

# Impact of Stress on the Performance of Construction Project Managers

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**Abstract:** The work of construction project managers (CPMs) is often highly stressful, due to time pressures, and due to the uncertainties and the dynamic social structure involved in construction projects. This study aims to investigate the impact of stress on the performance of CPMs. Correlation analysis and structural equation modeling are employed to uncover the relationships between different types of stress (i.e., objective stress, burnout, and physiological stress) and the work performances (i.e., task performance, interpersonal performance, and organizational performance) of CPMs. Data were collected from 108 CPMs who work in a variety of construction sectors, including prime contractors, subcontractors, developers, consultant firms, and the public sector. Results showed that (1) objective stress reduces the *task performance* of CPMs while burnout can have a positive effect on it; (2) *interpersonal performance* is maximized with a moderate level of objective stress (i.e., an inverted-U-shaped relationship between these two variables) and increases in line with the improvement of the task performance of individuals; and (3) *organizational performance* has U-shaped relationships with both burnout and physiological stresses and is worsened by objective stress. Last, it is suggested to stakeholders that regular reviews of job allocation, stress appraisals, stress management workshops, group or individual counseling, and psychological treatment or physiotherapy be carried out to optimize the stress and the performance of CPMs.

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## Introduction

Numerous researchers have investigated the impact of stress on performance of different professionals, such as nurses (Dailey et al. 1986), teachers (Byosiore 1988), and policemen (Collins and Gibbs 2003), but investigations of the impact of stress on the performance of construction project managers (CPMs) have rarely been conducted. According to a recent occupational stress study in the construction industry (CIOB 2006), nearly 70% of construction professionals suffer from stress, anxiety, or depression. There is clearly a need for more research on the impact of stress on construction professionals.

CPMs are generally considered key persons in the success of a construction project. The role of CPMs includes not only planning, organizing, and supervising the project team and the progress of work in construction projects, but also dealing with demanding time pressures, intrinsic uncertainties, and a dynamic social structure. In addition, this intensive workload is often chronic as CPMs are responsible for a project throughout, from

preconstruction to the completion stage. Since every single decision made by CPMs has a direct impact on time, cost, quality, and the final success of a construction project, it is inevitable that CPMs are subject to a great deal of stress in their work. The decision making of individuals who work in excessively stressful situations is generally more rigid, simplistic, and superficial (Cherrington 1994). Hence, stress is considered to have a negative impact on human beings.

However, stress is not necessarily harmful. As Selye (1976) noted, "Without stress, there would be no life." The stimulus of stress is essential for every successful experience, as it is always accompanied by motivation. Friend (1982) reported negative relationships between stress and the performance of management personnel, while Anderson (1975) found an inverted-U-shaped relationship between these two variables in managers. Leung et al. (2005a) investigated the impact of stress on the performance of construction estimators. It was found that stress leads to poor interpersonal relationships and task performance of cost estimators, and an inverted-U-shaped relationship was found between the stress of estimators and their organizational relationship in the company. Based on the nature of construction project management and the literature on stress, this study aims to investigate the impact of different types of stress on the performance of CPMs.

## Types of Stress Faced by CPMs

Stress is often regarded as a subjective feeling of individuals, in which the demands of work or life exceed the belief of the individual in his or her capacity to cope (Cox 1993). To enable a comprehensive investigation, three general delineated types of stress were incorporated in this study, namely, objective stress, burnout, and physiological stress (Keavney and Sinclair 1978;

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Monat and Lazarus 1991; Appley and Trumbull 1986; Cohen et al. 1995; Cohen and Rodriguez 1995).

### **Objective Stress**

Objective stress refers to the evaluation of a threat arising from cognitive factors. It depends on an individual's perception of his or her ability to carry out a job-related task involving a certain degree of difficulty or challenge. Objective stress is induced due to the discrepancy between an individual's perceived ability and his or her actual ability to deal effectively with tasks (Monat and Lazarus 1991; Leung et al. 2007). In a real situation, there are many cognitive factors affecting the objective stress of CPMs, such as the number of project deadlines, the number of tasks (e.g., numerous meetings, frequent site visits, many phone calls, etc.), and the difficulty of the tasks (e.g., complex decision making, multitask programs, various resource allocation duties, etc.) (Haynes and Love 2004).

