

A Validation Study of the Malay Version of the Job Stress Level Inventory

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Abstract

Job stress has been identified as one of the most widespread problems for many years. Hence, a validated and reliable instrument is very important for measuring the level of job stress among employees. About 210 secondary school teachers from 30 schools in Kota Bharu district participated in this study. The sample size was divided half into Exploratory factor analysis (EFA) and Confirmatory Factor Analysis (CFA). The instrument was answered by respondents by self-administered. Data was analyzed for EFA, CFA, internal consistency and convergent validity using STATA software version 14. The EFA resulted in reduction of items from 20 to 18, which comprised of 2 factors. Meanwhile, the CFA results exhibited that the data fitted the model very well with Chi square/df (1.488), CFI (0.944) and TLI (0.934) and RMSEA (0.069). The two factors of Job Stress Level Inventory were renamed as Job Performance and Intention to Withdraw. Overall JSLI produced very good internal consistency with Cronbach's alpha value of 0.93. The Average Variance Extracted (AVE) value of JSLI is 0.51 indicate that the convergent validity is met. Two factors produced by EFA consist of 17 items were named as Behavioural Symptom and Motivational Symptom that measuring the job stress level of employee. Job Stress Level Inventory was concluded to be a reliable and validated instrument in measuring the level of job stress among school teachers and also can be used to assess the job stress level of employee from other fields of work.

Keywords: Job stress, school teachers, Confirmatory Factor Analysis (CFA), reliability, internal consistency, convergent validity

1. Introduction

Generally, many definitions pertaining to job stress have been described by previous researchers with different theories. A study by Mkumbo (2011) that assessed factors associated with job stress among academia in Tanzania defined job stress as the stress that is caused by work, whereas Armstrong and Griffin (2004) defined job stress as the personal strain consequence from a particular work environment that is influenced by psychological characteristics of each employee. Even though studies concerning job stress have been conducted for many years, research is still ongoing to measure job stress among workers from many professions, including the teaching profession (Manjula, 2012; Jeyaraj, 2013 & Samad, 2010). Hence, many research tools and instruments have been developed and validated to investigate sources of job stress, such as Perceived Stress Scale by Andreou (2011) and Sources of Work Stress Inventory by Bruin and Taylor (2005). The Job Stress Level Inventory (JSLI) was adapted from Teacher Stress Level Inventory (TSLI) by Tsan (1998). Tsan employed this instrument to determine the level of job stress among lecturers in his study, which focused on occupational stress experienced by lecturers in a Malaysian teacher training college. Even though Tsan reported that the reliability of the instrument was $\alpha = 0.95$, however, no information was provided regarding the model fitness of the instrument. Moreover, to date, no article has been published concerning the measurements of JSLI validity and reliability. Thus, the objectives of the present study were to identify the model fitness of JSLI, to assess the reliability and to determine the convergent validity of the JSLI. The validation process began with the Exploratory Factor Analysis (EFA), followed by the Confirmatory Factor Analysis (CFA) and determination of reliability in order to offer a validated, reliable, and established instrument in measuring the level of job stress among employee.

2. Method

2.1 Participant (Subject) Characteristics

The JSLI, which consisted of 20 items, was translated into Bahasa Melayu and back-translated by a translator from the School of Languages, Literacies, and Translation in University Science Malaysia (USM). Next, the translated JSLI was pre-tested to assess the applicability and the teachers' understanding of the questionnaires. According to the sample size required for validation study, 210 respondents from 30 schools in the Kota Bharu district, Kelantan, Malaysia were included in the study as follows subject to variable ratio of 10:1 (Pedhazur, 1997). The required sample size after take into the consideration of 10% of estimated missing data or refused to participate in the study is 220. In a validation study, no standard calculation is required for sample size estimation. Winter et al. (2009) suggested that minimum sample size at least of 50-100 respondents is generally accepted while Comfrey and Lee (1992) recommended 200 sample size is fair for a validation study. The instruments were answered by the respondents through self-guided from the administrator.

