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Assessment Scale for Psychological Disorder Risks among Chinese College Students: Development and Preliminary Validation

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Abstract:

This study aimed to develop and preliminarily validate a psychological disorder risk assessment scale for Chinese college students, with an emphasis on early prevention and screening. Through literature analysis, item translation, and adaptation, a preliminary version of the scale was constructed and subjected to psychometric testing, including item analysis, exploratory factor analysis (EFA), and confirmatory factor analysis (CFA). The final version consists of 14 items and three factors: behavioral impulsivity, somatic anxiety manifestations, and depression with worry. EFA revealed a clear three-factor structure, cumulatively accounting for 63.38% of the total variance. However, CFA results indicated that the model fit did not reach ideal standards (TLI = 0.890, RMSEA > 0.08), which may be attributed to the small sample size and the lack of true cross-validation, as well as the complexity of psychological symptoms among college students. Despite these limitations, the scale serves as a preventive screening tool with the advantages of brevity and ease of administration. Future research should further validate the scale with larger samples, optimize the items, and establish more scientific normative standards to enhance its applicability and authority.

Keywords: Behavioral impulses; anxiety; depression; college students.

1. Introduction

College years represents a critical transition from adolescence to early adulthood, during which students undergo significant changes—physically, psychologically, and socially. They face multiple challenges, including academic competition, interpersonal relationships, financial pressure and future planning, making them a high-risk group for psychological disorders [1]. According to the World Health Organization

(WHO), mental health issues are among the leading causes of illness and disability among adolescents [2], with anxiety, depression, and impulsive behavior being particularly prominent. Chinese college students also show a high prevalence of psychological disorders, which not only severely impact academic performance and quality of life but also place a heavy burden on families, campuses, and society as a whole [3].

Against this backdrop, the importance of mental health education has become increasingly evident. However, most existing psychological assessment tools-such as the SCL-90 and the SDS-focus on treatment and diagnosis rather than prevention [4,5]. For example, the WHO Neurosis Screening Scale, though highly sensitive and specific for identifying small groups with psychological disorders, requires specialized training and is relatively complex to use. Similarly, while the SCL-90 covers nine symptom dimensions and offers a comprehensive assessment, its sensitivity and specificity for detecting psychological disorders are not ideal [6]. These tools often intervene only after problems have arisen, missing the optimal window for early prevention and intervention [7].

Therefore, there is a clear need to develop assessment tools focused on prevention. This study aims to create a concise, easily interpretable risk assessment scale suitable for routine screening in university settings. Focusing on common issues such as impulsive behavior, generalized anxiety, and depression among college students, we developed and preliminarily validated a brief scale.

2. Study: Development of the Psychological Disorder Risk Scale for Chinese College Students

2.1 Research Objective

2.1.1 Sub heading

This study aims to develop a scale with good reliability and validity for assessing psychological disorder risks among college students.

2.2 Methodology

2.2.1 Participants

Participants were recruited online and limited to current Chinese college students with no history of mental illness or use of psychiatric medications. To ensure data quality, three attention-check questions (e.g., "For this item, please select 'strongly disagree'") were included. Data from participants who failed these checks or had unusually long or short response times were excluded. Sample 1: Used for exploratory factor analysis (EFA). 291 questionnaires were collected, with 208 valid responses—80 males and 128 females, aged 18–35 (M = 21.43, SD = 2.51). Sample 2: Used for confirmatory factor analysis (CFA). 113 questionnaires were collected, all valid—56 males and 57 females, aged 18–25 (M = 21.4, SD = 1.76).

2.2.2 Procedure

The study began by reviewing literature on psychological disorders and referencing established scales such as the Barratt Impulsiveness Scale (BIS), Generalized Anxiety Disorder-7 (GAD-7), Symptom Checklist-90 (SCL-90), Cornell Medical Index Health Questionnaire (CMI), and Patient Health Questionnaire-9 (PHQ-9). Items were adapted through paraphrasing to maintain the original meaning while ensuring clarity. For example, "I can concentrate well" was rephrased as "I have difficulty concentrating." Some original items from other scales were also included.

The initial version of the Psychological Disorder Risk Scale for College Students used a 5-point Likert scale, with responses ranging from 1 (strongly disagree) to 5 (strongly agree). Participants were asked to reflect on their experiences over the past month. All participants provided informed consent online before completing the questionnaire.

Sample 1 was tested first. SPSS 25.0 was used for item analysis and EFA. Items with poor indicators or cross-factor loadings were gradually removed. After each deletion, factor analysis was repeated until a stable factor structure emerged. The final scale was then administered to Sample 2, and AMOS 26.0 was used for CFA, while SPSS 25.0 was used for reliability analysis.

