from Prof Stale Pallesen via e-mail to use Bergen Insomnia Scale. This scale consists of six questions measuring different symptoms of insomnia. Participants state the number of days in which they experienced various sleep problems in the last month between 0 and 7 on an 8-point scale. The lowest score that can be taken from the scale is 0 and the highest score is 42. "During the past month, how many days a week have you been so sleepy/tired that it has affected you at school/work or in your private life?" can be given as an example to the items in the scale. Pallesen et al. (2008) have implemented the scale to three different sample groups. These are student sample, community sample and patient sample. A 2-factor structure was found in the student sample and patient sample and a single factor structure was found in community sample. In the student sample, 4th, 5th and 6th questions explain factor 1 [daytime symptoms-(DS)] and 1st, 2nd and 3rd questions explain factor 2 [nocturnal symptoms-(NS)]. In the original study, the internal consistency of the scale in student sample was found as α= .79, test-retest reliability was found as r= .77 (5).

In DSM-4, A and B criteria were determined for ***insomnia diagnosis***. The first 4 items of the scale meet A criteria and the following 2 items meet B criteria. For insomnia, it is necessary to have problems in 3 or more days in a week at least in one of the items in A criteria and also to have problems in 3 or more days at least in one of the items in B criteria. In DSM-5, the 4th question in the scale is included in B criteria. For that reason, having 3 or more points in A criteria and also three or more points at least in one of the B criteria are defined as insomnia according to DSM-5.

Language equivalency-cultural adaptation and content validity

Turkish adaptation and content validity studies of the Bergen Insomnia Scale were carried out according to the following steps:

1. The scale was translated from English to Turkish by two independent linguists who can speak both languages well.

2. Researchers determined the most suitable option for each item and a single Turkish form was created.

3. Turkish form of the scale was retranslated from Turkish to English (original language) by two independent linguists other than the ones who did the first translation.

4. The most suitable option was determined by a third linguist independent from the two linguists who did the retranslation and a single English form was created.

5. Items in Turkish and original language were reviewed by an expert group of 10 people consisting of academicians for suitability of translation and content validity. The experts, whose opinions were taken for content validity, were asked to assess the suitability and comprehensibility of each item by giving 1-4 points [*1 point: Not suitable – 4 point: very suitable*].

Necessary corrections were made in line with the experts' suggestions. Approval was taken from Pallasen, the developer of the scale, for the retranslated English form.

Statistical analysis

The data was assessed using SPSS 21 (Statistical Package for Social Sciences Inc, IL, USA) and LİSREL 9,20 (Scientific Software International [SSI]) software packages. Content and construct validity analyses were performed for the validity of the scale and internal consistency and test-retest analysis were performed for reliability (Figure 1).
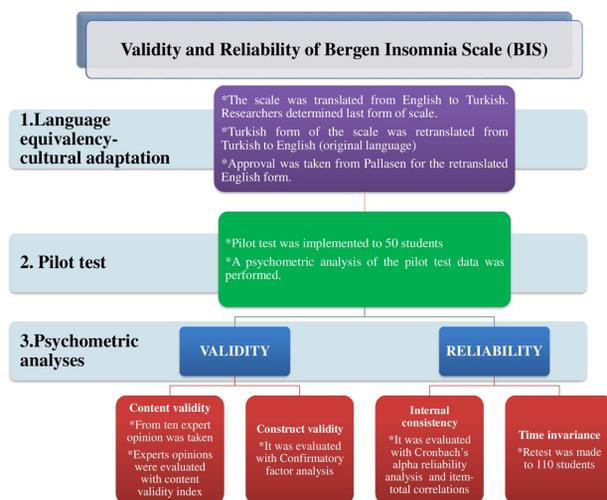

Figure 1: Steps of Validity and Reliability of Bergen Insomnia Scale (BIS)

Content validity index was calculated for *content validity*.

