DSM-5 Level 2 Sleep Disorders Scale Validity and Reliability of Turkish Form (Form for Children Aged 11-17 Years and Parent Form for Children Aged 6-17 Years)

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ABSTRACT

Introduction: This study aimed to assess the validity and reliability of Turkish version of DSM-5 Level 2 Sleep Disorders Scale.

Method: The scale was prepared by translation and back translation of DSM-5 Level 2 Sleep Disorders Scale. Study groups consisted of a clinical sample that contained cases that had sleep related problems and treated in a child and adolescent psychiatry unit and also a community sample. In the assessment process, child and parent forms of DSM-5 Level 2 Sleep Disorders Scale and also Children's Sleep Habits Questionnaire-Turkish version (CSHQ) and Pittsburgh Sleep Quality Index (PSQI) were used. As for reliability analyses, internal consistency coefficient and item-total score correlation analysis, test-retest reliability; and for validity analyses, explanatory factor analysis and for concurrent validity, correlation analyses with Children's Sleep Habits Questionnaire-Turkish version (CSHQ) and Pittsburgh Sleep Quality Index (PSQI) were made.

Results: In reliability analyses, Cronbach's alpha internal consistency

coefficient values were found to be very highly reliable regarding child and parent forms. Item-total score correlation coefficients were high for child form while medium and high for parent form; indicating a statistical significance. As for construct validity, two factors were maintained that would count for 74.1% of the variance in child form and 66.9% of the variance in parent form. It was seen that positive and negative statements weighed on two different factors. As for concurrent validity, child and parent form of the scale showed significant correlation with Children's Sleep Habits Questionnaire-Turkish version (CSHQ) and Pittsburgh Sleep Quality Index (PSQI).

Conclusion: It was found that Turkish version of DSM-5 Level 2 Sleep Disorders Scale could be utilized as a valid and reliable tool both in clinical practice and for research purposes.

Keywords: DSM-5 level 2 sleep disorders scale, child, sleep disorders, insomnia disorder, reliability, validity

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INTRODUCTION

Sleep problems might frequently be observed throughout all phases of life cycle. While prevalence of sleep problems reported by parents of preschoolers range between 25-50%, this rate has been reported as approximately 20-30% among school-age children (1, 2). Problems related to sleep need to be managed and treated efficiently, due to its severe negative impact on neurocognitive, academic, social and emotional functionality levels of children and adolescents. Current literature underlines the improvement observed in emotional and behavioral problems of children, following an efficient treatment of sleep-related problems (3). Again, many evidence exists, indicating a significant causal link between sleep problems and psychiatric disorders, such as Attention Deficit Hyperactivity Disorder (ADHD), Anxiety Disorders, and Mood Disorders, as well as sleep problems affecting the course of the

forementioned disorders (4-9). For all these reasons, novel assessment tools and instruments are needed to help the clinicians in evaluation, score and rating stages, and diagnosis of sleep problems observed in children and adolescents. Limited number of instruments in Turkish exist that assess and measure sleep problems. Among these, Pittsburgh Sleep Quality Index (PSQI), that was adapted into Turkish by Agargun et al. (10), another sleep disorder scale that evaluated parasomnias in children between the ages 7-11 years, again adapted by Agargun et al. (11), and Turkish version of Children's Sleep Habits Questionnaire-Short Form (CSHQ), adapted by Perdahlı Fis et al. (12) might be counted. During the process of evaluating children and adolescents, collecting information from various sources such as the individual, family, teachers and from other relevant parties, whenever required, increases the

validity and accuracy of assessment (13). Therefore, aforementioned assessment instruments and questionnaires developed to evaluate sleep problems, having the requirement to be filled by either parent solely or the individuals themselves, as self-report measures might create certain disadvantages during the assessment phase.

Diagnostic and Statistical Manual for Mental Disorders (DSM) consists of the most commonly used classification systems in the diagnosis of psychiatric disorders and problems, and is published following updates within certain intervals, by American Psychiatry Association. DSM has been published and distributed, with its latest 5th edition (14). Along with DSM-5 being published with updated diagnostic criteria in 2013, novel instruments and measures to be used for rating the severity of various psychiatric disorders as well as their utility during follow-up, have increasingly been warranted both in research fields and contemporary psychiatry practice. For these reasons, American Psychiatry Association has started to recommend using novel scales and instruments that have been adapted to new DSM-5 diagnostic criteria for many psychiatric disorders (15).

