Evaluation of Psychometric Properties of the Malay Version Perceived Stress Scale in Two Occupational Settings In Malaysia

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Abstract

Background: The 10-item version of Perceived Stress Scale (PSS-10) is a widely used tool to measure stress. The Malay version of the PSS-10 has been validated among Malaysian Medical Students. However, studies have not been conducted to assess its validity in occupational settings. **Aim:** The aim of this study is to assess the psychometric properties of the Malay version of the PSS-10 in two occupational setting in Malaysia. **Subjects and Methods:** This study was conducted among 191 medical residents and 513 railway workers. An exploratory factor analysis was performed using the principal component method with varimax rotation. Correlation analyses, Kaiser-Meyer-Olkin, Bartlett's test of Sphericity and Cronbach's alpha were obtained. Statistical analysis was carried out using statistical package for the social sciences version 16 (SPSS, Chicago, IL, USA) software. **Results:** Analysis yielded two factor structure of the Malay version of PSS-10 in both occupational groups. The two factors accounted for 59.2% and 64.8% of the variance in the medical residents and the railway workers respectively. Factor loadings were greater than 0.59 in both occupational groups. Cronbach's alpha co-efficient was 0.70 for medical residents and 0.71 for railway workers. **Conclusion:** The Malay version of PSS-10 had adequate psychometric properties and can be used to measure stress among occupational settings in Malaysia.

Keywords: Factor structure, Malaysia, Occupational, Perceived stress scale, Psychometric properties, Validity

Introduction

The 10-item version of Perceived Stress Scale (PSS-10) is a widely used tool to measure stress. It has shown adequate validity and reliability.[1] The PSS-10 has been translated and validated in many languages including Japanese, Portuguese, Thai, Chinese, Greek and Malay.[1-6]

There is a need to investigate the psychometric properties of the Malay version of PSS-10 among occupational settings in Malaysia as such a study has yet to be conducted.

The current study is the first in Malaysia aimed at assessing the psychometric properties of the Malay version of PSS-10 among occupational groups.

Subjects and Methods

Participants and study setting

This study recruited 191 medical residents from a Malaysian general hospital and 513 railway workers at the country's main depot in Kuala Lumpur, Malaysia. Respondents were informed about the objectives and benefits of the study. Confidentiality was assured and written informed consent was obtained from

the participants. The research protocol was approved by the Ethics Committee of the National Institutes of Health, Ministry of Health Malaysia. The study was conducted between December 2012 and March 2013.

Instruments

The Malay version of the PSS-10 used in this study was the same validated version used in a previous study conducted among Malaysian Medical Students.[6] The PSS-10 measures the degree to which one perceives aspects of one's life as stressful. It has a 5-point Likert scale and response ranged from 0 (never) to 4 (very often), indicating how often they have felt within the past month. Total scores range from 0 to 40, with higher scores indicating greater perceived stress.[7] Six out of 10 items of the PSS-10 were considered negative (1, 2, 3, 6, 9 and 10) and the remaining four as positive (4, 5, 7 and 8), representing "perceived distress" and "perceived coping," respectively.

Data analysis

All statistical analysis was performed using statistical package for the social sciences version 16 software (SPSS, Chicago, IL, USA). Total scores of PSS-10 were obtained by summing across all the 10 items after reversing the scores on the four positive items. Test of normality was carried out. An exploratory factor analysis of the 10-item scale was performed using principal component method with varimax rotation.[3,8] Correlation analyses, Kaiser-Meyer-Olkin and Bartlett's test of Sphericity were used. Cronbach's alpha was used to test the internal consistency of the scale.

Results

Socio-demographic characteristics

The mean standard deviation (SD) age of medical residents was 26.5 (1.6) years and 55.5% (106/191) were females. The mean (SD) age of railway workers was 41.4 (10.7) years and 74.9% (384/513) were male. The mean (SD) of daily working hours for medical residents was 9.3 (0.9) and the working hours ranged from 8.4 to 12.9 h. The mean (SD) daily working hours for railway workers was 8.4 (0.9) h and they ranged from 2.0 h to 8.0 h [Table 1].

