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Psychometric Properties of the Bangla Version of the Job Stress Scale (JSS)

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Research Article

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Abstract

The most widely used self-reported instrument for gauging workers' stress levels in the workplace is the Job Stress Scale (JSS). The psychometric properties of JSS were adapted, validated, and assessed for application in Bangladeshi culture in the current study. In accordance with the International Test Commission's recommendations for this adaptation study, the JSS was developed in an in-person survey (n = 489) and translated into Bangla. We collected data through structured interviews for employing item response theory (IRT), classical test theory (CTT), exploratory factor analysis (EFA), confirmatory factor analysis (CFA), and measurement invariance methods. The findings of the item analysis demonstrated satisfactory factor loadings, a double-factor structure, and an appropriate item-total correlation and test-retest reliability. Excellent composite reliability and adequate internal consistency were features of this JSS. Additionally, the JSS-Bangla showed satisfactory item discrimination indices in both CTT and IRT. According to this study's nomological network validation, job stress is significantly positively associated with quantitative workload and turnover intention. For Bangladeshi workplaces, including those in the RMG sector as well as other governmental and commercial sectors, and institutions, this would be extremely beneficial.

1. Introduction

The majority of workers at the company had a serious problem with work-related stress. More than 70% of workers across a range of industries report moderate to high levels of work-related stress, making job stress a major worldwide occupational health issue (American Institute of Stress, 2023). Anxiety, despair, and burnout are among the medical and psychological disorders that are significantly influenced by stress (WHO, 2020). In underdeveloped nations like Bangladesh, where labor-intensive businesses sometimes lack proper workplace laws, this issue is especially acute. The RMG sector in Bangladesh, which employs over 4 million people, about 85% of them are women, has been identified as a high-stress workplace because of heavy workloads, low compensation, and long working hours. (Siddiki, 2022; BGMEA, 2022).

Long workdays, unrealistic expectations, job insecurity, verbal abuse, and a further lack of autonomy are further factors that contribute to it (Islam et al., 2019; Ahmed & Raihan, 2014). RMG employees frequently work 10–12 hours a day, and they occasionally put in unpaid or coerced overtime, which can be stressful. Chronic physical and psychological strain is greatly impacted by this drive to reach unrealistic output targets. Likewise, teachers in both public and private institutions are increasingly reporting job-related stress because of excessive workloads, limited professional recognition, and resource scarcity, which compromise teaching effectiveness and psychological health (Akter et al., 2021; Yasmin & Ferdous, 2022). Both physical and mental health are impacted by these stressors (Akhter et al., 2017; Had et al., 2021; ILO, 2020). According to Akhter et al. (2017) and Islam et al. (2019), over 60% of RMG workers in Bangladesh report experiencing signs of occupational stress, such as irritability, poor job satisfaction, and disturbed sleep.

There were many instruments for measuring the job stress level, like the Job Stress Scale (JSS), Occupational Stress Indicator (OSI), Job Content Questionnaire (JCQ), and Work Stress Scale (WSS). The OSI and JCQ have already been adapted and validated for the Bangladeshi culture. But both scales are too long and multidimensional. The JCQ focuses on the work environment and job control (Karasek et al., 1979), and the OSI focuses on occupational health and personality (Cooper et al., 1988). On the other hand, the JSS focuses on job-specific psychological stress and is a widely used, appropriate self-report tool for evaluating stress in the

workplace setting because it directly measures job stress level, has strong psychometric properties, and is a short scale (Parker & Decotiis, 1983). It was also a widely accepted cross-cultural adaptation, like in India, Indonesia, Malaysia, and Iran (Chaudhary et al., 2013; Hadiyanti & Sari, 2025; Kayati et al., 2025; Sharif et al., 2018).

According to Denning et al. (2021), stress is characterized as a physical, emotional, or chemical element that results in mental strain, sickness, and bodily or emotional arousal. Stress in the workplace can take many different forms. One common form of stress in the workplace is job stress. "Job stress is a psychological state in which an individual experiences anxiety, depression, distress, and emotional tension due to role-based demands and time pressure in the workplace," define Parker and Decotiis (1983). According to Ben-Zur and Michael (2020), Leka et al. (2003), and Redfern et al. (2019), job stress has a detrimental impact on one's physical and mental well-being, performance, and productivity, as well as one's level of job and life satisfaction. Additionally, it has a good impact on low-quality work, high absenteeism, high turnover, and high error rates (Talapatra, 2016). The stress level in Bangladeshi workplaces must now be evaluated.

Even though the apparel industry contributes significantly to the nation's economy, mental health and psychological issues among garment workers have received little attention. This growing problem highlights the pressing need for culturally relevant and psychometrically sound tools to assess and lessen stress at work. Given the high-power instant gap and often rigid workplace procedures in Bangladesh, there is an urgent need for a culturally relevant and psychometrically sound Bangla version of the Job Stress Scale.

There is no validated and adapted Bangla version that can be used to measure job stress for job-specific psychological stress aspects in Bangladesh. Previous research on job stress in Bangladesh used a translated version of JSS (Razzak et al., 2022), which may compromise psychometric integrity. In Bangladesh, a culturally appropriate and psychometrically sound Bangla version of the JSS is urgently needed, given that the significant power distance is quite large and workplace systems are frequently inflexible.

The current study had three objectives. First, we aimed to adapt and validate the JSS. Second, we aimed to identify the double-factor structure that represents the data, ensuring that the scale captures the intended constructs of job stress through Exploratory Factor Analysis (EFA). Third, we examined the construct validity of the JSS via Confirmatory Factor Analysis (CFA). The original scale of job stress supported a double-factor model (Parker and DeCotiis, 1983), and we aimed that it would be a double-factor structure. Additionally, we aimed to assess and compare the internal consistency (McDonald’s ω and Cronbach’s α). As the original scale (JSS) showed excellent Cronbach’s α values, we expected that the new scale would demonstrate at least acceptable reliability. Fourth, we anticipated evaluating the nomological network validation of JSS by using the mental health issues, quantitative workload, and turnover intention. We expected that Job stress would have job stress is a significant positive association with quantitative workload and turnover intention, as well as a non-significant link to mental health issues. Fifth, we applied Item Response Theory (IRT) to assess the reliability, item discrimination index, and precision of this scale. Finally, we expected to support measurement invariance across gender and occupation type.

2. Method

2.1 Participants

This study conducted an on-site survey using the Kobo Toolbox. A sample of 489 garment workers from various garment factories was selected from the Chattogram & Dhaka districts of Bangladesh, based on convenience. The sample consisted of 52.1% females and 47.9% males, 71.2% RMG workers, and 28.4% teachers, with ages ranging from 15 to 48 (M = 26.26, SD = 6.16). Participants' job tenure ranged from 1 to 26 years (M = 4.42). 69.5% were married, 30.3% were unmarried, and 0.2% were divorced, based on marital status. Participants gave data voluntarily.