DSM-5 Level 2 Sleep Disorder Scale is an instrument designed to be used during the initial assessment process of children and adolescents with sleep problems, as well as during their follow-up. The scale has an 8-item parent form, that could be filled up by parents or legal guardians of children aged between 6–17 years, and a 9-item self report form to be filled up by adolescents aged between 11–17 years (15).

Aim of this study was to determine Turkish psychometric properties of DSM-5 Level 2 Sleep Disorder Scale, and to test its use within Turkish populations.

METHODS

Translation Process

In order to carry out Turkish adaptation of DSM-5 Level 2 Sleep Disorder Scale, written consent and permission were granted from HYB Publishing and Boylam Psychiatry Institute, that held publishing and translation rights of DSM-5 Source Book and Handbook, containing the studies for developing these measures and scales. Translation process was carried out by three consulting child and adolescent psychiatrists. Upon maintaining a final draft of the text by consensus, process of English translation was initiated. Translated version of the text was compared to the original draft, and checked and reviewed whether it met expected criteria for the inclusion of anticipated concepts. Following reception of required approvals, final version of the instrument was maintained.

Sample Group

This study's sample group comprised of cases that continued their follow up in a child and adolescent psychiatry unit, healthy volunteers and parents of children from both groups. Summing up the number of participants from clinical sample and community sample that was formed by choosing healthy volunteers from a socioeconomic catchment area, similar to that of the clinical sample, resulted with the participation of 85 children, and 86 parents, in total. Clinical sample that represented the high-risk group for psychiatric disorders comprised of 30 children aged 11–17 years old and 34 children aged between 6–17 years, who were all being followed up in a child and adolescent psychiatry unit, due to their sleep-related problems. Of the children aged between 6–17 years, who had made up the clinical parent sample, all were primarily diagnosed with ADHD and Insomnia Disorder. On the other hand, the primary diagnosis of all children aged between 11–17 years was Depressive Disorder and Insomnia Disorder. Since Children's Sleep Habits Questionnaire (CSHQ) that was filled up by the parents, and was used to evaluate concurrent validity of our instrument, had been assessed in preschoolers and school-

aged children, for its Turkish psychometric properties, child sample and parent sample for this specific subgroup were collected through the inclusion of participants from different families. Inclusion criteria for the study were; being 6–17 years old, meeting the criteria of any sleep disorder according to DSM-5 diagnostic criteria, and having a level of cognitive functioning just enough to be capable of understanding and following the instructions of the study. Exclusion criteria was positive history of a physical or a neurological condition that would require continuous medical care and treatment. Community sample that was representative of low-risk group for psychiatric conditions was formed by recruits residing within a catchment area that was similar to those in the clinical sample, socioeconomic-wise and attending similar schools as the clinical sample, and their families.

Generally, in order to obtain required sample size suggested by results of studies regarding research statistics, expected number of healthy volunteers needs to be the 5–10 fold of the number of total items in the scale. Therefore, in total, 80 healthy children and parents were aimed to be recruited. Inclusion criteria for the control group were; being 6–17 years old, not meeting criteria for any physical or a psychiatric disorder diagnosis, and having enough cognitive function levels to understand and follow study instructions.

Approval of the study was granted upon an evaluation undergone by the local ethics committee of the unit, where the study had been conducted.

Assessment Tools

1. DSM-5 Level 2 Sleep Disorder Scale-Child Form: consists of eight items in total. For each item, the child is asked to rate the severity of his/her symptoms related to sleep disorders, for the past 7 days. The scale has a 5-point Likert type rating (1=never, 2=very little/rarely, 3=sometimes, 4=most of the time, 5=almost all the time). Total scores range between 8–40 and higher scores indicate presence of much more severe sleep-related problems.

2. DSM-5 Level 2 Sleep Disorder Scale-Parent Form: For each item, the caregiver is asked to rate the severity of symptoms related to sleep disorders that occurred within the past 7 days, she/he had observed in his/her child. The scale has a 5-point Likert type rating (1=never, 2=very little/rarely, 3=sometimes, 4=most of the time, 5=almost all the time). Total scores range between 8–40 and higher scores indicate presence of much more severe sleep-related problems.