Cluster sampling strategy was used to sample the schools and the respondents. The sampling unit in cluster sampling consisted of primary sampling unit (PSU) and secondary sampling unit (SSU). The PSU had been schools, while the SSU was the respondents. The specific school and respondents were chosen based on random sampling technique where the respondents were randomly selected from the list of teachers' names obtained by the school administrator. The inclusion criteria were teachers must be in service for more than 6 months, while those who were employed on contract basis or involved in administrative work were excluded from the study. All questionnaires were self-administered with guidance from the enumerator. All the respondents gave their informed consent before they participated in the study. The study was approved by an Ethics Committee for Research Involving Human Subjects of University Putra Malaysia (JKEUPM) on 4th June 2014.

2.2 Instrument

The JSLI consisted of 20 items based on stress outcome related to work. The items were measured based on five-item Likert type scale. The items were scored as 1 = never, 2 = seldom, 3 = sometimes, 4 = often, and 5 = always. Meanwhile, the summated job stress score was divided into three categories. Scores of 17-39 were categorized into a low level of job stress, scores of 40-61 were grouped under moderate levels of job stress, and scores between 62-85 were classified under high level of job stress.

2.3 Data Analysis

This cross-sectional study design started with a descriptive study of the sociodemographic characteristics of the 210 respondents. Then, the data was split into half (n=105) and EFA was conducted to identify the specific latent factors extracted from 20 observed items in JSLI. Extraction method of principal factor analysis (PFA) was applied to identify latent variables that represent dimension of the concepts. The Eigenvalue was set to be greater than 1.0, while rotation was performed to obtain the clearest and simplest way of associating the original variables to the factors. The data were rotated using varimax rotation to get a clearer picture of variables load onto each factor. The factor loading was set to be greater than 0.5, which means that only variables with factor loadings greater than 0.5 will retain in the model. The data were analyzed repeatedly by using different numbers of factors until the best combination was obtained as the final result for EFA. Data analysis was performed by using STATA software version 14.

Next, Confirmatory Factor Analysis (CFA) via Structural Equation Modeling (SEM) was done to evaluate the model fitness of the data. Furthermore, internal consistency was employed to assess the reliability of JSLI by calculating the alpha reliability coefficients. The goodness of fit was evaluated by using five fit indices, which were Chi-square/df, Root-Mean-Square Error of Approximation (RMSEA), Comparative Fit Index (CFI), and Tucker-Lewis index (TLI) (12). The convergent validity was determined by Average Variance Extracted (AVE) of all items. The AVE represented the average percentage of variation explained by the items in factor and was calculated by dividing squared of factor loadings of every item with the number of items in a model.

3. Results

3.1 Descriptive Statistics

The demographic characteristics of the respondents included in this study were gender, age, marital status, level of education, monthly income, years of teaching experience and the presence of chronic disease (**Table 1**). Overall, the respondents for this study comprised of 78.1% female and 21.9% male teachers. Most teachers had a Bachelor's degree (85.7%) followed by a Master's degree (11.4%) and diploma (2.9%). About 92.9% were married teachers. The average age of the respondents was 44. The teaching years ranged from 1 to 22 years with a mean value of 8 years. Meanwhile, the average monthly income was RM4813. About 11.4% respondents had high blood pressure followed by diabetes (5.7%), and asthma (5.7%) among 680 respondents. Most of the respondents had low job stress level (67.6%), 29.5% of them had moderate job stress level while 2.9% experienced high job stress level.

