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## The causes and effects of work stress in construction project managers: the case in Sri Lanka

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This study aims to identify the critical stressors causing work stress with their effects on the performance of construction project managers (CPMs). The study was conducted in northern and eastern Sri Lanka where a significant rise in construction works was observed with the end of the ethnic war. Primary data were collected through conducting a survey of CPMs who work in a variety of construction entities and the data was statistically analysed. The findings reveal key sources of stress related to tasks, organizational settings, physical conditions and personal situations. Although general studies show that stress at a certain level is favourable and positively affects performance, in the studied context, a negative impact on task, interpersonal and organizational performance was found due to the high level of stress encountered by CPMs. Several recommendations are offered for practitioners to cope with high level of stress.

**Keywords:** construction project managers; stress; stressor; performance; Sri Lanka; stress coping

### Background

Construction project managers (CPMs) are one of the key personnel to achieve project success. Stirring all project team members to perform to the best of their ability while meeting cost, time and quality targets of the project and dealing with various stakeholder requirements put immense pressure on CPMs. Hence, Leung et al (2009) reveal that CPMs encounter a great deal of stress on construction projects. Haynes and Love (2004) state that the level of stress inducement encountered by construction managers is significantly higher than that of managers in other industries. The construction industry is more complex and difficult to manage compared to other settings, due to its highly fragmented nature with projects that are managed by temporary multiple organization settings.

Several studies on stress have been conducted over the past decade, generally in construction in different contexts. For example, according to the survey conducted by CIOB (2006) in the UK, participants in the construction industry suffer a high level of stress. Their results show that 68.2% had suffered from stress, anxiety or depression as a direct result of working in the construction industry. In particular, there are several studies that attempt to understand the work stress of construction site managers and operatives (for example, Sutherland & Davidson 1989; Djebarni 1996; Ng et al. 2005; Wong et al. 2010). Noteworthy is the work of Leung and her team in Hong Kong (Leung et al. 2008, 2009, 2011), which develops a wider understanding of causal relationships of stress among construction professionals. Love et al. (2010) further emphasize that higher stress levels are experienced by professionals working for contractors compared to consultants in Australia. A recent study by Zawawi et al. (2014) highlights the case in Malaysia where they report that around 68% of the professionals have experienced occupational stress in construction.

Most of above studies either discuss the stress of construction professionals in general or the stress of site staff. Research studies on the stress of CPMs are relatively fewer and mainly centred in Hong Kong – see the series of studies conducted by Leung and her team. More studies in different contexts are needed to establish that CPMs encounter very high levels of stress compared to other professionals in construction projects. In particular, there are no studies undertaken in developing countries like Sri Lanka, where advanced technologies and innovative methods are less utilized in the construction industry (Hadiwattege & Senaratne 2012; Priyadarshani et al. 2013), which could further add to the stress levels of project managers. Recently, significant construction activities were undertaken in northern and eastern provinces in Sri Lanka, creating high demand for construction project managers to complete projects within tight time scales and budgets, to the required quality while also satisfying various construction parties including the client and various funding agencies. Since little is known with respect to stress levels faced by CPMs under these circumstances, this study aimed to investigate those CPM's perspective on factors causing stress, its level and its impacts on their performance.

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## Literature review

### *Stress levels*

Stress is a complex phenomenon that encompasses social, psychological and physiological imperatives (Lazarus & Folkman 1984). It refers to an internal state, which results from frustrating or unsatisfying conditions. The concept of stress was first introduced in 1936 in the life sciences by Dr Hans Seyle, who was known as the father of stress research. Among various definitions of stress, the most commonly accepted was given by Lazarus and Folkman (1984). According to them, stress is a condition experienced when a person perceives that demands exceed an individual's resources. According to this definition, people do not feel that stressed when they have sufficient resources such as time and experience to manage a situation.

Stress can be either harmful or helpful depending on the circumstances involved. Seyle (1993) divided stress into eustress and distress. Eustress is healthy stress related to happiness, hopefulness and purposefulness. Distress is damaging stress. However, one person may look at a stimulus and see it as a challenge leading to mastery and growth, while another person sees the same stimulus as a threat, leading to stagnation and loss. Stress, therefore, should be viewed as a continuum along which an individual may pass, from feelings of eustress to those of mild or moderate distress to those of severe stress.