2.3 Results

2.3.1 Item Analysis

Based on classical test theory, the t-value for differences between high and low groups and the item-total correlation coefficient (r) were used as indicators of item discrimination. Results showed that all items except "My thinking is 跳跃性的 (jumpy)" and "I am a go-with-the-flow person" had significant discrimination. These two items were deleted.

2.3.2 Exploratory Factor Analysis

The initial scale was subjected to EFA. The KMO value was 0.919, and Bartlett's test of sphericity was significant ($\chi^2 = 2274.590$, df = 210, $p < 0.001$), indicating suitability for EFA. Principal component analysis revealed three factors with eigenvalues greater than 1, accounting for 56.75% of the total variance. Items with low loadings (<0.40) or high cross-loadings were removed step by step.

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After multiple iterations, 14 items were retained. A scree plot test confirmed three factors with eigenvalues greater than 1, cumulatively explaining 63.83% of the variance. Factor loadings ranged from 0.51 to 0.83. The factor structure is shown in Table 1:

Table 1. Rotated component matrix

Item	Factor 1	Factor 2	Factor 3
I act without thinking things through	0.732		
I often act on impulse	0.712		
I say things as soon as they come to mind	0.820		
I often experience unexplained hand tremors		0.816	
I have thoughts of harming myself		0.658	
I feel panicked or short of breath		0.763	
I find it hard to concentrate			0.688
I feel tense or irritable			0.723
I worry about being unable to handle future events			0.831
I cannot stop worrying or overthinking			
I always feel like something terrible will happen			0.816
I feel tired and lack energy			0.746
I have difficulty falling asleep, experience short sleep duration, or take a long time to fall asleep			0.739
I find it hard to focus on tasks			0.517
			0.680

2.3.3 Confirmatory Factor Analysis

CFA was conducted using AMOS 26.0 to test the three-factor model. Results showed that χ^2/df was less than 3, CFI = 0.910, IFI = 0.912, TLI = 0.890 (<0.9), and RMSEA > 0.08, indicating that the model did not meet acceptable standards. The model structure is illustrated in Figure 1.

2.3.4 Reliability and Validity Testing

Although the model in this study was not ultimately established, we still conducted reliability and validity analyses. A reliability analysis of the formal scale showed that the Cronbach's α values for the full scale and the three factors were 0.911, 0.744, 0.604, and 0.909, respectively. Only Factor 2 exhibited relatively poor reliability, while the rest demonstrated good reliability.

Structural validity was examined through exploratory factor analysis (EFA) to investigate the potential structure of the scale. EFA was conducted on Sample 1 (n = 208). The KMO value was 0.919, and Bartlett's test of sphericity was significant ($\chi^2 = 2274.590$, df = 210, $p < 0.001$), indicating that the data were highly suitable for factor analysis. Using principal component analysis with varimax rotation, three factors with eigenvalues greater than 1 were extracted, accounting for 63.83% of the total variance. The factor loadings of each item on its corresponding factor ranged from 0.51 to 0.83 (see Table 1), with no significant cross-loadings, suggesting a clear three-factor structure consistent with the theoretical framework.

To verify the stability of this factor structure, confirmatory factor analysis (CFA) was performed using Sample 2 (n = 113). Although the fit indices of the three-factor model did not fully meet ideal standards ($\chi^2/df < 3$, CFI = 0.910, IFI = 0.912, TLI = 0.890, RMSEA > 0.08), the CFI and IFI values were close to the acceptable threshold of 0.90. Given that the small validation sample size (n = 113) may have negatively affected model fit, the factor structure was considered acceptable overall. The results of both EFA and CFA provided preliminary evidence for the structural validity of the scale.

Content validity was also assessed. The item pool for this scale was derived from the translation, adaptation, and integration of well-established scales (e.g., BIS-11, GAD-7, PHQ-9, SCL-90), ensuring coverage of core domains of psychological disorder risks among college students. Additionally, all items were reviewed and discussed by psychology graduate students to ensure clarity and relevance, thereby establishing a foundation for good content validity. However, criterion validity was not examined in this study and will be addressed in future research.

