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Psychometric Evaluation of the Sleep Disturbance Scale for Children (SDSC) in Preschool-Aged Children

Hamid Hojjati [1], **Maedeh Sadeghigolafshani** [2], **Nafiseh Hekmati Pour** [3], **Alireza Salar** [4,*]

[1] Nursing Research Center, Golestan University of Medical Sciences, Gorgan, Iran
[2] Nasibeh School of Nursing and Midwifery, Mazandaran University of Medical Sciences, Sari, Iran
[3] Department of Nursing, AK.C., Islamic Azad University, Aliabad Katoul, Iran
[4] Community Nursing Research Center, Zahedan University of Medical Sciences, Zahedan, Iran

*Corresponding author: Alireza Salar, Community Nursing Research Center, Zahedan University of Medical Sciences, Zahedan, Iran. E-mail: salar@zaums.ac.ir

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Abstract

Introduction: Sleep disturbances are common in preschool-aged children and are associated with adverse neurocognitive and behavioral outcomes. Accurate assessment of these disturbances requires valid psychometric instruments, such as the Sleep Disturbance Scale for Children (SDSC). This study aimed to evaluate the psychometric properties of the Persian version of the SDSC for Iranian preschool children.

Methods: This cross-sectional descriptive study was conducted in 2020 on 260 children aged 5–6 years in Gorgan, Iran. The translation process included forward-backward translation and conceptual adaptation. Face validity was assessed with parental input and item analysis. Content validity was evaluated using the Content Validity Ratio (CVR), Item-Content Validity Index (I-CVI), and expert agreement. Construct validity was examined through exploratory factor analysis (EFA). Reliability was assessed via Cronbach's alpha, intraclass correlation coefficient (ICC), test–retest, standard error of measurement (SEM), and minimal detectable change (MDC). Questionnaire scores were normalized to a 0–100 scale.

Results: All items were understandable and demonstrated acceptable face validity. Content validity indices were satisfactory (S-CVI/Ave = 0.71). EFA identified five main factors: disorders in sleep initiation and maintenance, sleep-related movement disorders, sleep-related breathing disorders, arousal disorders, and excessive daytime sleepiness, explaining 69.19% of the total variance. The overall reliability was high (Cronbach's alpha = 0.902; ICC = 0.872). SEM, MDC, and minimal important change (MIC) indicated that the instrument was sensitive to real changes, with no ceiling or floor effects observed.

Conclusions: The Persian version of the SDSC is a valid and reliable tool for assessing sleep disturbances in preschool-aged children. It can be used for screening and evaluating sleep disorders in clinical and epidemiological research. Limitations include a geographically restricted sample and reliance on parental reports.

INTRODUCTION

Preschool age represents a critical stage in child development [1]. Sleep deprivation and sleep disturbances are highly prevalent among preschool-aged children. It is estimated that approximately 20–60% of children aged 2–5 years' experience at least one sleep-related problem [2]. Children who do not obtain sufficient or high-quality sleep exhibit more cognitive, behavioral, and psychological difficulties. Sleep disturbances in this population are associated with adverse neurocognitive and behavioral outcomes [3-6]. Insufficient sleep during the preschool years is linked to poorer neurobehavioral performance in later years, underscoring the need for accurate assessment of sleep patterns at this age [7].

Recent studies in various populations have shown that standardized instruments for assessing sleep disturbances play a key role in early detection, with one of the most validated tools being the Sleep Disturbance Scale for Children (SDSC) [8].

The SDSC was originally designed to evaluate sleep disorders in children and adolescents and consists of 26 items assessing 13 different dimensions of sleep problems [9, 10]. The questionnaire can measure six main domains of sleep disturbances, such as difficulties

in initiating and maintaining sleep, respiratory disorders, nocturnal awakenings, and excessive daytime sleepiness, and has demonstrated acceptable statistical validity and reliability across different populations [11]. The SDSC serves as a parent-reported screening tool for assessing "sleep problems or disturbances" and is not intended to provide a definitive clinical diagnosis of "sleep disorders" on its own [12].