Later, researchers (for example, Leung et al. 2007) identified two types of stress called subjective stress and objective stress. Subjective stress is seen as resulting from internal factors and is related to one's subjective feelings. Objective stress is caused by external factors and occurs as a result of events experienced. According to Haynes and Love (2004), many external factors cause objective stress of CPMs, such as number of project deadlines, the number of tasks (meetings, site visits) and the difficulty of tasks (complex decision making, various resources allocations). These could also trigger subjective stress, leading to dissatisfaction, loss of confidence and feelings of depression.

Researchers also identified two other levels of stress, which emerge when the sources of job stress are chronic and continuous: namely, burnout and physiological stress. According to Maslach et al. (1996), burnout is a syndrome of emotional exhaustion, depersonalization and reduced personal accomplishment that can occur among individuals within a working group. During the burnout state, individuals may make changes in their social life such as avoiding communication with people at work, low motivation and commitment at the workplace. According to Mellner et al. (2005), physiological stress often appears in the form of headaches, back pain and loss of appetite. Through their structural equation model Leung et al. (2011) explain a linear relationship of these three stress levels for CPMs. Accordingly, Leung et al. (2011) found that job stress (either objective or subjective), when not managed effectively, leads to burnout and burnout in turn leads to psychological stress. Hence, it is important to manage job stress without escalating to higher levels that result in further undesirable effects.

### *Sources of stress*

Sources of stress are termed stressors. They can be events, people or thoughts. The stressors can be grouped into four main categories: 1. Task stressors; 2. Organizational stressors; 3. Physical stressors; and 4. Personal stressors (Gmelch & Chan 1994; Leung et al. 2009), as explained next.

First, task-related stress is caused when there is too much work to do with too little time. Work overload; role conflict and role ambiguity; and, tight time frames could be considered as the task stressors of CPMs. Work overload can take two forms: quantitative work overload created by too many tasks and, qualitative work overload created by a lack of knowledge necessary to complete the task. Demands on CPMs to learn new technologies can create qualitative work overload. Quantitative work overload is often cited in the construction literature. For example, Haynes and Love (2004) found that work pressure and long working hours were the greatest stressors for site managers in Australia. Similarly, rigid time frames in construction projects are often discussed in construction literature. For example, Djebarni (1996) found that insufficient time together with pressure to make urgent decisions with limited information provoke managerial stress.

Second, organizational stressors include the organizational structure, organizational policy and the climate for career development. In construction, the matrix form of project organizational structure is most widely adopted (Gray et al. 1990), which leads to conflicts with functional managers and, therefore, stressful situations. Any policies that do not consider the feelings of employees could cause the employee considerable stress. In terms of the organizational climate, factors such as an unfavourable organizational culture, lack of opportunity for promotion, lack of job security, lack of career guidance and inadequate room for innovation could cause stress. For example, Senaratne and Malewana (2011) revealed that organizational conditions and culture are requisites for construction practitioners to learn and improve; and thereby avoid the qualitative workload mentioned above.

Third, the physical workplace has a great impact on stress levels. Physical stressors refer to the job setting including design and layout of office or work sites. It refers to the environmental sources of stress such as extreme temperatures, noise and vibration, poor air quality and lighting conditions, overcrowding and unsafe working conditions. The

construction sector is often highlighted for undesirable working conditions on construction sites. Hence, Love et al. (2010) emphasize that the quality of the work environment is crucial to improving the ability of construction professionals to cope with stress. It could have different impacts on CPMs, who generally work both at the site and at head office.

Fourth, personal stressors include both intrapersonal and interpersonal stressors. Intrapersonal stressors are considered to be more competitive, aggressive and time-driven, leading to so-called Type A behaviour. Work group cooperation and team spirit contribute to the interpersonal relationships among the project participants of CPMs. In addition, family conflicts and inadequate leisure time also play a major role in inducing stress. Each CPM has a different level of resistance to stressors depending on their personal characteristics and cultural background. Wong et al. (2010) and, recently, Chan et al. (2014) studied cultural influences on stress among construction professionals. Further, Loosemore and Waters (2004) bring another interesting perspective to the male-dominated construction industry by studying how gender influences stress coping behaviour. They found that men and women suffer from different stressors in the construction industry. Personal stressors such as ‘work–family conflict’ and ‘different views from supervisors’ are not only difficult to manage (Ng et al. 2005), but also difficult to isolate to study their impact.

