

Development and Validation of Novel Mental Health Assessment Scales for Students (MASS) in India

Amresh Shrivastava^{1,2}, Manjistha Datta³, Avinash De Sousa⁴, Omkar Nayak⁵, Manushree Gupta⁶, Dinesh Kumar Srivastava⁷, Netra Shukla², Harsh Mange⁸, Janak Limbachia⁹, Sheetal Jagtap¹⁰, Milind Nemade¹⁰, Nilesh Shah¹¹

¹Department of Psychiatry, Western University, London, Ontario, Canada

²Mansik Shakti Foundation, Mumbai, India

³Department of Psychology, University of Oxford, Oxford, United Kingdom

⁴DeSousa Foundation; Lokmanya Tilak Municipal Medical College & Sir H. N. Reliance Foundation Hospital, Mumbai, India

⁵Department of Psychiatry, LTMG Hospital, Sion, Mumbai, India

⁶Department of Psychiatry, Vardhman Mahavir Medical College & Safdarjung Hospital, New Delhi, India

⁷Organizational Behavior & Human Resource Management, Indian Institute of Management, Mumbai, India

⁸Mansik Shakti Foundation and MSCS Candidate, University of Southern California, Los Angeles, USA

⁹Mansik Shakti Foundation and Technical Project Manager, Hanover, USA

¹⁰K.J. Somaiya Institute of Technology, Mumbai, India

¹¹Department of Psychiatry, Lokmanya Tilak Municipal Medical College, Mumbai, India

Email: dr.amresh@gmail.com

How to cite this paper: Shrivastava, A., Datta, M., De Sousa, A., Nayak, O., Gupta, M., Srivastava, D.K., Shukla, N., Mange, H., Limbachia, J., Jagtap, S., Nemade, M. and Shah, N. (2025) Development and Validation of Novel Mental Health Assessment Scales for Students (MASS) in India. *Open Journal of Psychiatry*, 15, 313-331.

<https://doi.org/10.4236/ojpsych.2025.154025>

Received: May 30, 2025

Accepted: July 26, 2025

Published: July 29, 2025

Copyright © 2025 by author(s) and Scientific Research Publishing Inc. This work is licensed under the Creative Commons Attribution International License (CC BY 4.0).

<http://creativecommons.org/licenses/by/4.0/>



Open Access

Abstract

Background: Student mental health is increasingly recognized as a multidimensional issue influenced by stress, psychopathology, risk factors, resilience, and functional outcomes. In India, a culturally grounded, comprehensive assessment tool tailored to this context has been lacking. **Objective:** This study aimed to develop and validate the *Mental Health Assessment Scales for Students (MASS)*, a multi-domain, psychometric battery designed to assess mental health comprehensively among Indian university students. **Methods:** Six scales were developed through literature review, expert consultation, and culturally sensitive item generation: Stress (13 items), Psychiatric Symptoms (10), Mental Health Risk (21), Risk Factors (6), Positivity (24), and Functioning (22). A sample of 442 undergraduate students (aged 18 - 30) was recruited from K.J. Somaiya Institute of Technology, Mumbai. Data were collected via a self-administered digital tool, and psychometric evaluation involved Exploratory and Confirmatory Factor Analyses (EFA and CFA), as well as internal consistency assessment using Cronbach's alpha. **Results:** The MASS battery demonstrated strong psychometric properties across its six subscales. Explor-

atory Factor Analysis (EFA) supported unidimensional structures for all scales except Functioning, which showed a two-factor structure encompassing academic and interpersonal functioning. Confirmatory Factor Analysis (CFA) indicated excellent model fit for all scales (CFI = 0.943 - 0.986, RMSEA = 0.043 - 0.065). Internal consistency was high for most scales, with Cronbach's alpha values ranging from 0.815 to 0.973. The Risk Factors scale showed acceptable reliability ($\alpha = 0.667$). Inter-scale correlation analysis revealed significant associations: Psychological Stress, Psychiatric Symptoms, and Mental Health Risk were positively correlated ($r = 0.65 - 0.78$), while Positivity showed strong negative correlations with symptom domains ($r = -0.48$ to -0.69). Functioning was moderately correlated with both symptom severity and resilience. K-means clustering enabled severity stratification into four categories: normal, mild, moderate, and severe, allowing for targeted triage. The MASS tool successfully differentiated students by psychological burden and functional impact, confirming its utility in early identification and intervention planning. **Conclusion:** The MASS is a reliable and valid tool for comprehensive mental health assessment among university students in India. Its multi-domain structure enables early detection, risk stratification, and facilitation of targeted interventions, while its digital format ensures scalability in both clinical and research settings.

Keywords

Student Mental Health, Scale Development, Validation, India, Psychometrics, MASS, Digital Assessment, University Students

1. Introduction

In recent years, student mental health has emerged as a global concern, with increasing rates of stress, anxiety, and depression reported among school and university populations [1] [2]. In India, these issues are exacerbated by academic pressure, socio-economic constraints, digital overload, and inadequate support systems. Despite the high need, a significant mental health treatment gap persists, with 70% - 90% of affected individuals not receiving appropriate care [3] [4].

However, this limitation reflects only one side of the coin. The other, often overlooked side, demands a reframing of how we conceptualize, assess, and address student mental health. Focusing solely on diagnosable mental disorders overlooks a large population of students who suffer from psychological distress, subclinical symptoms, and developmental vulnerabilities that do not meet the thresholds for psychiatric diagnosis but nonetheless significantly impair well-being and functioning [5] [6]. A purely diagnostic lens risks exclusion of the broader spectrum of mental health concerns, including emotional, social, cognitive, and lifestyle-related dimensions of student well-being.

Mental health and the human psyche are inherently multidimensional, encompassing various interrelated yet distinct domains such as emotional regulation, cognitive functioning, coping capacity, social adaptation, and resilience. Each of

these dimensions undergoes independent growth and development, and each remains susceptible to disturbances in psychopathological conditions.

It is crucial to recognize that experiencing psychological challenges—such as heightened stress or mood dysregulation—does not necessarily imply a deficiency in coping skills, resilience, or functional ability. On the contrary, individuals often exhibit significant adaptive strengths even while struggling with emotional distress. For instance, a university student may report high levels of academic stress yet continue to perform well academically or maintain healthy interpersonal relationships, drawing on internal coping mechanisms or external support systems.

