Title: The Impact of Stress on Task and Interpersonal Performance of Construction Professionals

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ABSTRACT

Due to the dynamic and complicated construction process, multi-stakeholder involvement, the often tight and urgent time frame, and so on, construction industry has long been recognized as a stressful industry. In fact, stress is prevalent amongst construction professionals nowadays. Nearly 70% of construction professionals suffer from emotional stress, experiencing negative emotion, anxiety, depression, and so on. Physical stress, like headaches, back pain, allergy, and so on, is also not uncommon for them. However, stress is not necessarily bad. Stress can have positive or negative impact on performance, depending on the different work nature of individuals. Hence, this study aims to investigate the impact of stress on performance of construction professionals.

To achieve this aim, a set of questionnaire survey was designed based on extensive literature review. A hundred and forty surveys were collected from construction professionals in Hong Kong, including construction project managers, architects, quantity surveyors, structural engineers, and so on. Data were analyzed by Pearson correlation and multiple regression modeling using SPSS version 19. Two types of stress (i.e., burnout and physical stress) and two types of performance (i.e., task and interpersonal performance) were identified. Results showed that both burnout and physical stress of construction professionals associate negatively with their interpersonal performance, which further affect their task performance. Results of the current study act as a platform for further qualitative study investigating the relationships in-depth.

Keywords: Construction professionals, Performance, Stress

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1. INTRODUCTION

Due to the dynamic and complicated construction process, multi-stakeholder involvement, the often tight and urgent time frame, and so on, construction industry has long been recognized as a stressful industry. In fact, stress is prevalent amongst construction professionals nowadays. Nearly 70% of construction professionals suffer from stress, like negative emotion, anxiety and depression (CIOB, 2006). Physical stress, like headaches, back pain, allergy, and so on, is also not uncommon for them. Research studies have indicated the influence of stress on various performances of an individual (e.g., Cooper and Marshall 1981; Leung et al. 2008; Varhol 2000). In addition, stress can also be a ‘real cost’ for an organization. In fact, for every employee, an average of 30.1 working days are lost due to stress-related illnesses in the United Kingdom every year, which involves a total of 10.5 million working days annually (Health and Safety Executive in the United Kingdom 2006). Stress has long been recognized as a key issue to the development and success of any organization. However, stress is not necessarily bad. Depending on the work nature of different professional, stress can have positive or negative impact on performance. Hence, this study aims to investigate the impact of stress on task performance of construction professionals.

2. STRESS OF CONSTRUCTION PROFESSIONALS

Stress is often considered as a subjective feeling of an individual, in which work or life demands exceed the ability perceived by an individual to cope (Cox, 1993). However, this is only one perspective to look at stress. To enable a comprehensive investigation, two general delineated types of stress were incorporated in this study, namely burnout and physical stress (Freudenberger, 1983; Monat and Lazarus 1991; Cohen and Rodriquez 1995).

2.1 Burnout

Resulting from chronic stressors, burnout refers to a state of emotional and mental exhaustion of an individual (Leiter et al. 2001). It has long been recognized as a key issue in the construction industry (Leung et al. 2008; Yip et al., 2005). In general, symptoms of burnout involve emotional exhaustion, depersonalization and reduced personal accomplishment (Maslach et al., 1996; Schaufeli, 1993; Janssen et al., 1999). Emotional exhaustion appears when individuals become chronically fatigued and lose the ability to devote themselves to perform a job. According to Cordes and Dougherty (1993), this exhaustion may combine with the feelings of frustration and tension, which further triggers depersonalization of an individual. Common symptoms of depersonalization include physical withdrawal, poor relationships with others, more complaints about the workplace, and so on. Reduced personal accomplishment means the tendency of individuals to engage in negative self-evaluation, poor self-esteem, dissatisfaction with one’s work performance, poor interrelationships, and so on. An individual suffering from this, may not only feel a lack of progress, but also experience “losing ground” (Cordes and Dougherty, 1993).