### Effects of stress

According to Abramis (1994), different levels of stress may impact on individuals’ performance in different ways. Among the primary theories that exist on job and performance, researchers have found the inverted U theory relates to most situations. This theory suggests that increasing stress is good to the point beyond which it becomes bad. According to Leung et al. (2011), there is a strong relationship between stress and the performance of CPMs. They discuss three levels of performance as task, interpersonal and organizational performance. With task performance, CPMs need to meet cost, time and quality targets. Interpersonal performance plays a major role in construction projects, which involves multi-stakeholders such as the clients, the design team, consultants, contractors and sub-contractors. Further, organizational performance could be affected by the stress of CPMs. Leung et al. (2011) found that task and organizational performance were mostly affected by different levels of stress such as job stress, burnout and psychological stress for CPMs in Hong Kong. In particular, they found that job stress affects task performance while burnout and psychological stress further affects organizational performance.

### Research problem

The findings of the literature discussed above are synthesized in this section to fully define the research problem of this study.

Figure 1 brings together the findings of the literature in a conceptual framework following the relationship that four types of stressors lead to four types of stress, which ultimately affect three levels of performance. Three research questions were formulated for this study as follows.

*RQ1: What is the most critical type of stressor faced by CPMs in Sri Lanka?*

*RQ2: Which type of stress is most often encountered by CPMs in Sri Lanka?*

*RQ3: What is the relationship between stress and the performance of CPMs in Sri Lanka?*

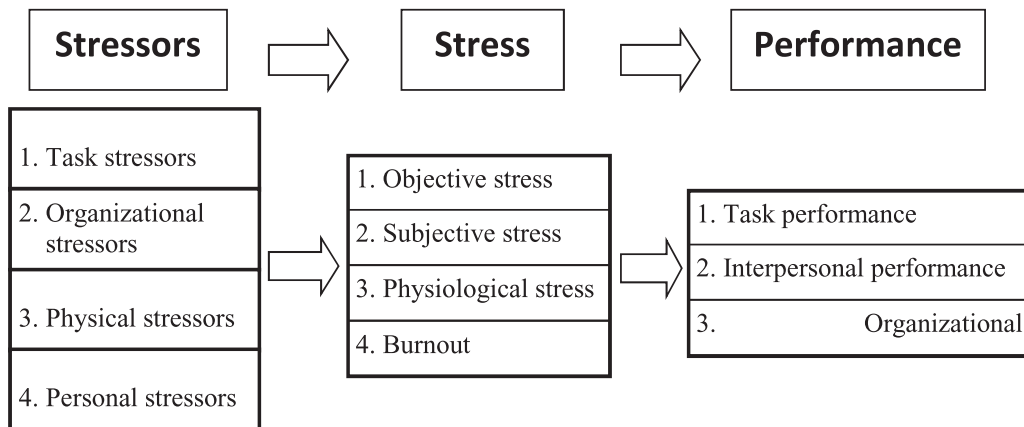


Figure 1. Conceptual framework.

## Research method

This research favours a quantitative study, having posed ‘what’ and ‘which’ types of research questions. Hence, a questionnaire survey was chosen as the research strategy. The questionnaire-based survey is a popular quantitative method, which allows statistical generalization, based on a representative sample.

This research was conducted among a randomly selected (using stratified sampling) sample of 155 CPMs from both the private and public sector and from both consultants and contractors, who were working in different sectors, such as building, irrigation, highways, roads, bridges, water supply and drainage, and combinations of these sectors (local authorities) in the northern and eastern provinces of Sri Lanka. The sample is representative within the selected province. The details of the sample are given in [Table 1](#).

Primary data was collected through the use of a written, structured questionnaire which was hand-delivered and sent by mail to the selected sample. Each questionnaire was prefaced by a paragraph explaining the objectives of the survey and the voluntary nature of respondent participation and assuring the confidentiality of responses and anonymity of respondents. Of the 155 distributed questionnaires, 115 were returned and the response rate is 74%. The initial version of this questionnaire was pilot tested on five respondents in Trincomalee district. Based on the pilot test, minor changes were made to the initial questionnaire. Data collection took place during the April–May 2012.