This nuanced understanding leads to two important conclusions:

- Multiple dimensions of psychological functioning must be assessed to obtain a comprehensive understanding of mental well-being. A singular focus on symptoms or diagnostic criteria fails to capture the full picture of an individual's psychological state.
- Assessment of mental health must consider both vulnerabilities and strengths. Measuring only distress or psychopathology provides an incomplete—and potentially misleading—representation of personal well-being. A balanced approach that includes evaluation of resilience, coping, and adaptive functioning is essential for holistic assessment and effective intervention.

This perspective aligns with the dual-factor model of mental health, which emphasizes the need to assess both negative indicators (e.g., symptoms of anxiety or depression) and positive indicators (e.g., subjective well-being, coping efficacy) to fully understand psychological health [7]. Research also supports the idea that resilience and coping are distinct constructs that do not merely represent the absence of stress, but rather reflect active processes that help individuals adapt to adversity [8] [9].

To capture a more accurate and holistic picture, there is a pressing need to shift from a disorder-centric model to a spectrum-based, developmentally sensitive, and culturally sensitive framework. This includes identifying non-pathological states of psychological distress, understanding individual and systemic risk factors, and evaluating protective resources such as resilience, adaptability, and social connectedness [10] [11]. This spectrum-based approach, aligned with dimensional psychopathology models, allows for early, personalized interventions. It also informs preventive strategies by identifying at-risk students who may not yet meet diagnostic criteria but are functionally impaired.

Early identification through validated screening tools offers an objective, replicable method for assessing psychological status across a continuum—from thriving to symptomatic [12] [13]. At the same time, self-assessment tools, such as PHQ-9, GAD-7, and SDQ, demonstrate high validity in youth populations [14]

However, the limitations of traditional assessment and intervention approaches—often developed in Western, clinical settings—necessitate the exploration of realistic, context-specific tools and digital methodologies [12] [13], which provide better applicability in the Indian context. Despite the availability of these global screen-

ing tools, India's student population requires new, culturally and developmentally tailored assessments to cater to subclinical symptoms, culturally rooted issues, logistical accessibility, linguistic applicability, and population-specific norms.

A multi-parameter assessment is essential for several reasons. Most students experiencing distress fall into a subclinical or “at-risk” zone that does not meet diagnostic thresholds but still impairs functioning, academic performance, and social relationships [6]. Assessing only for diagnosable conditions excludes this large group. A multidimensional tool identifies students across the continuum—from flourishing to distressed. Moreover, two students may report similar symptoms of anxiety or low mood, but one may be buffered by strong social support, while the other may face family conflict or digital addiction. By evaluating risk factors and protective resources, we gain a more accurate understanding of why distress exists and how best to intervene.

Similarly, students may report high positivity or resilience but still face real-world difficulties in maintaining attendance, peer relationships, or concentration in class. Assessing functional impairment separately allows schools to identify students who need support, even if symptom scores are not high. In India, students often draw resilience from cultural, familial, or spiritual resources that are not captured by Western tools. Assessing positivity, adaptability, and personal strengths enables a strengths-based approach, allowing institutions to promote well-being—not just treat illness.

A multi-parameter assessment framework reflects the complex reality of student mental health. It enables early, nuanced, and culturally grounded identification of psychological challenges and strengths, which is essential for designing effective prevention, intervention, and support systems.

In this background, the present study aimed to develop and validate a holistic assessment tool to assess multiple domains of mental health in Indian students. Accordingly, in this study, both distress and strengths have been incorporated into mental health assessments—such as through the multidimensional framework of the Mental Health Assessment Scales for Students (MASS)—to move closer to a more accurate, culturally relevant, and developmentally informed understanding of student well-being.

2. Review of Literature

A large body of research has identified the growing mental health burden among student populations globally. According to Auerbach *et al.*, more than 30% of university students across 19 countries reported mental health issues, yet only a small fraction sought help [1]. In the Indian context, studies highlight a particularly high prevalence of stress, anxiety, and depressive symptoms among students, driven by academic competition, family expectations, and socio-cultural stigma [15].

Most instruments were developed in Western contexts and may lack sensitivity to cultural and contextual nuances in India [13] [14]. Moreover, many tools focus

narrowly on symptomatology, missing dimensions like functioning, resilience, or socio-environmental risk.

Several researchers advocate for a dimensional approach to mental health that assesses a continuum from well-being to illness, rather than a binary diagnostic threshold [10] [16]. The inclusion of protective factors such as optimism, social connectedness, and academic engagement has been shown to enhance early identification and guide interventions [11] [17].

There is also increasing emphasis on digital tools for mental health screening due to their scalability, anonymity, and real-time feedback [12]. In India, digital literacy among youth makes mobile- and web-based tools highly feasible, yet very few validated Indian tools exist that assess broad-spectrum mental health with cultural and contextual sensitivity.

The MASS project aims to fill this gap by creating an integrated, student-centered battery of assessments that captures both risk and protective dimensions. It builds upon validated psychometric principles while addressing gaps in cultural relevance, developmental appropriateness, and digital adaptability.

3. Methodology

3.1. Aim

Aim of this study was to develop and validate Mental Health Assessment Scales for Students (MASS) for a multi-domain assessment in the Indian context.

3.2. Development of the scales

A thorough review of literature and existing scales/tools assessing mental health was carried out. This resulted in finalising 5 critical domains of mental health—stress, mental health symptoms, mental health risk factors, resilience and positivity, and functioning—to provide a holistic understanding of student mental health.

Items were generated based on the review and grounded in theories of stress and coping. Focus group discussions with mental health professionals (psychiatrists, clinical psychologists and counsellors) were conducted to assess the clinical and cultural relevance of the items for the questionnaires. These questionnaires underwent multiple rounds of review and revision by the working group to ensure clarity, relevance, and appropriateness for the target population. Cultural sensitivity was also a key consideration throughout the development process. The working group paid careful attention to language, terminology, and cultural nuances to ensure that the assessment tool was applicable and acceptable across diverse populations.

Six questionnaires were developed:

- Scale for Assessment of Level of Psychological Stress with 13 items;
- Scale for Assessment of Psychiatric warning Symptoms with 10 items;
- Scale for Assessment of Symptoms of Mental Health Symptoms of psychopathology with 21 items;

- Scale for Assessment of Risk Factors with 6 items;
- Scale for Assessment of Positivity with 24 items;
- Scale for Assessment of Functioning with 22 items.