Confirmatory factor analysis was performed using maximum likelihood (ML) method for **construct validity**. With confirmatory factor analysis, it was primarily tested to what extent the theoretical model explains the relations in the data set. Then analyses were made for alternative models. Chi-square ($\chi 2$), degrees of freedom (DOF), The Root Mean Square Error of Approximation (RMSEA), Standardized Root Mean Square Residual (SRMR) and Comparative Fit Index (CFI) coefficients of concordance/discordance were evaluated together with confirmatory factor analysis.

Reliability was assessed with internal consistency and test-retest.

To evaluate **internal consistency**, "Cronbach's alpha reliability coefficient" was used. In evaluation of Cronbach's alpha reliability coefficient, it is stated that α>.60 reflects modest reliability and α> .70 reflects good reliability (11).

The relation between **test-retest** scores was evaluated with Pearson's correlation analysis.

Average, percentage and standard deviation were used in the analysis of definitive findings.

Ethical Aspect of the Study

Written permission is taken from Pallasen via e-mail for the validity reliability study of the Bergen Insomnia Scale. Pallasen has sent necessary data for scale and implementation via e-mail. Ethical approval was taken from the Ethical Committee of the University for the study (30.05.2016-42). Written permissions were taken from Istanbul Provincial Directorate of National Education, school principals and students' parents for the implementation of the scale at schools.

Restrictions of the study

The results of the study are restricted to high school students studying in a district of Istanbul province.

Results

Introductory Results

The average age of the students is 15.54±1.133 and 58.9% are female. 38.9% study at Anatolian high schools and 34.3% are in the high school first grade. The economic conditions of the parents of 48.2% of the students is good (Table 1).

Table 1. Socio-demographic Information of Students (N:1293)

Variables		Min. – Max.	M±Sd
Age		13-19	15.54±1.13
		n	%
Gender	Female	761	58.9
	Male	532	41.1
School types	Anatolian High School	503	38.9
	Vocational and Technical High Schools	393	30.4
	High Schools	397	30.7
Grade	Prep grade	80	6.2
	First grade	443	34.3
	Second grade	345	26.7
	Third grade	262	20.3
	Fourth grade	163	12.6

Min.: Minimum, **Max.:**Maximum, **M:**Mean, **Sd:**Standard deviation

Results on item analysis and reliability

According to pilot test data, item-total correlations were found as >.20 other than the first item and Cronbach's alpha was found as .70 in factor of DS and .53 in factor of NS. From the feedback of the students, it was decided that the first item "During the past month,

how many days a week has it taken you more than 30 minutes to fall asleep after the light was switched off?" was not understood and an explanation is required. With the approval of the authors who developed the scale, it was changed as "During the past month, how many days a week were you not able to fall asleep within 30 minutes after you leave your phone/tablet and switched off the light although you wanted to sleep?".

According to the data obtained from 1293 students who participated in the study, the Cronbach's alpha reliability coefficient of the Bergen Insomnia Scale was found as .79 in the factor of DS, .63 in the factor of NS and .72 for total BIS. It was determined that Cronbach's alpha value has statistically good reliability. Test-retest correlation of the scale was found acceptable as r=.70 in the factor of DS and r=.63 in the factor of NS (p<.001; Table 2).

Table 2. Reliability and descriptive analysis values according to factors of Bergen Insomnia Scale

Factors	Scale Items	Mean	Sd	Item-factors r	Item-Total r	Test-retest r	M ±Sd	Cronbach's alfa
Nocturnal symptoms	I1	2.02	2.09	.36	.413			
	I2	1.07	1.62	.55	.363	.63	1.46±1.36	.63
	I3	1.28	1.65	.43	.301			
Daytime symptoms	I4	4.19	2.27	.63	.500			
	I5	3.17	2.29	.56	.522	.70	3.82±1.91	.79
	I6	4.09	2.28	.71	.621			
Total	-	-	-	-	-	.74	2.64±1.33	.72

M: Mean, **Sd:**Standard deviation, **r:**correlation

It was determined that Bergen Insomnia Scale item factor correlations vary between .56-.71 in the DS factor and .36-.55 in the NS factor (p<.001). When the BIS factor average scores of the students were analysed, it was determined that the average score of daytime symptoms factor was 3.82±1.91 and average score of NS was 1.46±1.36. The question with the lowest average was I2 (Staying awake for more than

30 minutes when you woke up at night) and the question with the highest average was I4 (not feeling adequately rested) (Table2).

