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Assessing the Validity and Reliability of the Adapted Staff Stressors Scale in Chinese Universities

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ABSTRACT

The purpose of this study was to develop and validate a stressors scale with reflective and formative indicators for teaching staff in Ningxia, China. The scale was analyzed through a questionnaire survey of 237 staff members using exploratory factor analysis (EFA) and validation factor analysis (CFA). The results showed that the scale had good structural validity and internal consistency, and the exploratory factor analysis extracted six dimensions explaining 66.908% of the variance. The Cronbach's alpha coefficient and the combined credibility were within the acceptable range. Further validation factor analysis showed that validity assessments (including convergent and discriminant validity) confirmed the robustness of the scale. For formative indicators metrics such as Variance Inflation Factor (VIF) were used to check for covariance between indicators to avoid redundancy. In addition, the importance and weights of the indicators were analyzed to confirm their relative importance in defining the structure. In summary, the Staff Stressors Scale can be used to measure faculty stress in private institutions in the Ningxia region of China, and it can also provide a basis for further research in the future.

Keywords: Reliability, validity, staff stressors scale, private HEIs, staff stress

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INTRODUCTION

In recent years, China has carried out in-depth reform of higher education, in which private higher education institutions (HEIs) play a very important role in the whole education system. The main reforms include curriculum structure, teaching methods, teaching content, education system, and personnel system. On the other hand, educational assessment, the construction of majors and disciplines, the assessment of educational quality, and faculty ratios have made higher demands on private HEIs (Yin, Huang, & Chen, 2019). University faculty members take on multiple responsibilities as educators, researchers, and social service providers, and are also under increasing work pressure. A survey of 42,000 teachers in China revealed that nearly 30% felt emotionally exhausted, and more than 80% reported that they suffered from work stress (Xue, 2015). In this context, it is necessary to pay more attention to the stressors of staff in private HEIs.

A number of studies have shown that the causes of high stress affecting faculty staff often include heavy workloads, research commitments, student behavior, classroom management, interpersonal relationships, administrative support, and others (Prilleltensky, Neff, & Bessell, 2016). Perceived stress among staff in the teaching environment is often related to the demands, expectations, and challenges they face in their professional roles, which may affect their job satisfaction, health, and teaching effectiveness (Skaalvik & Skaalvik, 2016). The purpose of this study was to explore the potential stressors of faculty staff in private institutions as well as to assess the validity and reliability of the Staff Stressors Scale.

LITERATURE REVIEW

Staff Stressors

There is evidence that teachers in general experience significant stress and that it affects their physical and mental health. Employees' perception that their work environment threatens their health and self-esteem is the common definition of staff stress, which is a negative emotional experience. According to Harmsen, Helms-Lorenz, Maulana, and Van Veen (2018), educator stress arises when staff members experience unpleasant, negative emotions including tension, anger, worry, frustration, or despair as a result of their job. Barouch Gilbert, Adesope, and Schroeder (2013) defined stress as the interaction between an individual and the environment. In other words, staff assessment of needs (stressors) and their available coping resources determine the impact on their well-being. Therefore, researchers prefer to explore why the concept of staff stress in the work environment arises and is referred to as a

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stressors. As emphasized by Skaalvik and Skaalvik (2016), sources of stress in the teaching and learning environments, consist of heavy work demands and challenging student behaviors. Now that the impact of occupational stress on individuals and organizations is well documented, exploring the sources of stress among staff in private HEIs is of greater interest.

Causes of Stress Among University Staff

McCarthy, Lambert, Lineback, Fitchett, and Baddouh (2016) showed that staff stressors are mainly derived from internal and external factors, which include staff's self-perception, role awareness, self-expectations, and professional competence, and exogenous factors include student discipline, work environment, and colleague and leadership relationships. In a study by von der Embse, Ryan, Gibbs, and Mankin (2019), it was concluded that potential sources of staff stressors in Western societies include teaching/research conflicts, workload, organizational practices, and interpersonal relationships in the work environment. A study from North China suggests that the sources of staff stress are first and foremost job appointment and title evaluation, followed by assessment and appraisal, salary and working conditions, and lastly, further training and learning. Staff stress is prevalent in both Western and Chinese societies (Harmsen, Helms-Lorenz, Maulana, &Van Veen, 2018; Li, & Kou, 2018).