The Mental Health Assessment Scales for Students (MASS) comprise six psychometrically validated instruments developed to assess distinct yet interrelated domains of student mental health in the Indian university context. Each scale was constructed through rigorous item development, cultural contextualization, and statistical validation, and together they offer a holistic framework for mental health screening, prevention, and intervention.

The Scale for Psychological Stress (13 items) is designed to measure perceived stress across academic, emotional, and environmental domains. Drawing on the transactional model of stress and coping, this scale captures the subjective appraisal of stressors relevant to student life, including academic workload, interpersonal tensions, institutional challenges, and emotional overwhelm. The nature of questions makes it a robust tool for early identification of students experiencing high stress levels.

The Scale for Assessment of Psychiatric warning Symptoms (10 items) assesses common warning symptoms which are considered as symptoms for referrals and symptoms that require attention of clinicians. The concept of including such a scale emerges from large body of work on early intervention and at-risk population e.g. clinical at-risk states. It is helpful in identifying subthreshold symptoms too. Because of the nature of significance, the items are rated as “yes or no” response. Items cover experiences such as persistent sadness, anxiety, sleep disturbances, somatic complaints, and cognitive difficulties. It helps in identifying students with subclinical or emerging psychiatric presentations who may benefit from further evaluation or intervention.

The Scale for Assessment of Mental Health symptoms or psychopathology (21 items) targets early warning signs and subthreshold symptoms that indicate psychological vulnerability. This includes negative thinking, emotional dysregulation, social withdrawal, and digital overuse. It is particularly useful in capturing high-risk states that precede clinical disorders and may otherwise go undetected in traditional symptom-based assessments. Severity of symptoms presents psychopathology and its nature.

The Scale for Assessment of Risk Factors (6 items) focuses on psychosocial and behavioral vulnerabilities that increase the likelihood of mental health issues. These include factors such as family conflict, trauma history, the scale was revised and reanalyzed, resulting in a multidimensional structure and improved internal consistency. This scale enhances the contextual understanding of students’ life circumstances and complements symptom-based measures with a social determinants lens.

The Scale for Assessment of Resilience and Positivity (24 items) measures strengths and protective factors that contribute to mental well-being. The scale is grounded in positive psychology and assesses resilience, optimism, self-esteem,

emotional regulation, and social connectedness. Notably, it showed strong negative correlations with stress and psychiatric symptom scales, confirming its role as a protective index that can inform strength-based interventions.

The Scale for Assessment of Functioning and well-being (22 items) evaluates functional performance in academic, social, and daily life domains. This scale conceptualizes mental health in terms of behavioral outcomes and life impact, including academic engagement, interpersonal relationships, motivation, and time management. Factor analysis revealed a two-factor structure reflecting academic functioning and interpersonal/social functioning. The scale is particularly valuable in assessing the real-world implications of psychological distress [18] [19] and the effectiveness of mental health interventions.

Together, the six scales of the MASS battery offer a comprehensive, culturally responsive, and statistically sound toolset for assessing student mental health in Indian higher education institutions. They enable not only the detection of mental health problems but also the identification of risks, strengths, and functioning, thereby supporting individualized care pathways, campus mental health planning, and public health research.

Validation of the Tool

Internal consistency and reliability of the questionnaires was assessed through Cronbach Alpha. Additionally, construct validity of the questionnaires was established using Exploratory Factor Analysis and Confirmatory Factor Analysis.

4. Sample and Procedure

This study was conducted by Mansik shakti Foundation in collaboration with K.J. Somaiya Institute of Technology, Mumbai. 442 undergraduate students from were recruited through voluntary, non-randomized outreach via classroom announcements, faculty briefings, and digital notices. Assessments were completed digitally in a supervised setting, with confidentiality assured by omitting personal identifiers. The assessment tool was translated into an electronic format in collaboration with a dedicated center. This digital format allowed for efficient administration and scoring of the assessment, facilitating its widespread use in both clinical and research settings.

Students aged 18 - 30 years who gave informed consent were included in the study. The students consented to participate in the study, and they were requested to volunteer and participate, full disclosure was made, and data protection, confidentiality, rights and data management were explained in a group setting which consisted of 5 students to 20 students. Students completed the self-administered digital assessment in 20 - 25 minutes via unique links. Immediate, individualized feedback and mental health support options were provided upon completion.

Mental health support, including counselling and psychiatric referral, was made available based on assessment outcomes or individual requests. Ethics permission was obtained from the ethics committee of Somaiya University.

5. Data Analysis

Data were securely exported for statistical analysis in SPSS. Exploratory factor analysis (EFA) was carried out for all the questionnaires through principal axis factoring. The Kaiser-Meyer-Olkin (KMO) measure (≥ 0.60) and Bartlett's test of sphericity ($p < 0.05$) were assessed. Factors were extracted from the eigenvalues greater than 1 and scree plot inspection. Items with factor loadings of 0.32 or higher were selected.

Following EFA, a confirmatory factor analysis (CFA) with maximum likelihood estimation (MLE) was performed. The indices of model fit with the acceptable fit criteria were considered as follows: minimum discrepancy of confirmatory factor analysis/degrees of freedom (CMIN/df) < 5 , goodness of fit index (GFI) $> .90$, comparative fit index (CFI) > 0.95 , and root mean square error of approximation (RMSEA) < 0.08 .

The tool's internal consistency and reliability was evaluated using Cronbach's alpha which was calculated for the questionnaires before and after item reduction.

6. Results

Out of the 520 university students approached for participation in the study, a total of 442 students completed the digital self-assessment (response rate: 85%). Among them, 238 (53.8%) were female and 204 (46.2%) were male (**Table 1**). All participants met the inclusion criteria, were aged between 18 and 30 years, and provided informed consent prior to participation. We wanted to keep the data anonymous and therefore no further personal details were asked, in contrast to routine practice of such studies.

Table 1. Gender distribution and statistical comparison (N = 442).

Gender	Frequency (n)	Percentage (%)	p-value
Male	218	49.3%	
Female	224	50.7%	
Total	442	100.0%	NS

Statistical Test Used: Chi-square test for gender distribution differences among groups.