The questionnaire used in this study was divided into four sections and devised as follows:

- (1) General (personal characteristic) measures (five questions). Here, characteristics such as age, gender, work experience, marital status and nature of organizations were questioned and measured.
- (2) Sources of stress measures (23 questions). For measuring stressors, Leung et al.’s (2009) questions were adopted (see Leung et al. 2009, [Table 4](#), Q1–Q23 for types of questions asked for each identified variable from the literature review). Responses were obtained on a five-point Likert scale ranging from (1) Strongly disagree to (5) Strongly agree.
- (3) For measuring types of stress, two studies were referred to (Gmelch & Chan 1994; Leung et al. 2011), and the questions were devised as below:
  - (3.1) Objective stress was measured in seven questions (see Leung et al. 2009, [Table 5](#), Q24–Q30). Here, to ascertain the difference (b–a), the respondents were requested to rate both their actual ability (b) and expected ability (a) from 1 (None) to 5 (Very high).
  - (3.2) Subjective stress was measured in three questions (see Leung et al. 2009, [Table 6](#), Q31–Q33). The respondents were requested to rate stress from 1 (None) to 5 (Very high). The overall subjective stress was calculated by summing the average score.
  - (3.3) Burnout was measured by four questions (see Leung et al. 2009, [Table 6](#), Q34–Q37). Responses were on a five-point Likert-type format ranging from 1 (Much less than usual) to 5 (Much more than usual). The average score was used to indicate the degree of burnout.
  - (3.4) The physiological stress level was measured by five questions (see Leung et al. 2009, [Table 6](#), Q38–Q42). Respondents were asked to rate their agreement with the statements on a five-point Likert-type format ranging from 1 (Much less than usual) to 5 (Much more than usual). The average score was used to indicate the degree of physiological stress level.
- (4) For measuring performance, eight questions were used based on Leung et al. (2011, [Table 7](#), Q43–Q50). Responses were obtained on a five-point Likert scale ranging from (1) Strongly disagree to (5) Strongly agree.

Table 1. Sampling framework.

Name of district	Project sectors	Population of CPMs	Sample of CPMs
1. Trincomalee	Building, irrigation, highway, road, bridges, water	55	17
2. Batticaloa	supply and drainage, and combinations of sectors	45	15
3. Ampara	(including private and public sectors – contractors’ perspective, clients’ perspective)	39	12
4. Jaffna		80	24
5. Kilinochchi		92	28
6. Mullaitivu		76	23
7. Vavuniya		68	21
8. Mannar		48	15
<b>Total</b>		<b>503</b>	<b>155</b>

The data analysis was carried out in three steps. As a first step, descriptive statistics such as mean scoring were generated. Next, correlation calculations were conducted in order to make an initial assessment of the strength and direction of the relationship between variables. Finally, Chi square tests were conducted to test the significance of these relationships using SPSS packages.

## Results

The collected data were organized into general information, sources of stress (task, organizational, physical, personal), types of stress (objective stress, subjective stress, burnout and physiological stress) and performance (task, interpersonal and organisational) of CPMs.

### General information

General profile of the surveyed sample of 115 CPMs is summarized in Figure 2. The age of the majority of the respondents (42.6%) was between 50 and 59, whereas 27% of respondents were in the age group of 30–39 years, 26.1% of were 40–49 years and 4.3% were aged over 60 years. There was no respondent aged 20–29. In terms of gender, 87.8% of the respondents were male while 12.2% of the respondents were female. Also, 86.1% of the respondents were married and 8.7% of the respondents were single. The majority thus had a spouse and were part of a family unit.