3.2 Exploratory factor analysis

The value of Kaiser-Meyer-Olkin (KMO) for TSLI was 0.864. In the analysis of EFA, two factors produced Eigenvalues greater than 1.0. Factor 1 had Eigenvalue of 8.222 while Factor 2 had Eigenvalue of 1.951. The two factors explained a cumulative percentage of 81.74% for the variance. Other than that, varimax rotation produced 18 items with all factor loadings greater than 0.50 (**Table 2**). Factor 1 had 12 items namely C1 (Feel continually negative, ineffective, depressed due to work related problem), C2 (Have trouble making decision at work), C3 (Less efficient at work than in the past), C4 (Quality of work has deteriorated), C5 (Fell exhausted spiritually, emotionally and physically after work), C6 (Catch colds and viruses frequently during working days), C7 (Eating habits have changed due to problems related to work), C8 (Using drugs to reduce anxiety due to work), C9 (Frequent boredom during working hours), C10 (Increase forgetfulness in carrying out the task), C13 (Lack of concentration in carrying out a task) and C14 (Feeling of dissatisfaction towards the job). Factor 2 had 6 items, namely C15 (Frequent moodiness, irritability, impatience during working hours), C16 (Little or no enthusiasm for job), C17 (Feel continually tired in the office, even after much sleep), C18 (Constantly feel frustrated during office hours), C19 (Desire to withdrawals from work's demands) and C20 (Constantly thinking of resigning or getting transferred from the present job). Two items, C11 (Insensitive towards others at workplace) and C12 (Strained relationship with boss, co-workers, friends and family), were not loaded into any factors. Thus, these items were removed from the next analysis.

3.3 Second Order Confirmatory Factor Analysis

Structural Equation Modeling (SEM) was used to perform Second Order CFA using STATA software. The two factors extracted from EFA are also known as the latent variables measured by 18 items, which are known as an observed variable. Second Order CFA was performed to test the two factors with 18 items of the instrument. The results retrieved from the first analysis of factor loadings of the 18 items are presented in **Table 3**. Nonetheless, the results of goodness of fit indices for the 18 items showed that the model did not fit the data well with Chi square/df (1.848), CFI (0.891) and TLI (0.876) and RMSEA (0.090). Based on the common rules of thumbs for interpretation of model fit, the Chi square/df value must be less than 5.0, the RMSEA must be less than 0.08, while GFI, CFI, and TLI values must be greater than 0.90 to indicate that the model fits the data well (Zainudin, 2012). However, in this study, the value for CFI and TLI is less than 0.90 and RMSEA value was greater than 0.08. The factor loading of each item was examined to check for item that had factor loading less than 0.50. Item C18 (Using drugs to reduce anxiety due to work) was found to have a factor loading of 0.475 which is less than 0.50, thus this item was deleted from the model.

However, the removal of item C18 (Using drugs to reduce anxiety due to work) still did not improve the model fitness, thus the Modification Indices (MI) were checked to find the redundant item. Two pairs of items, namely C13 (Less efficient at work than in the past) and C14 (Quality of work has deteriorated) and a second pair of item C15 (Fell exhausted spiritually, emotionally and physically after work) and C113 (Lack of concentration in carrying out a task) were found to have high MI with values of 26.471 and 16.3030 respectively. These pairs of items were set to be free parameter estimates. The factor loading of Job Stress on Factor 1 and factor 2 are 0.89 and 0.94 respectively. The R^2 for two factors are also high (0.79 and 0.88), which shows the contribution of Job Stress on its two factors is good. It indicates that Job Stress consists of two factors produced by EFA is well supported (Zainudin, 2015). The factor loading of final analysis of CFA is presented in **Figure 1**. Goodness of fit indices shows that the model fits the data well with Chi square/df (1.488), CFI (0.944) and TLI (0.934) and RMSEA (0.069). The convergent validity of JSLI is met since the Average Variance Extracted (AVE) value is 0.51 which is greater than 0.50.

3.4 Reliability

The Cronbach Alpha was computed for each item in each factor to assess the internal consistency of the instrument. Overall, the alpha coefficient score for the two factors of JSLI was 0.93, indicating that the instrument had strong reliability coefficient (Tavakol & Dennick, 2012). The Cronbach alpha for Factor 1 was $\alpha = 0.92$ and Factor 2 was $\alpha = 0.86$. Thus, all the factors were said to displayed good reliability coefficient.