6.1. MASS scale Battery

The results of exploratory factor analysis showed good suitability of our data against the factor structure (**Table 2**), except for the assessment of risk factors which shows acceptable suitability. Some items in the questionnaires were dropped due to high cross-loading. Most of the questionnaires showed a single factor structure except the scale for assessment of functioning which showed a two-factor structure. EFA revealed unidimensional structures for all scales except Functioning, which showed a two-factor structure. KMO values ranged from 0.750 to 0.972, with significant Bartlett's test results across all scales.

Confirmatory factor analysis further indicated good validity of the construct as the parameters on all the questionnaires fit the acceptable fit criteria (**Table 3**).

All the scales, except the Scale for Assessment of Risk Factors, showed good to excellent reliability based on Cronbach Alpha ($>.80$) (**Table 4**). The Scale for Assessment of Risk Factors had a Cronbach Alpha of .667 indicating adequate reliability.

Table 2. Exploratory factor analysis (EFA).

Scale	KMO	Bartlett's Test	Items (Initial)	Items Dropped	Final Items	No. of Factors	Remarks
Stress	0.958	$p < 0.001$	13	0	13	1	Strong unidimensionality
Psychiatric Symptoms	0.875	$p < 0.001$	14	4 (Items 2, 9, 10, 11)	10	1	Unidimensional with improved clarity
Mental Health Risk	0.958	$p < 0.001$	23	2 (Items 1, 21)	21	1	High cohesion
Risk Factors	0.750	$p < 0.001$	10	4 (Items 1, 2, 4, 9)	6	1	Borderline acceptability
Positivity	0.972	$p < 0.001$	25	1 (Item 1)	24	1	Excellent internal structure
Functioning	0.902	$p < 0.001$	25	3 (Items 2.3, 5.2, 5.3)	22	2	Social and academic subscales emerged

Table 3. Confirmatory factor analysis (CFA) results for each MASS subscale (N = 442).

Scale	χ^2/df	GFI	CFI	RMR	RMSEA	Mean Std. Factor Loading
Stress	1.829	0.964	0.986	0.038	0.043	0.75
Psychiatric Symptoms	2.017	0.971	0.965	0.006	0.048	0.68
Mental Health Risk	2.049	0.930	0.972	0.051	0.049	0.81
Risk Factors	2.074	0.988	0.972	0.003	0.049	0.59
Positivity	2.853	0.887	0.958	0.043	0.065	0.86
Functioning	2.385	0.908	0.943	0.071	0.056	0.70

Notes: χ^2/df (Chi-square to degrees of freedom ratio) < 3 indicates good model fit. GFI (Goodness of Fit Index) > 0.90 indicates good fit (borderline at 0.887 for Positivity). CFI (Comparative Fit Index) > 0.95 indicates excellent fit. RMR (Root Mean Square Residual) close to 0 indicates better fit. RMSEA (Root Mean Square Error of Approximation) < 0.06 indicates good model fit. Mean Standardized Factor Loading values > 0.60 suggest strong contributions of items to latent constructs.

Table 4. Internal consistency (reliability).

Scale	Cronbach's Alpha	Interpretation
Stress	0.941	Excellent
Psychiatric Symptoms	0.815	Good
Mental Health Risk	0.954	Excellent
Risk Factors	0.667	Acceptable (needs refinement)
Positivity	0.973	Excellent
Functioning	0.824	Good

Confirmatory Factor Analysis (CFA) was conducted to evaluate the structural validity of the scales included in the MASS battery. The results demonstrated a good model fit across all scales. Specifically, the Comparative Fit Index (CFI) values ranged from 0.943 to 0.986, indicating a strong model-data fit. The Root Mean Square Error of Approximation (RMSEA) values were between 0.043 and 0.065, which falls within the acceptable range, further confirming the appropriateness of the model structures. In addition, the Goodness of Fit Index (GFI) values exceeded the benchmark of 0.90 for most scales, apart from the Positivity scale, which yielded a slightly lower GFI of 0.887—still close to the acceptable threshold.

Internal consistency of the scales was assessed using Cronbach's alpha, which revealed satisfactory to excellent reliability coefficients. The Severity of Stress scale demonstrated excellent internal consistency with an alpha of 0.941. The Psychiatric Symptoms scale had a good alpha value of 0.815, while the Mental Health Risk scale showed excellent consistency at 0.954. The Risk Factors scale had a moderate alpha of 0.667, suggesting acceptable reliability given its diverse construct coverage. The Positivity scale displayed extremely high internal consistency at 0.973, and the Functioning scale also showed strong reliability with a Cronbach's alpha of 0.824.

These results support the psychometric soundness of the MASS subscales, including the Scale for psychological stress (SPS) scale, affirming their structural integrity and reliability for use in assessing mental health parameters in the university student population [20].

6.2. Inter-Scale Correlation Analysis

Strong positive correlations were observed among Stress, Psychiatric Symptoms, and Mental Health Risk ($r = 0.65$ to 0.78). Positivity was negatively correlated with all symptom scales ($r = -0.48$ to -0.69). Functioning showed moderate correlations with both risk and protective factors. The correlation analysis revealed several important patterns that support the construct validity of the MASS scales. There were strong positive correlations observed between the Severity of Stress, Psychiatric Symptoms, and Mental Health Risk scales, suggesting that these constructs share a common underlying dimension of psychological distress. This convergence indicates that individuals who report high levels of stress are also more likely to experience psychiatric symptoms and perceive themselves at greater mental health risk (**Table 5**).

Table 5. Inter-scale correlation summary (Pearson's r) (a).

	Stress	Psych Symptoms	MH Risk	Risk Factors	Positivity	Functioning
Stress	—	0.71	0.65	0.58	−0.69	0.63
Psychiatric Symptoms	0.71	—	0.78	0.52	−0.61	0.66
Mental Health Risk	0.65	0.78	—	0.60	−0.55	0.61

Continued

Risk Factors	0.58	0.52	0.60	—	−0.48	0.50
Positivity	−0.69	−0.61	−0.55	−0.48	—	−0.53

Summary of key strengths and Gaps(b).

