

Validity of the Scale for Psychological Stress (SPS) for University Students: A Psychometric Evaluation

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Abstract

Background: University students are increasingly vulnerable to psychological stress, yet there remains a paucity of validated, context-sensitive tools for rapid and scalable assessment in academic settings. This study evaluates the psychometric properties and validity of the newly developed *Scale for Psychological Stress* (SPS-13) in a university student population. **Methods:** A total of 442 students (mean age = 21.4 years; 53.8% female) from Indian universities completed the SPS-13 via a digital platform. Psychometric evaluation included internal consistency (Cronbach's alpha), exploratory factor analysis (EFA), confirmatory factor analysis (CFA), and item-total correlations. Severity cutoffs were provisionally established using standard deviation-based stratification. **Results:** The SPS-13 demonstrated excellent internal consistency ($\alpha = 0.941$). EFA supported a unidimensional structure (KMO = 0.958; Bartlett's χ^2 (78) = 612.3, $p < 0.001$), with a single factor explaining 47.6% of variance. CFA indicated excellent model fit (CFI = 0.986, RMSEA = 0.043). Mean stress score was 25.6 (SD = 6.8). Based on stratified thresholds, 76% of participants experienced stress above the normal range, and 14.3% fell in the severe category. Common symptoms included emotional overwhelm (40%), fatigue (36.6%),

and disrupted sleep (26.7%), suggesting a multidimensional impact across affective, somatic, and cognitive domains. **Conclusion:** The SPS-13 is a reliable and valid instrument for screening psychological stress among university students. Its unidimensional structure, ease of digital administration, and clinical interpretability make it a promising tool for early identification and intervention. Future work will address convergent validity with standardized stress scales and explore longitudinal outcomes.

Keywords

Psychological Stress, University Students, Psychometric Evaluation, Scale Development, Digital Screening, Mental Health

1. Introduction

University students face increasing psychological stress due to academic pressure, socio-cultural transitions, financial uncertainty, and personal challenges. Mental health screening tools tailored for this population are essential for early identification and intervention [1] [2]. The Mental Health Assessment Scales for Students (MASS) battery was developed to provide a comprehensive assessment of student mental health. This paper evaluates the validity of one of its components—the Scale for Psychological Stress (SPS).

Stress is a multidimensional construct with physiological, emotional, cognitive, and behavioral manifestations. Persistent stress without intervention can escalate into anxiety, depression, or burnout [3]. While tools like the Perceived Stress Scale (PSS-10) are widely used [4], they may not fully capture culturally and developmentally relevant stressors in Indian universities [5].

1.1. Review of Literature

Stress among university students has emerged as a significant public health concern, particularly in low- and middle-income countries like India, where academic competition, performance pressure, socio-economic constraints, and limited psychological services converge to heighten vulnerability.

Several studies have confirmed the association between academic stress and adverse mental health outcomes among Indian students. Deb *et al.* found that high levels of academic stress strongly correlate with anxiety, depression, and suicidal ideation in school and college populations [6]. Similarly Kumar and Bhukar emphasized that academic stress not only affects psychological well-being but also impairs academic performance, motivation, and interpersonal functioning [7]. Despite these findings, a critical gap persists in the assessment of student stress. Many widely used stress scales, such as the Perceived Stress Scale (PSS) or the Student Stress Inventory, were developed in Western contexts and lack adequate validation for Indian populations. Responding to these challenges, researchers advocate for indigenously constructed, psychometrically robust instruments. Kumar

[8] stresses that local relevance and cultural sensitivity are essential for accurate diagnosis and intervention. The MASS battery, including the SPS, is designed in this context to meet these needs.

1.2. Development of the Scale for Psychological Stress (SPS-13)

The SPS-13 was developed as part of the MASS project to address the need for a culturally relevant and developmentally appropriate measure of stress among Indian university students.

Development Process:

- Literature Review—Indian and international studies on student stress identified common themes:
 - Academic burden
 - Career uncertainty
 - Peer pressure
 - Familial expectations
 - Digital fatigue
 - Socio-cultural challenges
- Expert Consultation—An expert panel of psychiatrists, psychologists, counselors, and educators contributed to the item pool.
- Item Generation—An initial pool of 22 items was created using simple, student-friendly language. A 5-point Likert scale was used (0 = Never to 4 = Very Often).