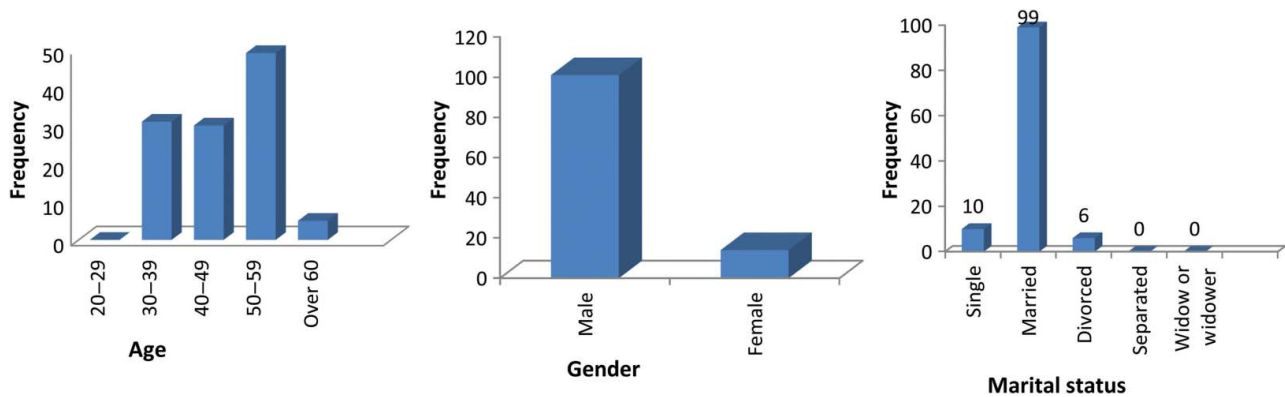


Figure 2. CPM general profile.

In terms of experience, a majority of respondents (44.3%) had experience of more than 15 years in the construction industry while only 6.1% had less than one year's experience, as shown in Table 2.

Further, respondents were working in a variety of organizations ranging from building to civil engineering sectors, as shown in Table 3.

### Sources of stress

The relative importance indices (RII) ranking technique and mean scoring were used in the analysis to identify the sources of stress (stressors). Respondents were asked to rate the degree of their agreement on a five-point scale ranging from 1

Table 2. Experience as CPMs.

Experience	Frequency	Percentage	Cumulative percentage
Less than 1 year	7	06.1	6.1
1–5 years	22	19.1	25.2
6–10 years	10	08.7	33.9
11–15 years	25	21.8	55.7
Over 15 years	51	44.3	100.0
<b>Total</b>	<b>115</b>	<b>100.0</b>	

Table 3. Nature of organizations in which CPMs are working

Nature of organization	Frequency	Percentage	Cumulative percentage
Building	13	11.3	11.3
Irrigation	28	24.3	35.7
Highways	34	29.6	65.2
Water supply	17	14.8	80.0
Local authority/others	23	20.0	100.0
<b>Total</b>	<b>115</b>	<b>100</b>	

(strongly disagree) to 5 (strongly agree).

Relative importance indices (RII) =  $\sum w/A \times N$ , where,

W – Weightings given to each factor (range from 1 to 5),

A - Highest weight (5),

N - Total no of samples

Table 4 presents the RII and mean scores for the four types of stressors measured.

Table 4. Sources of stress vs. mean score and relative important indices (RII).

Factors	Scale items description	Operational variable (OV)	Mean score		
			OV	Factor	% of RII
<i>Task stressors</i>					
Work overload	Q1. My job takes up most of the time I should have for relaxation	Work load	3.59	3.79	72
	Q2. There is constant pressure to work	Work pressure	3.59		72
	Q3. I have a lot of responsibility in my job	Quantitative Work overload	4.07		81
	Q4. My job requires that I learn new knowledge and technology to complete the works assigned satisfactorily	Qualitative Work overload	3.90		78
Poor role congruence	Q5. I am often caught between different parties by conflicting demands	Role conflict	3.56	3.26	71
	Q6. My job responsibilities are unclear and inconsistent	Role ambiguity	2.96		59
Mean score for task stressors			<b>3.61</b>		
<i>Organizational stressors</i>					
Poor organizational structure	Q7. I am working in a politicized environment	Politicized environment	3.44	3.23	69
	Q8. The entity that I am working for is bureaucratic	Bureaucratic structure	3.26		65
	Q9. I often feel unfairly treated by the organization	Poor recognition for employees	3.00		60
Career development environment	Q10. My organization provides me with a stable job, job focus and promotion opportunities	Promotional aspects	3.15	3.18	63
Career development environment	Q11. I participate in deciding on issues affecting the organization	Empowered in decision making	3.23		65
	Q12. I feel comfortable with the climate and culture of this organization	Organizational climate and culture	3.15		63
Mean score for organizational stressors			<b>3.20</b>		

(continued)



Table 4. (Continued)