Strengths	Areas for Improvement
Strong construct and factorial validity	Report eigenvalues, % variance explained
High internal consistency for most scales	Add test-retest reliability data
Clear unidimensionality or interpretable substructures	Provide item-level CFA loadings and modification indices
Contextually grounded, student-relevant items	Revise Risk Factors scale for better reliability
Real-time digital feedback integration	Publish norms and clinical cutoff scores (in future phase)

In contrast, the Positivity scale demonstrated significant negative correlations with all the problem-focused scales, including stress, psychiatric symptoms, and mental health risk. This inverse relationship supports the conceptualization of positivity as a protective factor, reflecting strengths such as optimism, hope, and emotional well-being that buffer against mental health challenges.

Furthermore, moderate positive correlations were found between the Risk Factors scale and the various symptom domains, including stress and psychiatric symptoms. This suggests that while risk factors such as poor sleep, isolation, or substance use contribute to vulnerability, they may operate through partially distinct pathways compared to core symptomatology. An item-wise summary is given in **Table 6**.

Table 6. Item-level psychometric summary.

Scale	Eigenvalue	Variance Explained (%)	Mean Rotated Factor Loading	Mean CFA Standardized Loading	Mean Item-Total Correlation
Stress	6.87	52.8%	0.71	0.75	0.68
Psychiatric Warning Symptoms	4.31	43.1%	0.66	0.68	0.61
Mental Health Symptoms	11.24	53.5%	0.78	0.81	0.74
Risk Factors	2.02	33.6%	0.55	0.59	0.50
Positivity	17.12	71.3%	0.82	0.86	0.79
Functioning	6.43	38.2%	0.68	0.70	0.66

Finally, the functioning scale was broadly correlated with all other domains, both positively with Positivity and negatively with the problem scales. This pattern reinforces the utility of functioning as a comprehensive outcome measure, capturing the real-life impact of psychological distress and protective capacities on academic, social, and daily performance among students [21] [22].

6.2.1. Psychometric Properties of the MASS individual Scales

- **Scale for Assessment of Stress (SAS-13)**

This 13-item unidimensional scale measures perceived academic, emotional, and environmental stress in university students. Exploratory factor analysis (EFA) confirmed a single-factor structure ($KMO = 0.958$), while confirmatory factor analysis (CFA) demonstrated excellent model fit ($CFI = 0.986$, $RMSEA = 0.043$). Internal consistency was high (Cronbach's $\alpha = 0.941$), indicating strong item coherence. The scale is especially useful for early detection of psychological distress in academic settings. Scores between 23 - 35 indicated moderately high level of stress and scores above 36 indicated severely high levels of stress warranting further attention. The scale's cultural alignment and high psychometric strength make it a significant tool for preventive mental health.

- **Scale for Assessment of Psychiatric Symptoms (SPSY-10)**

This 10-item scale (reduced from an initial 14) captures core psychiatric symptomatology, including mood instability, anxiety, and cognitive disturbances. EFA indicated a robust unidimensional structure ($KMO = 0.875$), with CFA confirming good model fit ($CFI = 0.965$, $RMSEA = 0.048$). The reliability coefficient was good (Cronbach's $\alpha = 0.815$). This scale was rated as yes or no response, it was for assessment of warning symptoms assessed for making referral, any response as "yes" qualified for referral to a psychiatrist. A score of 8 - 10 represented severe symptoms. This concise tool supports early psychiatric triage and referral, especially in educational settings lacking mental health professionals.

- **Scale for Assessment of Mental Health Risk (SMHR-21)**

Comprising 21 items, this scale evaluates subclinical symptoms, emotional dysregulation, academic pressure, and digital exposure. EFA confirmed a strong unidimensional construct ($KMO = 0.958$), with CFA results supporting excellent fit ($CFI = 0.972$, $RMSEA = 0.049$). The scale demonstrated high internal consistency ($\alpha = 0.954$). K-Means clusters indicated a threshold of score ≥ 32 suggesting moderate to severely elevated risk and the need for preventive strategies or closer monitoring. Its integration of digital risk makes it especially relevant in post-pandemic student life.

- **Scale for Assessment of Risk Factors (SRF-6)**

This brief 6-item scale assesses major psychosocial risk domains, including family dysfunction, trauma, and substance use. Despite a lower KMO value (0.750), both EFA and CFA indicated acceptable structure and fit ($CFI = 0.972$, $RMSEA = 0.049$). Cronbach's alpha was acceptable at 0.667, suggesting room for refinement.

This scale was rated as "yes" or "no", and presence of every item was rated as risk. It was not quantified

- **Scale for Assessment of Positivity (SAP-24)**

This 24-item scale assesses protective psychological constructs such as self-worth, resilience, optimism, and perceived social support. EFA confirmed unidimensionality ($KMO = 0.972$), with CFA indicating good fit ($CFI = 0.958$, $RMSEA$

= 0.065). Despite a marginal GFI (0.887), the scale's reliability was exceptionally high ($\alpha = 0.973$). A positivity score of <58 may indicate severely low resilience or reduced mental strength, while ≥ 105 reflects robust protective traits. The scale's strength lies in its predictive utility for coping and recovery potential.

• Scale for Assessment of Functioning (SAF-22)

The 22-item Functioning Scale assesses both academic performance and inter-personal/social functioning. EFA supported a two-factor model (KMO = 0.902), with CFA confirming acceptable fit (CFI = 0.943, RMSEA = 0.056). The scale showed good reliability ($\alpha = 0.824$). A total score of <46 suggests impaired functioning across academic or social domains. The bidimensional structure enhances its utility for holistic student assessment, enabling targeted support planning.

6.2.2. Severity Cut-Offs for MASS Subscales

Severity categories for the four core MASS (Mental Health Assessment Scales for Students) subscales were defined based on raw score distributions, informed by K-means clustering and expert clinical judgment. The cut-off ranges reflect stratified levels of psychological risk—Normal, Mild, Moderate, and Severe/Red Flag—for each dimension (Table 7).

Table 7. MASS subscale cut-offs for severity categories (raw scores).

Subscale	Total Items	Score Range	Normal	Mild	Moderate	Severe/Red Flag
1. Scale for psychological stress	13	0 - 52	8 - 11	12 - 22	23 - 35	35 - 52
2. Scale for mental health condition/clinical psychopathology	21	0 - 84	0 - 12	13 - 30	31 - 38	49 - 84
3. Resilience (PRS) (<i>reverse scored</i>)	24	0 - 96	85 - 120	84 - 104	59 - 83	24 - 58 (Low resilience)
4. Functioning (FWB)	22	0 - 88	64 - 88	47 - 63	25 - 46	1 - 24 (Severe impairment)

Note: the scale for Psychiatric warning symptoms and risk are categorical scales where response is yes/no.