Distribution of PSS-10 item scores for medical residents and railway workers

For all the 10 items of PSS-10, the response ranged from 0 (never) to 4 (very often). Among the 191 medical residents, 2.6% (5/191) to 11.5% (22/191) state a Score of 0 while 1.0% (2/191) to 3.7% (7/191) states a Score of 4 [Table 2]. With respects to the 513 railway workers, workers, 3.9 (20/513) to12.5% (64/513) stated a score of, while for the Score of (4), the range was 1.9% (10/513) to 8.8% (43/513) [Table 3].

Internal consistency of PSS-10

Cronbach's alpha co-efficient for medical residents were 0.70 for the total scale, 0.87 for the first factor and 0.73 for

Table 1: Socio-demographic and work characteristics of the medical residents and railway workers

Occupation	N	(%)
Medical residents (N=191)		
Gender		
Male	85	44.5
Female	106	55.5
Age		
≤24	17	8.9
25-27	125	65.4
≥28	49	25.7
Daily working hours		
Mean (SD)	9.3 (0.9)	
Minimum	8.4	
Maximum	12.9	
Railway workers (N=513)		
Gender		
Male	384	74.9
Female	129	25.1
Age		
20-34	157	30.6
35-49	177	34.5
≥50	179	34.9
Daily working hours		
Mean (SD)	8.4 (0.9)	
Minimum	8.0	
Maximum	12.0	

SD: Standard deviation

Table 2: Distribution of medical residents scores on the PSS-10 (n=191)

Item	Score n (%)				
	0	1	2	3	4
1	10 (5.2)	20 (10.5)	122 (63.9)	33 (17.3)	6 (3.1)
2	13 (6.8)	36 (18.8)	112 (58.6)	23 (12.0)	7 (3.7)
3	9 (4.7)	21 (11.0)	121 (63.4)	38 (19.9)	2 (1.0)
4	15 (7.9)	76 (39.8)	83 (43.5)	10 (5.2)	7 (3.7)
5	5 (2.6)	66 (34.6)	107 (56.0)	6 (3.1)	7 (3.7)
6	9 (4.7)	54 (28.3)	107 (56.0)	19 (9.9)	2 (1.0)
7	22 (11.5)	58 (30.4)	91 (47.6)	13 (6.8)	7 (3.7)
8	6 (3.1)	55 (28.8)	116 (60.7)	11 (5.8)	3 (1.6)
9	6 (3.1)	31 (16.2)	116 (60.7)	35 (18.3)	3 (1.6)
10	14 (7.3)	51 (26.7)	110 (57.6)	14 (7.3)	2 (1.0)

PSS: Perceived stress scale

the second factor. Cronbach's alpha coefficient for railway workers was 0.71 for the total scale, 0.88 for the first factor and 0.81 for the second factor. The analysis showed that the value of Cronbach's alpha did not improve despite items elimination.

Factor structure and construct validity of PSS-10 item

The principal component analysis with varimax rotation of all 10 items in the PSS-10 scale yielded two factors with initial eigenvalues >1 in both medical residents and railway workers. The two-factor solution accounted for 59.2% and 64.8% of the variance in the medical residents and the

railway workers respectively. The first factor accounted for 37.3% of the variance in medical residents and 40.7% in railway workers [Table 4]. Factor loading of items ranged from 0.59 to 0.86. The second factor accounted for 21.9% and 24.1% of the variance in medical residents and railway workers respectively. Factor loadings ranged from 0.67 to 0.84. The item's share of communality for one factor was at least 20% higher than its share of communality for the other factor [Table 5].

Discussion

The current study is the first in Malaysia that aimed at assessing the psychometric properties of the Malay version of PSS-10 among occupational groups in Malaysia namely: Medical residents and railway workers. The findings of this study support the reliability and validity of the Malay version of PSS-10.

The factor analysis yielded two factors with initial eigenvalues > 1 in both medical residents and railway workers. Here, the minimum acceptable value for factor loading was considered to be 0.30.[9] The two-factor solution accounted for 59.2% and 64.8% of the variance in the medical residents and the railway workers respectively. A previous study in Malaysia among medical students found that the Malay version of PSS-10 had two factors and these factors accounted for 57.8% of the variance.[7]

