ORIGINAL ARTICLE

Reliability and Validity of the Pressure Management Inventory in a Malaysian Population

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Summary

There is a general lack of valid tools to measure work stress of Malaysian. This study examines the validity and reliability of the Pressure Management Inventory (PMI). Reliability was evaluated using test retest method, and its correlation coefficient was calculated using Pearson's r. Internal consistencies were examined using Cronbach's Alpha. For precision, the Intraclass coefficients (ICC) were calculated for all the scales. Face Validity and Content Validity were assessed using an open-ended questionnaire on 6 content experts (psychiatrists in HKL)

The results show good internal consistencies (alpha $\leq$ 0.7) for most subscales, with the best results in the 'Pressure Scale'. The weak scales are 'Individual-Differences' scale and 'Social Support' scale. The test-retest correlation coefficients were significant at the level of $p<0.001$ for all, except one scale. The ICC coefficients were high (>0.7) for most scales, particularly for Pressure, Health and Coping Scales. The PMI is a suitable, reliable and valid tool to measure stress of Malaysians. More in-depth study with a wider sampling needs to be carried out to add confidence of its usage on Malaysians.

Key Words: Pressure Management Inventory (PMI), Cronbach Alpha, Intraclass, Test-retest reliability, Validity

Introduction

Occupational Pressure is a rising epidemic with detrimental effects on health. Recent statistics show that stress is now the number one reason behind sickness from work, with more than two-thirds of people suffering from work related stress[1].

The present world of work with its rapid and continuous changes put workers at even greater risks of occupational pressure. Women workers are not exempted and may be particularly vulnerable to occupational pressure[2]. Women's participation in the workforce in the last three decades has risen sharply and women made up two thirds of the current workforce in the civil service[3]. Women are also responsible for the second shift duty of housework coupled with the entrenched 'glass ceiling' phenomena faced at work[4] where women can only rise so far in corporation, puts women more at risk. The prevalence of mental disorders amongst Malaysian women is reported as 1.5 times higher than men [5] but women experiences of stress is still largely unexplored.

In health care and much of the other human service profession, burnout may occur shortly after the individuals enter the job[6]. Burnout usually affects the most able individuals, most competent and committed, and it diminishes the effective services of the very best

This article was accepted: 11 August 2003
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people in a given profession[7]. The outcome of stress at work is burnout. Burnout is 'an unhealthy condition that makes once idealistic, productive, enthusiastic workers detrimental to their profession, colleagues and themselves [7].

Therefore, employer/management need to be aware of their responsibilities to provide a safe and healthy environment. Awareness on the prevalence and precise identification on the stressor at work is crucial for effective design of interventions. It is not sufficient to consider merely the physical hazards but efforts must cover the silent but equally harmful psychosocial hazards.

However, there is little definitive data on the proportion of the organizational workforce affected, its sources of stress and its impact on workers' health, especially in Malaysia. More studies into stressed workers need to be carried out, but one of the difficulties, is the unavailability of a valid, reliable tool to study the multi-factorial occupational stress. Therefore, this study was designed to assess the reliability and validity of the English version Pressure Management Inventory (PMI) in a Malaysian population. This study is part of the main study on the occupational pressure of female allied health professionals.

Materials and Methods

a) The Reliability Check: Subjects, Tools, and Procedure

The participants for this study are 35 convenient sampling of health workers in HKL. There were 35 (out of 50) subjects who completed both the test and retest questionnaires designed at 1-2 weeks interval. The duration is to ensure that it is not too short that the respondents are able to recall their scorings nor is it too long that the surrounding conditions have changes that may influence pressure which then pollute the results. The conceptual framework for the study is presented in Figure 1.

The PMI is an industry level multivariate stress-tool with 145 questions. The questionnaire, designed to measure the stress process of employees, has 22 subscales that can be further grouped into six scales of job satisfaction, health, pressure, individual differences and coping scales and social support [8].

