Original Article / *Özgün Makale*

DOI: 10.4274/jtsm.galenos.2025.04834
J Turk Sleep Med 2026;13(1):42-49

Assessing Sleep in Late Life: Validation of the Turkish Jenkins Sleep Scale and Identification of Older Population-Specific Cut-Off

Yaşlılıkta Uyku Değerlendirmesi: Türkçe Jenkins Uyku Ölçeği'nin Validasyonu ve Yaşlı Nüfusa Özgü Kesme Noktasının Belirlenmesi

Fatma Özge Kayhan Koçak[1], Nagihan Sözen Gencer[2], Sibel Çavdar[3], Fatmanur Uzun Erten[3]

[1]*University of Health Sciences Türkiye, İzmir Tepecik Training and Research Hospital, Department of Internal Medicine, Division of Geriatrics, İzmir, Türkiye*
[2]*Balıkesir Atatürk City Hospital, Department of Internal Medicine, Division of Geriatrics, Balıkesir, Türkiye*
[3]*İzmir City Hospital, Department of Internal Medicine, Division of Geriatrics, İzmir, Türkiye*

Abstract

Objective: Sleep disturbances frequently affect older adults and are linked to geriatric issues such as frailty, cognitive decline, and depression. This study assessed the psychometric properties and diagnostic value of the Turkish version of the Jenkins Sleep Evaluation Scale (JSS-TR) in individuals aged 65 years and above.

Materials and Methods: One hundred thirty-two community-dwelling older adults completed the JSS-TR along with the Pittsburgh Sleep Quality Index (PSQI), the Basic Scale on Insomnia Complaints and Quality of Sleep, and a comprehensive geriatric assessment. Analyses included internal consistency, test-retest reliability, correlation with related measures, group comparisons, and receiver operating characteristic (ROC) curve analysis to identify the most appropriate cut-off score for poor sleep quality.

Results: The median participant age was 80 years (interquartile range: 9.75). The JSS-TR demonstrated good internal consistency (Cronbach's alpha: 0.68) and excellent stability over time (intraclass correlation coefficients: 0.92). It showed a moderate correlation with PSQI scores ($r = 0.62$, $p < 0.001$). ROC analysis indicated an optimal cutoff of ≥15, yielding 54% sensitivity and 87% specificity. Higher JSS-TR scores were significantly associated with frailty and history of falls ($p < 0.05$), supporting predictive validity.

Conclusion: The JSS-TR is a reliable and valid instrument for detecting poor sleep quality among older adults. A population-specific cut-off score of ≥15 improves diagnostic precision in this group.

Keywords: Sleep, aged, insomnia

Öz

Amaç: Uyku bozuklukları, yaşlı yetişkinlerde sık görülmekte ve kırılganlık, bilişsel gerileme ve depresyon gibi geriatrik sorunlarla ilişkilendirilmektedir. Bu çalışma, 65 yaş ve üzerindeki bireylerde Jenkins Uyku Değerlendirme Ölçeği'nin Türkçe versiyonunun (JSS-TR) psikometrik özelliklerini ve tanısal değerini değerlendirmiştir.

Gereç ve Yöntem: Bu kesitsel çalışmada, toplumda yaşayan 132 yaşlı yetişkin JSS-TR'nin yanı sıra Pittsburgh Uyku Kalitesi İndeksi (PSQI), Uykusuzluk Şikayetleri ve Uyku Kalitesi Temel Ölçeği ve kapsamlı bir geriatrik değerlendirme tamamlamıştır. Analizler; iç tutarlılık, test-tekrar test güvenilirliği, ilişkili ölçümlerle korelasyon, grup karşılaştırmaları ve zayıf uyku kalitesi için en uygun kesme noktasını belirlemek amacıyla alıcı işletim karakteristiği (ROC) eğrisi analizini içermiştir.

Bulgular: Katılımcıların ortanca yaşı 80 (çeyrekler arası açıklık: 9,75) idi. JSS-TR, iyi düzeyde iç tutarlılık (Cronbach's alpha: 0,81) ve mükemmel düzeyde zamansal kararlılık (sınıf içi korelasyon katsayısı: 0,92) göstermiştir. PSQI puanları ile orta düzeyde korelasyon saptanmıştır ($r = 0,62$, $p < 0,001$). ROC analizi, %54 duyarlılık ve %87 özgüllük ile en uygun kesme noktasını ≥15 olarak belirlemiştir. Daha yüksek JSS-TR puanları, kırılganlık ve düşme öyküsü ile anlamlı şekilde ilişkili bulunmuş ($p < 0,05$) ve bu da yordayıcı geçerliliği desteklemiştir.

Sonuç: JSS-TR, yaşlı yetişkinlerde kötü uyku kalitesini saptamak için güvenilir ve geçerli bir ölçektir. Nüfusa özgü ≥15 kesme noktası, bu grupta tanısal kesinliği artırmaktadır.