The use of the SDSC in preschool-age groups has also been explored in recent studies. For example, psychometric research conducted on children aged 3–6 years indicates that this instrument can identify patterns of sleep disturbances in preschoolers and is suitable for epidemiological studies in this age group [10]. However, the validity and reliability of any psychological measurement tool depend directly on the language and culture of its source. For the SDSC to accurately assess sleep disturbances in preschool-aged children, a translation and cross cultural adaptation process is necessary. This process involves not only literal translation but also conceptual adaptation of items to align with cultural characteristics, parental beliefs, and behavioral patterns.

Previous studies have demonstrated that translated versions of the SDSC in various cultures and languages, after undergoing standard procedures, generally exhibit satisfactory validity and reliability and maintain a relatively stable factor structure, although minor differences between populations may be observed [13]. Despite the validation of the Persian SDSC in Iranian children aged 6–15 years, the use of this tool in the preschool age group requires re-evaluation of its psychometric properties [14], because sleep patterns, parental reporting ability, and developmental structure differ at this age [15]. In particular, developmental differences in sleep regulation and behavioral variability among young children may influence factor structure and item performance. Therefore, generalizing the psychometric properties from older children to preschoolers is methodologically unreliable, and re-assessment of validity and reliability in this age group is necessary [16].

These findings highlight that the process of translation and psychometric evaluation is essential for each target population, including preschool-aged children, to ensure that the instrument has sufficient accuracy, validity, and reliability. Accordingly, the present study aimed to examine the psychometric properties of the Sleep Disturbance Scale for Children (SDSC) in a preschool population.

METHODS

The present study was a descriptive cross-sectional study conducted in 2020 on preschool-aged children (5–6 years) in Gorgan, Golestan Province, Iran. The study setting included preschools, children's playgrounds, and health and medical centers in Gorgan. Sampling was performed using a convenience sampling method.

Inclusion criteria consisted of all preschool-aged children without reported chronic physical diseases or psychiatric disorders, including attention-deficit/hyperactivity disorder (ADHD), depression, autism, and other similar conditions. In addition, the ability to communicate with parents and caregivers was considered a prerequisite for participation.

Exclusion criteria included the presence of chronic diseases such as diabetes and asthma (based on parental report) as well as incomplete questionnaires. In such cases, incomplete questionnaires were excluded from the analysis and, according to the sampling protocol, replacement participants were recruited.

Regarding the inconsistency in sample size reported by the reviewer, a re-examination of the data and research documentation confirmed that the final sample size used in all statistical analyses was 260 participants. Accordingly, all sections of the manuscript, tables, and statistical results were thoroughly reviewed and corrected to ensure complete consistency in reporting the sample size (n = 260) throughout the text and to eliminate any ambiguity regarding data management.

Data Collection Instrument

The original version of the Sleep Disturbance Scale for Children (SDSC) was used for data collection in this study.

This questionnaire was developed by Bruni et al. in 1996 and is used to assess sleep disturbances in children aged 6–15 years [8]. It evaluates sleep–wake rhythm and potential sleep-related problems and consists of 26 items with a 5-point Likert response scale. The scoring range of the questionnaire varies from a minimum of 26 to a maximum of 130. It assesses sleep disturbances in childhood and adolescence, including difficulties in initiating and maintaining sleep, sleep-disordered breathing, arousal disorders (sleepwalking, nightmares, night terrors), excessive daytime sleepiness, sleep wake transition disorders, and nocturnal sweating [8].

In this study, prior to data collection, all individuals involved in questionnaire administration and data collection received the necessary training. This training included standardized instructions for parents, procedures for completing the questionnaires, responding to participants' possible questions, and ensuring consistency in instrument administration. In addition, the principal investigator supervised all stages of data collection to minimize implementation errors and ensure data accuracy and completeness.

Translation Process

The translation of the questionnaire followed a forward–backward translation procedure to achieve equivalence with the original version. After obtaining permission from the original developer of the

questionnaire, the instrument was translated by two translators: one fluent in English, and the other fluent in English and experienced in medical and research terminology.

The translated version was reviewed and compared with the original version by the research team, and the final version was developed. The final Persian version was then back-translated into English by the same two translators. The back-translated version was sent to the original developer of the questionnaire for review and approval.

Face Validity

To assess face validity of the final translated version of the Sleep Disturbance Scale for Children, the questionnaire was administered to 10 parents of preschool-aged children to evaluate clarity of instructions, items, and question format.