2.2 Ethics

To carry out the study, we followed the Declaration of Helsinki. We informed the participants about the nature, concealment, discretion, and their right to withdraw from the study. Informed consent was also provided to each participant, and a signature was obtained before they filled out the questionnaire. The ethical clearance was received from the Biological Science Faculty, University of Chittagong, Bangladesh (Ref. No.: AERB-FBSCU-20250527-(1)).

2.3 Procedure

After obtaining permission from the original author, we began the adaptation process of the instrument, which involved forward and back translations into Bangla and Bangladeshi culture. A panel of experts synthesized, evaluated, and compared the adapted version in forward and back-translation phases (for backwards translation, we took two bilingual university students who were studying psychology, and for forward translation, we acquired two bilingual experts in English and Bangla). We combined these back translations into one. Two experts reviewed the original scale's content with the back-translated version to assess any differences in meaning. They proposed that there were no meaningful differences between the two versions and that the contents were identical. Next, a convenience sampling technique was used to pick 50 garment workers and teachers as a sample for testing the translated Bangla JSS. The corrected item-total correlations (CITC) ranged from .42 to .62, and Cronbach's alpha was .82. We considered linguistic, psychological, and cultural contexts throughout this process. This scale was incorporated into the final research.

2.4 Measures:

2.4.1 Job Stress Scale (JSS)

The job stress level was assessed using the 13-item Parker and DeCotiis (1983) scale. The two components of job stress that were utilized to measure "job-related feelings of anxiety" (5 items) and "feelings of being under substantial time pressure" (8 items), which were used to quantify job anxiety. This scale had no negative items. Participants typically rate each item on a scale ranging from 1 (strongly disagree) to 5 (strongly agree). Higher scores correspond to greater degrees of job stress. The JSS demonstrated satisfactory internal consistency in the current study (Cronbach's alpha = .89, McDonald's ω = .89).

2.4.2 Quantitative Workload Inventory (QWI):

The QWI, which measures the quantitative workload, was created by Spector and Jex (1998). The QWI is a five-item measure used to evaluate the volume of work required for a job. There are five possible responses: many times a day (coded 5) to less than once a month or never (coded 1). Each statement's frequency is rated by respondents. A high workload is indicated by greater scores, which might vary from 5 to 25. In the current investigation, the QWI presented satisfactory internal consistency (Cronbach's alpha = .85, McDonald's ω = .87).

Furthermore, a three-factor model was found to have satisfactory model fit according to the confirmatory factor analysis results: $\chi 2/df = 4.509$ and Standardized Root Mean Squared Residual (SRMR) = .042, Tucker–Lewis Index (TLI) = .992, Comparative Fit Index (CFI) = .996.

2.4.3 Turnover Intention Scale (TIS):

Dysvik and Kuvaas (2008) created the Turnover Intention Scale (TIS), which is widely used for measuring intention to quit. The intention of employees to leave was evaluated utilizing this five-item scale. Typically, respondents assess each topic on a scale of 1 (strongly disagree) to 5 (strongly agree). A greater score specifies a greater level of intention to leave. In the current investigation, the TIS indicated acceptable internal consistency (Cronbach's alpha = .97, McDonald's ω = .92). For a three-factor model, the confirmatory factor analysis findings also revealed satisfactory model fit: Standardized Root Mean Squared Residual (SRMR) = .051, Comparative Fit Index (CFI) = .998, Tucker–Lewis Index (TLI) = .995.

2.5 Data Analysis

To conduct the analyses, SPSS, R, and JASP 0.19.1.0 were used. SPSS was used for the following purposes: data cleaning, descriptive analyses of the sample, and correlation between job stress and mental health issues to test for discriminant validity. R 4.4.3 was utilized for the following purposes: descriptive analyses of the single items (skewness and kurtosis), IRT analysis, EFA, factor loading, inter-item correlation, CITC, and other reliabilities. JASP 0.19.1.0 was used in the DWLS method for CFA and multigroup CFA to create the factor loading figure. It also assesses average variance extracted (AVE). An acceptable degree of reliability is generally defined as 0.6 to 0.7, while a very good level is defined as 0.8 or higher. Nevertheless, values greater than 0.95 are not always favorable because they may indicate redundancy (Hulin et al., 2001).

The classical test theory (CTT) was utilized to evaluate the Bangla JSS's psychometric properties. We evaluated the following: composite reliability (accepted values ≥ 0.70), internal consistency reliabilities (Cronbach's alpha, McDonald's omega, and using the Spearman-Brown formula; accepted value ≥ 0.70), average variance extracted (AVE) (accepted values ≥ 0.50), inter-item correlations ideal range 0.15 to 0.50 but 0.80 are still considered acceptable only for unidimensional or short scales (Briggs & Cheek, 1986; Clark & Watson, 2016), and CITC (minimum of .30; DeVellis, 2021, Field 2017). A good measurement model is demonstrated by the variables' AVE being over 0.5(Basheer et al., 2019). Discriminant validity is confirmed when both Average Shared Variance (ASV) and Maximum Shared Variance (MSV) are lower than the AVE, demonstrating that constructs share less variance than with their own indicators (Hair et al., 2019). Additionally, ≥ .3 should be the prominent factor loading (Brown, 2015).

Exploratory Factor Analysis (EFA) was conducted, including a sampling adequacy test, namely the KMO (Kaiser-Meyer-Olkin), with an acceptable KMO value of .60, with values above .70 considered good and above .80 excellent (Tabachnick & Fidell, 2013). The Bartlett's test of sphericity is expected to be statistically significant ($p < .05$), indicating that correlations among items are sufficient for factor extraction (Field, 2017). Communalities should generally exceed .40, as lower values suggest items do not share enough variance with other items do not share enough variance with other items and may be poor candidates for retention (Hair et al., 2019). The Kaiser criterion recommends keeping factors with eigenvalues > 1 for factor extraction; visual inspection of the scree plot and parallel analysis provide further support (Cattell, 1966).

Confirmatory factor analysis (CFA) was completed to test the double-factor model of the JSS. Model fits were evaluated using the χ2/df value, goodness of-fit index (GFI), comparative fit index (CFI), Tucker–Lewis index (TLI), standardized root mean square residual (SRMR), and root mean square error of approximation (RMSEA). A good fit is indicated by a χ2/df ratio value of ≤ 2 (Schermelleh-Engel and Moosbrugger, 2003). However, Marsh and Hocevar (1988) suggested that this value should be < 5. A good fit model is specified by GFI, CFI, and TLI values ≥ 0.95 (Hu and Bentler, 1999). Additionally, a better-fitted model suggested by an RMSEA value between 0.06 and 0.08 and an SRMR value ≤ 0.08 (Schreiber et al. 2006).