### **Burnout**

Fatigue and frustration occur due to the failure of work, of life, or of relationships to produce the expected reward (Freudenberger 1983). Human beings normally react to stress with a range of different behaviors (Cohen et al. 1995; Keavney and Sinclair 1978). The symptoms of burnout include changes in the social life of individuals (i.e., CPMs may avoid communicating with people at work or in their private life) and attitude to work (i.e., low motivation and low commitment at work due to prolonged frustration, and frequent grumbling about low accomplishment) (Drago et al. 1986). All of these factors directly affect the work performance of CPMs and, thus, indirectly, the success of a project.

### **Physiological Stress**

Stress can affect human beings physiologically (Greenberg 2003). When the body is exposed to certain stressful situations, hormones will be released from the brain in order to support the other parts of the body during the changes or stressful circumstances. The body then tries to overcome stress by physiological adjustments. After some time, these adjustments can revert to normal if the body is no longer affected by any stressors. This process, in which the body prepares itself to deal with a threat, is named the "fight-or-flight response" (Cannon 1963; Allen 1983). However, if the stressful conditions continuously influence a person, the physiological adjustments may then persist. Physiological stress gradually appears in the form of headaches, back pain, loss of appetite, and so forth (Mellner et al. 2005). Research has found that the physiological stress of managers is generally caused by role ambiguity, lack of feedback, career development difficulties, and problems involving the organizational structure (Weiss 1983).

### **Performance of CPMs**

Unlike other construction professionals, the role of CPMs requires involvement with the project from its inception to its completion. Specifically, CPMs are responsible for time, cost, quality, safety, and environmental aspects of construction projects (i.e., on-time completion, cost within budget, quality acceptable to clients but in keeping with regulations, low accident rates on site, environmentally friendly construction methods and materi-

als, etc.). From assessing the viability of the project in the pre-construction stage to responding to feedback from the client in the postconstruction stage, CPMs act as a project's communication bridge between clients, project team members (e.g., architects, structural engineers, building services engineers, surveyors, suppliers, subcontractors, etc.), and the construction company (CIOB 1996). The nature of project management suggests that the quality of three types of performance by CPMs is critical to their success. They are *task performance*, *personal performance*, and *organizational performance* (Leung et al. 2005a, 2006).

### **Task Performance**

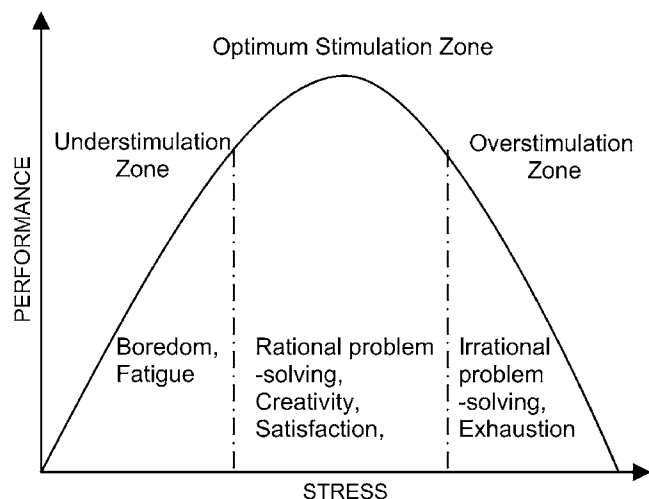
A poor task performance by CPMs usually means faulty decision making. There are three common criteria for measuring the task performance of a CPM: the duration, the cost, and the quality of construction projects (CIOB 1996; Jang et al. 2003; Olomolaiye et al. 1998; Walker 2002). In order to perform successfully in these three key areas, CPMs must consider the control of the project duration and the effectiveness of the planned schedule (time), the ability to meet the requirements of clients (quality), and the control of the project sum (cost). As site safety and environmental matters are the other essential elements on a construction site, CPMs are also required to consider the safety and environmental aspects of construction projects (Fryer 2004). Stress definitely affects the task performance of CPMs (Haynes and Love 2004), especially with the increasing demands, constraints, and complexity in the industry.