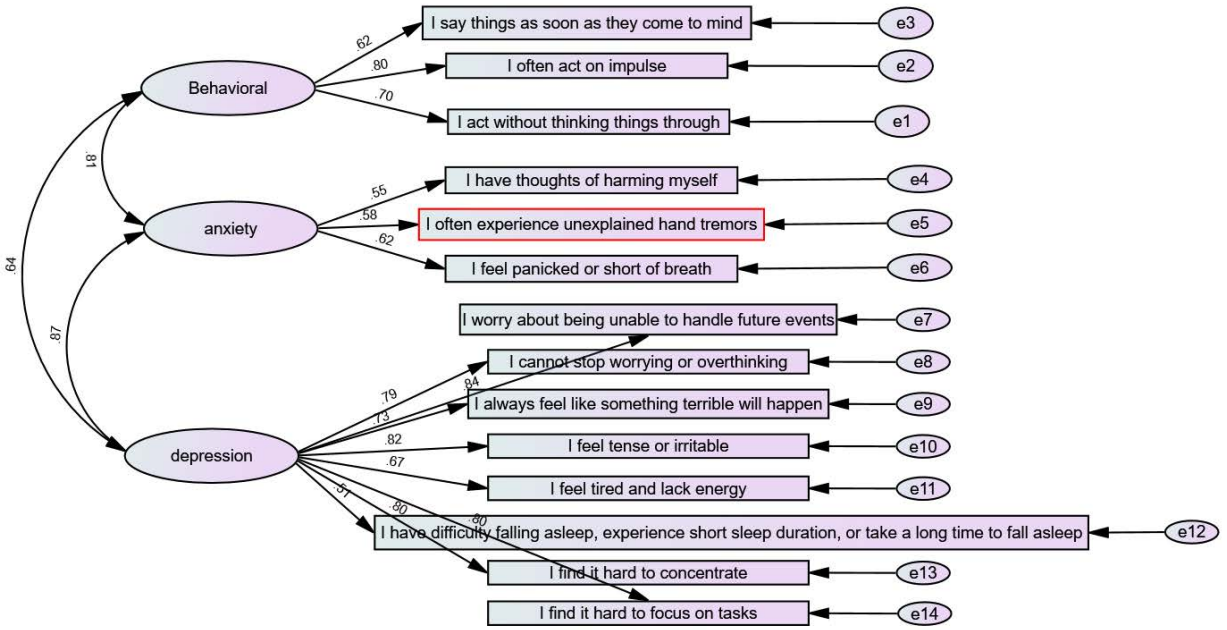

Fig 1. Confirmatory Factor Analysis

3. Discussion

3.1 Factor Structure and Theoretical Framework

Exploratory factor analysis revealed a three-factor structure comprising "Behavioral Impulsivity," "Somatization and Cognitive Anxiety," and "Depressive Symptoms," collectively explaining 63.83% of the total variance. This result aligns with the scale's initial theoretical framework. Factor loadings ranged from 0.51 to 0.83, meeting psychometric standards (typically set at >0.40), indicating that the items effectively measured their intended constructs. This three-dimensional framework corresponds to the common manifestations of psychological distress among college students. Recent empirical studies consistently highlight that psychological challenges in this population, particularly in the Chinese context, often present as comorbidities of impulsivity, anxiety, and depressive symptoms [8]. Notably, behavioral impulsivity has been recognized as a transdiagnostic marker of various psychopathological forms. Smith et al. emphasized that impulsivity is not merely a behavioral trait but also a significant predictor of both externalizing disorders (e.g., risky behaviors, substance use) and internalizing disorders (e.g., anxiety and depression) [9]. Including this factor is especially relevant in the college context, where developmental and environmental pressures may impair students' self-regulation abilities, leading to behaviors beyond their control. Similarly, somatic and cognitive anxiety items were grouped into one factor. In Chinese culture, psychological distress is often expressed through somatic symptoms, a phenomenon well-documented in cultural clinical psychology [10]. Items such as "I often experience unexplained trembling" or "I feel palpitations or shortness of breath" are not peripheral indicators but core features of anxiety experiences in this population. The third factor, depression, encompasses both affective and cognitive aspects (e.g., fatigue, sleep disturbances, and persistent worry), reinforcing existing models that emphasize the multifaceted nature of depression. The high factor loadings and internal consistency support the effectiveness of this factor in assessing depression risk among Chinese students.