Under the IRT, we conducted item analysis utilizing the graded response model (GRM). The recital of individual items about the underlying qualities is provided by IRT models. The item involvement across the trait distribution can be estimated with the help of these models. Before using the GRM, the assumptions of unidimensionality, local independence, and monotonicity were examined. A set of items is considered Unidimensional if it evaluates just a solitary trait (Yang and Kao, 2014). Loevinger's H coefficients and CCFA model fits can be used to evaluate unidimensionality. Standard guidelines state that Loevinger's H values between .30–.39 indicate weak, .40–.49 moderate, and ≥ .50 high unidimensionality (Sijtsma & Molenaar, 2002).

Local independence implies that there is no statistical association between an individual's response to several items (McDonald, 1981). Some authors claimed that if unidimensionality is true, local autonomy is obvious (Hays et al., 2000; Yang and Kao, 2014). Yen's Q3 residual coefficient (Yen, 1984) was utilized in this study to measure the local independence of items. The two items may have local independence if the Q3 coefficient is more than .2 (Chen and Thissen, 1997; Tate, 2003).

Monotonicity implies that the possibility of supporting an answer to an item does not decrease as the latent trait increases (van der Linden and Hambleton, 1997). Both statistical and graphical approaches were utilized to evaluate the items' monotonicity. Using the crit statistics, the significance of monotonicity desecration was evaluated. A crit value < 40 was regarded as not constituting a violation of monotonicity (Molenaar and Sijtsma, 2000). Additionally, the Rho coefficient [> .7 acceptable; Sijtsma and Molenaar, 1987] for each scale was evaluated.

R package Mokken version 3.0.2 was used to evaluate Loevinger's H coefficients and monotonicity, whereas the R package mirt version 1.32.1 was utilized to evaluate Q3 coefficients in the current study. In GRM, the R package mirt version 1.32.1 was used to the evaluate the Bangla Version JSS item qualities. Two parameters were assessed in this model: the discrimination parameter [a] or slope coefficient, and the threshold coefficient [b]. More information is provided by items with a greater slope coefficient or discrimination than by those with a lower one. For a more thorough explanation, Baker and Kim (2017) proposed the ensuing ranges of the slope coefficients: 0 ¼ none, .1- .34 ¼ very low, .35 .64 ¼ low, .65–1.34 ¼ moderate, 1.35–1.69 ¼ high, > 1.70 ¼ extremely high, andþinfinity¼perfect. The value of [b] shows the degree of fundamental trait at which a person has a 50% possibility of recommending a category. In addition to these constraints, test information curves (TIFs) and item characteristic curves (ICCs) for this scale were assessed.

Next, a sequence of multigroup CFA models was completed to evaluate the measurement invariance of the JSS Bangla across socio-demographic groups. In the current study, measurement invariance was measured for both males and females, as well as occupation type. A multigroup CFA was conducted using three models: Model l (configural invariance model: same structure across the groups), Model 2 (metric model: factor loadings limited

equally across the groups), and Model 3 (scalar model: factor loadings and intercepts constrained similarly across the groups). A non-significant Δχ2 value indicates that the groups' measurements are invariant. We employed ΔCFI, ΔRMSEA, and ΔSRMR to make conclusions regarding invariance in this investigation because the Δχ2 is an extremely stringent test of invariance (MacCallum et al. 1992) and sensitive to sample size (Dimitrov 2010). A proof of measurement invariance, Chen (2007) suggested ΔCFI ≥ 0.010, ΔSRMR ≤ 0.01, and ΔRMSEA ≤ 0.015. In addition to the statistical tests mentioned above, the nomological network validation of the JSS-Bangla version was evaluated using the Pearson product-moment correlation coefficient.

3. Results

3.1 Descriptive Statistics

Table 1 demonstrates the mean (M) and standard deviation (SD), with skewness and kurtosis, corrected item-total correlation (CITC), and factor loading of each item of JSS. Inter-item correlations showed that all items are significantly associated with each other.

Table 1
Descriptive Statistics, Corrected Item-Total Correlation, and Factor Loading for both factors

Factor	Items	M	SD	Skewness	Kurtosis	CITC	Standardized F L	Factor loading
TS	Item2	3.83	1.55	− .83	-1.02	.60	.65	.72
	Item4	3.51	1.76	− .51	-1.58	.66	.69	.80
	Item6	3.71	1.62	− .73	-1.18	.57	.60	.68
	Item8	2.97	1.78	.06	-1.81	.53	.55	.68
	Item9	4.06	1.47	-1.28	− .002	.64	.69	.79
	Item11	3.82	1.58	− .85	-1.02	.72	.81	.89
	Item12	4.02	1.53	-1.16	− .39	.72	.81	.90
	Item13	3.79	1.60	− .77	-1.16	.67	.69	.78
JA	Item1	2.76	1.73	.29	-1.69	.62	.72	.84
	Item3	2.38	1.62	.71	-1.20	.48	.54	.67
	Item5	2.37	1.65	.75	-1.19	.61	.68	.78
	Item7	2.75	1.73	.31	-1.69	.64	.74	.81
	Item10	2.48	1.60	.59	-1.31	.63	.71	.76

Note. M = Mean; SD = Standard deviation; CITC = corrected item-total correlation; TS= Time Stress; JA = Job Anxiety; FL, Factor Loading

The value appeared to be normal, as indicated by the skewness (ranging between − 1.28 and .75) and kurtosis (ranging between − 1.81 and − .002) values falling within the ranges recommended by Kim (2013). Item analysis findings demonstrated that every item had satisfactory CITC (varying between .48 and .64 for the Time Stress

subscale, between .53 and .72 for the job anxiety subscale) and satisfactory factor loading (ranging between .67 and .84 for the Time Stress subscale, between .68 and .90 for the job anxiety subscale), see Fig. 2. Each subscale of time stress had stronger inter-item correlations than the job anxiety subscales, according to the inter-item correlation matrix (Tables S1 & S2).

Table 2 findings demonstrated that the (subscales and full scale) had satisfactory internal consistency reliabilities (Cronbach's α and ω ranging from .81 to .89, and split-half reliability ranging from .81 to .89). The subscales' mean inter-item correlations ranged from .41 to .37, while the full scale had a mean correlation of .43. These findings implied that each subscale's items were homogeneous for the particular stress. Similarly, IRT-based reliability estimates (.80, .85, .89) showed consistent measurement precision across latent trait continua, affirming the scale's psychometric generalizability beyond CTT metrices. It had satisfactory composite reliability (ranging from .86 to .95) and discrimination power (Ferguson's delta ranging from .94 to .96), and AVE values were .61, .60, and .55. AVE > ASV, MSV subscales, and full scales.