### **Interpersonal Performance**

Construction projects often involve multistakeholders, such as the client, the design team, the consultants, contractors, and subcontractors. Communications and interactions between stakeholders directly influence the success of projects. CPMs, who act as a vital link among stakeholders (CIOB 1996), need to be equipped with good interpersonal skills in order to make sure construction projects can be carried out smoothly and completed according to the program. However, stress does not only affect the daily life of individuals, but also induces a lack of concern for their colleagues, as well as disrespect for, distrust of, and dislike of those they are working with (Defrank and Cooper 1987; Holt 1993). Hence, stress influences the interrelationships between colleagues, supervisors, and subordinates. It most definitely affects the assigned tasks, the performance of construction projects, and the satisfaction of the construction clients (Wolfgang 1991).

### **Organizational Performance**

The effect of stress is not limited to individual behaviors or specific projects. To a certain extent, stress can further influence organizational effectiveness, and this is especially important to employers. Organizational ineffectiveness simply refers to the financial impact on an organization resulting from poor employee performance (McGrath 1976) such as withdrawal behavior in an organization (Schuler 1982; Nandram and Bert 1993). Withdrawal behavior may occur when there is a gap between the organizational and the personal values of employees (Defrank and Cooper 1987; Djebarni 1996). The most common forms of withdrawal behavior are absenteeism from project meetings or even leaving the company (Gupta and Beehr 1979; Schuler 1982; Nandram and Bert 1993).



**Fig. 1.** Inverted-U-shaped relationship between stress and performance (Yerkes and Dodson 1908; Anderson 1976; Meglino 1977; Gmelch 1982; Jex 1988; Leung et al. 2005a)

## Stress and Performance

Up to the present, researchers have reached no definite consensus on the relationship between stress and performance. According to Zajonc (1965) and Meglino (1977), there is a positive relationship between stress and performance for simple tasks, while an inverted-U-shaped relationship is predicted for complex tasks involving many cues. On the other hand, Jamal (1984) and Abramis (1994) revealed a negative linear relationship between stress and performance.

Too much stress was found to have a negative impact on construction professionals (Leung et al. 2005a; Friend 1982; Jamal 1984), while insufficient stress may also induce boredom and a lack of concentration, initiative, or motivation, and can lead to understimulation (Varhol 2000; Cooper and Marshall 1981; Gmelch and Chan 1994). Only “moderate” stress is considered to be healthy, useful, beneficial, and optimal in producing a successful performance by individuals (Gmelch 1982; Yerkes and Dodson 1908; Selye 1976). Therefore, there is an inverted-U-shaped relationship between the degree of stress and the levels of perfor-

mance (Yerkes and Dodson 1908; Anderson 1976; Meglino 1977; Gmelch 1982; Jex 1998; Leung et al. 2005a) (see Fig. 1). With the nature of construction project management being so complicated and dynamic in the industry (CIOB 2006), it is necessary to investigate the impact of stress on the performance of CPMs.

## Research Methodology

A questionnaire was designed and disseminated to construction professionals with direct experience of construction project management. The questionnaires were distributed by fax, by e-mail, or in person to these employees between Oct. and Dec. 2005. Of the 500 distributed questionnaires, 108 were returned, representing a response rate of 21.6%. The respondents worked in a variety of construction companies, including prime contractors (60.3%), subcontractors (6.4%), developers (21.8%), consultancy firms (7.7%), and public sector organizations (3.8%). All the respondents were project managers with extensive experience of construction project management; nearly half of them (49.4%) had accumulated over 20 years’ experience in the construction industry, 44.4% of them had 11 to 20 years’ experience, and the rest (6.2%) had 6 to 10 years’ experience.

Three types of stress were measured in this study, namely, objective stress, burnout, and physiological stress. In order to measure the level of objective stress, the discrepancy between a person’s expected and actual abilities to handle stressors was assessed (Gmelch 1982). The respondents were requested to rate their actual ability (A) and their expected ability (B) in various dimensions (i.e., the number of tasks, the responsibility of the work, the level of difficulty of the work, etc.), selecting ratings from 1 (none) to 7 (a great deal) (Leung et al. 2005a,b, 2006) (see Fig. 2). The overall objective stress was calculated by summing the differences between the ratings under (A) and (B).