As stress is a complex, multivariate process that needs to be measured comprehensively, the PMI was chosen because it addresses the key elements of the stress process, which includes the sources (individual and organizational), moderators and the effects[8]. The subjects were personally approached wherever possible and/or a representative was identified and briefed on how to conduct the data collection to ensure and enhance perseverance since the PMI is lengthy and the study requires a retest. Permission to carry out the study was sought from relevant authorities. The second questionnaire was re-administered in 1-2 weeks time, with an average of 12 days. Researchers had proposed that a sample size of at least 30 subjects is needed for statistical analysis and test-retest reliability [9, 10]. In line with these reports, a target of at least 30 was initially plan and the final sample consisted of 35 participants.

The Validity Check: Subjects, Instrument, and Procedures

The psychiatrists at a major hospital in the Kuala Lumpur Hospital were identified because they represent the closest content experts on this specialty on occupational stress. The participants consisted of two female and four male psychiatrists. An open-ended questionnaire comprising of three questions were used together with the PMI. The open ended questionnaire was structured to address **coverage and appropriateness** of the PMI to check its validity as a tool to measure occupational pressure of working women.

Results

A total of 35 out of about 50 subjects responded to both test and the retest, (8 opted out from the beginning, and the remainder dropped out during the 2nd retest). Out of the 35 participants, 22 were post basic ICU nurses who had just completed their examination, 5 were staff nurses from neurology ward and 8 were therapy tutors. There were 31 female and four male participants. Participants' age range from 24 years to 50 years (m =34.3 $\pm$ SD 8.1). With regards to ethnicity, Malays formed the largest group (68.6%), followed by Indian (14.3%), and Chinese (17.1 %).

The paired-samples were calculated using t-test (Table I). The result shows that the relationship between the mean-scores of test and those of retest were not significant. This indicates that the variations between scores from the two administrations are insignificant and are thus, reliable and consistent. Only 2 sub-scales (job satisfaction and patience-impatience) were

significant, inferring that the 2 mean scores are not reliably correlated for these 2 subscales.

The strength of the correlation of test retest, after an interval of 1-2 weeks using Pearson's r (Table II) shows that out of the 22 items, almost all correlations were significant at p= 0.001 level, with one subscale (social support) being significant at p=0.05. Only the patient-impatient subscale was found to be not significant.

Using the guidelines for reliability on work-related assessment [11], most scales have moderate to good (r= 0.5 and above) reliability. However, three items (individual-differences, social support and job satisfaction subscale) show poor to fair (0.26 - 0.50) correlation. In comparison to the William & Cooper's findings, there is no distinct pattern noted. However, items in the Pressure and Health Scales appear to have consistently higher coefficients than the rest of the items.

The ICC, calculated using the analysis of variance, is in fact equivalent to the appropriate average of the Pearson correlations between all pairs of tests. The results shows that majority of the scale has good reliability, except for 6 subscales (Table II). The internal consistencies of the items, calculated from Cronbach Alpha, shows that most scales in the PMI have alpha-value of 0.7 and above (except for individual differences and social support). The patience-impatience subscale has the lowest internal consistency (alpha of 0.21), whilst the organizational satisfaction has the highest internal consistency (0.94). In the original study, all subscales met the target reliability coefficient of 0.7 and above, except for 'daily hassles (0.64). However, in the Malaysian samples, daily hassles have good reliability.

The Validity Check

The emerging themes arising from Question 1 are, comprehensiveness, good coverage, representativeness, valid, accurate, very detailed and lengthy. These suggest that the PMI has a good content-coverage and items are very representative of the work stress process.

Question 2 is on appropriateness of PMI as a stress tool for Malaysian in general. The experts highlighted the terms that may need to be reworded such as; "psychological feel', cracking up, over-conscientious, melancholy, ambiguous, exasperated, "change" programs, re-organization and feeling "extended in your job". The major issue raised since PMI is in English is, as one respondent assert, "some terms may not be understood by the average Malaysian". Generally the experts concurred that some modification of the wordings are required, and one suggests for a full translation into the Malay language.