At this stage, parents were asked to read the questionnaire items aloud to identify and clarify any ambiguities.

For item analysis during face validity assessment, both qualitative and quantitative methods were used. In the qualitative phase, the questionnaire was administered to a group of eligible mothers of young children participating in the study. Participants were asked to evaluate the clarity, simplicity, and comprehensibility of each item, and their feedback regarding any difficulty or ambiguity was collected and incorporated into the revision process.

In the quantitative phase, the Item Impact Score was used to assess the importance of each item. Participants rated the importance of each item using a 5-point Likert scale (from "not important" to "very important"). The item impact score was calculated using the following formula:

Item Impact Score = (Percentage of participants rating the item as important or very important) × (Mean importance score)

Items with an impact score below 1.5 were removed or revised [17].

Content Validity

To assess content validity, the translated questionnaire was reviewed by 10 experts, including a general psychiatrist, child psychiatrist, PhD in physiology, clinical psychology PhD, general psychology PhD, and four PhD-level nurses specializing in pediatrics and psychiatric nursing.

In this stage, Content Validity Index (CVI) at the item level (I-CVI) and scale level (S-CVI) were calculated to quantify expert agreement regarding each item and the overall scale. In addition, the Content Validity Ratio (CVR) was calculated based on Lawshe's formula to determine the essentiality of each item according to expert judgment.

Construct Validity

Exploratory factor analysis (EFA) was conducted to examine the factor structure of the instrument. Prior to analysis, statistical assumptions including multivariate normality were assessed using skewness and kurtosis indices. Given the ordinal nature of Likert-scale data, when variables were within acceptable limits of normality, the Maximum Likelihood estimation method was used for factor extraction. This method was chosen due to its high efficiency in parameter estimation and comparability with previous psychometric studies [18, 19].

During the psychometric evaluation process, all items were examined after face validity, content validity, item analysis, and factor analysis. Based on predefined criteria including CVR, CVI, and factor loadings, none of the items were removed, and all 26 items were retained in the final version of the instrument and used in the final analyses.

Reliability

Reliability of the questionnaire was assessed using internal consistency and stability measures. Internal consistency was evaluated using Cronbach's alpha coefficient for the total scale and each subscale [20, 21]. Test–retest reliability was assessed over a two-week interval. Thirty participants completed the questionnaire on two occasions, and the researcher was present during completion to ensure completeness of responses and to avoid any unexpected events that might influence responses.

The intraclass correlation coefficient (ICC) was calculated for each subscale and the total scale. Values above 0.75 were considered acceptable, and values above 0.90 were considered excellent [22].

In addition to stability, agreement was assessed using the standard error of measurement (SEM) and minimal detectable change (MDC). SEM was calculated using the following formula:

$SEM = SD \times \sqrt{(1 - ICC)}$

The minimal detectable change at the 95% confidence level was calculated using the following formula [23]:

$MDC = z \times \sqrt{2} \times SEM$

The minimal important change (MIC) was calculated using a distribution-based method based on test–retest score changes [24]:

MIC = 0.5 × SD of change scores

Floor and Ceiling Effects

Floor and ceiling effects were considered present if more than 15% of respondents achieved the lowest or highest possible scores, respectively, indicating insufficient content validity [25]. To assess floor and ceiling effects, data from the 260 participants included in the construct validity phase were used.

Score Normalization

To facilitate comparison across subscales, raw scores were converted to a standardized 0–100 scale. This normalization was based on the possible score range of each subscale (number of items × Likert scale range), using the following formula [20]:

Standardized score = (Observed score – Minimum possible score) / (Maximum possible score – Minimum possible score) × 100

Statistical Analysis

Data analysis was performed using SPSS version 22. Descriptive statistics (mean, standard deviation, tables, and figures) and inferential statistics (paired t-test and exploratory factor analysis) were used.