Chinese private HEIs have a unique organizational and cultural atmosphere. Currently, research on staff stressors in China still draws mainly on the management theories of Western societies, and most studies still adopt the stressors scales for faculty developed abroad, which are different from those in Chinese universities in terms of cultural background and education system, and which may lead to measurement errors. Therefore, there is a lack of systematic scale development and validation to characterize the existing stressors of staff in Chinese private HEIs.

Impact of Stress

There are many negative effects of stress. Staff may experience mood swings, decreased productivity, and negative changes in teaching effectiveness, which can lead to lateness, absenteeism, and turnover, all of which are negative effects of stress. Staff stress also increases the likelihood of burnout, with heavy workloads and challenging student behaviors significantly predicting burnout. Burnout is directly related to low teaching quality, low job satisfaction, and high turnover rates (Skaalvik & Skaalvik, 2016; Harmsen, 2018). According to the stress response theory, job stress causes a series of physiological and chemical

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reactions in individuals. Overload stress not only directly jeopardizes the physical health of staff, but even produces psychological disorders such as depression, which finally affects the quality of their work life. There are also studies that moderate stress can stimulate work vitality and motivation, but excessive stress can harm the physical and mental health of individuals and affect the quality of their work life (von der Embse et al., 2019).

METHODOLOGY

Data and Sample

In this study, 237 staff of a private HEIs in Ningxia Hui Autonomous Region were sampled through simple random sampling. The questionnaire was distributed online through Wenjuanxing software, which is considered to be more secure and is widely used in the Chinese region. A total of 260 questionnaires were distributed and 237 were collected in this study. Participation was voluntary for all faculty and staff, subjects' responses were anonymous, and linking subjects' e-mails to response data was not permitted. Participant anonymity, privacy, and confidentiality were protected.

The sample of participants consisted of 54% females and 46% males. The age of the participants was 26-36 years old with the highest percentage of 44%. The percentage of master's degrees was 75%, and the highest percentage of staff with 7-10 years of experience was 41.7%.

Instruments

The Staff Stress Scale (SSS) designed by Leung, Siu, and Spector (2000) was used in this study to measure the staff stressors in private HEI in Ningxia Hui Autonomous Region, China. The scale consists of six dimensions, which are recognition, perceived organizational practices, factors intrinsic to teaching, financial inadequacy, home/work interface, and new challenges. The study was conducted using a 5-point Likert scale, participants rated their level of agreement on a scale from 1 (No strength) to 5 (Major strength).

RESULTS

Content Validity

Hajjar (2018) defines content validity as the degree to which a measurement instrument accurately and fully reflects the specific content or construct under study. Content validity in research is crucial to ensuring the reliability of the findings. Considering the cultural

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differences and the fact that the background subjects of the study were Chinese teachers, the research questionnaire was translated back into Chinese by an English teacher with a pedagogical background who translated the original English questionnaire into Chinese, and then subsequently an English teacher translated the questionnaire that had already been translated into Chinese back into English again to better guarantee the accuracy and consistency of the translation (Almanasreh, Moles, & Chen, 2019).

The study then used the expert judgment method to validate the questionnaire's content validity by asking three doctorate-holding education experts from Chinese universities to evaluate each topic and assign a score based on the questionnaire's content's accuracy and clarity. At this point, the research scale's six items were changed based on recommendations from the experts.

Table 1: *Examples of Items in the Revised Questionnaire for Experts*

Items from the Questionnaire		Modified items by experts	
B11	Social climate in the university	B11	Lack of a positive social climate of cooperation and trust
B17	Appraised by students	B17	Low student evaluation and recognition
B20	Demands work makes on my relationship with spouse/children		N/A
	N/A	B20	lack of financial assistance for further study
B25	Student quality	B25	Declining quality of students
B26	Keeping up with new techniques, ideas, technology or innovations or new challenges	B26	Keeping up with new techniques, ideas, technology or innovations
	N/A	B27	Ability to take on new challenges

EFA Analysis Result

Exploratory factor analysis (EFA) was conducted using SPSS 27.0 software. The researcher used Principal Component Analysis (PCA) method as an extraction method to reduce the dimensionality of the items and improve the interpretability of the factors. The maximum variance rotation method was applied because it maximizes the amount of variance loading