A seven-point Likert-type scale was used to measure the burnout levels (Wharton 2004) and physiological stress levels (Greenberg 2003) of the CPMs. The respondents were requested to rate their agreement with the statements, ranging from 1 (much less than usual) to 7 (much more than usual) (see Fig. 2). The average score obtained was used to indicate the degree of burnout and physiological stress level.

To measure the performance of the CPMs, an eight-item scale

Objective Stress (Gmelch 1982)			
	Expected Ability		Actual Ability
1. The number of project deadlines	a) I have to meet	___	b) I am capable of meeting ___
2. The number of tasks	a) I have to do	___	b) I am capable of doing ___
3. The level of difficulty of my wk.	a) I have to deal wi.	___	b) I am capable of dealing wi. ___
4. The quality of wk.	a) I have to do	___	b) I am capable of doing ___
5. The responsibility of my wk.	a) I have to take	___	b) I am capable of handling ___
6. The degree of complexity of wk.	a) I have to do	___	b) I am capable of doing ___
7. The number of projects	a) I have to handle	___	b) I am capable of handling ___
Burnout (Wharton 2004)			
1. I avoid people at work and in my private life.			
2. My attitude about work is "why bother?"			
3. Communicating with others is a strain.			
4. I work hard but accomplish little.			
Physiological Stress (Greenberg 2003)			
1. I often have headaches and migraines.			
2. I have back pain sometimes.			
3. The problems of sweating, palpitations, and trembling are usual for me.			
4. I lose my appetite all the time when undertaking a time-limited project.			
5. I have skin problems, such as skin irritations and skin disorders.			

**Fig. 2.** Statement for measuring objective stress, physiological stress, and burnout level

**Table 1.** Scale Items, Factor Loadings, and Coefficient Alpha Reliabilities for the Performances

Factors	Nature	Items	Factor loading	Alpha
P1	Task performance	1. I can control the project duration within the project period.	0.863	0.813
		2. I can meet the clients' requirement easily.	0.782	
		3. Most of the schedules I plan are effective.	0.844	
P2	Interpersonal performance	1. I am satisfied with the relationship between my colleagues and me.	0.741	0.668
		2. I can get along with others at work well.	0.895	
P3	Organizational performance	1. I have the intention to leave this company.	0.879	0.869
		2. I dislike the organizational climate and culture.	0.912	
		3. It is difficult to achieve my personal goals in this company.	0.879	

Note: All items were measured on a seven-point scale ranging from "strongly disagree" to "strongly agree." Extraction Method: principal component analysis. Rotation Method: varimax with Kaiser normalization. Cumulative variance of the performances=76.93%.

<sup>a</sup>Data being reversed in the analysis.

(see Table 1) was used. Respondents were asked to rate their performances based on a seven-point Likert-type scale ranging from 1 (strongly disagree) to 7 (strongly agree).

## Data Analysis and Results

### Reliability and Factor Analysis

The reliability test showed that all the objective stress (S1), burnout (S2), and physiological stress (S3) data were statistically qualified to be factors in the analysis (Cronbach's alpha equal to 0.785, 0.756, and 0.795, respectively).

The eight-item performance scale was subjected to principal factor analysis with varimax rotation (eigenvalue=1 cut off) using SPSS version 14.0. Three factors were generated, namely, task performance (P1), interpersonal performance (P2), and organizational performance (P3), as in the previous literature. To ensure the reliability of the three generated performance factors, Cronbach's alphas were calculated (P1: 0.813, P2: 0.668, P3: 0.869). Table 1 indicates that all items and factors contained factor loadings and alpha values higher than 0.6 ( $\alpha > 0.6$ ) and were, thus, considered to be reliable in the study.

### Correlation between Stress and Performance of CPMs

In order to find out the interrelationships between the stress (S1: objective stress, S2: burnout, and S3: physiological stress) and the performance of the CPMs (P1: task performance, P2: interpersonal performance, and P3: organizational performance), Pearson's correlation analysis was applied. Table 2 shows the intercorrelations of the criticality indices of objective stress, burn-

out, physiological stress, and the three performances of CPMs. The results indicate a significant positive correlation between burnout (S2) and physiological stress (S3) ( $r=0.317$ ,  $p=0.01$ ), and between task performance (P1) and interpersonal performance (P2) ( $r=0.509$ ,  $p=0.01$ ).