3. Pittsburgh Sleep Quality Index (PSQI): is a 24-item scale developed by Buysse et al. (1989), and questions quality of sleep and sleep-related disorders during a 1-month time interval (16). Of total 24 items, 19 are replied by the individual being assessed, and 5 are expected to be answered by a close company, who would be able to observe the individual in his/her sleep. Each item of the scale is scored from 0 to 3 points (starting from least to most), and total score ranges between 0–21. The scale was adapted into Turkish by Ağargun et al. (1996).

4. Children's Sleep Habits Questionnaire (CSHQ): was developed by Owens et al. (2000), to assess sleep habits and sleep-related problems of children (17). The scale consists of 33 items expected to be replied by parents, and 8 subscales, that cover the evaluation of past week. The scale also contains three open-ended questions with the purpose of assessing sleep habits of the child. Total scores of 41 and above are interpreted as "positive for clinically significant sleep problems". The scale's Turkish psychometric properties were studied by Perdahli Fis et al. (2010).

Statistical Analysis

For statistical analysis, firstly, in order to show that there was no difference between study groups regarding sociodemographic and

clinical characteristics, analysis of variance (ANOVA) was performed for numeric variables; while chi-square test was used for analyzing categorical variables.

For reliability analysis, Cronbach alpha internal consistency coefficient of the scale was calculated. In addition to this, item-total score correlation coefficients were calculated, yielding to the result that the scale was a reliable instrument.

As for the construct validity of the scale, data collected from all study groups were used and exploratory factor analysis was performed. In order to test whether the sample was appropriate for exploratory factor analysis or not, Kaiser-Meier-Olkin Test was used as the first statistical measure, followed by Bartlett Test. Exploratory factor analysis was performed by applying Varimax rotation, in congruence to main components method, and factors with eigenvalues equal to 1 and above were included in the analysis. Among factor constructs, items that had factor loads equal to 0.4 and above were included in the analysis. Exploratory factor construct was compared to the scale's original dimensional structure. In addition to this, in order to determine concurrent validity, correlations between Level 2 Sleep Disorder Scale-Child Form and PSQI; as well as Level 2 Sleep Disorder Scale-Parent Form and CSHQ were measured.

RESULTS

In total, 85 children and 86 parents were included in this study. Mean age of children that made up the clinical group within parent sample ($n=34$) was 9.7 ± 1.9 years, while mean age of children that formed the community sample was 9.1 ± 1.1 years. Parents of 10 girls and 24 boys from the clinical sample, and parents of 27 girls and 25 boys from the community sample had filled up the scale. As for the group that comprised of children between the ages 11–17 years, 26 girls and 4 boys from the clinical sample; and 35 girls and 20 boys from the community sample had completed the questionnaire. Mean age of the cases within the group that consisted of children between 11–17 years of age ($n: 30$) was 15.8 ± 0.9 , while mean age of children that formed the community sample was 15.3 ± 0.6 . Sociodemographic characteristics of study groups have been presented in Table 1 and Table 2.

Regarding parent sample where the 6–17 year old group was assessed, statistically significant difference was found between cases and controls, for DSM-5 Level 2 Sleep Disorder Scale-Parent Form total scores ($T=7.491$, $p<0.0001$), CSHQ total scores ($T=6.587$, $p<0.0001$), and gender (chi-square=4.250, $p=0.039$); while no difference was found for age ($T=1.744$, $p=0.088$), level of maternal education (chi-square=0.778, $p=0.678$), and level of paternal education (chi square=0.909, $p=0.635$), between groups.

As for the 11–17 year old group, significant differences for DSM-5 Level 2 Sleep Disorders Scale Child Form total scores ($T=3.766$, $p<0.0001$), Pittsburgh Sleep Quality Index total score ($T=3.422$, $p=0.001$), age ($T=2.698$, $p=0.010$), and gender (chi-square=5.081, $p=0.024$) were found between case and controls, while no significant difference was observed for level of maternal education (chi-square=2.283, $p=0.319$), and levels of paternal education (chi-square=1.579, $p=0.454$), between groups.

Reliability Analyses

Reliability analyses performed for DSM-5 Level 2 Sleep Disorders Scale resulted in a Cronbach alpha internal consistency coefficient value of 0.905 for child form and 0.839, for the parent form. Cronbach alpha coefficient values for each item were shown in Table 3 and Table 4. Item-total score correlation coefficients ranged between 0.528 and 0.810 for self-report form; while 0.481–0.751, for parent form (Table 3 and 4).