Anahtar Kelimeler: Uyku, yaşlılık, uykusuzluk

Address for Correspondence/Yazışma Adresi: Fatma Özge Kayhan Koçak, University of Health Sciences Türkiye, İzmir Tepecik Training and Research Hospital, Department of Internal Medicine, Division of Geriatrics, İzmir, Türkiye
E-mail: drozgekayhankocak@gmail.com **ORCID-ID:** orcid.org/0000-0002-6447-2352
Received/Geliş Tarihi: 08.08.2025 **Accepted/Kabul Tarihi:** 19.09.2025 **Publication Date/Yayınlanma Tarihi:** 09.03.2026

Cite this article as: Kayhan Koçak FÖ, Sözen Gencer N, Çavdar S, Uzun Erten F. Assessing sleep in late life: validation of the Turkish Jenkins Sleep Scale and identification of older population-specific cut-off. J Turk Sleep Med. 2026;13(1):42-49

Introduction

Sleep is a basic physiological need essential for maintaining physical and mental health. However, sleep quality tends to decline with aging. Nearly one in five older individuals is estimated to have insomnia disorder, often linked to gender, mental health, or somatic conditions (1). Worldwide, the most prevalent sleep–related disorder is obstructive sleep apnea, followed by inadequate sleep quality, other sleep problems, insomnia, and excessive daytime sleepiness (2,3). Among community–dwelling older adults, poor sleep quality affects roughly 40% of individuals, and this prevalence may rise to 65% in institutional care (2,3).

Sleep disturbances in older adults have multifactorial causes, including medical conditions like benign prostatic hyperplasia (through nocturia) and psychological factors such as depression and anxiety (4,5). Sleep disturbance is closely related to geriatric syndromes as well as quality of life. For instance, poor sleep is a well–established predictor of late–life depression, conferring a 66% greater risk (4). Sleep duration shows a U–shaped relationship with frailty and depression, with both short (<6 hours) and long (>8 hours) durations, long sleep duration, in particular, has been linked to a 29% increased risk of dementia (5-8). Additionally, measures such as sleep latency, continuity, and architecture have demonstrated significant associations with cognitive performance (8). Disrupted sleep architecture is observed in individuals with mild cognitive impairment, and excessive daytime sleepiness increases the risk of cognitive decline by 26% (9,10).

Although sleep can be measured objectively with polysomnography, it is time–consuming and impractical in most outpatient settings (6). For practical reasons, subjective tools are frequently used. Instruments such as the Pittsburgh Sleep Quality Index (PSQI) and sleep diaries are well known but may be too lengthy or complex for rapid clinical screening in geriatric practice. The Jenkins Sleep Scale (JSS) is a concise four–item questionnaire using a six–point Likert scale to assess difficulty falling asleep, waking during the night, early morning awakening, and morning tiredness (11). It has been validated in specific populations, such as cardiac and rheumatologic patients (12).

The present study aimed to assess the validity, reliability, and predictive ability of the Turkish version of the JSS in adults aged 65 years and older. Establishing its psychometric properties will support its use as a rapid, reliable, and clinically meaningful tool in geriatric practice and research.

Materials and Methods

Study Design and Participants

This cross–sectional study was conducted in geriatric outpatient clinics of two tertiary care hospitals between March and June 2025. Exclusion criteria were absence of written informed consent; communication barriers (e.g., language limitations, significant hearing loss); inability to cooperate with assessment; and neurologic or psychiatric disorders likely to affect evaluation (e.g., cerebrovascular disease, dementia, major depression, delirium). In addition, we excluded patients with acute conditions liable to cause transient sleep disturbance or whose sleep was primarily disrupted by pain or breathing difficulty at the time of assessment (e.g., acute pain exacerbation, febrile illness/infection, decompensated cardiopulmonary disease with dyspnea/orthopnea). Stable chronic comorbidities documented within the Comprehensive Geriatric Assessment (CGA) (e.g., hypertension, diabetes, osteoarthritis/chronic pain, benign prostatic hyperplasia/urinary symptoms, chronic lung disease, coronary artery disease) were permitted. Sociodemographic characteristics (age, sex, marital status, and education) were obtained via interviewer–administered questionnaires.

Sample Size

Sample size estimation followed the participant–to–item ratio described by Hogarty et al. (13), using a 20:1 ratio. For the 4–item JSS, a minimum of 80 participants was required. To account for potential data loss, 10 additional participants were recruited, resulting in a planned sample size of 90.

Instruments

Jenkins Sleep Scale (JSS)

The JSS consists of four items evaluating sleep difficulties over the preceding four weeks. Each is rated on a 6–point scale (0 = never to 5 = 22–28 days), producing a total score from 0 to 20; higher scores indicate greater disturbance (11). Scores of ≥11 suggest frequent problems. The Turkish version was previously translated and validated by Duruöz et al. (12) and permission for use was obtained.