For the interrelationships between stress and performance, the results reveal that organizational performance (P3) is negatively correlated with all three types of stress: objective stress ( $r=-0.197$ ,  $p=0.05$ ), burnout ( $r=-0.293$ ,  $p=0.01$ ), and physiological stress ( $r=-0.192$ ,  $p=0.05$ ).

### Structural Equation Model for Stress and Performance of CPMs

To develop an integrated model for the stresses and the performances of the CPMs, Amos 7.0 for Structural Equation Modeling was employed. Seven fit indices were applied to quantify the degree of fit of the structural equation models precisely, although only four are usually recommended (Kline 1998). The seven fit indices were degree of freedom (df), chi-square ( $\chi^2$ ), root mean square error of approximation (RMSEA), goodness-of-fit index (GFI), adjusted goodness-of-fit index (AGFI), Bentler comparative fit index (CFI), and incremental fit index (IFI).

The GFI of Model I was 0.763, which meant that there was still room for improvement in fit indices. Therefore, Models II and III were further developed to optimize the fit indices. Three structural equation models were generated: Model I (the original model built based on the relationship found in the correlation analysis), Model II (a model with improvement on the fit indices after adding paths from task performance to interpersonal performance, and from burnout to physiological stress, respectively),

**Table 2.** Correlations among Objective Stress, Burnout Level, Physiological Stress, and Performances of CPMs

Stress/performance	Stress levels			Performances		
	S1	S2	S3	P1	P2	P3
S1 Objective stress	1					
S2 Burnout	0.125	1				
S3 Physiological stress	0.064	0.317 <sup>b</sup>	1			
P1 Task performance	-0.137	0.117	-0.011	1		
P2 Interpersonal performance	-0.045	-0.061	-0.026	0.509 <sup>b</sup>	1	
P3 Organizational performance	-0.197 <sup>a</sup>	-0.293 <sup>b</sup>	-0.192 <sup>a</sup>	-0.037	0.006	1

<sup>a</sup>Correlation is significant at the 0.05 level (two tailed).

<sup>b</sup>Correlation is significant at the 0.01 level (two tailed).



**Table 3.** Fit Indices of the Stress-Performance Structural Equation Model

Model	df	$\chi^2$	RMSEA	GFI	AGFI	CFI	IFI
I	308	1,185.0	0.107	0.763	0.709	0.776	0.778
II	306	1,106.4	0.102	0.773	0.719	0.795	0.798
III	306	861.0	0.085	0.812	0.768	0.858	0.860

Note: df=degree of freedom;  $\chi^2$ =chi-square; RMSEA=root mean square residual; GFI=goodness-of-fit index; AGFI=adjusted goodness-of-fit index; CFI=comparative fit index; and IFI=incremental fit index.

and Model III (an optimized model with further improvement on the fit indices after deleting the paths from burnout to interpersonal performance, from physiological stress to task performance, and from physiological stress to interpersonal performance). Table 3 shows that Model III was the model with the optimized fit indices (RMSEA=0.085, GFI=0.812, AGFI=0.768, CFI=0.858, and IFI=0.860). Therefore, Model III was considered to be a model with reasonable fit.

The maximum likelihood estimates, standard errors, critical values, and  $p$ -values of Model III are shown in Table 4. Maximum likelihood is a statistical method used to calculate the optimization of model fitting to the data. It is a parameter indicating the relationships between various variables, while critical value is the value of a test statistic such as the  $p$ -value. The  $p$ -values, which are all lower than 0.05, suggest that all causal relationships shown in Model III are significant (Arbuckle and Wothke 1999).

## Discussion

Structural equation modeling strengthened the results found in the correlation analysis and established an integrated model for all types of stresses and performances. Fig. 3 shows that objective stress influences task performance (negative linear), interpersonal performance (inverted U shape), and organizational performance (negative linear), while burnout acts as a predictor of task performance (positive linear) and organizational performance (negative

linear and U shape). Physiological stress is influenced by burnout (positive linear) and simultaneously affects organizational performance (negative linear and U shape). On the other hand, interpersonal performance can be improved by positive task performance.