2.2 Physical Stress

Physical stress refers to the physical manifestation of stress on an individual (Greenberg, 2003). When facing challenges or stressors, hormones are released from the brain and prepare for the fight or flight actions to be taken by an individual (Cannon, 1963; Allen, 1983). Physiological responses then occur under stress of an individual. These physiological adjustments are supposed to revert back to normal after a period of time when an individual no longer faces the threats, after the fight or flight actions. However, if the stressful situation is a chronic one, which influence an individual continuously, the physiological adjustment may then persist (Teasdale and McKeown,
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1994). Physical stress gradually appears and results in headaches, back pain, appetite loss, and so on (Leung et al., 2008; Mellner et al., 2005).

3. IMPACT OF STRESS ON TASK & INTERPERSONAL PERFORMANCE

The majority of previous studies tend to focus on the consequences of stress on productivity of an individual (e.g., Cooper and Cartwright, 1994; Quick et al., 1997; Spielberger and Reheiser, 1994). However, productivity is only one single aspect to indicate the performance of an individual. For construction professionals, interpersonal relationships play an important role in individuals’ work. It is widely accepted that workgroup cooperation has a significant impact on the project performance (Wolfgang, 1991). Hence, stress consequences can be categorized into two main parts, which are the task and interpersonal performance.

3.1 Task Performance

People under stress often perform at higher levels, but if the stress continues and exhaustion sets in, it leads to a range of negative influences (Selye, 1982). For task performance of construction professionals, it mainly focuses on three aspects, namely the control of the duration, the cost and the quality of construction projects (CIOB, 1996; Olomolaiye et al., 1998; Walker, 2002). As site safety and environmental matters are the other essential elements on a construction site, construction professionals are also required to consider the safety and environmental aspects of construction projects (Fryer, 2004). In fact, stress has found to have significant influence on the task performance of construction managers (Leung et al., 2008; Djebarni, 1996; Haynes and Love, 2004), especially with the increasing demands, constraints and complexity in the industry. However, studies focusing on construction professionals in general are still rare.

3.2 Interpersonal Performance

Construction projects often involve multi-stakeholders, including developers, architects, consultants, contractors, sub-contractors, suppliers and so on. Communications and cooperation between various stakeholders directly influence the success of projects. However, stress not only affects the personal life of an individual, but also induces a lack of concern for his or her colleagues, as well as disrespect for, distrust of and dislike of the project team members that they work with (Leung et al., 2005; Defrank and Cooper, 1987; Holt 1993). It can also influence the interrelationships between colleagues, supervisors and subordinates. Hence, it definitely affects the assigned tasks, the performance of construction projects and the satisfaction of construction clients (Wolfgang, 1991).

4. RESEARCH METHOD

To investigate the impact of stress on performance of construction professionals, a questionnaire survey was designed and disseminated to construction professionals who have direct experience of in the construction industry in Hong Kong, including project managers, quantity surveyors, engineers, architects, and so on. To control the reliability and representativeness of the data collected, purposive sampling was adopted in the study (Patton 1990), on which questionnaires were sent to construction professionals who had direct work experience and were working in the main sectors in the construction industry during the research period.

The questionnaires were distributed by fax, by email, or in person. 500 sets of survey were conducted, while 140 were returned, representing a response rate of 28.0%. The respondents
worked in a variety of construction companies, including main contractors (51.4%), consultancy firms (25.0%), sub-contractors (7.9%), public sectors (7.1%), developers (5.7%), and so on. All respondents were construction professionals with extensive experience in construction projects; more than half of them (54.7%) had accumulated over 10-year experience in the construction industry, 19.4% of them had 6 to 10 years’ experience, and 25.9% had less than 5 years’ experience.

Two types of stress were measured in this study, namely burnout and physical stress. Statements of the burnout level, includes the constructs of emotional exhaustion, reduced personal achievement and depersonalization (Maslach, 1996; Hastings et al., 2004) and physiological stress (Selye, 1982; Leung et al., 2008) were involved. A 7-point Likert-type scale was adopted. The respondents were requested to rate their agreement with the statements, ranging from 1 (much less than usual) to 7 (much more than usual). The average score obtained was used to indicate the degree of burnout and physical stress level of construction professionals in this study. Example items include ‘I worry about work during my hours off’ for burnout and ‘I often have headaches and migraines.’ for physical stress.