Table 1. Descriptive statistics of sociodemographic characteristics of 210 respondents

Variables	Frequency (%)	Mean (SD)
Gender		
Male	23 (21.9)	
Female	82 (78.1)	
Marital status		
Single	2 (1.9)	
Married	101 (96.2)	
Widow/divorced	2 (1.9)	
Level of education		
Diploma	3 (2.9)	
Degree	90 (85.7)	
Master	12 (11.4)	
Age		43.99 (6.67)
Monthly income		4813(1253.49)
Years of teaching		8 (5.39)
High Blood Pressure		
Yes	12 (11.4)	
No	93 (88.6)	
Asthma		
Yes	6 (5.7)	
No	99 (94.3)	
Diabetes		
Yes	6 (5.7)	
No	99 (94.3)	

Note: SD=Standard deviation

Table 2. Varimax-rotated factor pattern matrix of Job Stress Level Inventory (JSLI) of secondary school teachers in Kota Bharu district (n=105)

Item	Item description	Factor loadings			
		First analysis		Final analysis	
		1	2	1	2
C1.1	Feel continually negative, ineffective, depressed due to work related problem.	0.511		0.519	
C1.2	Have trouble making decision at work.	0.684		0.699	
C1.3	Less efficient at work than in the past.	0.611		0.616	
C1.4	Quality of work has deteriorated.	0.673		0.659	
C1.5	Fell exhausted spiritually, emotionally and physically after work.	0.680		0.685	
C1.6	Catch colds and viruses frequently during working days.	0.548		0.546	
C1.7	Eating habits have changed due to problems related to work.	0.653		0.662	
C1.8	Using drugs to reduce anxiety due to work.	0.548		0.538	
C1.9	Frequent boredom during working hours.	0.670		0.684	
C1.10	Increase forgetfulness in carrying out the task.	0.649		0.638	
C1.11	Insensitive towards others at workplace.	-		-	
C1.12	Strained relationship with boss, co-workers, friends and family.	-		-	
C1.13	Lack of concentration in carrying out a task.	0.592		0.568	
C1.14	Feeling of dissatisfaction towards the job.	0.648		0.635	
C1.15	Frequent moodiness, irritability, impatience during working hours.		0.679		0.684
C1.16	Little or no enthusiasm for job.		0.816		0.813
C1.17	Feel continually tired in the office, even after much sleep.		0.729		0.732
C1.18	Constantly feel frustrated during office hours.		0.812		0.813
C1.19	Desire to withdrawals from work's demands.		0.846		0.840
C1.20	Constantly thinking of resigning or getting transferred from the present job.		0.750		0.751

Table 3. Standardised factor loadings of confirmatory factor analysis (CFA) of Job Stress Level Inventory (JSLI) of secondary school teachers in Kota Bharu district (n=105)

Item	Item description	Factor loadings			
		First analysis		Final analysis	
		1	2	1	2
C1.1	Feel continually negative, ineffective, depressed due to work related problem.	0.736		0.719	
C1.2	Have trouble making decision at work.	0.633		0.638	
C1.3	Less efficient at work than in the past.	0.670		0.644	
C1.4	Quality of work has deteriorated.	0.707		0.671	
C1.5	Fell exhausted spiritually, emotionally and physically after work.	0.690		0.742	
C1.6	Catch colds and viruses frequently during working days.	0.661		0.676	
C1.7	Eating habits have changed due to problems related to work.	0.611		0.627	
C1.8	Using drugs to reduce anxiety due to work.	0.475		-	
C1.9	Frequent boredom during working hours.	0.775		0.761	
C1.10	Increase forgetfulness in carrying out the task.	0.741		0.730	
C1.13	Lack of concentration in carrying out a task.	0.830		0.856	
C1.14	Feeling of dissatisfaction towards the job.	0.680		0.680	
C1.15	Frequent moodiness, irritability, impatience during working hours.		0.865		0.869
C1.16	Little or no enthusiasm for job.		0.810		0.806
C1.17	Feel continually tired in the office, even after much sleep.		0.816		0.816
C1.18	Constantly feel frustrated during office hours.		0.706		0.698
C1.19	Desire to withdrawals from work's demands.		0.658		0.659
C1.20	Constantly thinking of resigning or getting transferred from the present job.		0.503		0.505