### Task Performance Affected by Objective Stress and Burnout

Although an inverted-U-shaped intercorrelation was found between objective stress and task performance, there is no curvilinear causal relationship between these two variables in the integrated structural equation model. With regard to Fig. 3, task performance is worsened with the increase of *objective stress*, which confirms the finding of previous research (Friend 1982; Jamal 1984). Perhaps the objective stress levels of CPMs are most likely in the overstimulation zone (refer to Fig. 1). CPMs are exposed to too much objective stress, which may be due to limited resources, a tight project schedule, changes beyond their control, inclement weather, and so on, and this eventually results in a decrease in task performance. In fact, CPMs always need to tackle many difficult tasks. As self-efficacy is always the key to success (Zajacoya et al. 2005), adequate perception of self-ability in completing the tasks is necessary for CPMs to achieve a good performance.

Normally, *burnout* affects task performance negatively (Parker 1995). However, it is interesting to note that burnout was found to be a positive predictor of good task performance in this study.

**Table 4.** Maximum Likelihood Estimates of Structural Equation Model C

Causal relationships	Maximum likelihood estimates	Standard errors	Critical value	$P$ -value
Objective stress (S1)				
→ Task performance (P1)	−0.133	0.046	−20.897	0.004
→ Organizational performance (P3)	−0.147	0.037	−3.913	0.000
Squared objective stress (S1 <sup>2</sup> )				
→ Interpersonal performance (P2)	−3.681	1.311	−2.807	0.005
→ Objective stress (S1)	48.633	9.695	5.016	0.000
Burnout (S2)				
→ Task performance (P1)	0.120	0.036	3.326	0.000
→ Organizational performance (P3)	−0.323	0.061	−5.284	0.000
→ Physiological stress (S3)	0.113	0.028	4.036	0.000
Squared burnout (S2 <sup>2</sup> )				
→ Organizational performance (P3)	13.746	3.181	4.321	0.000
→ Burnout (S2)	116.962	6.936	16.862	0.000
Physiological stress (S3)				
→ Organizational performance (P3)	−0.161	0.067	−2.393	0.017
Squared physiological stress (S3 <sup>2</sup> )				
→ Organizational performance (P3)	12.843	4.334	2.963	0.003
→ Physiological stress (S3)	201.674	12.519	16.110	0.000
Task performance (P1)				
→ Interpersonal performance (P2)	0.223	0.038	5.936	0.000

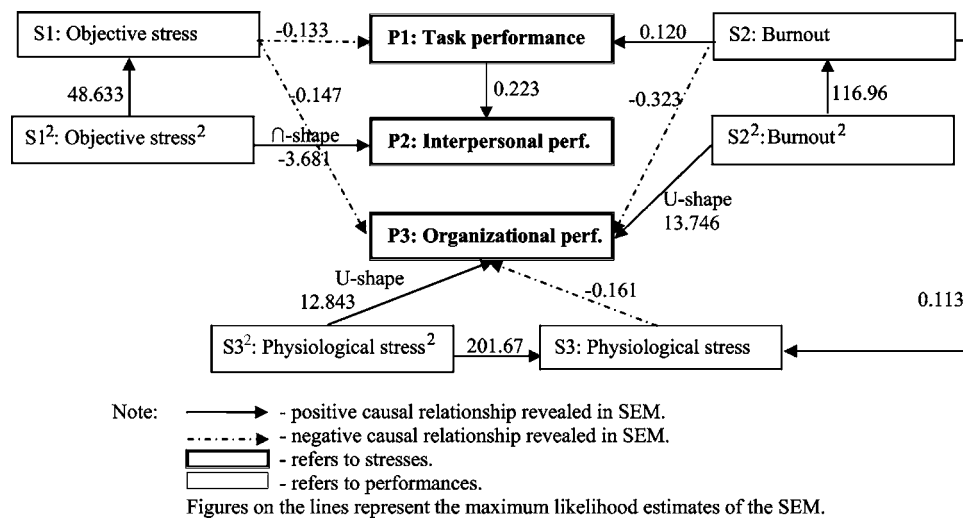


Fig. 3. Interrelationships between stresses and performances of CPMs

Since CPMs generally need to work and communicate with various stakeholders in complex construction projects, the positive relationship between burnout and task performance found in the study should be explored further in future studies.

