Investigating the Psychometric Properties of the Persian Version of the Multidimensional Test Anxiety Scale (MTAS)

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Abstract

Background: Physical, mental, and behavioral signs of exam anxiety show themselves throughout test preparation. This research sought to explore the psychometric characteristics of the Persian version of the Multidimensional Test Anxiety Scale (MTAS) among university students given the absence of a tool to assess the many aspects of test anxiety.

Objectives: Given the lack of a reliable and valid Persian-language scale for measuring the dimensions of test anxiety, the present study was conducted with the aim of examining the psychometric properties of the Persian version of the Multidimensional Test Anxiety Scale among university students.

Methods: Convenience sampling was used to choose 232 Jundishapur University of Medical Sciences students for this descriptive, psychometric research in 2022.Participants filled out the Rosenberg Self-Esteem Scale, the Frost Multidimensional Perfectionism Scale-Short Form, and the MTAS. Confirmatory factor analysis was part of the MATS's psychometric analysis, which was assessed using LISREL 8.8 and SPSS version 25.

Results: Confirmatory factor analysis verified the four-factor structure of the MTAS (Worry, Cognitive Interference, Tension, and Physiological Indicators). The MTAS exhibited an internal consistency of 0.93, while the Worry, Cognitive Interference, Tension, and Physiological Indicators subscales exhibited internal consistency of 0.88, 0.81, 0.89, and 0.83, respectively, as determined by Cronbach's alpha coefficient. The MTAS demonstrated strong divergent and convergent validity.

Conclusion: The MTAS has acceptable reliability and validity, as indicated by the results. The results of this investigation have the potential to enhance the cross-cultural literature on the MTAS.

Keywords: Scale; Test Anxiety; Validity; Reliability

Background

Educational and psychological literature have long acknowledged test anxiety as a substantial factor. The negative correlation between test anxiety and both student well-being and test progress and performance (1, 2) is the primary determinant of its association. There is a lack of consensus regarding the components that should be included within the test anxiety construct, despite the fact that there are numerous established and valid psychometric instruments for measuring test anxiety (3, 4). Furthermore, practitioners frequently encounter obsolete instruments that are devoid of suitable norms and thresholds for identifying individuals who require assistance and intervention (5). Test anxiety is a trait that is situation-specific; it is a consistent inclination or disposition to perceive performance appraisal situations (situations in which one's performance is evaluated in some capacity) as menacing and respond with high-level anxiety to the situation (6). High-trait anxious individuals may not necessarily respond to non-performance appraisal situations (such as those involving physical peril, ambiguity, separation, or daily routines) with sustained state anxiety, as trait anxiety is multidimensional (7). The initial conceptualizations of test anxiety were centered on a single dimension (8). The identification of distinct cognitive and emotional-physiological components within test anxiety was a significant

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advancement (9). There is a widespread agreement that test anxiety is a multifaceted concept that includes cognitive and emotional-physiological components (5). In 2020, Putwain et al. created the MTAS, an instrument that is intended to evaluate test anxiety by evaluating two cognitive dimensions (concern and cognitive interference) and two emotional-physiological dimensions (tension and physiological indicators). In the original analysis conducted by Putwain et al., this four-factor structure was found to be well-suited. In educational systems, exams are a critical component of the academic progression of individuals. This, in turn, results in a progressive escalation of test anxiety, as parents and educational systems place greater expectations and pressure on their performance. The initial step in providing assistance to individuals who experience severe and debilitating anxiety during test preparation and execution can be identified, given the detrimental effects of test anxiety on academic performance. Accurate identification of these individuals necessitates the utilization of suitable instruments. Additionally, it is imperative to evaluate the psychometric properties of an instrument in a novel culture prior to its scientific application. As a result, the objective of the current study was to examine the psychometric properties of the Persian variant of the Multidimensional Test Anxiety Scale (MTAS) among university students.

Objectives

Given the lack of a reliable and valid Persianlanguage scale for measuring the dimensions of test anxiety, the present study was conducted with the aim of examining the psychometric properties of the Persian version of the Multidimensional Test Anxiety Scale among university students.