- Psychological Stress (13 items; score range: 0 - 52):

Students scoring 8 - 11 were classified as *Normal*, 12 - 22 as *Mild*, 23 - 35 as *Moderate*, and 36 - 52 as *Severe*. High stress levels were commonly associated with emotional dysregulation, academic disengagement, and somatic symptoms.

- Mental Health Condition/Clinical Psychopathology (21 items; score range: 0 - 84):

Scores of 0 - 12 were considered *Normal*, 13 - 30 as *Mild*, 31 - 48 as *Moderate*, and 49 - 84 as *Severe*. This subscale included symptoms of mood disturbance, psychotic-like experiences, and anxiety, helping identify students at elevated psychiatric risk.

- Resilience (PRS) - *Reverse Scored* (24 items; score range: 0 - 96):

Resilience scores were categorized as *High/Normal* (85 - 120), *Mild Deficiency*

(84 - 104), *Moderate Deficiency* (59 - 83), and *Severe Deficiency* (24 - 58). Lower scores reflected poor coping skills, lack of psychological flexibility, and limited emotional buffering.

- Functioning and Well-Being (FWB) (22 items; score range: 0 - 88):

Students with scores 64 - 88 were classified as having *Normal Functioning*, 47 - 63 as *Mild Impairment*, 25 - 46 as *Moderate Impairment*, and 1 - 24 as *Severe Impairment*. This scale captured limitations in academic performance, daily routines, and social relationships.

Note: The Psychiatric Warning Symptoms and Risk Factors scales in the MASS system are based on categorical Yes/No responses.

7. Discussion

The present study aimed to develop and evaluate the psychometric properties of the MASS (Mental Health Assessment Scales for Students) questionnaires using both exploratory and confirmatory factor analysis, along with internal consistency measures. The results provide robust evidence for the validity and reliability of most scales in the MASS battery.

Out of the 520 university students approached for participation, 442 completed the digital self-assessment (response rate: 85%). Among them, 238 (53.8%) were female and 204 (46.2%) were male. All participants were between 18 and 30 years of age and provided informed consent.

An analysis was conducted to explore gender-based differences across the six MASS subscales. Independent samples t-tests showed no statistically significant gender-based differences ($p > 0.05$) across any of the six domains—Severity of Stress, Psychiatric Symptoms, Mental Health Risk, Risk Factors, Positivity, and Functioning. This finding contrasts with prior studies indicating greater internalizing symptoms among females [1], [2], suggesting that increased awareness, equitable access to coping resources, and the culturally contextualized design of MASS may have minimized gendered response biases.

This absence of significant gender-based variation suggests that in this student population, mental health challenges and strengths were distributed comparably across genders. It also indicates that the MASS battery is sensitive and applicable across gender groups without bias, supporting its utility for broad student mental health assessment.

These findings stand in contrast to some previous studies which have reported higher levels of internalizing symptoms (such as anxiety and depression) among female students. The lack of significant gender differences in the present study may be attributed to increased mental health awareness, more equitable access to coping resources across genders, or the culturally sensitive design of the MASS tools, which minimized gendered response biases.

In the current study, we opted for a comprehensive analysis using a single dataset ($N = 442$) for both EFA and CFA, because the total sample size of 442 participants provided sufficient statistical power for both EFA and CFA, with item-

to-participant ratios exceeding standard psychometric thresholds (e.g., 10:1). This allowed for stable factor extraction and fit estimation across the six subscales. The study was conducted during a limited academic window with voluntary participation from university students. Given logistical limitations a second independent cohort could not be feasibly recruited during the study period. Using same sample for both EFA and CFA is well-known psychometric validation when constrained by recruitment or resource limitations [23].

The exploratory factor analysis (EFA) demonstrated that the data were generally well-suited to factor analysis, as indicated by high KMO values and significant Bartlett's tests across all scales. Most questionnaires exhibited a clear single-factor structure, supporting the one-dimensionality of constructs such as stress, psychiatric symptoms, mental health risk, risk factors, and positivity. The only exception was the Functioning scale, which revealed a two-factor structure, suggesting that this domain may encompass multiple, distinct but related aspects of functioning. This finding is consistent with theoretical expectations, as functioning often involves both social and occupational components.

Some items were removed from the scales due to high cross-loadings. The removal of these items did not compromise the overall structure of the scales, and in fact, helped achieve more robust and interpretable factors.

Confirmatory factor analysis (CFA) further supported the construct validity of the MASS questionnaires. All scales met or exceeded commonly accepted fit indices, including GFI, CFI, RMR, and RMSEA, indicating that the hypothesized factor structures were well-represented in the data. These results provide strong evidence that the MASS questionnaires are valid measures of their respective constructs.

Reliability analyses showed that all scales, except the Scale for Assessment of Risk Factors, demonstrated good to excellent internal consistency, with Cronbach's alpha values above .80. The Risk Factors scale, while slightly lower ($\alpha = .667$), still met the minimum threshold for adequate reliability. This suggests that while the scale is acceptable for research purposes, further refinement—such as revising or replacing items—may enhance its reliability in future studies.

MASS provides a unique holistic assessment tailored to the needs of Indian students and can be used in the community for early identification and intervention. Instead of bringing primarily clinical, it has a broader focus to encompass the strengths that students can capitalise on to improve their mental well-being. Addressing these proactively is essential not only for students' mental well-being but also for their academic success, social functioning, and long-term development.

The MASS project successfully developed culturally relevant, psychometrically robust tools for assessing student mental health. EFA and CFA results support the construct validity of all six scales. The emergence of a two-factor structure in the Functioning scale reflects the dual burden of academic and social impairment common among students.

High reliability across five scales underscores internal consistency. The Risk

Factors scale showed lower reliability ($\alpha = 0.667$), indicating a need for refinement. Inter-scale correlations revealed expected patterns: stress and symptoms were strongly interlinked, while positivity emerged as a distinct protective domain.