To measure the performance of the CPMs, an 8-item scale was used. Example items include “I can meet the clients’ requirement easily.” for task performance and “I am satisfied with the relationship between my colleagues and me.” for interpersonal performance. Respondents were again asked to rate their performances based on a 7-point Likert-type scale ranging from 1 (strongly disagree) to 7 (strongly agree).

5. DATA ANALYSIS & RESULTS

Based on the data collected, various statistical techniques were applied using SPSS version 19.0. These techniques include Cronbach’ alpha reliability test, factor analysis, Pearson correlation, and regression analysis.

5.1 Factor Identifications

As the scales of burnout and physical stress were two different types of stress scales which have been adopted successfully in the previous studies (Leung et al. 2008); factor reduction was not needed to further subdivide these factors. The Cronbach’s alpha values showed that the factor structures of both burnout (0.775) and physical stress (0.760) were statistically reliable for the further analyses.

The performance scale was subjected to principal factor analysis with varimax rotation (eigenvalue – 1 cut-off) using SPSS Version 19.0. Two factors were generated, namely task performance and interpersonal performance. To ensure the reliability of the two generated performance factors, Cronbach’s alphas were calculated (0.772 and 0.619 respectively). All items and factors contained factor loadings and alpha values higher than 0.6 and were thus considered to be reliable in the study.

5.2 Pearson Correlation Analysis

Pearson correlation analysis was applied to investigate the interrelationships between stress and performance of construction professionals. Table 1 shows the correlation coefficients between burnout, physical stress, task performance and interpersonal performance of construction professionals. The results indicated that there were significant and negative relationships between burnout and interpersonal performance (-.356, p < 0.01) and between physical stress and
interpersonal performance (-.385; p < 0.01). On the other hand, significant and positive relationships were found between burnout and physical stress (0.576; p < 0.01) and between task and interpersonal performance (0.341; p < 0.01).

**Table 1 Correlation between Stress and Performance**

<table>
<thead>
<tr>
<th>Factors</th>
<th>Burnout</th>
<th>Physical Stress</th>
<th>Task Performance</th>
<th>Interpersonal Performance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Burnout</td>
<td>1</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Physical Stress</td>
<td>.576**</td>
<td>1</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Task Performance</td>
<td>-.123</td>
<td>-.028</td>
<td>1</td>
<td>-</td>
</tr>
<tr>
<td>Interpersonal Performance</td>
<td>-.356**</td>
<td>-.385**</td>
<td>.341**</td>
<td>1</td>
</tr>
</tbody>
</table>

Note: * - Correlation is significant at the 0.05 level (two-tailed).
** - Correlation is significant at the 0.01 level (two-tailed).

### 5.3 Regression Analysis of Stress and Performance

To conduct a more sophisticated exploration of the interdependent relationships between the stress and performance of construction professionals, multiple regression analysis was further applied in the study. Burnout and physical stress act as independent variables in the regression analyses of interpersonal performance; while the two types of stress and interpersonal performance was entered in to the model as independent variables of task performance (refer to Models 1 and 2 in Table 2). Model 1 revealed that the interpersonal performance of construction professionals was negatively associated with their physical stress and burnout, explaining 17.0% of the variance. Task performance was the dependent variable in Model 2 and was positively associated with task performance, accounting for 12.5% of the variance.