Table 1. Content Validity of the Sleep Disturbance Scale for Preschool Children (SDSC)

Item No.	Item	Impact Score	Relative CVR	I-CVI	Kappa	Remarks
	Disorders of Initiating and Maintaining Sleep					
1	How many hours does your child usually sleep at night?	4.14	1	1	1	Accepted
2	How long does it usually take for your child to fall asleep after going to bed?	3.6	1	1	1	Accepted
3	The child is reluctant to go to bed.	4.8	1	1	1	Accepted
4	The child has difficulty falling asleep at night.	4.14	0.8	1	0.89	Accepted
5	The child feels fear or anxiety when falling asleep.	3.6	0.8	0.9	0.89	Accepted
6	The child experiences sudden body jerks while falling asleep.	3.8	0.8	0.8	0.79	Accepted
7	The child shows repetitive movements while falling asleep (e.g., head banging).	4.05	1	0.9	0.79	Accepted
8	The child experiences dreams while falling asleep.	4.6	1	0.9	0.89	Accepted
9	The child sweats excessively while falling asleep.	4.6	1	0.8	0.89	Accepted
10	The child wakes up more than twice during the night.	4.6	1	0.8	0.79	Accepted
11	The child has difficulty falling asleep again after nighttime awakening.	4.6	0.8	0.8	1	Accepted
	Sleep-Disordered Breathing					
12	During sleep, the child has jerky and twisting movements, frequently changes body position, and throws off the blanket.	4.14	0.8	0.9	0.79	Accepted
13	The child has difficulty breathing during the night.	3.5	1	1	79/0	Accepted
14	The child breathes intermittently during sleep.	4.6	1	0.9	79/0	Accepted
15	The child snores during sleep.	4.7	1	0.8	1	Accepted
	Arousal Disorders					
16	The child sweats excessively during the night.	4.6	0.8	0.9	79/0	Accepted
17	The child experiences sleepwalking during the night.	3.3	1	0.9	79/0	Accepted
18	The child talks during sleep.	4.6	0.8	1	89/0	Accepted
19	The child grinds teeth during sleep.	4.6	1	1	1	Accepted
20	The child screams during sleep, cannot be awakened or communicated with, and does not remember the event the next day.	3.6	1	0.9	79/0	Accepted
21	The child does not remember dreams or nightmares.	3.8	1	1	89/0	Accepted
	Excessive Sleepiness Disorders					
22	Waking the child in the morning is unusually difficult.	4.05	0.8	0.9	1	Accepted
23	The child has difficulty waking up in the morning.	3.6	0.8	1	79/0	Accepted
24	Upon waking in the morning, the child feels unable to move.	4.7	0.8	0.8	1	Accepted
25	The child feels sleepy during the day.	4.8	1	1	79/0	Accepted
26	The child suddenly falls asleep during various daytime situations.	4.14	0.8	0.8	79/0	Accepted

Table 2. Kaiser-Meyer-Olkin (KMO) Measure of Sampling Adequacy and Bartlett's Test of Sphericity for the Preschool Children's Sleep Disturbance Instrument

Statistic	Value
Kaiser-Meyer-Olkin (KMO) Measure	0.908
Approx. Chi-Square (Bartlett's Test)	2344.2
Degrees of Freedom	231
Significance (p)	< 0.001

Table 3. Explained Variance of Extracted Factors in the Preschool Children's Sleep Disturbance Questionnaire

Factor	Eigenvalue	% of Variance (Before Rotation)	Cumulative % (Before Rotation)	% of Variance (After Rotation)	Cumulative % (After Rotation)
1	8.42	39.32	39.32	4.69	18.06
2	3.35	12.91	45.21	4.34	16.77
3	2.61	10.06	55.35	3.65	14.03
4	1.65	7.14	62.52	3.07	11.81
5	1.45	5.62	68.19	1.96	7.58