Table 2
Psychometric properties of the Job Stress Scale at the scale level

Psychometric properties	Time Stress	Job Anxiety	Full Scale	Suggested cutoff
Cronbach's alpha	.88	.81	.89	≥ 0.70
McDonald's omega	.88	.81	.91	≥ 0.70
Test-Retest Reliability	.80	.70	.81	≥ 0.70
AVE	.61	.60	.55	≥ 0.50
ASV	.20	.41	.16	
MSV	.51	.41	.51	
Composite Reliability	.93	.88	.95	≥ 0.70
Split-half Reliability (odd-even)	.88	.81	.89	≥ 0.70
IRT Reliability	.80	.76	.86	≥ 0.70
Rho coefficient	.88	.81	.91	≥ 0.70
Ferguson delta	.95	.93	.98	≥ 0.70
Mean inter-item correlation	.47	.46	.39	.15 ≤ r ≤ .50

Note. AVE, average variance extracted; CR, composite reliability; ASV, Average Shared Variance; MSV, Maximum Shared Variance

3.2 Exploratory Factor Analysis (EFA)

Kaiser-Meyer-Olkin measure (KMO = .91) and Bartlett's test of sphericity [$\chi 2(78) = 2624.47$, $p < .001$] confirmed that the information was appropriate for factor analysis. Parallel analysis, eigenvalues, and the scree plot suggested a double-factor structure for the thirteen-item JSS, where the time stress (factor 1) explained 29.2% of the items (2,4,6,8,9,11,12,13) variance and the job-related feeling of anxiety (factor 2) 18.5% of the items (1,3,5,7,10), explaining 47.7% of the total variance. Factor loading ranged from .49 to 79, and all items showed acceptable communalities, indicating that they contributed meaningfully to the factor (see Table S3). A scree

plot with parallel analysis demonstrating eigenvalues from the actual data, simulated data, and sampled data (see Fig. 1). The solid blue line represents eigenvalues from the actual data, while the dotted and dashed red lines demonstrate simulated and resampled data. The analysis indicates that only the first two factors from the actual data exceed those from the simulated and resampled data, supporting a two-factor structure. Model fit indices also supported the double-factorial structure (RMSEA = .065, SRMR = .030, TLI = .94, CFI = .96), confirming the scale's double-factor structure and internal consistency.

3.3 Confirmatory Factor Analysis (CFA)

A confirmatory factor analysis (CFA) was performed to assess the fit of a two-factor model comprising time stress and job anxiety, and the JSS evaluated the overall construct. For the time stress $\chi2(20) = 31.95$, $P = .044$, $\chi2/df = 1.60$, GFI= .99, CFI = .99, TLI = .99, RMSEA = .035, and SRMR = .037 the model shown an acceptable fit. The job anxiety demonstrated excellent model fit: $\chi2(5) = 2.87$, $P = .72$, $\chi2/df = .57$, GFI= .99, CFI = 1.00, TLI = 1.00, RMSEA = .000, and SRMR = .016. The full-scale model (JSS) also demonstrated an excellent model fit: $\chi2(64) = 74.98$, $P = .16$, $\chi2/df = 1.17$, GFI = .99, CFI = .99, TLI = .99, RMSEA = .019, and SRMR = .040. All indices fulfill conventional criteria for satisfactory model fit, with values of CFI and TLI above 90, RMSEA, and SRMR = below .08. Although the values for time stress and the JSS model were above 3.0, they remained within the acceptable range, and other indices collectively accept the adequacy of the model structure.

3.4 Item Response Theory (IRT) analysis

Mokken Scale Analysis indicated that the Bangla version of the JSS exhibits satisfactory to strong scalability. Table 3 findings revealed item-level H coefficients for time stress ranged from .45 (item 6) to .58 (item 12), with an average H coefficient of .52, indicating strong scalability. Item H coefficients for job anxiety ranged from .40 (item 3) to .52 (item 7), suggesting satisfactory scalability (H = .48). With zero violations, zero significant violations, and critical ratios of 0, the majority of items satisfied the monotonicity assumption. The only exception was JA item 10, which had a crit value of 10 and a single violation, falling below the threshold of concern (≥ 40). These findings suggest that all items reliably assess the desired latent trait, with items 3 and 10 receiving only minor attention.

Table 3

Item Parameter Estimates from the Graded Response Model for both factors

Factor	Items	a1	b1	b2	b3	b4
TS	Item2	1.674	-1.638	− .772	− .651	− .249
	Item4	2.040	− .804	− .365	− .316	− .034
	Item6	1.428	-1.392	− .809	− .557	− .129
	Item8	1.489	− .548	.043	.120	.486
	Item9	2.078	-1.384	-1.080	− .864	− .389
	Item11	2.906	-1.199	− .607	.543	− .195
	Item12	2.904	-1.260	− .794	− .736	− .411
	Item13	1.898	-1.401	− .648	− .500	− .253
JA	Item1	1.892	− .414	.245	.323	.667
	Item3	1.290	− .143	.709	.827	1.284
	Item5	1.682	− .088	.687	.728	1.004
	Item7	1.705	.428	.287	.357	.679
	Item10	1.442	− .389	.587	.674	1.231

Note. a = discrimination parameter; b1-b4 = category thresholds; TS = Time Stress; JA = Job Anxiety

Table S4's findings for the graded response model revealed that every item on the JSS-Bangla provided a fair amount of information on the criteria that evaluate the scale, making them useful for differentiating between people based on these aspects. Item discriminations ranging

from .1.428 to 2.906 for the TS subscale (Mean α ¼ 2.05), from 1.290 to 1.892 for the

JA subscale (Mean α ¼ 1.602). All items have moderate to high discriminations. Results

regarding threshold (b1-b2) represent points along the latent trait continuum where respondents are likely to select higher response categories. Thresholds for TS ranged from − 1.638 to .543, while JA thresholds ranged from − .414 to 1.284, demonstrating that items cover a broad range of the latent trait.