Results related to validity

It was seen that 10 experts whose opinions were taken for **content validity** of Bergen Insomnia Scale gave at least 3 points to the items. Item level average of the scale was found between3.90-4.00 and content validity index was found as .99.

In accordance with the suggestions of experts, minor changes were made in items 4 and 6 without changing the meaning.

Overall concordance and discordance coefficients of theoretical model are given primarily in Table 3 which contains overall concordance/discordance coefficients obtained as a result of confirmatory factor analysis performed for **construct validity**. It was followed by "suggested" model in which two error covariance between three items in the second factor was added in line with modification suggestions. The table also includes single dimensioned alternative models in which unrelated 2 factors and items are collected in single dimension (Table 3).

When the overall concordance discordance coefficients of theoretical model were analysed, CFI=.95 and SRMR=.07 were acceptable, but X^2_{8}=123.47 and RMSEA=.10 were not acceptable. For that reason, error covariance was added between 1st item and 2nd item and between 2nd item and 3rd item in the second (suggested) model in line with modification suggestions. Given that the chi-square test result, which was expected to be insignificant, was affected by the sample size, it was seen that other overall concordance discordance coefficients of the suggested model were excellent (CFI= .99, SRMR=.03) and acceptable ($X^{2/Sd}$=4.62, RMSEA=.05; Table 3).

The two-factor structure of Bergen Insomnia Scale was validated and the first factor is defined as daytime symptoms (DS) of insomnia and second factor is defined as nocturnal symptoms (NS) of insomnia. The factor loads of items in DS factor (standard weights) was found between .65 and .93; factor loads of items in NS factor was found between .38 and .84 (Figure 2).

Table 3. Overall Concordance/Discordance Coefficients Obtained Result of Confirmatory Factor Analysis of BIS

Model	χ^2	p	DOF	χ^2/DOF	CFI	RMSEA	SRMR	$\Delta\chi^2$
Theoretical	123.47	00	8	15.43	.95	0,10(0,08-0,12)	.07	
Suggested	**27.71**	**00**	**6**	**4.62**	**.99**	**0,05(0,03-0,07)**	**.03**	**95.76**
Unrelated two factors	142.63	00	9	15.85	.94	0,10(0,07-0,14)	.08	19.16
Single factors	664.76	00	9	73.86	.72	0,24(0,22-0,25)	.14	541.29
* Perfect fit	-	>0.05	-	χ2/sd<3	0.97≤CFI≤1	0.00< RMSEA<0.05	0.00≤SRMR≤ 0.05	-
*Acceptable fit	-	>0.05	-	χ2/sd<5	0.95≤CFI≤0.97	0.05< RMSEA<0.1	0.05≤ SRMR≤ 0.1	-

χ2; Chi-square **DOF:** Degrees of freedom; **RMSEA:** The Root Mean Square Error of Approximation; **SRMR:** Standardized Root Mean Square Residual; **CFI:** Comparative Fit Index

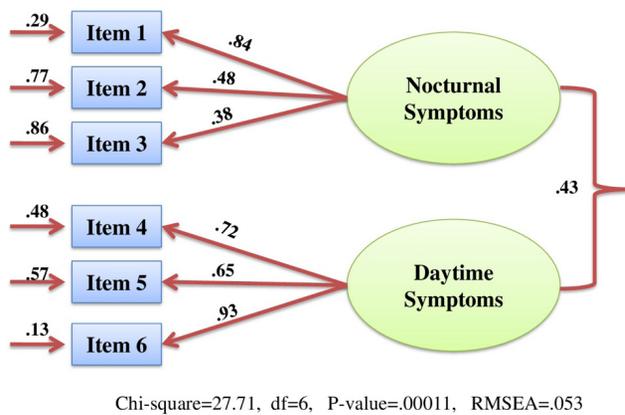Chi-square=27.71, df=6, P-value=.00011, RMSEA=.053