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required for the factor matrix and provides clearer factor separation (Ehido, Awang, Halim, & Ibeabuchi, 2020). The researcher performed the EFA procedure on the questionnaire, which allowed for the extraction of six male factors out of the 27 question items, which cumulatively explained 66.908% (>60%) of the variance contribution, indicating that these six male factors explained the vast majority of the information on the scale. The two factor analysis methods, Bartlett's test of sphericity and Kaiser-MeyerOlkin (KMO) measure of sampling adequacy, allowed for the clarification of the interactions between the variables, with the Bartletts test of sphericity being significant (p-value < .05) and the Kaiser-Meyer-Olkin (KMO) value of .896, which exceeded the required value of .6 (Hajjar, 2018), indicating that the data results are satisfactory. The EFA results are shown in Table 2 and Table 3.

Table 2: *The KMO and Bartlett's Test*

KMO and Bartlett's Test		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.896
Bartlett's Test of Sphericity	Approx. Chi-Square	3369.089
	df	351
	Sig.	.000

Table 3: *The Number of Components and Total Variance Explained for SS construct*

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	8.982	33.268	33.268	8.982	33.268	33.268
2	2.469	9.143	42.411	2.469	9.143	42.411
3	1.891	7.003	49.414	1.891	7.003	49.414
4	1.880	6.962	56.375	1.880	6.962	56.375
5	1.502	5.563	61.938	1.502	5.563	61.938
6	1.342	4.970	66.908	1.342	4.970	66.908

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Table 4 shows the results of Varimax rotation extraction during SS construct, containing six components and their respective items. The acceptable value of factor loadings should be .6 or higher, where the factor loadings of POP 7, POP 12, and FIT 15 are .537, .461, and .553, respectively, which are below the recommended threshold of .6. Therefore, these three items were deleted and all other items were retained. In the end, 24 items were retained and suitable for measuring SS constructs.

Table 4: *The Six Components and Their Items*

	Loadings						Mean	Std.
	1	2	3	4	5	6		
REC 1		.736					2.98	1.164
REC 2		.799					2.97	1.186
REC 3		.811					2.95	1.210
REC 4		.728					2.90	1.180
REC 5		.803					2.97	1.218
POP 6	.763						3.08	1.123
POP 7 Deleted Item							3.11	1.251
POP 8	.802						2.95	1.172
POP 9	.761						3.00	1.133
POP 10	.773						2.98	1.146
POP 11	.726						3.05	1.107
POP 12 Deleted Item							3.00	1.266
FIT 13			.815				2.91	1.204
FIT 14			.796				2.96	1.136
FIT 15 Deleted Item							3.14	1.236
FIT 16			.756				2.90	1.173
FIT 17			.774				2.97	1.123
FI 18					.784		2.96	1.129
FI 19					.768		2.97	1.187
FI 20					.803		3.08	1.147
HWI 21				.799			2.95	1.276
HWI 22				.761			3.03	1.146

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HWI 23	.800		3.00	1.173
HWI 24	.801		3.06	1.131
NC 25		.790	3.04	1.104
NC 26		.754	3.04	1.201
NC 27		.800	3.08	1.167

Internal Reliability

In order to ensure the credibility of the results of the study, the reliability of the survey instrument was examined in this study through SmartPLS 4.0 software, where the values of Cronbach's coefficient Alpha and rho A were computed separately to assess the internal reliability of the measurement of each dimension. The study proved that items are considered reliable if their Cronbach's Alpha and Rho_a values exceed.7 (Rovai, Baker, & Ponton, 2014; Muda, Baba, Awang, Badrul, Loganathan, & Ali, 2020). As shown in Table 5, the dimensions and construction of this study have met the requirement of internal consistency.

Table 5: *Reliability of Research Instrument*

	Cronbach's Alpha	Rho_a
	>.7	>.7
REC	.888	.890
POP	.877	.879
FIT	.872	.872
FI	.849	.851
HWI	.870	.870
NC	.802	.802

Note: REC=Recognition; POP=Perceived Organizational Practices ; FIT=Factors Intrinsic to Teaching; FI=Financial Inadequacy; HWI=Home/work Interface; NC=New Challenge

Results of the Validity Assessment

Convergent validity Factor analysis was used to examine convergent validity in addition to construct validity testing. Convergent validity is a measure of how well a construct aggregates or agrees with other theoretically similar constructs. It is typically evaluated by

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looking at each construct's average extracted variance (AVE) and composite reliability (CR) in relation to each other (Hajjar, 2018).