Question 3 aimed at surveying the appropriateness of PMI to measure stress of working women. The emerging themes can be basically grouped as related to i) women-health status and/or ii) home-environment status.

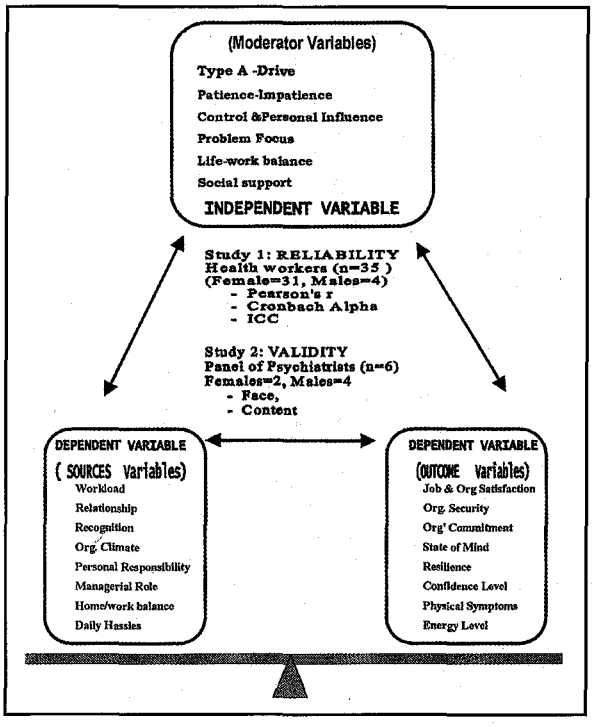

Fig. 1: Conceptual framework of study

Table I: Results of paired sample t-test

PMI 22 Subscales	MEAN DIFFERENCES						
	M Test scores With (SD) N=35	M Retest Scores With (SD) N=35	M Difference With (SD)	95% CI (Lower -upper) Of the differences		t	Sig (2-tailed)
JOB SATISFACTION							
Job Satisfaction	24.2 (4.9)	22.3 (5.0)	1.91 (5.2)	0.11	3.71	2.16	.038 (S)
Org. Satisfaction	21.2 (5.3)	20.9 (5.1)	0.31 (2.4)	-0.53	1.15	0.76	.453
Org. Security	14.0 (3.4)	13.5 (2.9)	0.49 (2.8)	-0.46	1.43	1.05	.303
Org. Commitment	22.7 (3.8)	22.5 (3.9)	0.20 (3.2)	-0.91	1.30	0.37	.714
HEALTH							
State of Mind	16.5 (3.3)	16.6 (3.7)	-0.03 (3.0)	-1.05	0.99	-0.06	.955
Resilience	15.7 (2.6)	16.3 (2.8)	-0.48 (2.3)	-1.30	0.32	-1.22	.231
Confidence Level	9.70 (2.6)	10.3 (2.7)	-0.57 (1.9)	-1.21	0.07	-1.82	.079
Physical symptoms	13.9 (2.8)	13.9 (3.1)	0.06 (2.2)	-0.69	0.81	0.15	.878
Energy Levels	13.4 (3.2)	13.1 (3.1)	0.31 (2.7)	-0.61	1.23	0.69	.492
PRESSURE							
Workload	20.4 (4.7)	20.6 (5.8)	-0.14 (4.1)	-1.56	1.27	-0.21	.839
Relationships	30.5 (5.4)	30.6 (5.8)	-0.11 (3.6)	-1.35	1.11	-0.18	.852
Recognition	14.4 (3.0)	14.4 (3.4)	0.00 (2.3)	-0.79	0.79	0.00	1.00
Org. Climate	14.9 (2.2)	15.2 (2.5)	-0.31 (1.9)	-0.97	0.34	-0.98	.336
Personal Responsibility	14.8 (3.0)	14.9 (3.4)	-0.08 (2.5)	-0.96	0.78	-0.20	.843
Managerial Role	13.0 (4.0)	13.4 (4.1)	-0.45 (3.1)	-1.50	0.59	-0.88	.383
Home-work Balance	20.1 (4.5)	20.5 (5.1)	-0.31 (4.0)	-1.71	1.08	-0.46	.649
Daily Hassles	13.9 (2.5)	13.9 (2.5)	-0.08 (1.7)	-0.67	0.49	-0.29	.768
IND DIFFERENCES							
Type A Drive	6.80 (2.7)	7.10 (2.3)	-0.28 (2.6)	-1.19	0.62	-0.64	.526
Patience-Impatience	16.6 (2.3)	19.7 (2.8)	-3.14 (3.4)	-4.32	-1.97	-5.45	.000 (S)
Control	16.6 (2.3)	16.0 (3.1)	0.54 (2.8)	-0.42	1.51	1.14	.261
Personal Influence	12.3 (1.7)	12.3 (2.2)	0.08 (2.0)	-0.60	0.77	0.26	.800
COPING SCALE							
Problem Focus	24.4 (3.6)	24.7 (4.7)	-0.25 (3.9)	-1.59	1.08	-0.39	.699
Life-Work Balance	16.9 (2.7)	17.3 (3.7)	-0.43 (2.9)	-1.44	0.58	-0.86	.395
Social Support	12.6 (2.3)	13.1 (2.7)	-0.49 (2.7)	-1.41	-0.44	-1.07	.294