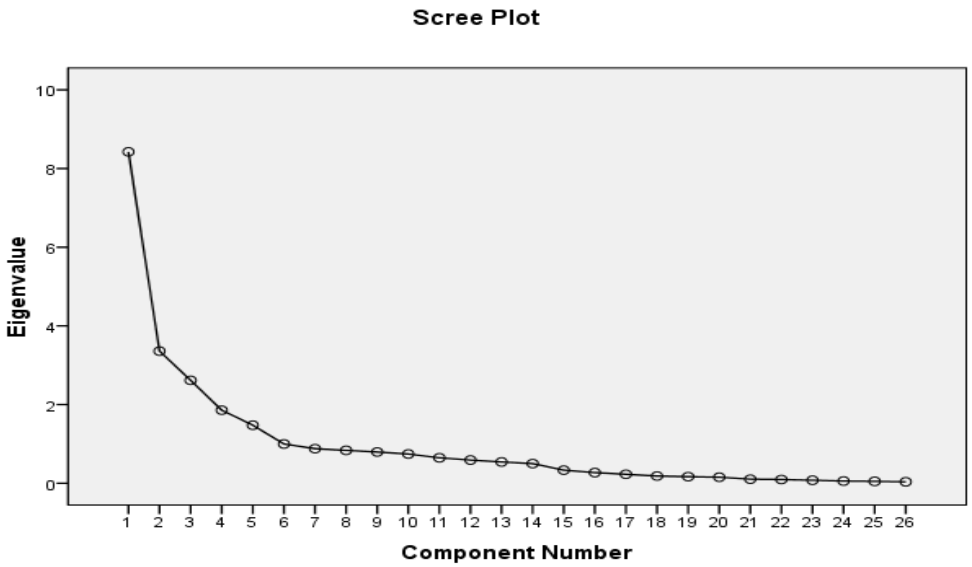

Figure 1. Scree Plot for Determining the Appropriate Number of Factors to Extract in the Preschool Children's Sleep Disorders Instrument

Table 4. Factor loadings and communalities of items in the Preschool Children's Sleep Disturbances Scale obtained from Exploratory Factor Analysis with Promax Rotation

Item No.	Item	Communality	Factor Loading
	Sleep onset and maintenance problems		
1	How many hours does your child usually sleep at night?	0.666	0.782
2	How many hours does it usually take for your child to fall asleep after going to bed?	0.649	0.762
3	The child is reluctant to go to bed	0.536	0.631
4	The child has difficulty falling asleep at night	0.852	0.449
5	The child feels fear and anxiety when falling asleep	0.827	0.790
8	The child experiences dreams while falling asleep	0.868	0.876
10	The child wakes up more than twice during the night	0.906	0.911
11	The child has difficulty falling back asleep after nighttime awakening	0.908	0.919
12	The child shows jerky movements during sleep, frequently changes body position, and kicks off the blanket	0.217	0.328
	Sleep jerking movements		
9	The child sweats excessively when falling asleep	0.353	0.536
6	The child shows body jerking movements when falling asleep	0.926	0.952
7	The child shows repetitive movements such as head banging during sleep onset	0.868	0.943
	Sleep-disordered breathing		
13	The child has breathing problems during the night	0.821	0.891
14	The child breathes intermittently during sleep	0.841	0.899
15	The child snores during sleep	0.816	0.896
16	The child sweats excessively during the night	0.546	0.719
	Sleep arousal disorders		
17	The child experiences sleepwalking during the night	0.436	0.571
18	The child is reported to talk in sleep	0.510	0.684
19	The child grinds teeth during sleep	0.684	0.797
20	The child screams during sleep and is unresponsive, with no recall in the morning	0.634	0.766
21	The child does not remember nightmares or nocturnal experiences	0.691	0.787
	Daytime sleepiness		
22	It is unusually difficult to wake the child in the morning	0.414	0.579
23	The child wakes up with difficulty in the morning	0.684	0.737
24	The child feels unable to move in the morning	0.728	0.761
25	The child feels sleepy during the day	0.679	0.679
26	The child suddenly falls asleep during the day in different situations	0.597	0.509

Table 5. Reliability of the Preschool Children Sleep Questionnaire using Cronbach's Alpha

Dimension	Mean ± SD	Cronbach's Alpha	Standardized Cronbach's Alpha	Number of items
Sleep initiation and maintenance disorder	42.16 ± 4.11	0.882	0.893	9
Jerky movements during sleep	6.71 ± 2.02	0.965	0.965	3
Sleep-disordered breathing	14.23 ± 2.62	0.885	0.888	4
Sleep arousal disorders	21.34 ± 4.51	0.819	0.821	5
Daytime sleepiness	20.91 ± 4.53	0.815	0.815	5
Total questionnaire	105.38 ± 8.21	0.882	0.902	26

Table 6. Intraclass Correlation Coefficients (ICC) of the Preschool Children Sleep Questionnaire using the test–retest method