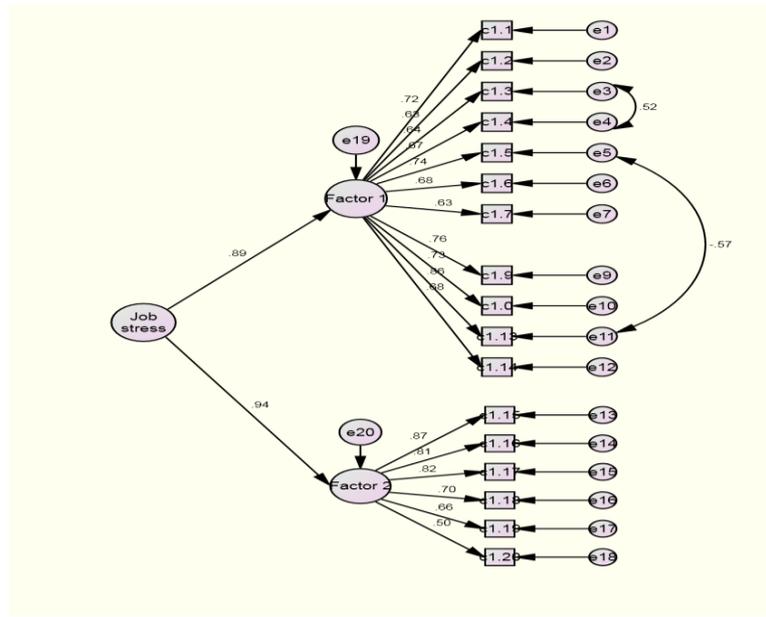


Figure 1. Final model of CFA of Job Stress Level Inventory (JSLI) using SEM analysis

4. Discussion

The exploratory factor analysis (EFA) is a multivariate statistical procedure that is commonly used in psychology and educational fields. Before the analysis can be proceeded with EFA, the data need to be examined for their suitability. KMO values of 0.89 suggested that the data had been suitable to be preceded with EFA. The KMO index ranged from 0 to 1 and values greater than 0.5 was considered suitable for factor analysis (Tabachnick & Fidell, 2007). On top of that, Principal Factor Analysis (PFA) was employed as the extraction method as the researcher had no prior hypothesis about the existing number of latent variables. The varimax rotation was used in this study due to its easy interpretation of factors.

One of the objectives of EFA is to reduce a large number of variables into a smaller set of variables. This research started with EFA because the researchers had no prior believe on the number of factors that should be extracted from the large set of latent factors that was represented by a set of items. In this study, 20 items of original JSLI was reduced to 18 items. Two items, namely items C11 (Insensitive towards others at workplace) and C12 (Strained relationship with boss, co-workers, friends, and family), failed to be loaded in any factor, indicating that these items did not represent the latent variables of job stress. Any item that did not load onto factor or did not load into several factors had been suggested to be removed from the model to avoid correlation problem during CFA and reliability analysis. EFA allowed the formation and refinement of the theory by establishing an underlying dimension between the measured variable and the latent construct (William et al., 2012). This is shows by 18 items (measured variables) loaded in two latent factors.

The factor loadings for the validation study were set to be greater than 0.50. However, the cut-off point of factor loadings depends on researchers as some researchers might set the factor loadings as low as 0.3. In fact, Zainudin (2012) suggested that the factor loadings for newly developed scale should be 0.5 or higher, while an established scale should have factor loadings of 0.6 or higher. The first analysis of CFA of 18 items showed that one item, namely Item C18 (Using drugs to reduce anxiety due to work) had factor loadings less than 0.50. About 36.2% of the teachers in Kota Bharu district sometimes used medicine to reduce their anxiety due to work burden, while about 32.4% rated seldom, and 4.8% rated as always and often. These percentages showed that most teachers sometimes used medicine as an alternative to reduce their anxiety. Besides, the dependencies of teachers on medicine indicated that most of them experienced job stress that represented by symptoms like anxiety. However, as this item had factor loadings at 0.475, which is less than 0.50, this item was deleted from the model. Furthermore, a low factor loading means the correlation between the observed and the latent variables is also low.

To ensure the unidimensionality of a measurement model, the correlation between observed and latent variables should be high, thus this item is deleted from the model. Among 17 items, item C15 (Fell exhausted spiritually, emotionally, and physically after work) had high percentage of 'always' with 6.7%. This indicates that when teachers experienced job stress, they always feel exhausted after work. When teachers had emotionally, spiritually and physically exhausted, their teaching performance at the workplace will decrease. Additionally, about 13.3% of teachers often feel continually

negative, ineffective, depressed due to work related problem. If these negative feelings continue for a long period of time, teachers probably will develop more chronic psychological problems such as burnout.