Pittsburgh Sleep Quality Index (PSQI)

The PSQI is a 19–item measure covering seven components of sleep quality, with total scores ranging from 0 to 21. A cut–off score of ≥5 is indicative of poor sleep quality. We employed the Turkish version validated by Ağargün et al. (14).

Basic Scale on Insomnia Complaints and Quality of Sleep (BaSIQS)

BaSIQS contains seven items assessing aspects such as sleep onset latency, fragmentation, and perceived quality. Each item is rated from 0 to 4, yielding total scores of 0–28. Values above 15 indicate frequent sleep disturbances. The Turkish version validated by Ağar et al. (15) was used in the present study.

Comprehensive Geriatric Assessment (CGA)

Frailty status was determined by the Clinical Frailty Scale (CFS), with scores ≥5 defining frailty (16). Disability was defined as activities of daily living (ADL) <5 or instrumental activities of daily living (IADL) <8 (17,18). Sarcopenia risk was screened using the SARC–F questionnaire, with scores ≥4 indicating increased risk (19). Cognitive performance was measured with the Standardized Mini–Mental State Examination, using a cut–off of <24 for impairment (20). Additional CGA components included assessments for urinary incontinence, falls within the past year, visual or hearing impairments, and nutritional status via the Mini Nutritional Assessment, with scores ≤7 indicating malnutrition (21).

Assessment of Anxiety, Depression and Stress

Anxiety symptoms were measured with the Generalized Anxiety Disorder–2 (GAD–2) scale, using a threshold of ≥3 (22). Perceived stress was assessed with the four–item Perceived Stress Scale (PSS–4), where higher scores indicate greater stress (23). Depressive symptoms were screened using the Patient Health Questionnaire–2 (PHQ–2), with a cut–off of ≥3 (24).

Cross-Cultural Adaptation

The JSS–TR, previously translated into Turkish by Duruöz et al. (12). The previously validated article employed the translation–back translation method. It was reviewed by three geriatricians to confirm its suitability for older adults. No further adaptation was deemed necessary.

Reliability Assessment

Internal consistency was examined using Cronbach's alpha, with values above 0.6 considered acceptable. Test–retest reliability was evaluated using a two–week interval in 20 participants. Agreement for categorical items was quantified using Cohen's kappa, interpreted as: >0.90 (almost perfect), 0.80–0.90 (strong), 0.60–0.79 (moderate), 0.40–0.59 (weak), 0.21–0.39 (minimal), and <0.20 (none). For continuous scores, intraclass correlation coefficients (ICC) were calculated using a two–way mixed–effects model (absolute agreement), with >0.90 considered excellent, 0.75–0.90 good, 0.50–0.75 moderate, and <0.50 poor.

Validity Assessment

Content validity was explored through cognitive interviews with 10 older participants to confirm clarity and relevance of items.
Construct validity was tested by examining correlations between the JSS–TR and BaSIQS (convergent validity), and between the JSS–TR and GAD–2, PHQ–2, and PSS–4 (discriminant validity).
Concurrent validity was assessed by correlation between JSS–TR and PSQI scores. Predictive validity was evaluated by comparing JSS–TR scores across subgroups with and without selected geriatric syndromes, including frailty, falls, disability, cognitive impairment, malnutrition, hearing or vision problems, and sarcopenia risk.
Agreement analysis between the JSS–TR and PSQI classifications was performed using Cohen's kappa.

Diagnostic Accuracy

The PSQI served as the reference standard, with ≥5 indicating poor sleep quality (12). Receiver operating characteristic (ROC) curves were generated, and area under the curve (AUC) values ≥0.7 were regarded as acceptable sensitivity (Se), specificity (Sp), positive predictive value (PPV), negative predictive value (NPV), likelihood ratios (LR^+/LR^-), and overall accuracy were calculated with 95% confidence intervals (CIs). Three scoring approaches were examined: continuous JSS–TR score, the existing ≥11 cut–off, and the optimal cut–off (>15) determined by the Youden index. Diagnostic indices (Se, Sp, PPV, NPV, LR^+/LR^-, AUC) were reported across plausible thresholds; results are summarized at ≥11 (screening–oriented) and ≥15 (confirmation–oriented) to reflect different clinical use cases.

Ethics approval was granted by the Clinical Research Ethics Committee of University of Health Sciences Türkiye, İzmir Tepecik Training and Research Hospital (approval number: 2025/01–14, date: 05.02.2025).
All participants provided written informed consent, and study procedures complied with the Declaration of Helsinki.

Statistical Analysis

Data analysis was performed using SPSS version 25. Normality was assessed by the Shapiro–Wilk test. Variables with normal distribution were expressed as mean ± standard deviation; non–normally distributed data were expressed as median (interquartile range [IQR]). Categorical variables were summarized as frequencies and percentages, and comparisons were made using chi–square or Fisher's exact tests. Group differences for continuous variables were examined using independent samples t–tests or Mann–Whitney U tests, depending on distribution. Spearman's correlation coefficients assessed associations between JSS–TR scores and other measures, with rho values interpreted. Kappa statistics were used to interpret agreement categories. ROC curve results were interpreted. The Youden index was calculated to identify optimal cut–off values. Permission to use all scales was obtained from the original authors.