Subscale (Factor)	ICC	95% Confidence Interval		P-value
		Lower	Upper	
Sleep initiation and maintenance disorder	0.802	0.530	0.922	P<0.01
Jerky movements during sleep	0.797	0.488	0.920	P<0.01
Sleep-disordered breathing	0.934	0.833	0.974	P<0.01
Sleep arousal disorders	0.858	0.641	0.944	P<0.01
Daytime sleepiness	0.879	0.694	0.952	P<0.01
Total questionnaire	0.872	0.678	0.949	P<0.01

Table 7. Absolute Reliability of the Preschool Children Sleep Disorders Scale

Subscale (Factor)	Score Range	ICC	SD	SEM (Standard Error of Measurement)	MIC (Minimal Important Change)	MDC (Minimal Detectable Change)	MDC%	Agreement
Sleep Initiation and Maintenance Disorder	9–45	0.802	0.38	0.169	0.19	0.46	57.35%	Positive
Sleep-Related Movement Disorders	3–15	0.797	0.01	0.004	0.005	0.01	1.25%	Positive
Sleep-Disordered Breathing	4–20	0.934	0.50	0.128	0.25	0.35	37.47%	Positive
Arousal Disorders During Sleep	5–25	0.858	0.63	0.237	0.31	0.65	75.76%	Positive
Excessive Daytime Sleepiness Disorders	5–25	0.879	0.13	0.045	0.022	0.12	13.65%	Positive
Total Questionnaire	26–130	0.872	0.29	0.10	0.145	0.27	30.96%	Positive

Table 8. Ceiling and Floor Effects of the Preschool Children Sleep Disorders Questionnaire

Questionnaire Dimension	Score Range	% of Participants with Minimum Score	% of Participants with Maximum Score
Sleep Initiation and Maintenance Disorder	9–45	0%	3.5%
Sleep-Related Movement Disorders	3–15	0%	10%
Sleep-Disordered Breathing	4–20	0%	0.8%
Arousal Disorders During Sleep	5–25	0%	0.4%
Excessive Daytime Sleepiness Disorders	5–25	0%	0.5%
Total Questionnaire	26–130	0%	0%

Table 9. Standardization and Normalization of the Preschool Children Sleep Disorders Questionnaire

Questionnaire Dimension	Raw Score		Score out of 100	
	Mean	SD	Mean	SD
Sleep Initiation and Maintenance Disorder	42.16	4.11	80.40	10.27
Sleep-Related Movement Disorders	6.71	2.02	58.87	25.25
Sleep-Disordered Breathing	14.94	1.96	68.37	12.25
Arousal Disorders During Sleep	20.58	1.91	77.90	9.80
Excessive Daytime Sleepiness Disorders	20.93	2.12	79.65	10.60
Total Questionnaire	105.33	8.21	79.27	7.47

DISCUSSION

The present study was conducted to evaluate the psychometric properties of the Persian version of the Sleep Disturbance Scale for Children (SDSC) in preschool children. The findings demonstrated that this instrument possesses satisfactory construct validity and reliability. Exploratory factor analysis yielded a five-factor structure that explained 69.19% of the total variance. These findings indicate the adequacy of the factor structure in the target population and support the stability of the instrument's structure among preschool-aged children.

The five-factor structure identified in the present study differs from the original six-factor structure of the SDSC. This discrepancy may be attributed to the developmental characteristics of preschool children as well as cultural differences in the perception and reporting of sleep-related behaviors. At this age, overlap among certain dimensions of sleep disturbances is likely, which may reduce the distinction between some components during factor analysis. Furthermore, the process of translation and cultural adaptation may influence the pattern of factor loadings, a phenomenon that has also been reported in previous studies [10, 11, 26, 27].

Regarding construct validity, one item demonstrated a relatively low factor loading (0.328). However, it was retained in the final version because of its theoretical and clinical importance in ensuring comprehensive coverage of the construct. According to psychometric principles, decisions regarding item removal or retention should not be based solely on statistical indices; rather, the content relevance and contribution of each item to

explaining different dimensions of the construct should also be considered. In addition, qualitative analysis indicated that some apparently similar items actually measure distinct aspects of sleep disturbances, and their removal could reduce content validity and compromise the comprehensiveness of the instrument [20, 28].