Figure 2: BIS confirmatory factor analysis graphic

The average score of NS of students according to introductory features was found as 4.37± 4.08, average score of DS was found as 11.45±5.74 and total average score was found as 15.82±7.96. Considering the students having sleep problem in 3 or more days a week in the last month, it was determined that 32.9% of the students had difficulty in falling asleep, 17.3% woke up at night and could not fall asleep within 30 minutes, 19.5% woke up early in the morning, 74.2% did not feel adequately rested, 55.8% feel sleepy/tired affecting school/work or private life and 70.5% were not satisfied with their sleep (Table 4). When evaluated according to DSM-5, it was determined that 43.4% of the students have insomnia problem. The prevalence of insomnia was significantly higher in women than men (Table 4).

Table 4. Introductory Features of Students According to BIS and Factors

Items	³3 day n (%)	M± Sd
Nocturnal Symptoms	-	4.37±4.08
M1: You are not able to fall asleep within 30 minutes, after you leave your phone/tablet and switched off the light although you wanted to sleep	426(32.9)	2.02±2.09
M2: You stay awake for more than 30 minutes when you woke up at night	224(17.3)	1.07±1.62
M3: You wake up at least 30 minutes earlier than you are supposed to wake up and then could not fall asleep again	252(19.5)	1.28±1.65
Daytime Symptoms	-	11.45±5.74
M4: You feel like you did not take enough rest after getting up	960(74.2)	4.19±2.27
M5: You feel sleepy/tired in a manner that shall affect your school/job or private life	721(55.8)	3.17±2.29
M6: You dissatisfied with your sleep	911-70.5	4.09±2.28
BIS Total	-	15.82±7.96
Person who have insomnia according to DSM-5	561(43.4)	-
Female	364(47.8)	p<.001*
Male	197(37.0)	

* Chi-square test, **M:**Mean, **Sd:**Standard Deviation

Discussion

In this study, the validity and reliability of Bergen Insomnia Scale was evaluated for adolescents. With DFA performed for construct validity, the 6-item and two-factor structure of BIS was validated. Cronbach's alpha, item-total and test-retest correlations showed that the scale is reliable. It was determined that Bergen Insomnia Scale is a valid and reliable instrument to be used for evaluating insomnia and investigating the daytime and nocturnal symptoms in adolescents.

Reliability can be defined as items in a measuring instrument measure the same feature and giving consistent and stable results in repeated measurements under same conditions (12-15). *Internal consistency* is the reliability which shows that all items in the scale have the capability to measure the related variable. Alpha coefficient is one of the most common methods used for testing the internal consistency reliability (16). It is recommended that alpha coefficient of the scale is >.70, but >.60 is stated to be acceptable (11, 17). Cronbach alpha value of the scale in the original study was found .79 in the student sample with average age of 21.4±3.7. In this study, total Cronbach alpha reliability coefficient of .72 and Cronbach alpha value of the factor of DS of insomnia of .79 were close to the alpha coefficient of the original scale and on a good level. Cronbach alpha value of the factor of NS of insomnia of .63 was considered acceptable. According to literature, reliability is affected by the number of questions in the scale and reliability increases as the number of questions increases (18). In this study, the fewer number of questions and working with a group with an average age of 15.54±1.13 may be the reason of this result.

In the literature, it is stated that the *item-total correlations* should be >.30 (18). In pilot study data of this study, correlation of the first item with total was found low and the question was corrected with the approval of the author who developed the scale. In the analyses following the data collection, item-total correlations were found similar to the original study (r=.35-.74) and acceptable with >.30.

Test-retest reliability is the power of a measuring instrument to give consistent results in repeated measurements and remain stable in time. In the literature, it is stated that there are maximum 4 weeks between two measurements (19) and it is performed with at least 100 people. It is suggested that test-retest correlation coefficient is ≥.40 (17). In the original study, retest correlation was found .77 two weeks after the first test. In this study, test-retest correlation was determined on a good level as .74 with 110 people four weeks after the first data collection.

Validity is related to whether a data collection instrument is suitable with the feature it aims to measure, whether it makes the measurement in accordance with the rules and to what extent the measurement data measures the feature it aims to measure accurately. In other words, validity is the level on which measurement instrument serves its purpose (12, 14, 20).