Results

Participant Characteristics

A total of 132 older adults took part in the study. The median age was 80 years (IQR: 9.75), and 64.4% (n = 85) were women. Of the participants, 12.9% (n = 17) were illiterate, and 17.4% (n = 23) lived alone. The median score of CFS, ADL and IADL were 4, 6, and 8, respectively. The median score of JSS–TR, PSQI and BaSIQS were 12, 6, and 12, respectively. Sleep disturbance was identified in 52.3% (n = 69) according to the JSS–TR and in 60.6% (n = 80) based on the PSQI, as shown in Table 1.

Reliability

The JSS–TR demonstrated strong stability over time, with a kappa value of 0.806 ($p < 0.001$) for dichotomized scores and an ICC of 0.906 ($p < 0.001$) for the total score. Internal consistency reliability was acceptable for a brief 4–item multidomain screener, with a Cronbach's alpha of 0.683.

Validity

Content Validity

Feedback from cognitive interviews with 10 older participants indicated that items were clear and relevant, with no changes required.

Construct Validity

JSS–TR scores correlated strongly with BaSIQS scores ($rs = 0.624$, $p < 0.001$). Weak but significant correlations were observed with GAD–2 ($rs = 0.273$, $p = 0.002$), PSS–4 ($rs = 0.188$, $p = 0.03$), and PHQ–2 ($rs = 0.172$, $p = 0.05$).

Predictive Validity

Higher JSS–TR scores were recorded in participants with frailty (p = 0.012), history of falls (p = 0.026), and hearing impairment (p = 0.004), as shown in Table 2. No significant associations were found for disability, sarcopenia risk, malnutrition, vision impairment, urinary incontinence, or cognitive impairment.

Concurrent Validity

JSS–TR and PSQI scores showed a moderate correlation (rs = 0.425, p < 0.001) and fair to moderate agreement (Cohen's kappa = 0.342, p < 0.001). Agreement with BaSIQS was moderate (kappa = 0.407, p < 0.001). Table 3 presents detailed correlation results between JSS–TR and PSQI components.

Group Comparisons and Discrimination

When participants were divided into poor (n = 80) and good (n = 52) sleepers using a PSQI cut–off ≥5, total and most item scores of the JSS–TR were significantly higher in the poor sleep group (p < 0.001 for total, item 1, and item 4) (Table 4).

Diagnostic Accuracy

The ROC analysis indicated that the JSS–TR total score had an AUC of 0.706 (95% CI: 0.617–0.794) for identifying poor sleep quality (PSQI ≥5). The >15 cut–off (the confirmation–oriented threshold) demonstrated superior specificity (86.54%) and PPV (86.0%) compared to the previously recommended >11 cut–off (relative to the screening–oriented threshold), though sensitivity was lower (53.75% vs. 66.25%) [AUC = 0.701 (95% CI: 0.612–0.791), AUC = 0.677 (95% CI: 0.583–0.772), respectively]. Choice of threshold should reflect clinical intent (screening vs. confirmation), noting that NPV was modest in this cohort. Table 5 presents the full diagnostic accuracy indices, and Figure 1 shows the ROC curves for both cut–offs.

Table 1. Demographics of participants.

Variables	All participants
Age, years	80 (9.75) (65–95)
Female sex, n (%)	85 (64.4)
Education level, n (%)	
Illiterate	17 (12.9)
Literate	22 (16.7)
5–8 years	61 (46.3)
9–11 years	16 (12.1)
11 years	16 (12.1)
Marital status, n (%)	
Single	1 (0.8)
Married	73 (55.3)
Widow	58 (43.1)
Living alone, n (%)	23 (17.4)
Comprehensive geriatric assessment	
CFS	4 (2) (1–7)
ADL	6 (1) (1–6)
IADL	8 (1) (1–8)
SARC-F	3 (3.75) (0–10)
MNA-SF	13 (2) (2–14)
S-MMSE	25 (5) (9–30)
Fall history, n (%)	57 (43.2)
Presence of incontinence, n (%)	66 (50)
Vision impairment, n (%)	110 (83.3)
Hearing impairment, n (%)	71 (53.8)

Continuous variables were expressed as median (interquartile range) (minimum-maximum), and categorical variables were presented as frequencies (percentages).

CFS: Clinical Frailty Scale, ADL: Activities of daily living, IADL: Instrumental activities of daily living, MNA-SF: Mini Nutritional Assessment-Short Form, S-MMSE: Standardized Mini-Mental State Examination.

Table 2. The predictive validity of the JSS-TR.