The digital format and student-centered design enhance the feasibility of MASS as a scalable solution. By addressing subclinical and developmental dimensions, MASS bridges the gap between clinical thresholds and actual student experience.

7.1. Merits of Combined Interpretation

- **Comprehensive Diagnosis and Triage**

Interpreting MASS scales together enables nuanced identification. For instance, a student scoring high on STRESS, SYMPTOMS, and RISK with low FUNCTIONING and POSITIVITY likely needs urgent, multi-modal intervention. This is in line with the biopsychosocial model [24].

- **Distinguishing At-Risk from Resilient Students**

A student with moderate symptoms but high positivity and functioning might be managing well and may benefit from peer support or brief counseling rather than intensive care. This reflects resilience frameworks [8].

- **Targeted Preventive Strategies**

High risk factor scores in the absence of current symptoms point to latent vulnerabilities—indicating a need for preventive education and monitoring. This mirrors youth mental health staging models [25].

- **Identifying Strength-Based Interventions**

Students who report high stress but also show high positivity may benefit from self-help or lifestyle interventions. This is grounded in the positive psychology approach [26].

- **Functional Impairment as an Outcome Indicator**

Functioning scores help determine whether symptoms impair academic or social domains. Poor functioning despite low symptoms may indicate situational or environmental issues.

7.2. Example Case Profiles

- **Student A:** High STRESS, SYMPTOMS, RISK; low POSITIVITY, FUNCTIONING → Suggests depressive episode; refer for psychiatric intervention.
- **Student B:** High STRESS; average SYMPTOMS; high POSITIVITY and FUNCTIONING → Likely stress-related concerns; recommend stress management.
- **Student C:** Low SYMPTOMS; high RISK FACTORS (e.g., trauma, poor sleep); average FUNCTIONING → At-risk; initiate preventive counseling.

MASS represents a significant advancement in student mental health assessment. It is holistic, culturally sensitive, psychometrically validated, and digitally deployable. The MASS battery captures the full spectrum of psychological well-being—spanning distress, risk, resilience, and functioning. This comprehensive

approach facilitates early detection, supports tiered interventions, and aligns with global recommendations for multidimensional, developmentally appropriate mental health tools in educational settings [27] [28].

8. Conclusions

The current study presents the development and validation of the *Mental Health Assessment Scales for Students (MASS)*—a comprehensive, culturally contextualized, and psychometrically sound set of tools designed to assess the mental health of Indian university students. The results from both exploratory and confirmatory factor analyses demonstrate strong construct validity across all six scales: Severity of Stress, Psychiatric Symptoms, Mental Health Risk, Risk Factors, Positivity, and Functioning. Most scales exhibited unidimensional structures, with the Functioning scale revealing a two-factor solution, aligning with theoretical expectations of the multifaceted nature of psychosocial functioning.

Internal consistency reliability was found to be good to excellent across five scales, with only the Risk Factors scale showing moderate reliability, suggesting a direction for refinement in future iterations. Importantly, the absence of significant gender differences in scale scores supports the tool's applicability across diverse student subgroups, reinforcing its fairness and generalizability.

What distinguishes MASS is its multidimensional and integrative design. Unlike many screening instruments that focus solely on symptomatology, MASS captures a broader psychosocial profile by incorporating risk factors, resilience, functioning, and positive psychological dimensions. This positions it as a tool not only for early detection of psychological distress but also for mapping individual strengths and vulnerabilities—thereby enabling more tailored, tiered, and preventive interventions. Such a framework aligns with contemporary mental health paradigms, including the biopsychosocial model, positive psychology, and clinical staging approaches, which advocate for early, context-sensitive identification and support.

Furthermore, the digital format and self-administered structure of MASS make it highly scalable and accessible in resource-limited academic and community settings. Its use can significantly enhance the mental health infrastructure in Indian universities and public health systems by bridging the gap between clinical care and developmental mental health promotion.

In sum, MASS is not merely a screening tool but a foundational platform for a student mental health ecosystem. It enables comprehensive mental health triaging, promotes early and preventive care, and supports well-being through the identification of protective factors. Future directions include refining the Risk Factors scale, expanding the tool's use in diverse educational settings, and integrating it into digital health applications to maximize its reach and impact. By empowering educators, counselors, and policymakers with evidence-based insights into student mental health, MASS contributes meaningfully to the vision of a mentally healthy academic community in India.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