Methods

In the academic year 2022, the sample population was comprised of all pupils at Ahvaz Jundishapur University of Medical Sciences. For ten factors, the recommended sample size for confirmatory factor analysis is approximately 200 cases (10, 11). Furthermore, it is recommended that each item have a minimum of 10 participants. Consequently, a convenience sampling method was employed to select 232 participants from this population. To translate the Multidimensional Test Anxiety Scale (MTAS) a conventional backward-forward translation technique was utilized. Initially, it was translated into Persian by a professional translator. Several academic members from Ahvaz Jundishapur University of Medical Sciences' Department of Language assessed the Persian translation. The scale was then back-translated into its original English language by the reviewers. Any differences or inconsistencies were found and fixed after comparing the translated text to the original English text. A pilot sample of 25 participants was then given the Persian MTAS in order to evaluate its general appropriateness for the target audience as well as its clarity and understanding. Any remaining issues or ambiguities were resolved in accordance with the feedback from the pilot testing. The Persian MTAS was prepared for administration to the primary study participants upon its completion. Individuals were required to satisfy the subsequent eligibility requirements in order to participate in the investigation: 1. Enrollment in any undergraduate or postgraduate program at Ahvaz Jundishapur University of Medical Sciences, 2. Willingness to participate in the study procedures and provide informed assent. The process of data collection entailed the self-administration of questionnaires. The questionnaires were disseminated to eligible participants after the institutional review board approved them. Participants were apprised of the study's objectives, the procedures that were to be followed, and their right to withdraw at any time. The participants did not incur any financial costs as a result of their participation in the study. All participants provided informed assent.

Instruments

Multidimensional Test Anxiety Scale: In 2020, Putwain and colleagues (5)devised the Multidimensional Test Anxiety Scale (MTAS), which evaluates four dimensions of test anxiety: Cognitive Interference, Tension, Physiological Indicators, and Worry. The Likert scale is composed of 16 items, each of which is rated on a 5-point scale from strongly disagree (1) to strongly agree (5). Good convergent validity has been demonstrated by the MTAS, which has a positive correlation with measures of test anxiety and an increased risk of mental health issues, and a negative correlation with school well-being. Good divergent validity has also been demonstrated (5). The overall scale exhibited a test-retest reliability of 0.80, while the corresponding scores for Cognitive Interference, Tension, Worry, and Physiological Indicators were 0.65, 0.70, and 0.82, respectively (5).

Frost Multidimensional Perfectionism Scale-Brief (FMPS-Brief): Burgess, Frost, and DiBartolo (12) developed the Frost Multidimensional Perfectionism Scale-Brief (FMPS-Brief), an 8-item measure of perfectionism that evaluates two dimensions: Evaluative Concerns and Striving Perfectionism.

The Likert scale is a five-point scale that ranges from one to five, with one representing firmly disagree and five representing strongly concur. The subscale scores range from 4 to 20, while the total score ranges from 8 to 40 (12). The total scale has a Cronbach's alpha of 0.83, indicating that it has acceptable psychometric properties (12).

Rosenberg Self-Esteem Scale (RSES): The Rosenberg Self-Esteem Scale (RSES) is a 10-item self-report instrument that assesses global self-esteem. The Likert scale is used to rate each item on a scale of 1 to 4, with 4 representing firmly concur and 1 representing strongly disagree. The total score is between 0 and 40, with higher scores suggesting greater self-esteem. The RSES has exhibited robust psychometric properties. Goldsmith (13) reported a test-retest reliability coefficient of 0.84, which suggests that the scale remains consistent over time. Bernadette, Valery, and Timothy (cited in the original text) reported test-retest reliability coefficients of 0.84, 0.86, and 0.62 for two-week, five-month, and one-year intervals, respectively. These results further underscore the scale's temporal stability. Alizadeh et al. (14) confirmed the scale's reliability by reporting satisfactory internal consistency and test-retest reliability using methodologies such as Cronbach's alpha.

Data Analysis: Using SPSS-25 and confirmatory factor analysis (CFA) with LISREL 8.80, Pearson's correlation was used to examine the data. Various fit indices were used to evaluate the fit of the suggested model: Among the many fit indices used to evaluate the suitability of the suggested model were: X^2/df : A value under 3 suggests a solid model fit. A score over 0.90 indicates an appropriate model fit among NFI, NNFI, CFI, RFI, IFI, and GFI (15, 16). Apart from the above-mentioned fit indices, one should also take into

account the general trend of fit indices and the material meaning of the model. A well-fitting model should not only have reasonable fit indices but also make sense conceptually and experimentally.

Results

With a virtually equal gender distribution (127 females, 105 males) and ages spanning from 18 to 47 (average 26.67 years), the research examined data from 232 individuals. With the rest divided between Bachelor's degrees (68.45%) and Master's degrees (48.9%), most participants were single (67.67%) and had postgraduate degrees (82.44%). Anxiety levels were measured using the Multidimensional Test Anxiety Scale MATS (5). Especially, the statistics (Table 1) showed far greater test anxiety ratings for women than for men (P < 0.05).

The item-total correlations for the Rosenberg Self-Esteem Scale (RSES) ranged from 0.58 to 0.80.

Pearson's correlation test was used to investigate the correlations among the subscales and with the whole scale. Table 2 reveals significant relationships between the subscales and the overall anxiety scale as well as between the subscales themselves.