Content validity is the degree of the scale and each item in the scale to represent the structure to be measured or be suitable (21). Expert opinion is taken to evaluate the content validity. Such experts must be people who know the scientific field which is investigated and know the techniques and methods of preparing scale questions. In the literature, an expert group consisting of 5-10 people is

recommended (10, 22). Experts evaluate to what extent the items in a scale measure the behaviours to be measured in terms of items' clarity, comprehensibility and suitability with the culture. The scale is reorganized in accordance with the experts' suggestions (16, 20). For content validity index, Grant and Davis (1997) state that 80% of the items must have 3 or more points and Lynn (1986) indicate that content validity index must be at least .83. In this study, it was determined that the average score given by the 10 experts from whom opinions are taken for items of BIS was between 3.90-4.00. Content validity index of .99 showed that the statements in the scale are suitable to our culture and represent the structure to be measures.

Moreover, the literature recommends that the approval of the expert who developed the scale should be taken after retranslation (10). In this study, the scale was organized by getting approval from Pallasen twice following retranslation and pilot study (5).

Construct validity is the method which finds out numerically that items in a scale measure a single concept in which items are discussed as a whole or they measure a few concepts. Construct validity studies are carried out by examining the factor that the measurement instrument measures or investigating the relationship of the measurement instrument with other scales and measurements (19). Confirmatory factor analysis is a validity analysis which can be used while developing a scale and adapting a developed scale to another culture (23). It also gives an idea about to what extent the present data predicts the variables to be measured. In this method, the relationship between the structure and observed variables, error margins, to what extent the observed variables explain the structure and the factor loads are tested (14).

To test the fitness of the model, first chi-square ($\chi 2$) fit index is examined. Chi-square tests the significance of the difference between observed and predicted covariance matrix. Insignificant chi-square value means that there is no significant difference between observed and predicted covariance matrix and therefore model is fit. However, chi-square value is easily affected by sample size and chi-square value is mostly significant when large samples are included. For that reason, it is suggested that the value obtained by dividing chi-square value by degree of freedom ($\chi 2/sd$) is based on when evaluating the model fitness (24, 25). Since this study includes a large sample, chi-square value was found significant (p<.001). When overall concordance discordance coefficients of the theoretical model were examined, it was determined that CFI and SRMR are acceptable, but ⬚2 and RMSEA are not acceptable. Later, CFI and SRMR values were found excellent and ⬚2/sd and RMSEA values were found acceptable in the suggested model with addition of two error covariance in accordance with the modification suggestions.

It was determined that the Turkish form of Bergen Insomnia Scale is compatible with the structure in the original scale with 6 questions and 2 factors (5). Given the questions of the Bergen Insomnia Scale, factor 1 is defined as DS of insomnia (4th, 5th and 6th questions) and factor 2 is defined as NS (1st, 2nd and 3rd questions) as in the original scale (5).

Confirmatory factor analysis evaluates whether the relationship of the questions constituting a factor with the factor is adequate and it is expected that the factor loads are >.40 (12). In this study, the factor loads of the questions were found positive and >.40 except for 3rd question (factor load=.35).

When introductory features are examined, it is determined that the average score of factor of DS of insomnia is higher than average score of factor of NS. This result indicates that the high school students experience DS more and they experience NS of insomnia less. In the original study conducted in student sample, it was found that "you not able to sleep within 30 minutes after you leave your phone/tablet and switched off the light although you wanted to sleep" question has the highest average. In this study, "how many days a week did you feel not adequately rested after waking up?" question had the highest average. It is thought that this is caused by the cultural differences in relation to the time of going to bed.

Bergen Insomnia Scale is created based on DSM-4 diagnosis criteria and it also conforms to the DSM-5 diagnosis criteria. The first four questions which measure different symptoms of insomnia (difficulty in initiating sleep, difficulty in maintaining sleep, waking up early in the morning and nonrestorative sleep) correspond to A criteria in DSM-4 for insomnia. The last two questions (being so sleepy/tired that it has affected you at school/work or in your private life and being dissatisfied with your sleep) complies with B criteria in DSM-4. When the scale is evaluated according to DSM-5 criteria, the first three questions (difficulty in initiating sleep, difficulty in maintaining sleep, waking up early in the morning) correspond to A criteria and the last three questions (nonrestorative sleep, being so sleepy/tired that it has affected you at school/work or in your private life and being dissatisfied with your sleep) correspond to B criteria.