The reliability findings showed that the intraclass correlation coefficients (ICCs) ranged from 0.79 to 0.93, indicating satisfactory measurement stability over time. Internal consistency was also adequate (total Cronbach's alpha = 0.902). These findings are consistent with those reported in previous studies examining different cultural versions of the SDSC [10, 29]. Moreover, the high alpha coefficients observed in some short subscales may be attributable to strong inter-item correlations and do not necessarily indicate conceptual redundancy [30, 31].

No significant ceiling or floor effects were observed, indicating an appropriate distribution of scores and the instrument's ability to discriminate among different levels of sleep disturbance severity. This finding supports the sensitivity of the instrument in identifying individual differences [29].

In some subscales, inconsistency between the Minimal Important Change (MIC) and the Minimal Detectable Change (MDC) was observed. This discrepancy may reflect limitations in responsiveness or measurement error. Given the nature of these indices, their interpretation should be undertaken cautiously and in conjunction with other psychometric indicators [24].

The conversion of scores to a standardized 0–100 scale facilitated interpretation and comparison across subscales and is consistent with commonly used approaches in health measurement instruments [32, 33].

In the present study, convergent and discriminant validity indices, including Average Variance Extracted (AVE) and Composite Reliability (CR), were not calculated because the analysis was conducted at the exploratory factor analysis (EFA) stage and the primary objective was to identify the underlying factor structure of the instrument. These indices are generally interpreted within the framework of confirmatory factor analysis (CFA) and structural equation modeling, and their calculation during the exploratory phase may result in premature and less accurate interpretations [34]. Therefore, a more comprehensive evaluation of convergent and discriminant validity is recommended for future studies.

Criterion validity and predictive validity were also not examined because the study employed a cross-sectional design and lacked a clinical gold standard. These forms of validity typically require longitudinal designs or clearly defined clinical groups [24].

Diagnostic accuracy analyses, including receiver operating characteristic (ROC) analysis, sensitivity, specificity, and determination of optimal cutoff scores, were not performed because the primary aim of the study was the initial psychometric evaluation of the instrument in a general population. Such analyses require a diagnostic reference standard and clearly defined clinical and non-clinical groups, which were not available in the present study. Consequently, these issues should be addressed in future research [34, 35].

Overall, the findings of the present study are consistent with those reported for translated versions of the SDSC in various languages and cultures, including Spanish, Turkish, Arabic, and Chinese populations, suggesting that the instrument demonstrates acceptable psychometric stability across diverse cultural settings [11]. However, the specific focus of the current study on preschool-aged children and the comprehensive evaluation of reliability indices and factor structure provide additional evidence supporting the use of the Persian version of the SDSC in younger age groups. In general, the consistency of the present findings with previous cross-cultural evidence suggests that translated versions of the SDSC continue to demonstrate satisfactory validity and reliability across different cultural contexts, indicating the stability of the instrument's psychometric properties and its cross-cultural applicability [36].

From a clinical applicability perspective, the findings indicate that the Persian version of the SDSC can be used as an initial screening tool in real-world settings such as preschools and child mental health services. Features such as adequate reliability, a stable factor structure, and standardized scoring facilitate its rapid and practical use in non-specialized settings. Nevertheless, this instrument should not be considered a substitute for comprehensive clinical diagnostic assessment and should be interpreted alongside clinical interviews and other diagnostic procedures. Therefore, its primary application lies in screening and the early identification of children at risk for sleep disorders.

In conclusion, the psychometric findings of the present instrument demonstrate internal consistency and temporal stability comparable to those reported for the original SDSC and other internationally validated instruments. Furthermore, owing to its specific focus on preschool children and the inclusion of more comprehensive analyses of absolute reliability and floor/ceiling effects, the instrument may provide enhanced capability for the accurate assessment of sleep disturbances in this age group an aspect that has not been reported in many previous translations and cross-cultural validation studies.

CONCLUSION

The Preschool Children Sleep Disorders Questionnaire demonstrated satisfactory psychometric properties, including adequate validity and reliability. The face and content validity of the items were found to be

appropriate, and the five-factor structure explained a substantial proportion of the total variance, showing consistency with findings from international studies, including those based on the Sleep Disturbance Scale for Children (SDSC).

The reliability of the instrument was excellent at both the overall scale and subscale levels. Furthermore, the analysis of absolute reliability indicated that the questionnaire is capable of detecting real changes over time. The absence of significant ceiling and floor effects further supports the instrument's adequate response range and sensitivity.