Most sub-scales show the mean-differences are not significant at $p<0.05$ except for 2 sub-scales of patience-impatience and job satisfaction.

Table II: Internal Consistency. Test Retest Reliability and Intraclass

PMI 22 Subscales	No Of Items	[William & & Cooper's]	Pearson 's r (Loh, 2001) Pearson 's r	Pearson 's r Sig (2-tailed)	Cronbach's Alpha	Intra class Coefficient
JOB SATISFACTION						
Job Satisfaction	6	0.89	0.434**	0.009	0.61	0.58
Org. Satisfaction	6	0.83	0.890**	0.000	0.94	0.94
Org. Security	5	0.77	0.637**	0.000	0.77	0.77
Org. Commitment	5	0.75	0.642**	0.000	0.78	0.79
HEALTH						
State of Mind	5	0.82	0.641**	0.000	0.78	0.78
Resilience	4	0.70	0.629**	0.000	0.77	0.77
Confidence Level	3	0.70	0.753**	0.000	0.86	0.85
Physical symptoms	3	0.72	0.732**	0.000	0.84	0.85
Energy Levels	4	0.79	0.629**	0.000	0.77	0.77
PRESSURE						
Workload	6	0.84	0.708**	0.000	0.82	0.82
Relationships	8	0.88	0.795**	0.000	0.88	0.89
Recognition	4	0.85	0.751**	0.000	0.85	0.86
Org. Climate	4	0.78	0.683**	0.000	0.81	0.81
Personal Responsibility	4	0.79	0.690**	0.000	0.81	0.82
Managerial Role	4	0.73	0.713**	0.000	0.83	0.83
Home-work Balance	6	0.83	0.658**	0.000	0.79	0.79
Daily Hassles	6	0.64	0.768**	0.000	0.87	0.87
IND DIFFERENCES						
Type A Drive	5	0.72	0.453**	0.006	0.62	0.62
Patience-Impatience	5	0.80	0.121 (NS)	0.489	0.21	0.13
Control	5	0.72	0.485**	0.003	0.64	0.63
Personal Influence	3	0.71	0.512**	0.002	0.66	0.67
COPING SCALES						
Problem Focus	6	0.80	0.590**	0.000	0.72	0.73
Life-Work Balance	4	0.73	0.611**	0.000	0.73	0.74
Social Support	3	0.80	0.427*	0.010	0.59	0.59

** Correlation is significant at the 0.001 levels

* Correlation is significant at the 0.0 5 level

All correlations are significant except for 1 subscale (patient-impatience)