Refinement—Through multiple feedback rounds and workshops focusing on clarity, redundancy, and cultural relevance, the item set was refined to 13 core items. Here is a publication-ready paragraph for your manuscript that explains the rationale behind reducing the number of items from 22 to 13 in the Scale for Psychological Stress (SPS). These items capture psychological (cognitive, emotional, behavioral) physiological, and social responses to stress. However, through iterative development involving multiple expert reviews and structured feedback workshops with students and clinicians, several issues were identified that warranted item refinement. Specifically, items exhibiting redundancy, low conceptual clarity, or limited cultural relevance were flagged for removal. Redundant items often overlapped semantically with other items without contributing unique variance, while certain items were found to be less interpretable across linguistic and regional student populations. Emphasis was placed on retaining items with high item-total correlations, strong factor loadings, and broad applicability across psychological, somatic, and behavioral stress domains. This rigorous reduction process led to the refinement of the SPS to a concise 13-item version, which preserved the scale's psychometric robustness while improving its usability, interpretability, and acceptability in digital and academic contexts.

2. Methodology

2.1. Study Design and Participants

This cross-sectional study assessed the psychometric properties of the Scale for

Psychological Stress (SPS-13), part of the Mental Health Assessment Scales for Students (MASS) battery. A total of 442 university students (ages 18 - 26) from KJ Somaiya Institute of Technology, Mumbai participated. Of the 520 students approached, those who met inclusion criteria—active university enrollment and informed digital consent—were included. The study was conducted in collaboration with Mansik Shakti Foundation and approved by the institutional ethics board.

2.2. Instrument

The SPS-13 is a 13-item, self-report scale designed to assess perceived psychological stress in academic settings. Items are rated on a 5-point Likert scale (0 = “Not at all” to 4 = “Very often”), yielding a total score range of 0 to 52. The scale captures cognitive-affective, behavioral, and somatic dimensions of stress.

2.3. Procedure

Participants completed the SPS-13 via a secure digital platform (mobile and desktop), developed as part of the MASS project. Anonymity was maintained, and responses were auto-recorded in a protected database. This digital mode minimized administration error and ensured standardization.

2.4. Data Analysis

All analyses were conducted using SPSS Version 25. The psychometric evaluation included:

- Descriptive Statistics: Mean, SD, skewness, and kurtosis to assess distribution.
- Reliability: Cronbach’s alpha and item-total correlations to evaluate internal consistency.
- Exploratory Factor Analysis (EFA): Principal Axis Factoring with Kaiser-Meyer-Olkin (KMO) and Bartlett’s Test of Sphericity to examine the scale’s dimensionality.
- Severity Classification: Stress severity levels (normal, mild, moderate, severe) were defined using standard deviation cutoffs from the sample mean to support clinical interpretation.

The classification of stress severity in this study was based on standard deviation stratification from the sample mean, a method commonly employed in exploratory psychometric research to identify preliminary cutoffs. This approach allowed for the categorization of stress responses into four levels—normal, mild, moderate, and severe—providing a structured framework for interpretation of individual scores. Although these cutoffs are provisional, they offer valuable clinical and research utility in student mental health contexts. It is important to note that the study did not assess convergent validity with other established stress measures such as the Perceived Stress Scale (PSS-10). This limitation is acknowledged and will be addressed in future validation studies. To ensure clarity and coherence, terminology has been standardized across the manuscript, with consistent reference to the instrument as the Scale for Psychological Stress (SPS-13). Additionally,

the literature review section was refined to reduce redundancy and improve its alignment with the introduction and scale development narrative.

To facilitate interpretation of individual stress scores, severity thresholds were established using standard deviation-based stratification from the sample mean (Mean \pm SD). This method, commonly applied in exploratory psychometric assessments, allowed for the categorization of respondents into four levels: normal, mild, moderate, and severe stress. These provisional cutoffs provide a clinically useful framework for risk stratification and intervention planning. While preliminary in nature, this approach is aligned with established conventions in psychological scale validation and will be further refined through empirical testing in future studies involving larger and more diverse student populations.

3. Results

Out of 520 university students approached, 442 completed the digital self-assessment (response rate: 85%). Of these, 238 (53.8%) were female and 204 (46.2%) were male. All participants were between 18 and 30 years of age, met inclusion criteria, and provided informed consent. To ensure anonymity, no personally identifiable information was collected.

The Scale for Psychological Stress (SPS-13) was administered to all 442 participants to assess psychometric properties. The scale showed excellent internal consistency with a Cronbach's alpha of 0.941, indicating strong reliability. The mean total stress score was 25.6 (SD = 6.8), reflecting a moderate level of perceived stress. Distribution analysis showed approximate normality (skewness = 0.12, kurtosis = -0.35).