References

- [1] Auerbach, R.P., Alonso, J., Axinn, W.G., Cuijpers, P., Ebert, D.D., Green, J.G., *et al.* (2016) Mental Disorders among College Students in the World Health Organization World Mental Health Surveys. *Psychological Medicine*, **46**, 2955-2970. <https://doi.org/10.1017/s0033291716001665>
- [2] World Health Organization (2021) World Mental Health Report: Transforming Mental Health for All. WHO. <https://www.who.int/publications/i/item/9789240049338>
- [3] Gururaj, G., Varghese, M., Benegal, V., Rao, G.N., Pathak, K., Singh, L.K. and NMHS Collaborators Group (2016) National Mental Health Survey of India, 2015-16: Summary. National Institute of Mental Health and Neurosciences.
- [4] Patel, V., Saxena, S., Lund, C., Thornicroft, G., Baingana, F., Bolton, P., *et al.* (2018) The Lancet Commission on Global Mental Health and Sustainable Development. *The Lancet*, **392**, 1553-1598. [https://doi.org/10.1016/s0140-6736\(18\)31612-x](https://doi.org/10.1016/s0140-6736(18)31612-x)
- [5] Wessely, S., Brugha, T., Jenkins, R. and Singleton, N. (1997) A Question of Access: Why Women Do Better in Mental Health Care. *The British Journal of Psychiatry*, **170**, 292-294. <https://doi.org/10.1192/bjp.170.4.292>
- [6] Blanco, C., Okuda, M., Wright, C., Hasin, D.S., Grant, B.F., Liu, S., *et al.* (2008) Mental Health of College Students and Their Non-College-Attending Peers: Results from the National Epidemiologic Study on Alcohol and Related Conditions. *Archives of General Psychiatry*, **65**, 1429-1437. <https://doi.org/10.1001/archpsyc.65.12.1429>
- [7] Keyes, C.L.M. (2002) The Mental Health Continuum: From Languishing to Flourishing in Life. *Journal of Health and Social Behavior*, **43**, 207-222. <https://doi.org/10.2307/3090197>
- [8] Masten, A.S. (2001) Ordinary Magic: Resilience Processes in Development. *American Psychologist*, **56**, 227-238. <https://doi.org/10.1037/0003-066x.56.3.227>
- [9] Tugade, M.M. and Fredrickson, B.L. (2004) Resilient Individuals Use Positive Emotions to Bounce Back from Negative Emotional Experiences. *Journal of Personality and Social Psychology*, **86**, 320-333. <https://doi.org/10.1037/0022-3514.86.2.320>
- [10] Keyes, C.L.M. (2005) Mental Illness and/or Mental Health? Investigating Axioms of the Complete State Model of Health. *Journal of Consulting and Clinical Psychology*, **73**, 539-548. <https://doi.org/10.1037/0022-006x.73.3.539>
- [11] Eisenberg, D., Golberstein, E. and Hunt, J.B. (2009) Mental Health and Academic Success in College. *The B.E. Journal of Economic Analysis & Policy*, **9**, Article No. 40. <https://doi.org/10.2202/1935-1682.2191>
- [12] Naslund, J.A., Aschbrenner, K.A., Araya, R., Marsch, L.A., Unützer, J., Patel, V., *et al.* (2017) Digital Technology for Treating and Preventing Mental Disorders in Low-Income and Middle-Income Countries: A Narrative Review of the Literature. *The Lancet Psychiatry*, **4**, 486-500. [https://doi.org/10.1016/s2215-0366\(17\)30096-2](https://doi.org/10.1016/s2215-0366(17)30096-2)
- [13] Rathod, S., Pinninti, N., Irfan, M., Gorczynski, P., Rathod, P., Gega, L., *et al.* (2017) Mental Health Service Provision in Low- and Middle-Income Countries. *Health Services Insights*, **10**, 1-7. <https://doi.org/10.1177/1178632917694350>
- [14] Löwe, B., Decker, O., Müller, S., Brähler, E., Schellberg, D., Herzog, W., *et al.* (2008) Validation and Standardization of the Generalized Anxiety Disorder Screener (GAD-

- 7) in the General Population. *Medical Care*, **46**, 266-274.
<https://doi.org/10.1097/mlr.0b013e318160d093>
- [15] Jovanović, A.A., Gasić, M.J., Ivković, M., Milovanović, S. and Damjanović, A. (2008) Reliability and Validity of DSM-IV Axis V Scales in a Clinical Sample of Veterans with Posttraumatic Stress Disorder. *Psychiatria Danubina*, **20**, 286-300.
 - [16] Joseph, N., Sharma, N., Suruliraj, B. and Nelliyanil, M. (2021). Assessment of Academic Stress and Its Associated Factors among Undergraduate Students in a Coastal City of South India. *Indian Journal of Community Medicine*, **46**, 472-476.
 - [17] Herman, K.C., Lambert, S.F., Reinke, W.M. and Ialongo, N.S. (2011) Longitudinal Associations between Externalizing Behavior and Academic Adjustment in Late Elementary School: Moderation by School Climate. *Psychology in the Schools*, **48**, 571-588.
 - [18] Wessely, S., Rose, S. and Bisson, J. (1997) Brief Psychological Interventions ("Debriefing") for Trauma-Related Symptoms and Prevention of Post-Traumatic Stress Disorder: A Review. *Cochrane Database of Systematic Reviews*, No. 2.
 - [19] Kroenke, K., Spitzer, R.L. and Williams, J.B.W. (2001) The PHQ-9: Validity of a Brief Depression Severity Measure. *Journal of General Internal Medicine*, **16**, 606-613.
<https://doi.org/10.1046/j.1525-1497.2001.016009606.x>
 - [20] Markon, K.E., Chmielewski, M. and Miller, C.J. (2011) The Reliability and Validity of Discrete and Continuous Measures of Psychopathology: A Quantitative Review. *Psychological Bulletin*, **137**, 856-879. <https://doi.org/10.1037/a0023678>
 - [21] Herman, K.C., Lambert, S.F. and Ialongo, N.S. (2011) Targeting Mental Health Disparities among School-Aged Children in a National Priority. *American Psychologist*, **66**, 273-276.
 - [22] Deb, S., Strodl, E. and Sun, J. (2015) Academic Stress, Parental Pressure, Anxiety and Mental Health among Indian High School Students. *International Journal of Psychology and Behavioral Sciences*, **5**, 26-34. <https://doi.org/10.5923/j.ijpbs.20150501.04>
 - [23] Worthington, R.L. and Whittaker, T.A. (2006) Scale Development Research: A Content Analysis and Recommendations for Best Practices. *The Counseling Psychologist*, **34**, 806-838. <https://doi.org/10.1177/0011000006288127>
 - [24] Engel, G.L. (1977) The Need for a New Medical Model: A Challenge for Biomedicine. *Science*, **196**, 129-136. <https://doi.org/10.1126/science.847460>
 - [25] McGorry, P.D., Hickie, I.B., Yung, A.R., Pantelis, C. and Jackson, H.J. (2006) Clinical Staging of Psychiatric Disorders: A Heuristic Framework for Choosing Earlier, Safer and More Effective Interventions. *Australian & New Zealand Journal of Psychiatry*, **40**, 616-622. <https://doi.org/10.1080/j.1440-1614.2006.01860.x>
 - [26] Seligman, M.E.P. and Csikszentmihalyi, M. (2000) Positive Psychology: An Introduction. *American Psychologist*, **55**, 5-14. <https://doi.org/10.1037/0003-066x.55.1.5>
 - [27] Kessler, R.C., Berglund, P., Demler, O., Jin, R., Merikangas, K.R. and Walters, E.E. (2005) Lifetime Prevalence and Age-of-Onset Distributions of DSM-IV Disorders in the National Comorbidity Survey Replication. *Archives of General Psychiatry*, **62**, 593-602. <https://doi.org/10.1001/archpsyc.62.6.593>
 - [28] Patel, V., Flisher, A.J., Hetrick, S. and McGorry, P. (2007) Mental Health of Young People: A Global Public-Health Challenge. *The Lancet*, **369**, 1302-1313.
[https://doi.org/10.1016/s0140-6736\(07\)60368-7](https://doi.org/10.1016/s0140-6736(07)60368-7)