Internal consistencies and ICC coefficients are all above o.7 (excepts for 1 subscale from Job satisfaction And all 4 subscale from "Individual Differences" Scale)

Discussion

a) The reliability Check

Based on a guideline for ICC values on reliability of work related assessments [12], this study indicates that majority of the scales are above 0.75 (good reliability). Only one sub-scale (item 2) has the value of above 0.90, which is the value needed for clinical application to ensure valid interpretation of findings. There are six sub-scales (item 16-22), which was found to be below 0.75 (poor to moderate reliability). Therefore, caution needs to be exercised in these scales with low reliability such as individual differences and social support.

Secondly, the guideline on alpha-value for work-related-assessment states that a value exceeding 0.50 is adequate for a pilot study, 0.70 for research with grouped data, and 0.95 is required in order to make important decisions about an individual [13]. Using this guideline, most scales in the PMI can be considered adequate for group comparison (except for social support and individual differences). Only one sub-scale, the organizational satisfaction (alpha of 0.94) has high internal consistencies. Therefore, overall the findings may suggest that the PMI is not precise enough for individual diagnostic purposes, but is adequate for group comparison study.

Specifically, individual-differences and social-support has low reliability with its lowest in the patience-impatience sub-scales. A possible reason is that perception of 'individual-differences' is more subjective in comparison with other more objective scales. Therefore there is a greater variation over time and with it, a lower reliability value. In contrast, pressure scale has very good reliability as most of the items within this scale can be measured objectively.

Similarly, social support is rather subjective, but what appear to be more crucial is that, there are only 3 questions to represent this scale. Thus, low reliability is expected in scales with low items, and in line with the Malaysian's extended family system, perhaps there should be some questions on use of family members and relatives as support system, rather than merely referring to friends in particular. Individual differences particularly patient-impatience although have sufficient items but the questions allow great response variation. This perhaps can be improved by adding the words, "in most situations" or "most of the time"... so that the questions are more precise since they actually intend to measure a stable trait that should yield high reliability.

In contrast, those items measuring attitudes normally has low reliability as attitudes vary over time. However, measurement of type A behavior has been doubtful due to the confusing operational precision and construct validity as discussed in the literature review. Thus this justifies the low reliability coefficients here. In conclusion, the PMI as a whole is a reliable tool to measure pressure at work in a Malaysian population.

b) The validity check

Issues raised related to women's health includes menstrual disturbances, premenstrual-tension related syndromes, fitness status, any physical conditions or diseases that may influence /aggravate /spill-over to stress at work. Issues related to home-environment includes violence at home, distressing family relationship, burden at home such as financial, care for elders, care for children and/or care for sick spouse. The PMI do not address these issues directly, although there are representative items from homework balance and daily hassles. These needs to be expanded because recent research shows that these factors influence work stress, although its causal relationship with stress at work is not that clear. Work to home spillover occurs just as home to work; although there were claims that work to home spillover was more powerful[14].

In synthesizing these evidences, the overall consensus appears to suggest that PMI, with minor adjustment on wordings and sentence constructions has high face and content validity as a stress tool to measure the work stress of the average Malaysians.

Implications from study

Two implications can be drawn from this study. The first is directly related to the use of PMI for early identification (measurement) of stress at work for Malaysian in general. The second relates to measurement of occupational pressure of the female workers. These implications reflects the paradigm shift in the current management of occupational pressure from I) curative-focused towards preventive-focused, and ii) workers' sole responsibilities towards organizational-shared responsibility, thus reflecting a shift from an isolated to a more proactive and holistic approach to manage stress.

First, the use of the multivariate PMI as a stress tool to objectively measure stress in the organization can be recommended, as it is a valid and reliable tool to detect

a wide range of variables in the stress process. Primary intervention means identifying the stressor early and emphasizing preventative measures.