			Mean score		
Factors	Scale items description	Operational variable (OV)	OV	Factor	% of RII
<i>Physical stressors</i>					
Poor work environment	Q13. My office is too crowded	Too crowded	2.98	3.19	60
	Q14. My office is too noisy	Noisy	3.03		61
	Q15. The temperature in my office is too hot	Too hot	3.66		73
	Q16. There are many interruptions and disturbances in my work environment	Poor physical layout	3.10		62
Poor home environment	Q17. I am not satisfied with my home environment.	Poor home environment	2.38	2.38	48
Mean score for physical stressors			<b>3.03</b>		
<i>Personal stressors</i>					
Work group cooperation	Q18. I have a good relationship with my superiors	Superior relations	3.48	3.46	70
	Q19. My subordinates are trustworthy and friendly	Subordinate relations	3.43		69
Type A behaviour	Q20. My colleagues trust and respect me	Colleagues relations	3.47	3.68	69
	Q21. People sometimes say that I easily lose my temper	Irritation	3.33		67
	Q22. I do not go home before I have finished what I have planned	Achievement	3.75		75
	Q23. I demand high quality in my work	Perfectionism	3.97		79
Mean score for personal stressors			<b>3.57</b>		

According to Table 4, the mean score for task stressors, organizational stressors, physical stressors and personal stressors are 3.61, 3.20, 3.03 and 3.57 respectively. This denotes that the major sources of stress were from task and personal stressors, while physical stressors were clearly lowest. Almost all stressors tested were above or closer to 60% RII except poor home environment. Quantitative and qualitative workloads represented the most significant stressors scoring 81% and 78% RII. Further, perfectionism related to Type A behaviour was significantly identified at 79% RII. On the whole, the task stressors remained the most dominant factor among the stressors faced by CPMs.

#### *Analysis of level of stress of construction project managers*

The level of stress was measured based on the responses from CPM for questions designed as given in Table 5. The respondents were requested to rate their actual ability (b) and their expected ability (a) for the seven scales. The overall objective stress would then be calculated by summing the difference between the rating of b and a (b-a) on these seven items according to the e115 respondents' objective scores.

It is interesting to note that although the CPMs identified time targets as one of the most significant stressors, when measured, most of them found that they are capable of managing the set deadlines (lower mean score at 43) and also handling difficult tasks (lower mean score at 0.49).

Table 5. Measures for objective stress.

Factors	Variable	Scale items/measures (questionnaire)	Difference (%)
Objective stress	Deadlines	Q24. The number of project deadlines I have to meet/am capable of meeting	0.43
	Number of tasks	Q25. The number of tasks I have to do/am capable of doing	0.77
	Level of difficulty	Q26. The level of difficulty of work I have to do/am capable of doing	0.49
	Quality of work	Q27. The quality of work I have to produce/am capable of producing	0.78
	Responsibility of work	Q28. The scope and responsibility of work I have to take/am capable of handling	0.79
	Degree of complexity	Q29. The degree of complexity of work I have to do/am capable of doing	0.66
	Number of projects	Q30. The number of projects I have to do/am capable of doing	0.70



Table 6. Measures for other types of stress.

Factors	Variable	Scale items/measures (questionnaire)	Mean
Subjective stress	Degree of satisfaction with environment	Q31. My workplace environment and climate are not very pleasant or satisfactory	2.70
	Feeling of depression	Q32. I feel depressed in my occupation	2.98
	Confidence in the organization	Q33. I have full confidence that the organization that will help me in the future	3.30
<i>Overall for subjective stress</i>			
Burnout	Changes in the social life of individual	Q34. I avoid people at work and in my private life	3.13
	Attitude to work (low motivation and commitment)	Q35. My attitude about work is 'why bother'	2.95
	Avoid communicating with others	Q36. Communicating with others is a strain	3.19
	Low accomplishment	Q37. I work hard but accomplish little	3.12
<i>Overall for burnout</i>			
Physiological stress	Appears in the form of headaches and migraines	Q38. I often have headaches and migraines	2.83
	Appears in the form of back pains	Q39. I sometimes have back pain	2.93
	Appears in the form of sweating, palpitation and trembling	Q40. The problems of sweating, palpitation and trembling are usual for me	2.92
	Appears in the form of appetite	Q41. I lose my appetite when undertaking a time-limited project	3.15
	Appears in the form of skin disorder	Q42. I have skin problems such as skin irritation and skin disorders	2.44
<i>Overall for psychological stress</i>			
			2.85

The findings show that CPMs were suffering from a considerable level of stress (close to or above 3), in particular from 'burnout', which was highest at a mean score of 3.10. The statements which scored the highest points (3.19 and 3.15) were question number 36 'Communicating with others is a strain' and question number 41 'I lose my appetite when undertaking a time limited project'. The only statement that received less than 2.5 mean score was related to skin disorders.