This suggests that the subscales are all closely connected and assessing features of the same underlying concept (anxiety).

Reliability Analysis: In order to evaluate the internal consistency or reliability of the MTAS and its subscales, the study implemented Cronbach's alpha. The following alpha coefficients were obtained: the Test Anxiety Scale (0.93), the Worry Subscale (0.88), the Cognitive Interference Subscale (0.81), the Tension Subscale (0.89), and the Physiological Symptoms Subscale (0.83).

Confirmatory Factor Analysis (CFA): In order to evaluate the construct validity of the MTAS, the study implemented confirmatory factor analysis (CFA). The four-factor model of the MTAS is well-suited to the data, as evidenced by the CFA results in Table 3 and Figure 1.

| able 1. Comparison of Test Mixety Scores in Male and Temale Tarticipants | | | | | | | | | |
|--|--------|-----|-------|-------|------|-----|------|--|--|
| Variable | Gender | Ν | Mean | SD | t | df | Р | | |
| Test Anxiety Scores | Female | 127 | 45.10 | 12.53 | 4.31 | 230 | 0.01 | | |
| | Male | 105 | 38.06 | 10.57 | | | | | |

 Table 1. Comparison of Test Anxiety Scores in Male and Female Participants

Table 2. Correlations among Subscales and with the Total Scale

| Variable | Mean (SD) | 1 | 2 | 3 | 4 | 5 |
|---------------------------|---------------|---|-------------|-------------|-------------|--------|
| 1. Total Anxiety Scale | 42.13 (12.22) | 1 | 0.81^{**} | 0.80^{**} | 0.87^{**} | 0.83** |
| 2. Worry | 12.48(3.93) | | 1 | 0.56** | 0.57^{**} | 0.52** |
| 3. Cognitive Interference | 10.57(3.28) | | | 1 | 0.60^{**} | 0.53** |
| 4. Tension | 9.99(3.99) | | | | 1 | 0.71** |
| 5. Physiological Symptoms | 9.07(3.51) | | | | | 1 |

**Correlation is significant at .01 level.

| Fit indexes | X ² | df | X²/df | SRMR | GFI | RFI | IFI | CFI | AGFI | NNFI | NFI | RMSEA |
|-------------|-----------------------|----|-------|------|------|--------|------|------|------|------|------|-------|
| Four-Factor | 302.45 | 98 | 3.08 | 0.05 | 0.86 | 0.93 • | 0.96 | 0.96 | 0.80 | 0.95 | 0.94 | 0.08 |

Convergent and Discriminant Validity: The MTAS demonstrates adequate convergent validity, as evidenced by the significant positive correlations (P < 0.05) it demonstrates with measures of perfectionism. This implies that the MTAS is measuring a construct that is associated with other measures of perfectionism. However, the MTAS exhibits substantial negative correlations (P < 0.05) with self-esteem measures, indicating that it has adequate discriminant validity. This suggests that the MTAS is not measuring the same construct as self-esteem.

Discussion

Anxiety is a prevalent experience for numerous students in educational environments. Test anxiety, in particular, is a substantial psychological variable that can affect academic performance and overall well-being. The development and validation of exhaustive and reliable assessment tools are essential for comprehending and resolving this issue, as test anxiety is widespread. The literature emphasizes the necessity of assessment instruments that can accurately represent the multifaceted character of test anxiety. The effectiveness of existing instruments in identifying and addressing individual differences in test anxiety experiences may be limited by their inability to adequately encompass all aspects of this complex phenomenon. The objective of this study was to examine the psychometric properties of the MTAS, an instrument that is intended to evaluate the different aspects of test anxiety. The results substantiate the validity and reliability of the MTAS, illustrating its potential for comprehensively measuring test apprehension. Our study's results show that the MTAS and its subscales have high internal consistency. Cronbach's alpha was used to examine internal consistency, obtaining scores of 0.93, 0.88, 0.81, 0.89, and 0.83 for the overall MTAS score, as well as the Cognitive Interference, Tension, Worry, and Physiological Symptoms subscales.