Variables		n (%)	Median JSS –TR (IQR)	p–value	z-score
Frailty	Frail	44 (33.3)	8 (10.75)	**0.012**	-2.525
	Non-frail	88 (66.7)	13 (6.75)		
Falls history	Yes	57(43.2)	13 (9.5)	**0.026**	-2.230
	No	75 (56.8)	10 (10)		
ADL disability	Yes	8 (6.1)	15 (12.25)	0.306	-1.024
	No	124 (93.9)	11 (9)		
IADL disability	Yes	39 (29.5)	10 (11)	0.423	-0.801
	No	93 (70.5)	12 (7)		
Urinary incontinence	Yes	66 (50)	14 (8.5)	0.155	-1.421
	No	66 (50)	10 (9.25)		
Hearing impairment	Yes	71 (53.8)	10 (10)	**0.004**	-2.871
	No	61 (46.2)	15 (9.5)		
Vision impairment	Yes	110 (83.3)	12 (8.25)	0.587	-0.542
	No	22 (16.7)	8 (13.75)		

Table 2. Continued.

Variables		n (%)	Median JSS–TR (IQR)	p–value	z-score
Malnutrition	Yes	7 (5.3)	9 (7)	0.498	-0.678
	No	125 (94.7)	12 (9)		
Sarcopenia risk	Yes	63 (47.7)	11 (9)	0.862	-0.174
	No	69 (52.3)	12 (8)		
Cognitive impairment	Yes	51 (38.6)	9 (11)	0.321	-0.992
	No	81 (61.4)	12 (7)		

JSS–TR: The Turkish version of Jenkins Sleep Scale, ADL: Activities of daily living, IADL: Instrumental activities of daily living.

Table 3. Spearman rho correlations value between the JSS–TR overall and components scores score and the PSQI overall and components scores.

	JSS–TR score	1. Trouble falling asleep	2. Waking up several times per night	3. Trouble falling asleep again	4. Waking up feeling tired and worn out
C1-Subjective sleep quality	0.377**	0.516**	0.166	0.224*	0.148
C2-Sleep latency	0.454**	0.692**	0.054	0.229*	0.262*
C3-Sleep duration	0.195*	0.305**	0.015	0.025	0.164
C4-Sleep efficiency	0.241*	0.303**	0.003	-0.044	0.335**
C5-Sleep disturbances	0.273**	0.254*	0.121	0.118	0.316**
C6-Use of sleeping medication	-0.031	-0.099	-0.099	-0.077	0.058
C7-Daytime dysfunction	0.203*	0.126	-0.040	0.042	0.406**
PSQI overall score	0.425**	0.585**	0.036	0.123	0.401**

*p<0.05, **p<0.001.

JSS–TR: Turkish version of Jenkins Sleep Scale, PSQI: Pittsburgh Sleep Quality Index.

Table 4. JSS-TR scores comparisons between PSQI sleep quality groups.

	Poor sleep quality n = 80	Good sleep quality n = 52	p–value
	Median (IQR)	Median (IQR)	Mann-Whitney U
JSS-TR scores	15 (10)	10 (7)	<0.001
1. Trouble falling asleep	4 (3)	0 (1)	<0.001
2. Waking up several times per night	5 (3)	5 (2)	0.698
3. Trouble staying asleep	4 (4)	4 (5)	0.519
4. Waking up feeling tired and worn out	3 (5)	0 (2)	0.001

PSQI ≥5 indicates poor sleep quality (reference standard). Minumum-maximum value of all items of JSS–TR were 0–5. Minimum-maximum value of JSS-TR total score were 0–20. JSS–TR: Turkish version of Jenkins Sleep Scale, PSQI: Pittsburgh Sleep Quality Index, IQR: Interquartile range.

Table 5. Test accuracy results of the JSS-TR to predict sleep distribution based on PSQI score.

Cut-off value	Se % (95% CI)	Sp % (95% CI)	PPV % (95% CI)	NPV % (95% CI)	LR^+	LR^-	Youden index
≥11*	66.25 (54.81–76.45)	69.23 (54.90–81.28)	76.81 (68.16–83.68)	57.14 (48.28–65.57)	2.15 (1.39–3.33)	0.49 (0.34–0.70)	0.355
≥15**	53.75 (42.24–64.97)	86.54 (74.21–94.41)	86 (74.97–92.65)	54.88 (48.41–61.19)	3.99 (1.95–8.19)	0.53 (0.41–0.69)	0.403

*The previously recommended value.

**The optimal cut-off value.

Threshold interpretation: ≥11 prioritizes sensitivity for screening; ≥15 prioritizes specificity/PPV for confirmation. NPV depends on prevalence and was modest in this cohort; positive results should be confirmed (e.g., PSQI/clinical evaluation).

Se: Sensitivity, Sp: Specificity, PPV: Positive predictive value, NPV: Negative predictive value, LR: Likelihood ratio, JSS–TR: Turkish version of Jenkins Sleep Scale.