Factor loading of items ranged from 0.68 to 0.82 for medical residents and 0.59-0.86 for railway workers. For all items

in both occupational groups, factor loadings were greater than 0.59 and none of the items loaded significantly onto the second factor. These findings are comparable with that found by a previous study.[7] In 1988, Cohen and Williamson, found that the factor loadings of the scale items were 0.42 and higher. According to Cohen's original analysis, the two factors accounted for 25.9% and 15.7% of the variance, respectively.[10] In this study, the factor loadings for all items were high and ranged between 0.59 and 0.86. Previous research on different language versions of the PSS-10 identified that the PSS-10 had two latent factors and they accounted for 52% and 58% of the variance respectively. They had also reported a minimum factor loading of 0.32 and a maximum of 0.88.[3,11-14]

In this study, the first factor included items that were negatively worded (e.g., been upset, unable to control things, felt nervous and stressed) and the second factor reflected positively worded items (e.g., able to control irritation and ability to handle personal problems). The first factor was labelled ''perceived distress'' and the second factor was labelled ''perceived coping.''[15] The Cronbach's alpha coefficient in this study was 0.70 for medical residents and 0.87 for railway workers. These findings are comparable to previous studies from Malaysia and overseas.[6,7]

Cross-cultural research methodologies have delineated significant gaps on health outcomes globally as most measurements were developed in English; hence there were relatively limited tools in non-English-speaking cultures.[16] The evaluation of psychometric properties of the Malay version PSS-10 in this study will enable researchers in the future to use a validated measure of stress among other occupational groups and settings. Generalization of the results of this study is possible due to the adequacy of the sample size and the inclusion of diverse and heterogeneous occupational groups (professional doctors from the hospital and railway workers, which include blue and white collar workers). A possible limitation in this study was the absence of the concurrent and predictive validity assessment, which is recommended for future studies.

Conclusion

This study found that the Malay version of the PSS-10 is a valid instrument to measure stress among medical residents and railway workers in Malaysia.

Table 3: Distribution of railway workers scores on the PSS-10 (*n*=513)

Item	Score *n* (%)				
	0	1	2	3	4
1	56 (10.9)	59 (11.5)	303 (59.1)	55 (10.7)	40 (7.8)
2	64 (12.5)	72 (14.0)	310 (60.4)	40 (7.8)	27 (5.3)
3	45 (8.8)	56 (10.9)	309 (60.2)	60 (11.7)	43 (8.4)
4	40 (7.8)	102 (19.9)	326 (63.5)	32 (6.2)	13 (2.5)
5	27 (5.3)	84 (16.4)	349 (68.0)	43 (8.4)	10 (1.9)
6	20 (3.9)	68 (13.3)	337 (65.7)	63 (12.3)	25 (4.9)
7	48 (9.4)	96 (18.7)	310 (60.4)	46 (9.0)	13 (2.5)
8	23 (4.5)	92 (17.9)	355 (69.2)	30 (5.8)	13 (2.5)
9	23 (4.5)	71 (13.8)	351 (68.4)	45 (8.8)	23 (4.5)
10	30 (5.8)	70 (13.6)	358 (69.8)	34 (6.6)	21 (4.1)

PSS: Perceived stress scale

Table 4: Total variance explained; principal component analysis of the PSS-10 among medical residents and railway workers

Occupational group	Factor	Initial eigenvalues (total)	Extraction sums of squared loadings variance (%)	Total	Variance (%)	Cumulative (%)
Medical residents	1	3.732	37.3	3.732	37.3	37.3
	2	2.195	21.9	2.195	21.9	59.2
Railway workers	1	4.072	40.7	4.072	40.7	40.7
	2	2.405	24.1	2.405	24.1	64.8

PSS: Perceived stress scale

Table 5: Rotated factor loadings of PSS-10 among medical residents and railway workers

Item	Medical residents (N=191)		Railway workers (N=513)	
	Factor 1 (α=0.87)	Factor 2 (α=0.73)	Factor 1 (α=0.88)	Factor 2 (α=0.81)
1	0.76	−0.10	0.84	−0.02
2	0.82	0.02	0.86	0.02
3	0.81	−0.11	0.86	0.03
4	−0.11	0.75	−0.01	0.84
5	0.02	0.76	0.02	0.85
6	0.77	0.03	0.59	−0.31
7	−0.06	0.67	−0.26	0.68
8	−0.04	0.81	−0.09	0.81
9	0.68	−0.22	0.77	−0.15
10	0.80	0.01	0.78	−0.12

PSS: Perceived stress scale

Recommendations

Future research should assess the concurrent and the predictive validity of this scale.

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