Table 1. Sociodemographic characteristics of parent sample

		Sleep disorders group N: 34	Control group N: 52
Age		9.7±1.9	9.1±1.1
Gender*	Girls	10 (29.4%)	27 (51.9%)
	Boys	24 (70.6%)	25 (48.1%)
Level of maternal education	Primary & secondary school	19 (55.9%)	24 (46.2%)
	High school	7 (20.6%)	13 (25.0%)
	College	8 (23.5%)	15 (28.8%)
Level of paternal education	Primary & secondary school	15 (44.1%)	19 (36.5%)
	High school	11 (32.4%)	16 (30.8%)
	college	8 (23.5%)	17 (32.7%)
scales	DSM-5 Level 2 Sleep Disorder Scale-Parent Form **	22.7±6.53	13.5±4.84
	Children's Sleep Habits Questionnaire**	56.9±8.91	45.0±7.03

* $p=0.039$, ** $p<0.0001$

Table 2. Sociodemographic characteristics of adolescent sample (children aged between 11–17 years old)

		Sleep disorders group N: 30	Control group N: 55
Age*		15.8±0.9	15.3±0.6
Gender**	Girls	26 (86.7%)	35 (63.6%)
	Boys	4 (13.3%)	20 (36.4%)
Level of maternal education	Primary & secondary school	19 (63.3%)	37 (67.3%)
	High school	9 (30.0%)	10 (18.2%)
	College	2 (6.7%)	8 (14.5%)
Level of paternal education	Primary & secondary school	18 (60.0%)	26 (47.3%)
	High school	9 (30%)	19 (34.5%)
	College	3 (10.0%)	10 (18.2%)
scales	DSM-5 Level 2 Sleep Disorder Scale-Child Form ***	26.7±9.2	19.5±6.6
	Pittsburgh Sleep Quality Index ****	21.6±7.2	15.5±8.0

* $p=0.010$, ** $p=0.024$, *** $p=0.0001$, **** $p=0.001$

Validity Analyses

In order to determine construct validity of the measure, DSM-5 Level 2 Sleep Disorder Scale was assessed by using exploratory factor analysis. Prior to the analysis, Kaiser-Meyer-Olkin and Bartlett tests were also performed, in order to test whether the sample was appropriate or not.

Kaiser-Meyer-Olkin analysis coefficient for DSM-5 Level 2 Sleep Disorder Scale Child Form was calculated as 0.848, chi-square value was determined to be 447.728 ($p<0.0001$), by using Bartlett Test, and it was

Table 3. Item-total score correlation coefficients, Cronbach alpha coefficients and factor loads for items of DSM-5 Level 2 Sleep Disorders Scale-Child Form

	Item-total score correlation coefficient	Cronbach alpha coefficient	Factor 1	Factor 2
Sleep-C1	0.699	0.893		0.803
Sleep-C2	0.748	0.888	0.887	
Sleep-C3	0.696	0.893	0.904	
Sleep-C4	0.528	0.908		0.822
Sleep-C5	0.736	0.890		0.682
Sleep-C6	0.810	0.882		0.805
Sleep-C7	0.658	0.896	0.748	
Sleep-C8	0.730	0.892	0.603	0.529

Table 4. Item-total score correlation coefficients, Cronbach alpha coefficients and factor loads for items of DSM-5 Level 2 Sleep Disorders Scale-Parent Form

	Item-total score correlation coefficient	Cronbach alpha coefficient	Factor 1	Factor 2
Sleep-P1	0.537	0.825	0.765	
Sleep-P2	0.514	0.829		0.882
Sleep-P3	0.549	0.823		0.887
Sleep-P4	0.523	0.827	0.713	
Sleep-P5	0.636	0.812	0.841	
Sleep-P6	0.653	0.810	0.750	
Sleep-P7	0.481	0.834		0.651
Sleep-P8	0.751	0.804	0.826	

shown that the sample group was fit for factor analysis. As a result of the factor analysis, two factors with eigenvalues above 1 were maintained. Eigenvalue of the first factor was 4.869, and explained 60.86% of the variance. First factor consisted of four items ("I had a relaxing sleep and it made me feel rested", "I was satisfied with my sleep", "I had enough sleep", "my quality of sleep"). Eigenvalue of the second factor was calculated as 1.060, and explained 13.25% of total variance. Four items ("my sleep was not relaxing", "I had trouble falling asleep", "I had trouble maintaining my sleep", "I had problems during my sleep") had loaded on this factor. "my quality of sleep", which was the 8th item, essentially loaded on the first factor, and little on the second factor.