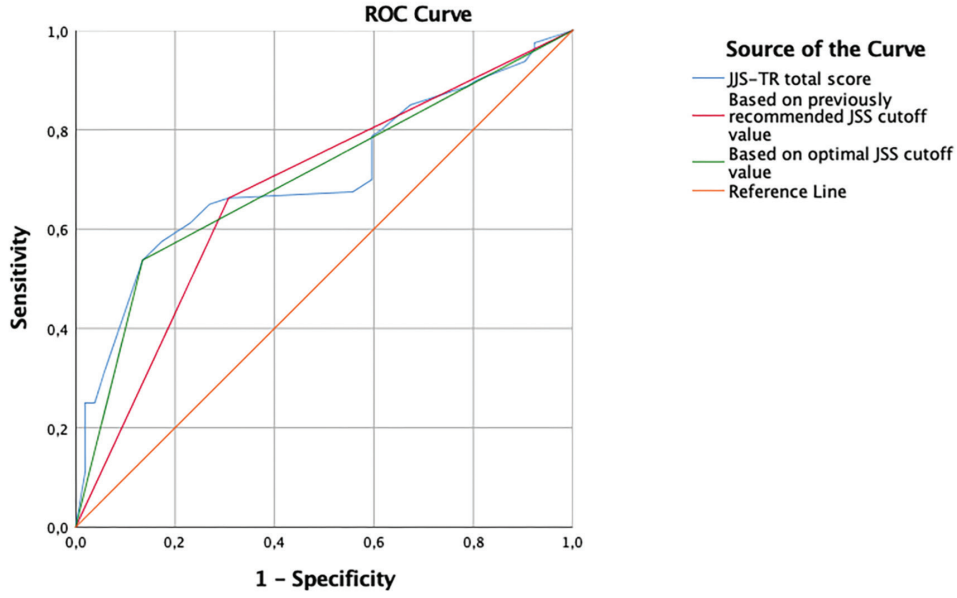

Figure 1. The receiver operating characteristic (ROC) curve annotates the ≥11 (screening-oriented) and ≥15 (confirmation-oriented) thresholds. ROC curve for the Turkish version of Jenkins Sleep Scale score, the previously recommended value and the optimal cut-off value in detecting sleep distrubition based on the Pittsburgh Sleep Quality Index (poor sleep quality vs. good sleep quality). The red diagonal represents the line of no discrimination (area under the curve = 0.5), corresponding to a non-informative classifier.

Discussion

The JSS–TR demonstrated moderate sensitivity and specificity, with a relatively high PPV, supporting its utility as a screening tool for identifying sleep disturbances among older adults. Importantly, our findings highlight the value of using a population–specific cutoff of ≥15, which provided greater specificity and PPV than the previously recommended cutoff of ≥11. The population–specific cut–off yielded a more precise identification of individuals with objectively poor sleep, as defined by the PSQI. This enhanced diagnostic accuracy is especially meaningful in geriatric care settings, where avoiding unnecessary interventions and focusing on those truly in need is a clinical priority. Our findings support the integration of the JSS–TR with the ≥15 cut–off as part of routine sleep assessments in older populations.

The predictive validity analysis highlighted that poor sleep, as measured by JSS–TR, was associated with frailty, falls, and hearing problems. The absence of an association with sarcopenia risk aligns with evidence indicating that while both poor sleep and reduced muscle strength are important geriatric issues, their link is likely mediated through broader health decline (6,25). Meta–analytic data indicate that insomnia nearly doubles the risk of frailty, particularly when sleep onset and maintenance are impaired (26).

Convergent validity was supported by significant correlations with PSQI subdomains, except for "use of sleep medication," which may be influenced by prescribing habits rather than actual sleep quality. Items related to difficulty initiating sleep and morning tiredness appeared to be the most discriminating. Psychosocial influences on sleep in later life are well documented, with studies showing that cumulative stressors contribute to worsening sleep patterns over time (27). Our weak correlations with depression and anxiety measures suggest that JSS–TR primarily reflects sleep disturbance rather than emotional distress; however, longitudinal evidence shows a bidirectional relationship between poor sleep and depressive symptoms, underlining the importance of monitoring both in clinical care (28). Network analyses also suggest that certain JSS subdomains, such as "feeling tired in the morning," may act as key connectors between insomnia and depression (29).

No significant association emerged between JSS–TR scores and cognitive impairment in this sample, although other research points to complex and sometimes subtle links between sleep and cognitive performance. Recent meta–analysis showed that short sleep latency and better sleep efficiency correlate with stronger executive function, while non–restorative sleep and early morning awakenings may impair cognitive flexibility and working memory (8). Differences in findings may reflect the use of self–report measures and cross–sectional design in our study. Finally, given the simplicity, brevity, and psychometric strength of the JSS–TR, it appears suitable for routine use in geriatric outpatient settings. As sleep quality is a vital determinant of physical and psychological health in older adults (30), incorporating the JSS–TR into clinical workflows may enhance the detection and management of sleep–related problems.