Figure 3 represents the test information curves (TICs) for the Time Stress (blue dashed line) and Job Anxiety subscales (red dashed line). These curves illustrate the measurement precision of each subscale across varying levels of the latent trait (θ). The time stress subscale provided the greatest information at lower levels of the latent trait (θ range − 2 to 0), peaking around θ = -1. In contrast, Job anxiety indicated higher measurement precision in the mid-range of the latent continuum (θ ranged 0 to 2), peaking around θ = 1. These results suggest that the TS items are more effective in discriminating individuals with lower levels of the trait. In contrast, JA items provide more information for respondents with average to moderately high levels. Each panel displays the information function of a respondent item (see Fig. 4). Items JS11-JS13 demonstrate the highest peaks, indicating high precision in narrow θ ranges, while items JS1 – JS5 provide broader but less precise

information across wider θ ranges. The inter-item correlation matrix (Q3 coefficients) revealed low to moderate associations among JSS items, consistent with the multidimensional structure of the scale (TA vs JA), with a range from − .34 to 1(see Table S5). The majority of associations were below .30, suggesting minimum local dependence, which supports the assumption of unidimensional for each factor.

3.5 Measurement invariance across gender and occupation type

Table 4 findings showed that the JSS-Bangla had configural, metric, and scalar invariance across gender as well as occupation type. The configural invariance model of gender had a satisfactory model fit ($\chi 2$ = 116.63, df = 128, p value = .755, CFI = 1.000, RMSEA = .049, SRMR = .05). There were negligible changes in CFI and RMSEA values between the configural vs metric models (.006, − .005, respectively), scalar vs metric models (.004, − .054, respectively). The configural invariance model of occupation type had a satisfactory model fit ($\chi 2$ = 126.32, df = 128, p value = .525, CFI = 1.000, RMSEA = .000, SRMR = .052). There were slight changes in CFI and RMSEA values between the configural vs metric models (.003, − .033, respectively), scalar vs metric models (-.003, − .033, correspondingly). These findings accepted full measurement invariance, suggesting that the JSS measures time stress and job-related feelings of anxiety equivalently in both males and females, as well as RMG workers and teachers.

Table 4

H coefficient and monotonicity outputs of the Bangla Version of JSS

Factor	Loevinger's *H* coefficients		Monotonicity			
			#ac	#vi	#zsig	crit
TA		**.52**				
	Item2	.47	24	0	0	0
	Item4	.52	24	0	0	0
	Item6	.45	24	0	0	0
	Item8	.50	24	0	0	0
	Item9	.53	24	0	0	0
	Item11	.56	24	0	0	0
	Item12	.58	24	0	0	0
	Item13	.52	24	0	0	0
JA		**.48**				
	Item1	.50	24	0	0	0
	Item3	.40	24	0	0	0
	Item5	.49	24	0	0	0
	Item7	.52	24	0	0	0
	Item10	.50	24	1	0	10

Note. #ac = (active comparison) #vi = (violations) #zsig = (significant violation) crit = critical ratio; TS= Time Stress; JA = Job Anxiety

Table 5

Measurement invariance of the JSS across gender and occupation type

Model	χ2	df	Δχ2	P value	CFI	ΔCFI	RMSEA	ΔRMSEA	SRMR	ΔSRMR
Gender (male vs. female)										
Configural	116.63	128		0.755	1.00		.049		.051	
Metric	236.54	139	-119.91	< .001	.994	.006	.054	− .005	.071	− .020
Scalar	174.54	176	-62	.517	1.00	.004	.000	− .054	.053	− .018
OT (RMG workers vs. teachers)										
Configural	126.32	128		.525	1.00		.000		.052	
Metric	175.92	139	-49.6	.019	.997	.003	.033	− .033	.060	− .008
Scalar	152.22	176	-23.7	.902	1.00	.003	.000	− .033	.053	− .007

Note. df, degrees of freedom; CFI, comparative fit index; RMSEA, root mean square error of approximation; SRMR, standardized root mean square residual; OT, Occupation Type

3.6 Reliability

The reliability of the Bangla JSS's internal consistency was evaluated utilizing Cronbach's (α) and McDonald's (ω). The JSS demonstrated satisfactory internal consistency reliabilities (Cronbach's α and McDonald's ω ranged from the job-related feeling subscale of .81, the time stress subscale of .88, and the full scale of .89, and McDonald's ω ranged from the job-related feeling subscale of .81, the time stress subscale of .88, and the full scale of .91) in indices in Bangladeshi culture (see Table 2).

3.7 Nomological Network Validation

Correlation analyses revealed that job stress was significantly positively associated with quantitative workload (r = .471, p = < 0.01) and turnover intention (r = .343, p = < 0.01).

4. Discussion

The current study was expected to evaluate the psychometric properties of the Bangla version of the Job Stress Scale (JSS-Bangla) among RMG workers and teachers, which was interpreted as part of a cross-cultural study. We evaluated the JSS-Bangla's psychometric properties at the item and scale levels. The findings indicated each subscale's items (time stress, job anxiety) had satisfactory corrected item-total correlation (CITC). Each subscale of this scale uses this psychometric to distinguish between high and low scorers. The time stress subscales' items exhibited greater item-total correlations than those of the job anxiety subscale. The JSS-Bangla CITC results found an almost similar pattern among items (Kayati et al., 2025; Razzak et al., 2022; Saleem et al., 2017; Shukla & Srivastava, 2016; Usman et al., 2010).

Findings demonstrated that the mean inter-item correlation of the time stress and job anxiety subscales was accepted the suggested range. Therefore, these mean inter-item correlation scores suggested the subscales. A nearly similar inter-item correlation was also found for this scale (Kayati et al., 2025; Razzak et al., 2010; Usman et al., 2010). Consequently, this item would be preserved since it was the same in other cultures. Findings regarding reliability recommended that the JSS-Bangla had satisfactory internal consistency reliabilities, test-retest reliability, and an excellent composite reliability for all subscales and the full JSS-Bangla. The AVE value is greater than the ASV and MSV values, suggesting discriminant validity. Most of the studies in different languages found nearly similar satisfactory internal consistency reliability (Kayati et al., 2025; Saleem et al., 2017; Shukla & Srivastava, 2016; Usman et al., 2010).

The EFA results recommended the double-factor structure of the JSS, with sampling adequacy demonstrating that the data were well-matched for factor analysis, and Bartlett's test supported that the inter-item correlations were appropriate for extraction (Bartlett, 1954; Kaiser, 1974). Parallel analysis and scree plot findings showed a double-factor structure, explaining an acceptable proportion of variance. All items demonstrated substantial loadings and adequate communalities, and the model showed excellent fit indices, supporting factorial validity. Consistent with a prior study highlighting the advantages of parallel analysis over traditional retention methods (Hayton et al., 2004), these findings confirm the JSS as a reliable and psychometrically sound measure.