Overall, this questionnaire represents a reliable and appropriate instrument for assessing sleep disorders in preschool children and can be used in clinical research, epidemiological studies, and the evaluation of treatment interventions.

Limitations

Several limitations should be considered when interpreting the findings of this study. First, the study was conducted among preschool children from a specific geographical region, which may limit the generalizability of the findings to other age groups and cultural contexts. Second, all data were collected exclusively through parental reports, which may be subject to reporting bias and perceptual errors.

Due to the limited sample size within the male and female subgroups, gender-based comparative analyses and measurement invariance testing could not be performed. In addition, the stability and responsiveness of the instrument were not evaluated in longitudinal studies or clinical populations. Objective measures of sleep assessment, such as actigraphy, polysomnography, and structured clinical interviews, were not utilized.

Furthermore, several potentially important contextual and confounding variables, including socioeconomic status, parenting style, screen exposure, and sleep-related behavioral factors, were not controlled for in the analyses.

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AUTHOR CONTRIBUTIONS

Maedeh Sadeghi-Golafshani, as the first author, was responsible for the initial drafting of the manuscript and organization of the content. Dr. Hamid Hojjati conducted the data analysis, statistical evaluation, and final revision of the manuscript. Dr. Nafiseh Jakamati-Pour was responsible for field data collection and contributed to manuscript revision.

CONFLICT OF INTEREST

The authors declare that there are no financial or non-financial conflicts of interest related to the conduct of this study or the preparation of this manuscript.

ETHICAL CONSIDERATIONS

This study, entitled "Psychometric Evaluation of the Sleep Disturbance Scale for Children (SDSC) in Preschool Children," was approved by the Student Research Committee of Islamic Azad University, Aliabad Katoul Branch, and conducted under the supervision of the Ethics Committee of Islamic Azad University, Chalous Branch. The study was approved under the ethical code IR.IAU.CHALUS.REC.1398.005.

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Appendix 1: Final Version of the Preschool Children Sleep Disorders Questionnaire (SDSC-P)
Response options (Likert scale, left to right):
1 = Never | 2 = Rarely | 3 = Sometimes | 4 = Often | 5 = Always

1	2	3	4	5	Questionnaire Item
					Sleep Initiation and Maintenance Disorder
□	□	□	□	□	How many hours does your child usually sleep at night?
□	□	□	□	□	How long after going to bed does your child usually fall asleep?
□	□	□	□	□	The child is reluctant to go to bed.
□	□	□	□	□	The child has difficulty falling asleep at night.
□	□	□	□	□	The child experiences fear or anxiety when falling asleep.
□	□	□	□	□	The child experiences dreams while falling asleep.
□	□	□	□	□	The child wakes up more than twice during the night.
□	□	□	□	□	The child has difficulty falling back asleep after nighttime awakenings.
□	□	□	□	□	The child exhibits frequent body movements, changes position often, and throws off bedcovers during sleep.
					Sleep-Related Movement Disorders
□	□	□	□	□	The child sweats excessively while falling asleep.
□	□	□	□	□	The child exhibits sudden jerking body movements while falling asleep.
□	□	□	□	□	The child displays repetitive movements such as head banging while falling asleep.
					Sleep-Disordered Breathing
□	□	□	□	□	The child experiences breathing difficulties during the night.
□	□	□	□	□	The child breathes intermittently or irregularly during sleep.
□	□	□	□	□	The child snores during sleep.
□	□	□	□	□	The child sweats excessively during the night.
					Arousal Disorders During Sleep
□	□	□	□	□	The child sleepwalks during the night.
□	□	□	□	□	The child talks in their sleep.
□	□	□	□	□	The child grinds teeth during sleep.
□	□	□	□	□	The child screams during sleep and does not remember it in the morning.
□	□	□	□	□	The child does not remember nightmares or nocturnal experiences.
					Excessive Daytime Sleepiness
□	□	□	□	□	Waking the child in the morning is unusually difficult.
□	□	□	□	□	The child has difficulty waking up in the morning.
□	□	□	□	□	The child feels unable to move upon waking in the morning.
□	□	□	□	□	The child feels sleepy during the day.
□	□	□	□	□	The child suddenly falls asleep during the day in various situations.