The Modification Index (MI) was carried out in order to identify any correlated error among the items due to the model failed to meet the criteria of model fitness index. Two pairs of items, namely C13 (Less efficient at work than in the past) and C14 (Quality of work has deteriorated) and a second pair of item C15 (Felt exhausted spiritually, emotionally and physically after work) and C113 (Lack of concentration in carrying out a task) were identified as a redundant items when Modification Indices is high with value of 26.471 and 16.3030 respectively. Thus, correlated errors occurred due to the items redundancies. Commonly, there are two choices to solve the problem of redundant items in CFA. The first choice is, the researcher can delete one of the two redundant items and re-specify the model or second choice is by setting two redundant items as free parameter estimates and re-specifying the model. In this study, both pairs were set as free parameter estimates because both items had factor loadings greater than 0.50. The model was re-specified until a final output is obtained. In the first analysis of CFA, item C18 (Using medicine to reduce anxiety due to work) were found to have factor loadings of 0.475 thus this item was removed from the next analysis.

Reliability is commonly described as the consistency or the reproducibility of a measurement over time and occasion (Streiner. Reliability analysis can be described in the form of internal consistency and stability. In this study, reliability analysis was performed in single administration by determining the consistency of the instruments in measuring the level of job stress among teachers, which had been measured via Cronbach alpha. The reliability of an instrument is assumed as good if the items could produce high Cronbach alpha coefficient ($\alpha > .70$) (Yusoff, 2012). Overall, the Cronbach alpha for the JSLI was 0.93. It indicated that TSLI had good level of internal consistency to reproduce similar results at different times and occasions. Each factor of TSLI also had good internal consistency as the value of Cronbach alpha was greater than 0.7. High Cronbach alpha means high correlation or interrelatedness between the items. Other than that, reliability estimates the amount of measurement errors in a test by squaring the correlation and subtracting it from 1.00 (Tavakol & Denick, 2012). High measurement error produces low internal consistency, thus JSLI is said to have low measurement error due to higher internal consistency.

The labelling of two factors is important in order to reflect the theoretical and the conceptual latent construct. Previous researchers suggested at least two or three variables must be loaded on a factor so that it can give a meaningful interpretation. However, in order to avoid model identification problem during CFA, each EFA factor must have at least three or four items in a factor (Zainudin, 2012). In this study, at least 5 items were loaded onto each factor. Hence, a discussion was made among experts to coin a suitable name for each factor. Items in Factor 1, such as 'Have trouble making decision at work', 'Less efficient at work than in the past', and 'Quality of work has deteriorated' seemed to be related with the behavioural displayed by the employee. Meanwhile, items in Factor 2, such as 'Constantly feeling frustrated during office hours', 'Little or no enthusiasm for job', and 'Frequent moodiness, irritability, and impatience during working hours' seemed related to the less motivated at the workplace. Thus, Factor 1 was renamed as Behavioural Symptoms, whereas Factor 2 was renamed as a Motivational Symptoms.

5. Conclusion

The Exploratory Factor Analysis (EFA) of the JSLI produced two factors with 18 items, which displayed lesser items than the original TSLI. Furthermore, the CFA proved that the two factor models consist of 17 items fit very well based on goodness of fit indices. Moreover, convergent validity confirmed that a set of items truly measured its own factor. In conclusion, the JSLI had been proven as a reliable and validated instrument, which consisted of two factors, namely Behavioral Symptoms and Motivational Symptoms. In identifying the job stress level, this JSLI had been specifically focused on measuring the behavioral symptoms shows by the employees at the workplace and the employee motivation towards their job. Additionally, with the new validated and instruments of JSLI, future research can be conducted in identifying the relationship between job stress and other variables such as employee's career commitment and job satisfaction. This validated JSLI may have a significant contribution to the existing body of knowledge in job stress fields and can be applied to assess the job stress level in other professional fields.

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