The assessment criteria state that a concept is considered to explain more than half of the variance of its indicators if its AVE value is .50 or more. A number of .70 or greater is typically regarded as satisfactory, demonstrating acceptable internal consistency and reliability. The CR value evaluates the internal consistency of a construct's indicators (Rovai et al., 2014). The study's findings demonstrated that all of the constructs' AVE values were higher than .50 and their CR values were higher than .70, demonstrating satisfactory convergent validity. The measurement results are shown in Table 6.

Table 6: *Convergent Validity*

Constructs	Average Variance Extracted(AVE)	Composite Reliability
	>.5	>.7
FI	.769	.909
FIT	.723	.913
NC	.716	.883
POP	.670	.910
REC	.690	.918
HWI	.719	.911

Note: FI=Financial Inadequacy; FIT=Factors Intrinsic to Teaching; NC=New Challenge; POP=Perceived Organizational Practices ; REC=Recognition; HWI=Home/work Interface

Discriminant Validity Furthermore, the discriminant validity of the different concepts was tested. Studies have evaluated discriminant validity using the Fornell-Larcker criterion, and the Heterogeneous Trait-Monomorphic Trait Ratio (HTMT) can assist us in defining the boundaries between various concepts. Discriminant validity is the measure of whether the dimensions of the same underlying trait should be significantly different from one another or have low correlation (Ramayah, Cheah, Chuah, Ting, & Memon, 2018). The Fornell-Larcker criterion was examined by comparing the correlation between constructs and the square root of the variance extracted for each construct (Henseler, Ringle, & Sarstedt, 2015). HTMT refines the measurement model by identifying potentially overlapping problem constructs. All HTMT values are below a conservative threshold of .9, the structure is shown to have

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sufficient discriminant validity. The measurement results are shown in Table 7 and Table 8. In summary, the measurement model demonstrated sufficient reliability, convergent validity, and discriminant validity.

Table 7: *Constructs Discriminant Validity of the Fornell-Larcker Criteria*

	B_FI	B_FIT	B_HWI	B_NC	B_POP	B_Rec
FI	**.877**					
FIT	.468	**.850**				
HWI	.352	.399	**.848**			
NC	.363	.332	.359	**.846**		
POP	.403	.363	.394	.430	**.818**	
REC	.433	.432	.410	.371	.345	**.831**

Note: FI=Financial Inadequacy; FIT=Factors Intrinsic to Teaching; HWI=Home/work Interface; NC=New Challenge; POP=Perceived Organizational Practices ; REC=Recognition

Table 8: *Constructs Discriminant Validity of the HTMT*

	FI	FIT	HWI	NC	POP	REC
FI						
FIT	.543					
HWI	.408	.457				
NC	.44	.396	.43			
POP	.465	.414	.449	.512		
REC	.497	.49	.466	.438	.388	

Note: FI=Financial Inadequacy; FIT=Factors Intrinsic to Teaching; HWI=Home/work Interface; NC=New Challenge; POP=Perceived Organizational Practices ; REC= Recognition

Formative Construct Assessment Since the second-order model of staff stressors is classified as a formative indicator, it is viewed as a cause of the latent variable rather than an effect, as outlined by Hair, Hult, Ringle, Sarstedt, Danks, and Ray (2021). In this context, researchers focus primarily on the extent to which each indicator contributes to the construction of the latent variable. To evaluate the measurement models for formative constructs, this paper employs two key criteria: the weights of the indicators and the significance and relevance of their covariates.

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First, the researcher assessed the covariance among the formative items by analyzing the Variance Inflation Factor (VIF). A VIF value less than or equal to the threshold of 3.3 indicates the absence of significant covariance issues between the formative indicators (Hair et al., 2021). Next, the indicator weights were evaluated to determine their significance and contribution to the SS construct. For an indicator to be considered meaningful, its weight must exceed .1, signifying a substantial contribution to the construct. The results of this study confirmed that all indicator weights exceeded the recommended threshold of .1, while the VIF values were within acceptable limits ($\leqslant$3.3). Additionally, the *t*-values of the external weights were greater than 1.65 at the 10% significance level in a two-tailed test, further supporting the validity of the indicators. Detailed measurement outcomes are presented in Table 9.