The CFA findings supported the two-factor first-order model that recommended that the JSS-Bangla assess the time stress and job-related feelings of anxiety. These findings are nearly similar to other studies (Chaudhary et al., 2013; Hadiyanti & Sari, 2025; Kayati et al., 2025; Ömer Yılmaz, 2023; Sharif et al., 2018). Shukla and Srivastava (2016) studied the factor structure of the JSS across the eight regions of the world (North America, Oceania, Western Europe, Asia, the Middle East, non-Western Europe, South America, and sub-Saharan Africa) and supported the two-factor structure. The factor loadings in this study had an almost similar pattern for both the time stress and job anxiety subscales (Denning et al., 2021; Shukla & Srivastava, 2016; Usman et al., 2010) of these studies.

Findings about the IRT assumptions suggested the suitability of applying any IRT model, like the graded response model and Mokken scale analysis. These analyses demonstrated strong support for the scale's reliability and validity. Both time stress and job anxiety subscales revealed sufficient unidimensionality, indicating that each subscale captures a single underlying construct. Residual correlations suggested the absence of local dependence, confirming that the items function independently and do not unduly influence each other (Embreston & Reise, 2000). Monotonicity assumptions were fully supported, with item response patterns increasing consistently across the latent trait. This confirms that higher levels of the underlying stress dimensions are associated with a greater likelihood of endorsing items, reflecting theoretically expected behavior. Item discrimination measured through the graded response model indicated that the items effectively differentiate respondents across various levels of stress, while test information analysis revealed that subscales provide complementary measurement precision across different stress levels. The pattern of item endorsement observed in the JSS-Bangla suggests that the time stress subscale requires lower levels of latent trait compared to the job anxiety subscales. As most of the items have moderate to high difficulty parameters, the JSS-Bangla, particularly the time stress subscale, and thus less efficient in discriminating those experiencing very high levels of job stress. Overall, these findings indicate that the JSS-Bangla is a psychometrically sound tool that satisfies the core assumptions of unidimensionality of subscales,

monotonicity, scalability, and discrimination. Regarding items' performance, all items of the JSS-Bangla version performed in almost similar patterns reported in the original Brazilian version JSS (Mateus et al., 2015).

The multigroup CFA findings indicate that the JSS-Bangla evaluates the same constructs for both males and females, as well as teachers and RMG workers. Therefore, the gender and occupation type mean differences between groups based on the JSS-Bangla observed scores are valid. Measurement invariance of the JSS between males and females, as well as teachers and RMG workers, was invalidly demonstrated by Chen et al. (2014), Rafieifar et al. (2019), and Ybema et al. (2010). Furthermore, Nomological network validation was estimated using correlations with job stress, quantitative workload, turnover intention, and mental health problems. The finding showed that there was a strong positive association between quantitative workload and job stress, supporting the Job Demand-Control (JDC) model, which predicts that higher workload increases stress when workers have limited control over the tasks (Bakker & Demerouti, 2017). Similarly, the positive association between job stress and turnover intention is consistent with Conservation of Resources (COR) theory, indicating that stress depletes personal resources, which may lead workers to consider leaving their jobs (Halbesleben et al., 2009). There was a non-significant negative association between mental health problems and job stress. This is consistent with other study that shows that workload and turnover intention are associated with job stress practices (Akhter et al., 2017; Lavender et al., 2025). These findings support the construct validity of the measures and confirm that observed interrelationships among workload, stress, and turnover intention are theoretically meaningful, thereby validating the nomological network.

In summary, the Bangla version of the Job Stress Scale is a psychometrically reliable tool with suitable reliability and validity for assessing job stress within the Bangladeshi context. This study used both CTT and IRT to evaluate the JSS-Bangla's psycho metric properties in detail. IRT analysis gives item-level information that enhances CTT results, with IRT showing apparent benefits over CTT. The GRM-based IRT model provides data on measurement accuracy, and scale information curves reveal whether each subscale of the JSS-Bangla effectively assesses higher workplace stress levels. The GRM also recommended potential improvements for the JSS-Bangla. Thus, researchers are increasingly using IRT models to assess a scale's psychometric properties.

4.1 Practical Implication

This validated tool utilizes researchers and organizations in Bangladesh with a trustworthy means of monitoring and assessing the level of stress in workplace practices. Organizations, researchers, and policymakers can assist in dignifying stress levels in the Bangladeshi workplace that impact employee well-being, especially in labor-intensive sectors like garments and education. Organizations can employ the scale to identify high-risk worker groups, monitor psychosocial risks, and evaluate the effectiveness of stress management interventions, workplace wellness programs, and policy reforms aimed at improving employee mental health and productivity. The JSS-Bangla also contributes to the advancement of indigenous psychological assessment instruments, supporting more accurate and meaningful studies in an organizational setting across Bangladesh.

4.2 Limitations and Future Research

Despite the encouraging results, several limitations should be taken into consideration. Firstly, the current data were gathered from garment workers and teachers in two districts using a convenience sampling technique.

Future studies may consider a nationally representative sample across diverse groups of employees, including nurses, institutions, NGOs, and both the private and public sectors, which would be more practical. A representative sample from each socio-demographic group should be included in a future study. Secondly, this study lacked longitudinal follow-up to evaluate the scale's predictive validity as well as external behavioral validations.

4.3 Conclusion

The JSS-Bangla of the Psychometric properties was examined in the current study. It had satisfactory item discrimination indices in both CTT and IRT. In addition, its Bangla factor structure is the same as that of the other studies. It had satisfactory factor loading, test-retest reliability, and discriminant validity. It is a reliable and valid instrument for assessing time stress and job-related feelings. It would be helpful for psychologists, private or public organizations, and researchers to evaluate the level of job stress among Bangladeshi RMG workers and teachers.