Given its brevity and multidomain content, the JSS–TR is most suitable for triage and case–finding. For initial screening/

triage (prioritizing sensitivity), ≥11 may be preferred. For case–finding/confirmation in geriatric clinics (prioritizing specificity and PPV), ≥15 is preferable (specificity ~87%, PPV ~86) with lower sensitivity (~54). Because NPV is modest in our sample, consistent with relatively high prevalence of poor sleep, the JSS–TR is not optimal for ruling out poor sleep on its own; positive results should be followed by confirmatory assessment (e.g., PSQI/clinical evaluation).

Study Limitations

This study has some constraints. First, its cross–sectional design limits our ability to examine changes in sleep patterns over time or to determine the scale's sensitivity to treatment effects. Second, although we excluded individuals with diagnosed psychiatric or neurological conditions, unrecognized or subthreshold symptoms may still have influenced sleep and introduced residual bias. Third, sleep disturbances were assessed through self–report measures rather than objective tools such as actigraphy or polysomnography, which may reduce measurement precision. Fourth, while the study sample was derived from two tertiary geriatric clinics, limiting generalizability to other settings, especially community–dwelling or institutionalized older adults, future multicenter or population–based studies could provide broader validation. Finally, residual confounding from unmeasured or undiagnosed sleep–specific conditions (e.g., obstructive sleep apnea) cannot be excluded.

Conclusion

Sleep disturbances in older adults may signal underlying depression or contribute directly to symptoms such as fatigue and repeated hospital visits. Therefore, the ability to assess sleep quality rapidly and practically is essential in geriatric clinical practice. The JSS–TR proved to be a valid, reliable, and efficient screening tool for adults aged 65 years and older. The population–specific cutoff of ≥15 improved diagnostic precision, making it more suitable for geriatric settings than the previously recommended threshold. Future research should focus on the responsiveness of the JSS–TR to therapeutic interventions, including cognitive behavioral therapy for insomnia and pharmacologic treatments, to further establish its utility in both clinical and research settings.

Ethics

Ethics Committee Approval: Ethics approval was granted by the Clinical Research Ethics Committee of University of Health Sciences Türkiye, İzmir Tepecik Training and Research Hospital (approval number: 2025/01–14, date: 05.02.2025).
Informed Consent: All participants provided written informed consent.

Footnotes

Authorship Contributions

Surgical and Medical Practices: F.Ö.K., N.S.G., S.Ç., Concept: F.Ö.K., S.Ç., Design: F.Ö.K., N.S.G., S.Ç., F.U.E., Data Collection or Processing: F.Ö.K., N.S.G., F.U.E., Analysis or Interpretation: F.Ö.K., Literature Search: F.Ö.K., Writing: F.Ö.K., N.S.G., S.Ç., F.U.E.
Conflict of Interest: No conflict of interest was declared by the authors.
Financial Disclosure: The authors declared that this study received no financial support.

References

1. Endomba FT, Tchebegna PY, Chiabi E, Angong Wouna DL, Guillet C, Chauvet-Gélinier JC. Epidemiology of insomnia disorder in older persons according to the Diagnostic and Statistical Manual of Mental Disorders: a systematic review and meta-analysis. Eur Geriatr Med. 2023;14(6):1261-1272.
2. Canever JB, Zurman G, Vogel F, et al. Worldwide prevalence of sleep problems in community-dwelling older adults: a systematic review and meta-analysis. Sleep Med. 2024;119:118-134.
3. Pangaribuan SM, Wu TY, Herlianita R, et al. Global occurrence rates of sleep disturbances among institutionalized older adults: a systematic review and meta-analysis. Sleep Med Rev. 2025;81:102091.
4. Hill Almeida LM, Flicker L, Hankey GJ, Golledge J, Yeap BB, Almeida OP. Disrupted sleep and risk of depression in later life: a prospective cohort study with extended follow up and a systematic review and meta-analysis. J Affect Disord. 2022;309:314-323.
5. Li XL, Wei J, Zhang X, Meng Z, Zhu W. Relationship between night-sleep duration and risk for depression among middle-aged and older people: a dose-response meta-analysis. Front Physiol. 2023;14:1085091.
6. Pana A, Sourtzi P, Kalokairinou A, Pastroudis A, Chatzopoulos ST, Velonaki VS. Association between muscle strength and sleep quality and duration among middle-aged and older adults: a systematic review. Eur Geriatr Med. 2021;12(1):27-44.
7. de Souza ÂMN, Fernandes DPS, Castro IS, Gróla FG, Ribeiro AQ. Sleep quality and duration and frailty in older adults: a systematic review. Front Public Health. 2025;13:1539849.
8. Qin S, Leong RLF, Ong JL, Chee MWL. Associations between objectively measured sleep parameters and cognition in healthy older adults: a meta-analysis. Sleep Med Rev. 2023;67:101734.
9. Khaing K, Dolja-Gore X, Dizon J, et al. Effect of excessive daytime sleepiness and long sleep duration on all cause dementia: a systematic review and meta-analysis. J Gerontol A Biol Sci Med Sci. 2025;80(7):glaf087.
10. Wei J, Wang M, Guo Y, Liu Y, Dong X. Sleep structure assessed by objective measurement in patients with mild cognitive impairment: a meta-analysis. Sleep Med. 2024;113:397-405.
11. Jenkins CD, Stanton BA, Niemcryk SJ, Rose RM. A scale for the estimation of sleep problems in clinical research. J Clin Epidemiol. 1988;41(4):313-321.
12. Duruöz MT, Ünal Ç, Ulutatar F, Sanal Toprak C, Gündüz OH. The validity and reliability of Turkish Version of the Jenkins Sleep Evaluation Scale in rheumatoid arthritis. Arch Rheumatol. 2017;33(2):160-167.
13. Hogarty KY, Hines C V., Kromrey JD, Ferron JM, Mumford KR. The quality of factor solutions in exploratory factor analysis: the influence of sample size, communality, and overdetermination. Educ Psychol Meas. 2005;65(2):202-226.
14. Ağargün MY, Kara H, Anlar Ö. The validity and reliability of the Pittsburgh Sleep Quality Index. Turk Psikiyatri Derg. 1996;7(2):107-15.
15. Ağar İ, Malakcıoğlu C, Mutlu HH. Uykusuzluk şikayetleri ve Uyku Kalitesi Temel Ölçeği'nin Türkçe geçerlilik ve güvenirliği. TJFMPC. 2021;15(4):846-52.