#### *Analysis of the impact of stress on the performance of construction project managers*

Task performance was tested using questions related to cost, time and quality targets of projects. Interpersonal performance was tested using questions that explored how CPMs get on with others. Organizational performance was measured using questions on CPMs' role in their organization (see Table 7 for the questions).

One way to determine the relationship between stress and performance is to correlate the participants' favourableness scores. Therefore, Pearson's correlation between types of stress (objective stress, subjective stress, burnout, physiological stress) and performance, in terms of task performance, interpersonal performance and organizational performance, were conducted using the SPSS package (see Table 8).

Table 7. Performance measures.

Factors	Variable	Scale items/measures (questionnaire)
Task performance	Cost	Q43. I can control the project during the project period
	Quality	Q44. I can meet the client's requirements easily
	Time	Q45. I have an ineffective schedule during planning
Interpersonal performance	Interpersonal relationship	Q46. I often feel less respect for those I am working with
	Good cooperation	Q47. I can get along well with others at work
Organizational performance	Poor organizational relationship	Q48. I dislike the organizational climate and culture
	Group cohesiveness	Q49. I am proud to tell others that I am part of this organization
	Willingness to participate in performance	Q50. I find that my values and the organization's values are very different

Table 8. Pearson correlation analysis between overall stress and overall performance.

Variable	Objective stress	Subjective Stress	Burnout	Physiological Stress	Task performance	Interpersonal performance	Organizational performance
<i>Objective stress</i>							
Pearson's correlation	1.000						
Significance (two-tailed)	0.000						
N	115						
<i>Subjective stress</i>							
Pearson's correlation	0.334**	1.000					
Significance (two-tailed)	0.000	0.000					
N	115	115					
<i>Burnout</i>							
Pearson's correlation	0.696**	0.299**	1.000				
Significance (two-tailed)	0.000	0.001	0.000				
N	115	115	115				
<i>Physiological stress</i>							
Pearson's correlation	0.717**	0.352**	0.790**	1.000			
Significance (two-tailed)	0.000	0.000	0.000	0.000			
N	115	115	115	115			
<i>Task performance</i>							
Pearson's correlation	-0.594**	-0.319**	-0.725**	-0.635**	1.000		
Significance (two-tailed)	0.000	0.001	0.000	0.000	0.000		
N	115	115	115	115	115		
<i>Interpersonal performance</i>							
Pearson's correlation	-0.609**	-0.159**	-0.613**	-0.621**	0.579**	1.000	
Significance (two-tailed)	0.000	0.089	0.000	0.000	0.000	0.000	
N	115	115	115	115	115	115	
<i>Organizational performance</i>							
Pearson's correlation	-0.519**	-0.307**	-0.513**	0.526**	0.526**	0.380**	1.000
Significance (two-tailed)	0.000	0.001	0.000	0.000	0.000	0.000	0.000
N	115	115	115	115	115	115	115

\*\* Correlation is significant at the 0.01 level (two-tailed).

Pearson's correlation analysis indicated negative correlation coefficients of -0.594, -0.609, -0.519 between objective stress and task, interpersonal and organizational performances respectively. Further, Pearson's correlation coefficients of -0.319, -0.159, -0.307 were found between subjective stress and task, interpersonal, organizational performance. Pearson's correlation coefficients of -0.725, -0.613, -0.513 were found between burnout and task, interpersonal, organizational performance. Also, correlations were found between physiological stress and task performance (-0.635), interpersonal performance (-0.621) and organizational performance (-0.498). These clearly indicate that a negative predictive relationship exists between these stress types and the performance of CPMs.

Chi square tests were carried out to test the significance of those differences. The Chi square test is used when respondents have been allocated to categories on two variables. If the significance value is equal to or less than 0.05, it can be concluded that the Chi square test indicates that there is a significant association between the two variables. The Chi square test confirms the significance ( $p = 0.000$ ) at significance level of 0.05 (two-sided) (see Table 9).

Table 9. Chi square test results among stress and performance.