Kaiser-Meyer-Olkin analysis coefficient for DSM-5 Level 2 Sleep Disorder Scale Parent Form was calculated as 0.810, chi-square value was determined to be 302.783 ($p<0.0001$), by using Bartlett Test, and it was shown that the sample group was fit for factor analysis. As a result of the factor analysis, two factors with eigenvalues above 1 were maintained. Eigenvalue of the first factor was 3.290, and explained 48.99% of the variance. First factor consisted of five items ("My sleep was not relaxing", "I had trouble falling asleep", "I had trouble maintaining my sleep", "I had problems during my sleep", "My sleep quality"). Eigenvalue of the second factor was calculated as 1.431, and explained 17.89% of total variance.

Second factor consisted of three items ("I had a relaxing sleep and it made me feel rested", "I was satisfied with my sleep", "I had enough sleep").

Correlation coefficient obtained as a result of assessing concurrent validity between DSM-5 Level 2 Sleep Disorder Scale Child Form and PSQI was measured as $r=0.650$ $p<0.0001$.

Correlation coefficient obtained as a result of assessing concurrent validity between DSM-5 Level 2 Sleep Disorder Scale Parent Form and CSHQ was measured as $r=0.717$ $p<0.0001$.

DISCUSSION

With this study, we have aimed to carry out the adaptation of DSM-5 Level 2 Sleep Disorder Scale into Turkish, as well as the evaluation of its psychometric properties. As a result, it was shown that Turkish version of the scale could be used as a valid and reliable instrument.

Cronbach alpha internal consistency coefficient values for child and parent forms suggested the scale was highly reliable (0.905 and 0.839, respectively), and the scale appropriately represented the whole. Item-total score correlation coefficients for Level 2 Sleep Disorder Scale were high for child form; and medium-high for parent form. These findings indicate that items of the scale were consistent among one another, and the construct was reliable, as a whole. Taking all into account, it is possible to conclude that the scale could be used as a reliable tool.

Regarding concurrent validity analysis, correlation values between PSQI and child form, as well as between CSHQ-Turkish version and parent form were calculated as 0.650/0.717, respectively, indicating a statistically significant high-level validity, for both forms. Concurrent validity measures of the scale suggest the instrument's utility as a valid assessment tool.

Exploratory factor analysis was performed on DSM-5 Level 2 Sleep Disorders Scale. Two factors with eigenvalues above 1, for each form were obtained. This was not found to be in congruence with the original single-factor construct of the scale. When factor constructs for each form were assessed separately, it was seen that positive and negative statements loaded on two different factors. We might state that items of Sleep Disorders Scale were highly specific to symptom clusters within the construct, and this might be interpreted as aiding the clinician to collect clear data on the severity of sleep disorders, without being exposed to effects of any confounding factor.

Limitations and Strengths of the Study

Main limitation of this study stemmed from relatively low number of cases that formed the case group, and were within the symptomatic phase of the disorder. Another limitation to the study was the lack of a structured clinical interview to be used for differential diagnostic process. Cases with sleep problems within the case group, that had all been primarily diagnosed as Insomnia Disorder, and no other individuals with different sleep-related disorder diagnosis included in the study, might also be considered as a limitation. Nonetheless, one needs to be cautious while interpreting the differences obtained following comparative analyses of scale items; since differences exist between patient and control group, regarding gender and age. Failure to calculate test-retest correlation and correlation coefficient values between raters might also be considered as another limitation. In accordance with the aims of the study, it was possible to perform all statistical analyses, without any outage from the original sample size of the study. High-level representative quality of the sample group might be accounted as a strength of the instrument and the study. Thus, the scale was also shown to be appropriate for clinical use.

Ethics Committee Approval: Ethics Committee Approval was granted by local ethics committee of Celal Bayar University Hospital.

Informed Consent: oral and written consent were obtained from all participants.

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