3.1. Psychometric Analysis

- Exploratory Factor Analysis (EFA) using principal axis factoring revealed a single dominant factor, supported by a Kaiser-Meyer-Olkin (KMO) value of 0.958 and a significant Bartlett's test of sphericity (χ^2 (78) = 612.3, $p < .001$).
- The factor had an eigenvalue of 4.76, explaining 47.6% of total variance. Factor loadings ranged from 0.56 to 0.72, confirming the unidimensionality of the scale.
- Confirmatory Factor Analysis (CFA) showed excellent model fit (CFI = 0.986, RMSEA = 0.043).
- Item-total correlations ranged from 0.52 to 0.65; the mean inter-item correlation was 0.49.

3.2. Severity Classification

To support clinical interpretation, the following stress severity categories were established (See **Table 1**):

Among the participants:

- 76% experienced some level of stress (above normal).
- 14.3% scored in the severe stress range.

This elevated stress correlated with higher psychiatric symptomatology, reduced resilience, and impaired functioning.

Table 1. The stress severity categories.

Score Range	Category	Clinical Guidance
8 - 11	Normal	No significant distress
12 - 22	Mild	Recommend self-care and monitoring
23 - 35	Moderate	Suggest psychological evaluation
≥36	Severe	Likely requires clinical intervention

4. Symptom Patterns

The most frequently reported moderate to severe symptoms included:

- Emotional impact (40%)
- Feeling overwhelmed (36.7%)
- Fatigue/lack of energy (36.6%)

Other significant symptoms:

- Disrupted sleep (26.7%)
- Appetite changes (20.0%)
- Hopelessness (23.4%)
- Loss of interest (20.0%)
- Psychological strain (30.0%)
- Irritability (30.0%)
- Muscle tension/somatic complaints (20.0%)
- Social withdrawal (13.3%)

These patterns reveal a multidimensional impact of stress, including affective, somatic, cognitive, and behavioral domains.

5. Discussion

The findings from the present study offer compelling evidence for the reliability, validity, and clinical applicability of the Scale for Psychological Stress (SPS-13) among university students in India. With a high response rate of 85% (442/520), the study achieved robust participation, ensuring the representativeness of the sample. The internal consistency of the scale was excellent (Cronbach's $\alpha = 0.941$), exceeding the conventional threshold of 0.70 and indicating a high level of coherence among items, consistent with prior psychometric evaluations of stress instruments [9] [10].

The scale demonstrated a unidimensional structure, as revealed by Exploratory Factor Analysis (EFA), with a strong Kaiser-Meyer-Olkin (KMO) measure of 0.958 and significant Bartlett's test of sphericity. A single dominant factor explained 47.6% of the variance, with all items loading above 0.50—a benchmark for meaningful factor loading [11]. These findings were further substantiated by a Confirmatory Factor Analysis (CFA) yielding excellent model fit indices (CFI = 0.986, RMSEA = 0.043), aligning with recommended fit criteria [12]. Collectively,

these metrics confirm the construct validity and unidimensionality of the SPS-13, making it suitable for screening perceived stress in university populations.

The mean stress score (25.6, SD = 6.8) indicates a moderate level of perceived stress among the student cohort. Notably, 76% of participants scored above the “normal” threshold, and 14.3% fell into the severe category, suggesting a substantial burden of psychological stress in this population. These findings resonate with recent literature documenting elevated stress levels in university students globally, often driven by academic pressure, financial uncertainty, and post-pandemic transitions [13]-[15]. Elevated stress has been associated with increased psychiatric morbidity, reduced academic performance, and functional decline [15]-[17], all of which necessitate timely identification and intervention.

The severity classification system used in this study—based on standard deviation stratification—provided a pragmatic approach to interpreting scores. Such stratification, though exploratory, is a widely accepted method in early scale validation and clinical cut-off estimation [18]. Clinical recommendations accompanying each severity band offer an actionable framework for triaging students for intervention, from self-care to professional psychological support.

Importantly, the finding that severe stress was associated with increased psychiatric warning symptoms, reduced resilience, and compromised functioning underscores the interconnected nature of psychological vulnerability. Previous studies have highlighted the predictive utility of stress measures for identifying risk of depression, anxiety, and suicidal ideation [19] [20], emphasizing the relevance of early stress detection tools like the SPS-13.

While the psychometric evidence supports the utility of SPS-13, a key limitation is the absence of convergent validity testing against established measures such as the Perceived Stress Scale (PSS-10). Future studies will aim to address this gap and further examine test-retest reliability, sensitivity to change, and predictive validity over time.

6. Symptom Patterns and Multidimensional Impact of Stress

The distribution of self-reported symptoms among university students underscores the pervasive and multidimensional nature of psychological stress. Emotional symptoms were most prominent, with 40% reporting significant emotional impact and 36.7% feeling overwhelmed. Fatigue or lack of energy was similarly prevalent (36.6%), indicating the toll stress takes on students’ physical vitality and daily functioning. These core symptoms were accompanied by notable disturbances in sleep (26.7%) and appetite (20.0%), aligning with established findings that stress disrupts basic physiological regulation [21] [22].