Table 9: *VIF Values and Outer Weights for Formative Constructs*

Item	Outer Weight	*t*-value	VIF
FIT -> SS	.151	2.195	1.492
FI -> SS	.295	3.847	1.507
NC -> SS	.155	2.446	1.383
POP -> SS	.326	4.777	1.439
REC -> SS	.241	3.569	1.473
HWI -> SS	.245	3.107	1.410

Note: FI=Financial Inadequacy; FIT=Factors Intrinsic to Teaching; HWI=Home/work Interface; NC=New Challenge; POP=Perceived Organizational Practices ; REC=Recognition; SS=staff stressors

Convergent validity assessment is the last phase in evaluating the formative model. The main method for this assessment is redundancy analysis, which confirms if formative indicators accurately reflect the entire construct (Hair, Matthews, Matthews, & Sarstedt, 2017). A reflective proxy construct was created to measure the same idea as the formative construct, and it was based on theoretical assumptions. Teacher efficacy was chosen as the reflective proxy and included as the dependent variable in this study. SmartPLS software was then used to test the model.

According to Hair et al. (2017), path coefficients (β) and explained variance (R^2) are the main emphasis of redundancy analysis. The path coefficients show how strongly and significantly

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the formative construct (like staff stressors) and the reflecting proxy (like teacher efficacy) are related. Conversely, R^2 indicates the percentage of variance in the reflective construct that can be accounted for by the formative indicators. To demonstrate good convergent validity, path coefficients should ideally be greater than .7, and an R^2 value greater than .50 is deemed adequate.

The study's findings showed that staff stresses and teacher efficacy had a path coefficient of .743 and an R^2 value of .552. These results suggest that a significant amount of the variance in the reflective proxy construct can be explained by the formative indicators taken together. The formative measures successfully capture the intended construct, as evidenced by the model's good convergent validity.

RESULTS & CONCLUSION

Based on the results of the exploratory factor analysis (EFA) of the staff stressors (SS) construct, the measurement instrument explained 66.908% of the total variance of the interaction structure between items. All six components had Cronbach Alpha values greater than .7 with high and acceptable reliability coefficients. The questionnaire ended up retaining 24 items after removing items with factor loadings below .6 (POP 7 Conflicting demands; POP 12 Lack of consultation and communication with university authority; FIT15 Too many assignments and papers to mark). The results indicated that this study confirmed the six-component structure of the SS construct. The results of the subsequent validated factor analysis (CFA) also emphasized the assessment of the validity of the SS construct and its components (FI, FIT, HWI, NC, POP, REC), supported by high factor loadings, internal consistency, and AVE value. The scale has been shown to have good reliability and validity and has a certain degree of generalizability in China.

The findings of this study emphasize that in the Chinese context, staff stressors are very much related to the constructs of recognition, perceived organizational practices, factors intrinsic of teaching, financial inadequacy, home/work interface, and new challenge. On the one hand, this study contributes to a deeper understanding of the main factors of staff stressors in a specific cultural context and provides a basis for future researchers to conduct related studies. On the other hand, based on the findings of this study, educational institutions can target interventions for staff stress management to provide practical implications for the effective relief of staff stress.Furthermore, the findings provide practical significance by identifying

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specific stressors that can inform the design of targeted stress management interventions, ultimately supporting the effective mitigation of teacher stress.

Limitations of the study

The Private HEIs Staff Stressors Scale is a valuable tool in education research. However, its application has certain limitations. In this study, 237 staff of private HEIs in China's Ningxia Hui Autonomous Region had their work-related stresses measured. The stability of the results may be jeopardized because of the limited sample size and the unique nature of HEI staff professions. This issue is further compounded by time constraints. Future studies should use the scale on a bigger and more varied sample to improve the dependability of the results. Furthermore, the markers on the scale can be culturally biased or fall short of capturing the particular difficulties that Chinese private HEI staff encounter. To provide a more thorough knowledge of the causes of staff stress, future study should think about adding qualitative research techniques including observations and interviews.

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