Secondly, objective questionnaire may not be able to adequately illuminate specific stressor related to a particular group such as working women. Therefore, highly pertinent women issues such as work-home spillover, poor home environment, family relationship, violence at home and women-related health problem, needs to be further illuminated with qualitative interview, to supplement and complement the PMI.

Conclusion

In conclusion this study provides evidence that PMI is, in general, a valid and reliable tool for measuring occupational pressure of Malaysians. It is a suitable, industry level tool, as both the Cronbach alpha and Pearson's r are 0.7 and above for most scales. However, care need to be taken when interpreting scales with lower values and supplementary tools may be needed for illuminating pressure pertaining to specific population such as working women. As most scales in the PMI (except for social support and individual differences) qualified the above 0.7 coefficient value and based on the work assessment guideline [13], it can be suggested that PMI is adequate for group comparison. In summary, PMI can be recommended as a tool to measure organizational stress of groups of workers, although it is not precise enough for making individual decisions.

Overall the use of PMI provides evidences to promote the current paradigm shift on work-stress management which emphasize:

i) preventive rather than curative focus, and
ii) organizational-responsibility rather than sole worker responsibility.

The psychological health and occupational well being of the health care workers should be given due emphasis so that they remain committed, effective and healthy. This helps ensure that their level of empathy, caring and respect for patients most in need of care are maintained / enhanced. Staffs who are distressed will be less effective in what they do, as tension and ill-health can undermine job performance. Employer has a duty to ensure that the workplace is safe and healthy for all workers, regardless of occupational status, creed and race. Therefore, the need for a valid tool is timely and necessary for stress monitoring and to help identify the hidden, and often-neglected psychosocial stressors at work.

Acknowledgements

Resource Center, Harrogate, United Kingdom for permission to use the copyright Pressure management Inventory. Dato Dr Abdul Aziz and participating psychiatrists from the Department of Psychiatry, HKL; Ms YS Chin and the post-basic ICU students, Nursing Sister Ding and Neuro 5B staff nurses, HKL. Dr K.F. Quek and Professor W.Y. Low from University Malaya, Faculty of Medicine; Mr H.S. Liang. Clinical Research Center. HKL

(This study is part of the research on Occupational Pressure amongst the female allied health professionals in HKL)

References

1. Raymond C. Stress - the real millennium bug. Stress News 2000; 12: 4.
2. O'Donnell K. Women more at risk of stress. BBC Health Online News 2000; October 16: 13: 21 GMT 14:21 UK. Available online: news.bbc.uk/hi/English/health/newsid-97400/974638.stm.
3. Singh S. Women power rising in the civil service. New Strait Times (M). 1999; July 5th.
4. Gladding ST Counseling – a comprehensive profession (4th ed.). Merrill, Prentice Hall, 2000.
5. Lee CP. Women more prone to mental illness, New Strait Times (M). 2000: April 17.
6. Muldary TW Burnout and Health Professionals: Manifestations and Management. A Capistrano Publication, 1983.
7. Benjamin L. Understanding and Managing Pressure in the Academic World. Highlights: An ERIC/CAPS Digest. 1987. ED 291017.
8. William S & Cooper, CL. Measuring Occupational Pressure: Development of the Pressure Management Indicator. J. Occ. Health Psychology 1998; 3(4): 306-21.
9. Hicks C. In Experimental Designs, Open Learning Foundation. 1990.
10. Cooper CL, Sloan, SJ, and Williams, S. Occupational Pressure Indicator. Windsor: NFER-NELSON Publishing 1988.
11. Hopkins WG A new view of statistic: Reliability calculation and more 1998. Avail on line http://www.uq.edu.au/~hmrburge/stats/relycalc.html#signif.
12. Portney LG, Watkins MP. Foundations of Clinical Research: Applications to Practice, 2nd ed. Norwalk, CT: Appleton & Lange 2000.
13. Watkins D. Assessing the approaches to learning. Assessment and evaluation for Higher Education, 1992; 17(1): 11-20.
14. Lingren HG. Work and Family: Today's Juggling Act, Electronic version pubs@unl.edu; 1998.