3.2 Model Fit Issues and Possible Explanations

Although EFA revealed a clear factor structure, CFA indicated that the three-factor model did not achieve acceptable fit indices (TLI = 0.890; RMSEA > 0.08). Several methodological and conceptual reasons may explain this discrepancy. First, the sample size used for CFA (n = 113) was below the widely recommended minimum of 200 participants for stable parameter estimation [11]. Small sample sizes are prone to overfitting or underfitting and

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may not yield ideal fit indices. Future studies with larger samples are needed to re-evaluate the factor validity with greater statistical power. Second, some items adapted from international scales may not have achieved full linguistic or cultural equivalence. Despite using translation and back-translation procedures, expressions such as "I have thoughts of harming myself" may carry different connotations in the Chinese cultural context. Such subtle cultural biases could lead to errors in covariance or cross-loadings, undermining model fit. Third, the complexity of students' mental health symptoms may challenge traditional factor structures. Liu et al. argue that contemporary students often exhibit mixed and subclinical symptoms that do not fully align with classical diagnostic categories [12]. A more robust model might require incorporating correlated errors or a bifactor structure to account for the common underlying factor of psychological distress often seen in internalizing disorders.

3.3 Reliability Analysis

The full scale demonstrated excellent internal consistency, with a Cronbach's α coefficient of 0.911. This indicates consistent inter-item correlations, making the scale suitable for risk screening at an aggregate level. However, the reliability coefficients of the subscales varied: Factor 1 (Behavioral Impulsivity) showed acceptable reliability (α = 0.744), consistent with previous studies using impulsivity subscales, which often report moderate internal consistency due to the heterogeneous manifestations of impulsive behaviors [10]. Factor 2 (Somatic Anxiety) had a relatively low α coefficient of 0.604. This may be attributed to the diversity of somatic symptoms associated with anxiety. Somatic complaints such as trembling, palpitations, or breathing discomfort may be episodic, context-dependent, and influenced by individual differences in symptom awareness and reporting [3]. Factor 3 (Depressive Symptoms) showed high reliability (α = 0.909), comparable to widely used depression measures such as the PHQ-9 [7]. This suggests that the depression component of the scale is coherent and robust. However, the relatively low reliability of Factor 2 means that interpretations based solely on this subscale should be made with caution. Future revisions could improve measurement precision by adding more somatic anxiety items or incorporating behavioral and physiological markers.

3.4 Limitations and Methodological Reflections

Several limitations should be considered when interpreting the results. First, the sample was recruited online and may not fully represent the broader Chinese college student population. Regional, socioeconomic, and educational differences may influence symptom expression and scale performance, another influencing factor is the gender difference observed in the survey, with female students showing higher connectivity of depressive symptoms [13]. Future studies should adopt stratified sampling strategies across different universities to enhance generalizability [10]. Second, the sample size was moderate, and although two datasets were collected for EFA and CFA, this approach limited the ability to conduct a truly independent cross-validation. Best practices in scale development recommend using three independent samples for preliminary EFA, subsequent CFA, and validation against external criteria [14]. Additionally, the lack of criterion validity analysis and test-retest reliability testing in this study reduces confidence in the scale's utility.

3.5 Theoretical and Practical Implications

Despite these limitations, this study contributes meaningfully to both research and practice. Theoretically, it supports a tripartite risk model comprising impulsivity, anxiety, and depression-constructs central to contemporary developmental psychopathology. This structure aligns with a transdiagnostic approach aimed at identifying common underlying mechanisms of mental disorders rather than diagnosing isolated symptoms. From a practical perspective, the scale provides a concise, easy-to-administer tool suitable for large-scale screening in higher education settings. Its emphasis on detecting preclinical risks aligns with global mental health initiatives advocating for early intervention and prevention [3]. For example, university counseling centers and student affairs offices could use this tool to identify at-risk students before severe pathology emerges, addressing issues through group interventions, psychoeducation, or individual counseling, and tracking outcomes such as academic burnout or dropout risk. Moreover, the identified factors are amenable to targeted interventions. For instance, impulsivity could be addressed through mindfulness training, cognitive-behavioral strategies could alleviate anxiety and depressive symptoms, and somatic awareness techniques might help students manage physical manifestations of stress. Providing such modular interventions based on scale results could enhance the precision and effectiveness of student mental health services.

4. Conclusion

This study developed a preliminary version of a psychological disorder risk scale for Chinese college students and evaluated its psychometric properties. Exploratory factor analysis supported a three-factor model, and the full scale demonstrated good internal consistency. Although

confirmatory factor analysis did not yield an ideal model fit, potentially due to sample size and cultural adaptation issues, the scale remains a promising preventive screening tool. Its brevity and focus on core transdiagnostic risk factors make it particularly suitable for settings with limited time and resources. Future research should aim to validate the scale in larger, more representative samples, refine problematic items, and gather additional evidence for its validity. Establishing normative cutoff scores and assessing sensitivity over time would further enhance its practical value in promoting mental health on college campuses.

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