16. Özsürekci C, Balcı C, Kızılarslanoğlu MC, et al. An important problem in an aging country: identifying the frailty via 9 Point Clinical Frailty Scale. Acta Clin Belg. 2020;75(3):200-204.
17. Arik G, Varan HD, Yavuz BB, et al. Validation of Katz Index of independence in activities of daily living in Turkish older adults. Arch Gerontol Geriatr. 2015;61(3):344-350.
18. Güzel A, Uçan Yamaç S, Turan S, Üner S. Turkish validity and reliability of the Lawton instrumental activities of daily living scale. TJPH. 2024;22(1):59-71.
19. Malmstrom TK, Morley JE. SARC-F: a simple questionnaire to rapidly diagnose sarcopenia. J Am Med Dir Assoc. 2013;14(8):531-532.
20. Molloy DW, Alemayehu E, Roberts R. Reliability of a Standardized Mini-Mental State Examination compared with the traditional Mini-Mental State Examination. Am J Psychiatry. 1991;148(1):102-105.
21. Sarikaya D, Halil M, Kuyumcu ME, et al. Mini nutritional assessment test long and short form are valid screening tools in Turkish older adults. Arch Gerontol Geriatr. 2015;61(1):56-60.
22. Spitzer RL, Williams JB, Kroenke K, et al. Utility of a new procedure for diagnosing mental disorders in primary care. The PRIME-MD 1000 study. JAMA. 1994;272(22):1749-1756.
23. Eskin M, Harlak H, Demirkıran F, Dereboy Ç. The adaptation of the Perceived Stress Scale into Turkish: a reliability and validity analysis. New Symposium Journal. 2013;51(3):132-40.
24. Levis B, Sun Y, He C, et al. Accuracy of the PHQ-2 alone and in combination with the PHQ-9 for screening to detect major depression: systematic review and meta-analysis. JAMA. 2020;323(22):2290-2300.
25. Qi X, Kong H, Li J, Chen C. The relationship between insomnia and multidimensional frailty in community-dwelling older adults: a systematic review. Arch Gerontol Geriatr. 2025;129:105661.
26. Wen Q, Yan X, Ren Z, Wang B, Liu Y, Jin X. Association between insomnia and frailty in older population: a meta-analytic evaluation of the observational studies. Brain Behav. 2023;13(1):e2793.
27. Chen JH. Racial and ethnic trajectories of sleep disturbances: variations by age and cohort. J Gerontol A Biol Sci Med Sci. 2023;78(10):1897-1907.
28. Yang P, Tian L, Xia Y, et al. Association of sleep quality and its change with the risk of depression in middle-aged and elderly people: a 10-year cohort study from England. J Affect Disord. 2025;373:245-252.
29. Sun HL, Chen P, Bai W, et al. Depressive and Insomnia symptoms among older adults with different chronic pain trajectories: a network analysis based on observation over an eight-year period. Depress Anxiety. 2025;2025:8065167.
30. Sella E, Miola L, Toffalini E, Borella E. The relationship between sleep quality and quality of life in aging: a systematic review and meta-analysis. Health Psychol Rev. 2023;17(1):169-191.