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Figures

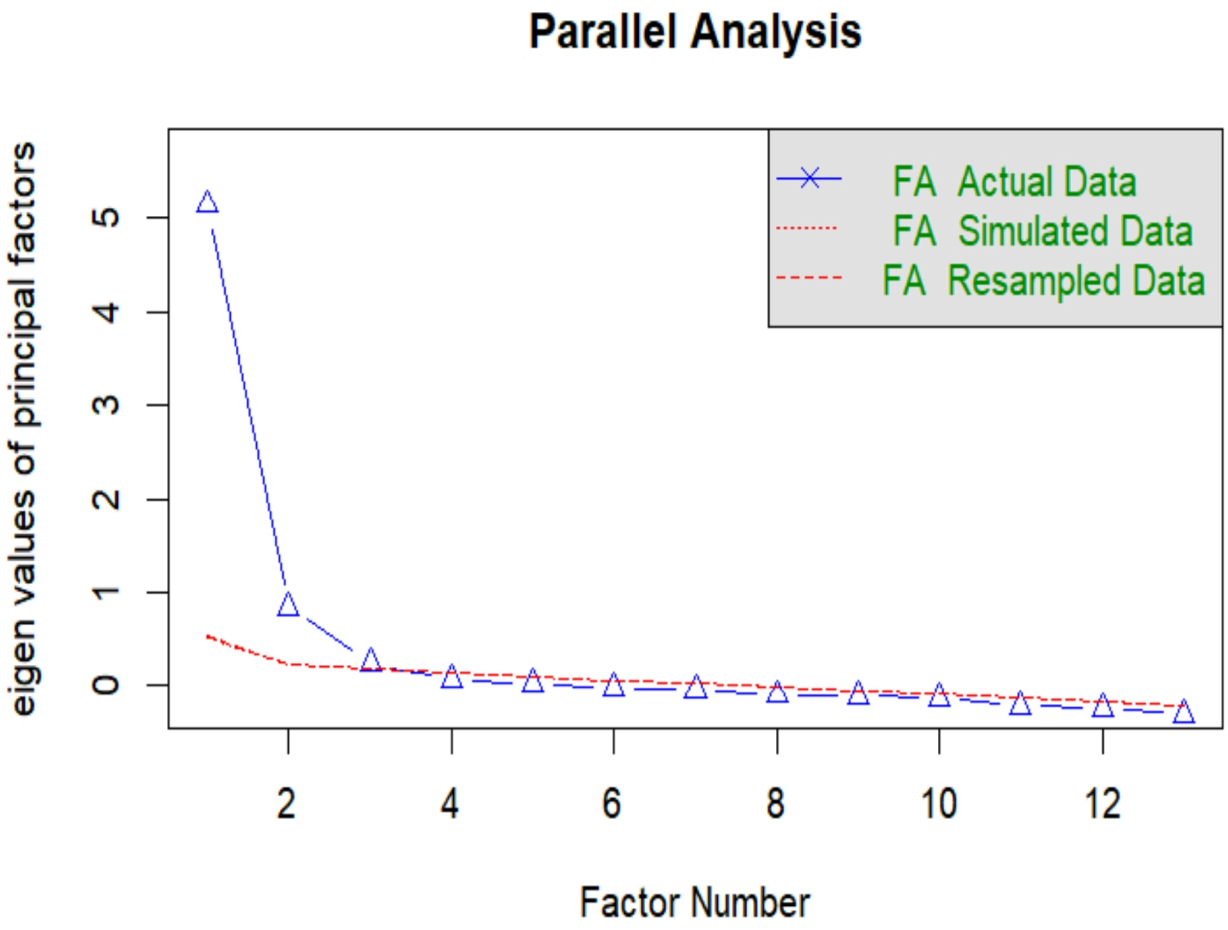


Figure 1

Parallel analysis of eigenvalues for factor retention

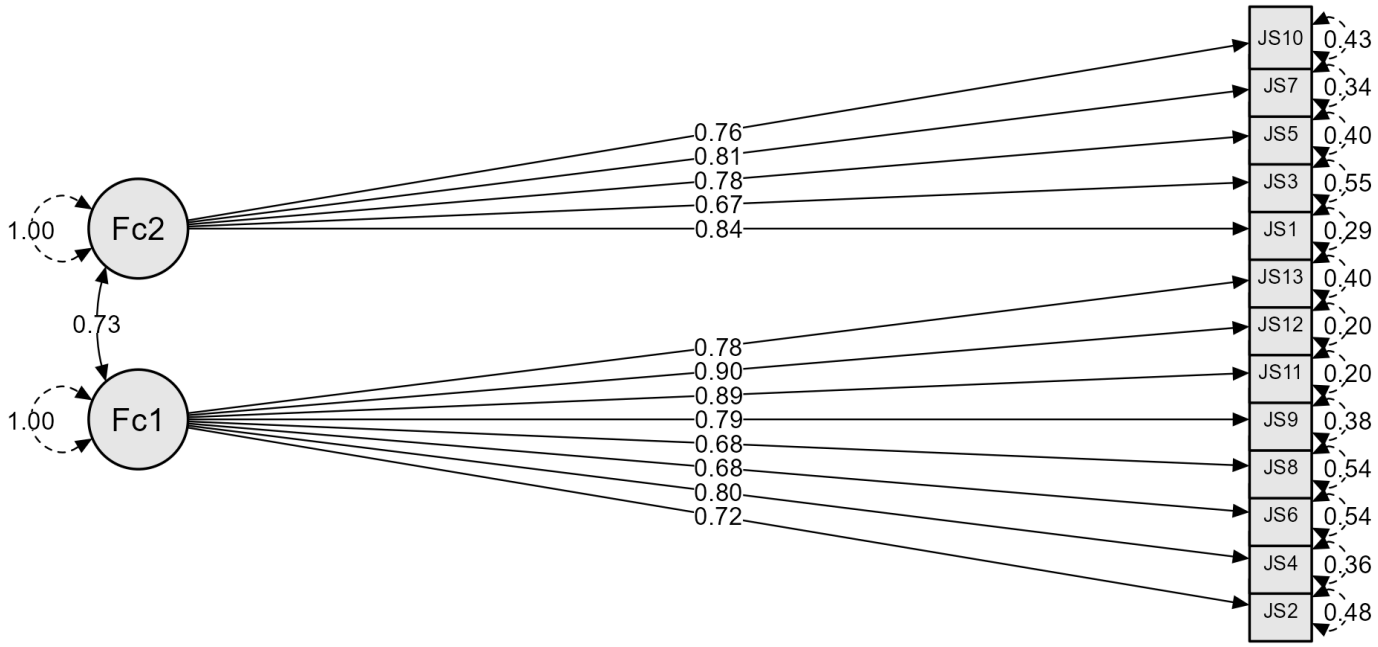


Figure 2

Two factors first-ordered model of the JSS-Bangla

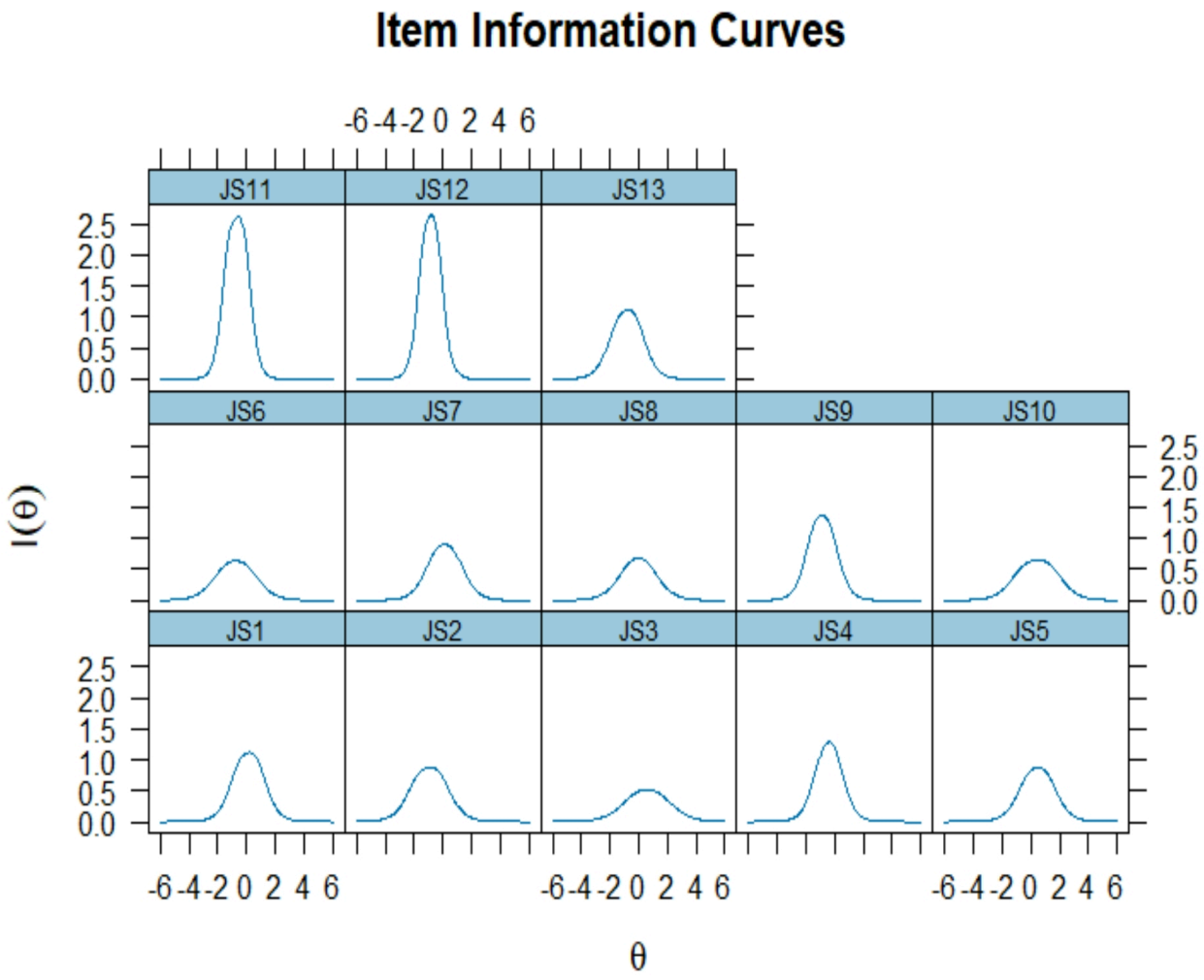