### Interpersonal Performance Induced by Objective Stress and Task Performance

An inverted-U-shaped relationship was found between *objective stress* and interpersonal performance (refer to Fig. 3), indicating that either too much or too little objective stress could impair interpersonal performance between CPMs and their workgroups, and that only moderate stress could optimize the interpersonal performance of CPMs. CPMs suffering from too much objective stress have an excessive perception of their inabilities to tackle tasks, while lack of self-efficacy can break the relationship between the individuals and others due to feelings of shame and disgrace (Kaufman 1989; Baldwin et al. 2006). Where CPMs have too little objective stress (i.e., too much self-efficacy), this can also result in poor interpersonal relationships within workgroups, especially for CPMs with an immodest attitude to their work. Hence, it is important for CPMs to adjust their objective stress to a “moderate” level in order to optimize their interpersonal performance in construction projects.

On the other hand, interpersonal performance can also be enhanced by effective *task performance*. As the role of the CPM is so influential in every construction project, a good task performance by the CPM always implies the success of a construction project with project duration, budget, quality, safety, and environmental aspects all functioning smoothly. CPMs working in a problem-free environment can improve their relationships within workgroups since fewer conflicts will occur.

### Organizational Performance Influenced by Objective, Burnout, and Physiological Stress

*Objective stress* has long been recognized as a main cause of poor organizational performance, which includes low employee morale and withdrawal behaviors (“Stress and Low Morale...” 2000; Fuller 2006; Leung et al. 2005a). Individuals with perceptions of inability to carry out their tasks normally react automatically with avoidance or escapism (Newton and Keenan 1985; Carver et al.

1989). CPMs who experience an inability to meet project deadlines, to overcome difficulties, to handle multiple responsibilities intrinsically in their role, and so on, may show a great discrepancy between their perceived personal value and that of the organization. They may dislike the organizational culture, may have increased complaints about the organization, may develop withdrawal behaviors (e.g., absenteeism, lateness for work, leaving the company, etc.), and, thus, may develop poor organizational performance.

The other interesting result in the study is the U-shaped relationship between *burnout* and organizational performance. Either high or low burnout can lead to good organizational performance, while moderate burnout has a negative impact on it. It is foreseeable that a low level of burnout could lead to high organizational performance as CPMs suffering from burnout always adjust to negative changes in their behavior in the areas of social life (i.e., avoid communicating with others), attitude to work (i.e., low motivation during their work), and low job satisfaction (i.e., a lot of complaints about construction companies, reward systems, promotion schemes, welfare systems, etc.) (Drago et al. 1986). With the deterioration of attitude to work and job satisfaction, it is inevitable that CPMs’ sense of identification with their companies will decrease and the intention to leave will increase. However, why high burnout can enhance organizational performance of CPMs cannot be explained. Perhaps CPMs with high burnout may gain sufficient experience to adjust to the job, to shift tasks to colleagues, and to really accept the organizational climate and culture in the company.

A U-shaped relationship was also found between *physiological stress* and the organizational performance of CPMs, which, again, implies that both high and low physiological stress can enhance organizational performance, and moderate stress leads to low organizational performance. It is understandable that low physiological stress (i.e., when CPMs are not suffering from any stress-induced physical problems and are in good health) leads to good organizational performance. However, it is interesting that high physiological stress can also induce good organizational performance. Perhaps it is due to the comprehensive and legally required employee-benefits system in Hong Kong (HKSAR 2004) that provides satisfactory medical treatment for CPMs who suffer from any physical problems. CPMs can then build up a sense of

identification with their construction company and appreciation from the company, and can, in the end, enhance their organizational performance. Therefore, employers are recommended to keep providing medical care support to their CPMs and reviewing its comprehensiveness and adequacy.

## Recommendations

### Practical Implications

The results of this study confirm that objective stress has a negative impact on the task and organizational performance of individuals. Therefore, construction stakeholders are recommended to keep reviewing and monitoring the abilities of all their CPMs and to allocate their job responsibilities and workload accordingly. *Regular meetings* are necessary for CPMs to report their work progress and the difficulties encountered. The stakeholders can then understand the real situations of individual CPMs and provide them with suitable assistance, either human resources or material.