When the studies carried out abroad are examined, it is seen that the prevalence of insomnia is in a wide range; 7.4-22.1% in adults and 8.3-19.3% in young groups (6, 26-33). The prevalence of symptoms varies between 21.4% and 51%.

Bjorvatn et al. determined that 53.6% of the 1301 patients with an average age of 47.8 had insomnia problems in 2016. According to a study carried out in Denmark, the sleep problem was identified as 14.9% in 7870 adults with an average age of 44.4 (26). In their study on 1042 adults, Castro et al. (2013) determined objective insomnia prevalence as 32%, subjective insomnia prevalence as 45% and the subjective prevalence of insomnia according to DSM-4 as 15%. In a study carried out with 1128 people in Sweden, insomnia symptoms were 24.6% and insomnia prevalence as 10.5% (28). In a study carried out with 2011 people in China, insomnia prevalence was found as 22.1% according to DS-4 diagnosis criteria, 10.8% according to DSM-5, 4.7% according to International Classification of Diseases 10th version (ICD-10) and 15.1% according to ICSD-2(29).

In a systematic review by Jiang et al. (2015), insomnia prevalence was determined as over 18.5% in university students and over 7.4% in general population. In a study carried out with 6919 Portuguese adolescents by Amaral et al. (2013), insomnia symptoms prevalence was found 21.4% and insomnia ratio was found 8.3%. In the study of Calhoun et al. (2014) with 700 students, the insomnia ratio was found 19.3%. In the study of Chung et al. (2014) carried out with 290 adolescents in China, the prevalence of insomnia symptoms was determined as 40% and it was determined that 9.3% of them had insomnia according to DSM-4.

When the studies carried out in our country are examined; in the study of Benbir et al. (2015) on 4758 people, the prevalence of any insomnia symptom was found 51% and insomnia prevalence was found 12.2% (8.6% in men, 15.7% in women); in the study of Koyuncu et al. (2013) on 512 students, sleep disorder prevalence was found 11.9%; in the study of Özgün (2013) with 4144 students with an average age of 11.30 ± 3.28, insomnia prevalence was found 18.8%; in the study of Temel et al. (2010) with 472 adolescents, the prevalence of the ones with bad sleep quality was found 43.1% and in the study of Şenol et al. (2012) with 300 adolescents, the prevalence of the ones with bad sleep quality was found 54.7%. In this study, it was determined that 43.4% of the students have insomnia problem according to DSM-5. Moreover, the prevalence of insomnia was significantly higher in women than men. Similar to our results, it was determined that the rate of insomnia is significantly higher in women than men in the literature (31, 32, 34).

Although there are not many intercultural studies on insomnia, it was found that the countries where insomnia is most common are Brazil (79.8%), South Africa (45.3%), Eastern Europe (32%), Asia (28.3%) and Western Europe (23.2%) according to a research carried out throughout the world. The high prevalence indicates that there is a need for initiatives for solving this problem (35).

Conclusion and suggestions

As a conclusion, the validity and reliability of the Turkish form of Bergen Insomnia Scale, which was developed by Pallesen et al.and original language of which is English, was found good. The results of the confirmatory factor analysis conducted for evaluating the construct validity validated the original structure of the Bergen Insomnia Scale which is included in the literature. It was determined that Bergen Insomnia Scale is a consistent scale which provides similar measurement values in repeated measurements. In accordance with these results, BIS Turkish Form can be used to evaluate insomnia in adolescents in school and community health studies.

Ethics Committee Approval: Ethics committee approval was received for this study from the Ethics Committee of the Institute of Health Sciences of Marmara University (number 42, dated 30.05.2016).

Informed Consent: Written informed consent was obtained from the families of the children who participated in this study.

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