Figure 3

Item information curves for items JS1-JS13

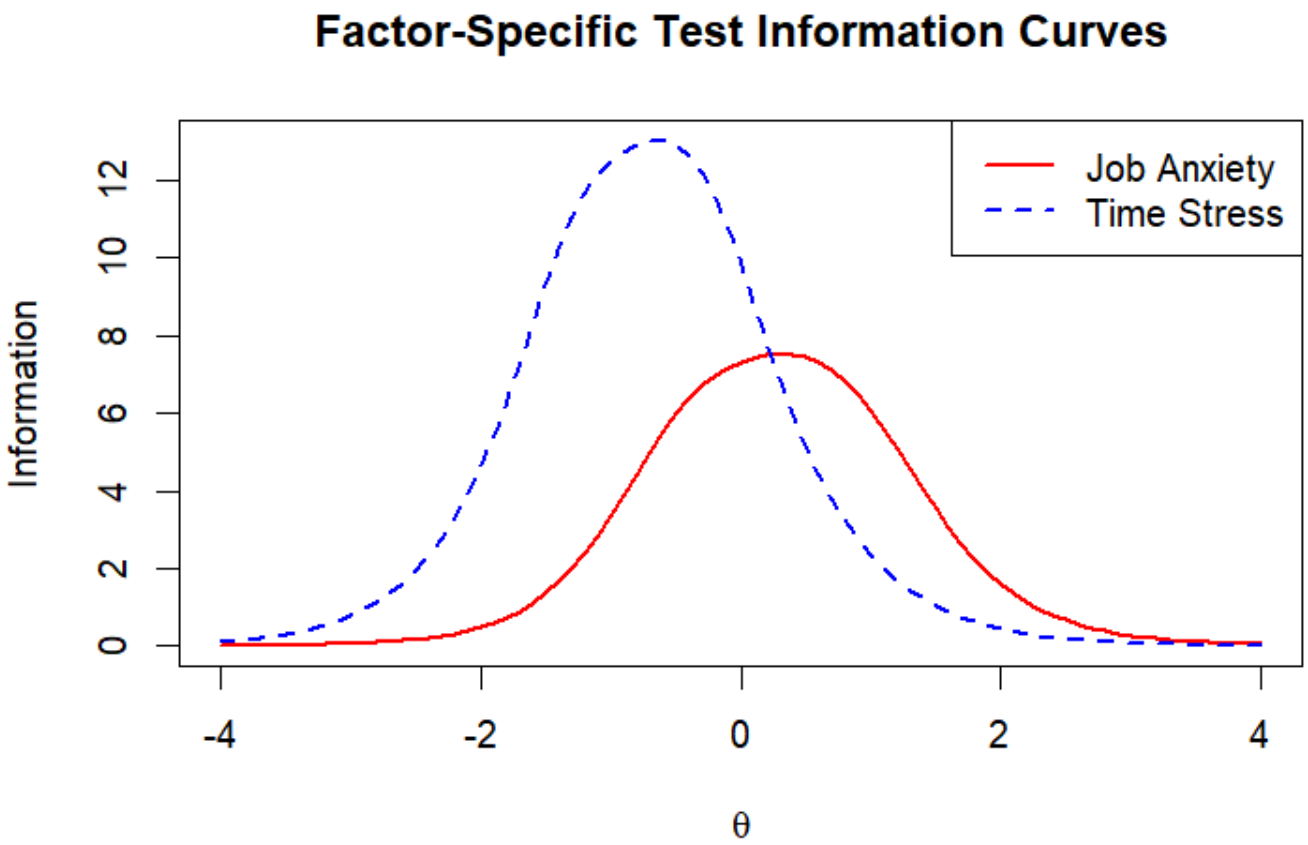


Figure 4

Factor-specific test information curves for time stress and job anxiety

Supplementary Files

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- Supplementarytable.docx