Variable	Objective stress	Subjective stress	Burnout	Physiological stress	Task performance	Interpersonal performance	Organizational performance
Chi square	56.600	63.539	42.93	52.817	28.452	35.496	51.530
Degree of freedom	21	11	17	20	12	08	10
Asymp.sig	0.000	0.000	0.000	0.000	0.005	0.000	0.000

Overall, the results suggest a strong and significance level of negative correlation between stress and performance of CPMs.

### **Discussion of results**

As the results revealed, major sources of stress for CPMs in northern and eastern Sri Lanka were from task and personal stressors. When reviewing findings from the literature, this finding is mostly consistent with the findings related to site managers (for example see Djebarni, 1996; Haynes & Love 2004). However, physical stressors were lowest and the impact of the home environment was found at the minimum level. This is contradictory to Hayes and Love (2004), who identified the third critical stressor of construction site managers as the family/home environment. The reason could be, as revealed through the survey, that most CPMs work in head offices and visit construction sites from time to time, and therefore are less affected by the unfavourable work environment at construction sites. Further, CPMs are well paid and generally have better living conditions than the average worker. Hence, impacts from the home or office environment on CPMs was reported to be minimum.

In terms of the types or level of stress that CPMs are suffering, the findings revealed a considerable level of unhealthy stress, which was more at a 'burnout' level. The high workload has led most CPMs to reduce communication with work colleagues, and even bypass their meals to meet strict time targets. These findings are consistent with Leung et al. (2011), who found that job stress leads to burnout which if ignored would lead to more severe stress at the 'psychological' level necessitating medical treatment. The effect of the unfavourable stress observed in CPMs has not only affected their task performance, but also interpersonal and organizational performance at a collective level. Consistent with Leung et al. (2011) in Hong Kong, this study further confirms a strong and significant level of negative correlation between stress and performance of CPMs. Hence, although the general literature confirms an inverted relationship, the stress of CPMs shows a negative relationship, mainly owing to the high workload with strict time targets that they commonly experience in the construction industry.

### **Conclusions**

The result of this study confirms that construction project managers (CPMs) suffer from different types of stress such as objective stress, subjective stress, burnout and physiological stress. The overall level of stress was considerable, with evidence of 'burnout' stress. This high level has led to a negative impact on performance (task, interpersonal and organizational) of construction project managers in the studied context.

This implies that it is important to exercise preventive stress coping strategies to consistently maintain low stress levels in CPMs. There are several stress coping strategies identified in the literature, which would help CPMs to avoid high levels of stress. For example, Haynes and Love (2004) view problem-focused coping, which is aimed at reducing the demands of stressors, as more appropriate for CPMs. This could be done as Leung et al (2008) suggest by reviewing workloads at regular meetings. Zawawi et al. (2014) propose managing stress through self-efficacy. If a positive sense of self-efficacy is built – CPMs' self-belief and belief in their ability to handle themselves in an array of situations – stress could be better managed. This is why training through regular stress appraisals and stress management workshops (Djebarni 1996; Haynes & Love 2004) are effective.

However, the organizations need to provide time and space for CPMs to interact with other colleagues. As Leung et al. (2011) identify, support from the workgroup is the most direct resource to help in coping with stress. Love et al. (2010) suggest managing stress at other levels too. For example, at the individual level, focus on diet, exercise, cognitive techniques and relaxation training; at the team level focus on supervisory training, team building and sensitivity training; and at the organizational level, focus on modifying work times/shifts, reducing physical hazards, improving career ladders, modifying the use of training and technology, job rotation, and enrichment and empowerment.

Further, the identified stressors could be managed by CPMs as follows:

- Task stressors dominated the sources of stress among the construction CPMs. Hence, it is recommended that regular (weekly, monthly) progress review meetings and site meetings be conducted among key parties in order to reduce work overload and poor role congruence (role conflict and role ambiguity).
- Personal stressors were also found as a significant source of stress. To overcome this, it is recommended to strengthen cooperation between the CPMs and their work groups.
- Organizational stressors also contributed to sources of stress. It is recommended that organizations maintain adequate training and development.
- Finally, physical stressors contributed least to sources of stress for CPMs. However, construction entities should take reasonable care to provide a comfortable working environment both in the office and on-site.

Hence, with regard to stress management of CPMs, a collective effort is required, with the top management's attention and the individual's commitment. Further research could explore how different stress coping strategies assist in managing the stress levels of CPMs.

### Disclosure statement

No potential conflict of interest was reported by the authors.

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