Paton et al. (5) used Cronbach's alpha to assess internal consistency, yielding scores of 0.87, 0.66, 0.88, and 0.82 for the Worry, Cognitive Interference, Tension, and Physiological Symptoms subscales, respectively. Our study has a higher level of internal consistency than Paton's. Furthermore, our results support the fourfactor structure of the MTAS proposed by Paton et al. (5). The study's findings showed that the suggested fourfactor linked model, which included worry, cognitive interference, tension, and physiological symptoms, suited the data well. This data implies that the MTAS accurately reflects the multidimensional nature of test anxiety. The MTAS's outstanding psychometric features make it an invaluable tool for educators and psychologists. The measure may successfully detect kids who are suffering considerable test anxiety, allowing for prompt interventions and assistance. The MTAS demonstrates a substantial positive connection with indicators of perfectionism. This result corresponds with other studies (17, 18), indicating that persons predisposed to perfectionism are more prone to experiencing test anxiety. The MTAS has a substantial negative connection with self-esteem metrics. This conclusion aligns with other research (19-21), suggesting that those with diminished self-esteem are more susceptible to test anxiety. The relentless pursuit of flawlessness and the propensity to establish excessively high standards for oneself are the defining characteristics of perfectionist students. Additionally, they engage in severe self-criticism of their actions, surpassing the mere completion of assignments. For them, the sole source of gratification is the flawless and complete execution of their responsibilities, rather than simply outperforming their peers. This frequently results in academic decline, procrastination, and the avoidance of responsibilities. Perfectionists demonstrate a substantial inclination to endorse perfectionistic beliefs. These misinterpretations bear a striking resemblance to the negative distortions that are present in anxiety and depression. The process of generalizing failures is exacerbated by the all-or-nothing thinking that is a defining characteristic of perfectionism, which in turn increases anxiety, excitability, and concern in students. A strong sense of self-worth acts as a buffer against the many obstacles, demands, and stresses that people face throughout their lives. It has a big impact on how people see, understand, and react emotionally to things in life. It may also play a significant role in assessing how stressful a scenario is and reducing general anxiety. When faced with challenging and difficult situations in life, those who have a strong sense of self-worth are more resilient and experience less

anxiety. Fostering a strong feeling of self-worth empowers people, which results in improvements like improved academic performance, more self-assurance, and less worry. This encourages a persistent desire for achievement. On the other hand, poor self-esteem leads to a lot of negative ideas, which might make test anxiety worse. Numerous research conducted over the last 20 years have shown a strong correlation between students' levels of perfectionism and test anxiety. A meta-analysis of 20 years of studies on the aspects of test anxiety and perfectionism was carried out by Burcas et al. There were 22 samples totaling 4,521 people in this metaanalysis. The findings showed that whereas perfectionistic strivings have slight but а non-significant positive link with overall test anxiety (r + = .04), perfectionistic fears have a moderate to strong positive correlation with total test anxiety (r + = .42). Nonetheless, there were significant positive associations between cognitive and emotional exam anxiety and both worries and aspirations (18). A cross-sectional study was conducted by Sarı et al. to investigate the relationship between self-esteem and test anxiety in high school pupils. The study involved seven hundred twenty-four secondary school students who were preparing for university entrance exams. Sarı et al.'s study's principal findings suggest that gender is a factor in test anxiety, and there is a negative correlation between self-esteem scores and test anxiety levels. It was noted that female students experienced a greater degree of test anxiety than their male counterparts, and students who reported higher levels of self-esteem reported lower levels of test anxiety. This measure may provide a novel quantitative methodology for literature and furnish essential data for further intervention study on kids' test anxiety. Subsequent results derived from data gathered using this scale may be used by health administrators to formulate plans for enhancing student health. This research may augment understanding of the cultural influences on the concept of anxiety and improve its external validity.

Conclusion

The standardization of the Multidimensional Test Anxiety Scale (MTAS) offers researchers expanded opportunities to investigate and study test anxiety without sacrificing quality or accuracy. The MTAS exhibits satisfactory reliability and validity, as indicated by the results. The results of this investigation have the potential to enhance the cross-cultural literature on the MTAS. The Multidimensional Test Anxiety Scale (MTAS) is a simple instrument for doing research in big populations and achieving exploratory aims. Further research is required to investigate its validity and dependability in a variety of scenarios, therefore accumulating greater proof of its value. The research has significant drawbacks. We do not have data on how the Multidimensional Test Anxiety Scale (MTAS) performs in other groups. Future study is required to replicate the MTAS's performance in other scenarios using different sampling methods. This study's sample size was limited to students from a single institution in Ahvaz. Future studies should broaden the area of study by gathering data from numerous places and demographics. Correlational investigations with linked psychological dimensions may help to enhance item content validity. Self-report surveys may be influenced by social-cultural desirability and recollection biases. Our sample size was modest, but adequate for powerful factor analysis using common criteria. We also did not analyze test-retest reliability, thus the stability over time is a relevant subject for future study. Data were obtained using selfreport techniques, which have the potential to compromise validity due to participant inattention, misrepresentation, desirability bias, and self-selection bias.

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Conflict of interests: There is no conflict of interest.

Ethical approval: The Ethics Committee of Ahvaz Jundishapur University of Medical Sciences has assigned the study the ethics code IR.AJUMS.MEDICINE.REC.1400.046.

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Figure 1. Four -Factor model of Multidimensional Test Anxiety Scale (MTAS)