On the other hand, CPMs should also develop their own skills to cope with burnout. Thus, *stress management workshops* or *counseling meetings* promoting the acquisition of various stress management skills are suggested for employers. Sherman (1982) and Gates (2003) revealed that either relaxation exercises or counseling services can help to relieve the stress of employees. In fact, stress management workshops are very popular among organizations in western countries like the US and the UK; they are, however, still rare in Hong Kong. The stakeholders can employ suitably qualified people (e.g., counselors or stress management consultants) as instructors of some groups, or to provide individual briefings, or as facilitators at gatherings for the purpose of understanding the task and the organizational conditions of the CPM and, thus, teaching appropriate coping methods. Employers could also intervene with the aim of strengthening cordial relationships with CPMs.

To tackle physiological stress, it is suggested that construction firms provide periodical all-round stress appraisals for CPMs. Where CPMs have a moderate level of physiological stress and show preliminary signs of stress-related physical symptoms such as headache, stomachache, or back pain, employers can recommend them for *psychological treatment* or *physiotherapy* (e.g., guided imagery, and acupuncture points massage), even if the CPMs are not qualified to take actual sick leave or are not entitled to the benefit of any medical treatment, (Karen and Gwen 1996; Steven and Gwen 1997).

### Further Research

Some of the data collected for the self-reporting measurement applied in this study may be of uncertain reliability, and there is a potential risk of common method variance. However, it should be noted that the scales adopted in this study have been employed broadly in previous stress management research (Gmelch 1982; Quick and Quick 1984; Cooper and Marshall 1981). As CPMs normally need to communicate with multistakeholders and coordinate complicated tasks in construction projects, the respondents with extensive practical experiences in the study reflect an actual practical phenomenon in the industry. Therefore, we can have confidence that the responses received were reliable.

The questionnaire survey provides a generalizable study on the relationship between stress and performance among CPMs. In

order to carry out an in-depth study on this topic, a qualitative research method is suggested. Further interviews or focus groups on some specific cases are recommended for cross-validating the results found in this study and uncovering the reasons behind these results.

In addition, the results found U-shaped relationships between the burnout and the organizational performance and between the physiological stress and the organizational performance of CPMs in this study, which is different from the findings of previous studies as aforementioned from other counties. As the respondents in the study were most likely the CPMs from Asia, further research is recommended to investigate the impact of cultural influences on the stress and performance of CPMs in different areas. In addition, as coping is considered to be an important moderator for the stress-performance model, further research on the relationship between stress, coping behaviors (emotion focused and problem focused), and the performance of CPMs is necessary to understand the integrated stress management of CPMs.

## Conclusions

The literature review revealed that stress should not be simply classified as job related or nonjob related. From the stress management and psychological scientific literature, three types of stress were identified in this paper: objective stress, burnout, and physiological stress.

The study identified three aspects of performance (task performance, interpersonal performance, and organizational performance), and confirmed the impacts of the three types of stress on the performance of CPMs. An inverted-U-shaped relationship was found between objective stress and interpersonal performance. While the simultaneous inverted-U-shaped correlation and the negative linear causal relationships between objective stress and task performance suggest that CPMs are overstimulated, the objective stress of CPMs has to be released in order to optimize their task performance. U-shaped causal relationships were found between both burnout and physiological stress, and organizational performance. Burnout can enhance the task performance of CPMs at the same time.

In order to optimize the performance of CPMs, it is recommended that the stakeholders of construction companies hold regular meetings to review and monitor the job allocations of CPMs. Moreover, regular stress appraisals and stress management workshops should be provided for CPMs, so that they can equip themselves with suitable coping skills to manage stress. In the unfortunate cases where CPMs are already showing signs of physiological stress, employers could refer them for psychological treatment or physiotherapy. In general, stakeholders or supervisors should adopt proactive strategies to ensure that the stress levels of CPMs are within an optimal range. Stress management workshops, group or individual counseling, and psychological or pharmacological treatment can play an important role in stress management to ensure quality performance in the industry.

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