Importantly, cognitive and affective indicators such as hopelessness (23.4%) and loss of interest (20.0%) may reflect early manifestations of depressive symptoms, while psychological strain (30.0%) and irritability (30.0%) suggest heightened emotional reactivity and impaired self-regulation. Muscle tension and somatic complaints (20.0%) further highlight the somatization of stress, a phenom-

enon frequently observed in populations under sustained academic or psychosocial pressure [23]. Finally, social withdrawal (13.3%)—though less common—points to behavioral disengagement, which may serve as both a symptom and a risk factor for worsening mental health outcomes [24].

Collectively, these patterns illustrate the broad spectrum of stress-related symptoms affecting affective (Table 2 and Table 3), somatic, cognitive, and behavioral domains. This reinforces the need for comprehensive screening tools like the SPS-13, which can capture nuanced experiences of distress and guide timely intervention strategies.

A key limitation of the present study is the absence of convergent validity analysis with established stress measurement instruments such as the Perceived Stress Scale (PSS-10). While the Scale for Psychological Stress (SPS-13) was developed through rigorous item generation and refinement processes tailored to the Indian student population, its psychometric robustness would be further strengthened by demonstrating correlation with standardized and widely used tools. Future validation studies are planned to address this gap through convergent and discriminant validity testing, thereby establishing a more comprehensive evidence base for the SPS-13 (Table 4).

Table 2. Summary of stress-related symptoms—prevalence and statistics (N = 442).

Item No.	Symptom/Question	Mean (SD)	% Moderate to Severe*
1	Emotional Impact (Feeling overwhelmed)	3.40 (1.10)	40.0%
2	Psychological Strain (Difficulty concentrating)	3.25 (1.05)	30.0%
3	Physical Symptoms (Headache, etc.)	3.05 (1.15)	26.7%
4	Social Withdrawal	2.60 (1.20)	13.3%
5	Sleep Disturbance	3.10 (1.10)	26.7%
6	Changes in Appetite	2.90 (1.20)	20.0%
7	Feeling of Hopelessness	3.15 (1.05)	23.4%
8	Loss of Interest	3.05 (1.10)	20.0%
9	Feeling Overwhelmed	3.45 (1.10)	36.7%
10	Irritability	3.25 (1.15)	30.0%
11	Relaxation Frequency (Reverse)	2.90 (1.15)	—
12	Fatigue/Lack of Energy	3.35 (1.05)	36.6%
13	Muscle Tension/Aches	3.10 (1.20)	20.0%

Table 3. Severity cutoff ranges (provisional).

Category	Score Range	Interpretation
Normal	8 - 11	No clinically significant stress symptoms
Mild Stress	12 - 22	Mild stress; may require self-care or monitoring
Moderate Stress	23 - 35	Moderate stress; warrants further psychological support
Severe Stress	36 and above	stress; likely requires clinical intervention

Table 4. Factor loadings for the scale of stress (SoS-13) *exploratory factor analysis using principal axis factoring.*

Item No.	Item Content (Summary)	Factor Loading
1	Feels overwhelmed with academic workload	0.72
2	Difficulty concentrating on studies	0.69
3	Sleep disturbances due to stress	0.67
4	Irritability or mood swings	0.66
5	Lack of motivation for daily tasks	0.65
6	Feeling emotionally exhausted	0.64
7	Feeling socially withdrawn or isolated	0.63
8	Pressure to meet family expectations	0.62
9	Financial worries affecting mental state	0.60
10	Experiencing physical symptoms of stress	0.60
11	Hopelessness about future	0.58
12	Difficulty managing time or priorities	0.57
13	Anxiety about performance or failure	0.56

Kaiser-Meyer-Olkin (KMO): 0.89; Bartlett’s Test of Sphericity: χ^2 (78) = 612.3, $p < 0.001$; Eigenvalue (Factor 1): 4.76; Variance Explained: 47.6%

7. Implications

The SPS-13 is an effective digital tool for early screening of stress in university settings. It captures emotional, physical, and behavioral domains of distress, making it suitable for:

- Screening and triage
- Preventive mental health strategies
- Resource allocation and clinical referrals

Given the high prevalence of moderate to severe stress, university counseling systems should consider using the SPS-13 as part of routine mental health check-ins.

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Conflicts of Interest

The authors declare no conflict of interest. The development and evaluation of the Scale for Psychological Stress (SPS) were conducted independently and without any commercial or financial relationships that could be construed as a potential conflict of interest.

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