**Table 4 Regression Models of Stressors, Stresses, and Injury Incident of CWs**

<table>
<thead>
<tr>
<th>Model</th>
<th>Dependent Variables</th>
<th>Independent Variables</th>
<th>Beta</th>
<th>t</th>
<th>Sig.</th>
<th>R</th>
<th>R²</th>
<th>Sig. (ANOVA)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Interpersonal Perf.</td>
<td>Stress</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>Interpersonal</td>
<td>(constant)</td>
<td>-</td>
<td>19.895</td>
<td>0.000</td>
<td>0.412</td>
<td>0.170</td>
<td>0.000</td>
</tr>
<tr>
<td></td>
<td>performance</td>
<td>Physical Stress</td>
<td>-0.254</td>
<td>-2.663</td>
<td>0.009</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Burnout</td>
<td>-0.210</td>
<td>-2.193</td>
<td>0.030</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Task Performance</td>
<td>Stress &amp; Interpersonal Perf.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Task Performance</td>
<td>(constant)</td>
<td>-</td>
<td>6.700</td>
<td>0.000</td>
<td>0.354</td>
<td>0.125</td>
<td>0.000</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Interpersonal Performance</td>
<td>0.354</td>
<td>4.424</td>
<td>0.000</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### 6. DISCUSSION

Based on the results of the two regression models developed, a statistical Stress-Performance model was developed for construction professionals in Hong Kong (refer to Figure 1). Although stress was found to have no direct association with the task performance of construction professionals, both burnout and physical stress have negative impact on the interpersonal performance of construction professionals, which further influence the task performance.
Figure 1 A Statistical Stress-Performance Model for Construction Professionals

Note: - positive causal relationship revealed by Regression Models (refer to Table 2).
- negative causal relationship revealed by Regression Models (refer to Table 2).
- represents performances.
- represents stresses.

Interpersonal Performance affected by Burnout and Physical Stress

As illustrated in Figure 1, burnout was found to affect interpersonal performance of construction professionals negatively. In fact, an individual suffering from burnout would easily be frustrated and be emotionally fatigue. These negative emotions may hinder them from connecting with other people. In fact, an individual suffering from burnout was found to have a higher change in having physical withdrawal in interpersonal relationships and having more complaints about the workplace, and so on. (Cordes and Dougherty, 1993). All these worsen their interpersonal relationships with their colleagues at work.

Physical stress was also found to have a negative impact on interpersonal performance of construction professionals. When an individual suffer from physical stress, symptoms such as headaches, migraines, high blood pressure and loss of appetite occur. Physical wellness is essential for the social behavior of an individual. Individuals in poor physical condition may not be able to afford to spend as much time as their colleagues to connect with people (e.g., participating in informal gatherings, which is, to certain extent, physically demanding). Thus, it is not surprising that physical stress worsens interpersonal performance of construction professionals.

Task Performance affected by Interpersonal Performance

The resulted model reveals that the impact of stress was mainly on interpersonal performance. Stress has no direct impact on the task performance of construction professionals. However, the positive path from interpersonal performance to task performance has unveiled the indirect impacts of burnout and physical stress on task performance of individuals. Interpersonal relationship has long been recognized as the prime key to the task performance of individuals (Defrank and Cooper, 1987; Holt, 1993). Once it is affected by stresses, the task performance of individuals is also influenced.

7. IMPLICATION & FURTHER RESEARCH

A self-reporting survey measurement method was adopted in the current study. Therefore, the findings may have the potential risk of common method variance and the validity of data may be questioned. It would be ideal to also obtain objective data of the various variables (e.g., objective work stress measurement and physiological indicators of stress levels) for cross-validation of the subjective data in further study. However, it should be noted that the scales used in this study
were adopted from the extensive stress management and construction management literature. In addition, the respondents of this study were all construction professionals in Hong Kong who had direct experience with construction projects.

The current research, which was done using quantitative methods based on a relatively small sample size, provides a foundation of the relationships between various stress and performance of construction professionals in the construction industry. Quantitative methods attempt precise measurement of variables, while qualitative methods aim at seeking how and why things happen (Cooper and Schindler, 2006). Although qualitative methods have been available much longer in sociology and psychology research, quantitative research methods were adopted in the current study as the aim of the current research is to explain and predict the relationships between various variables identified. To achieve an in-depth understanding of the relationships between these variables, it is recommended that qualitative research methods, such as personal interviews and case studies, be used for further research and act as a cross-validation of the foundation result of the current study (triangulation method).

8. CONCLUSIONS

Due to the demanding nature of construction projects, the often urgent time frame, and the crisis-ridden construction site environment in the industry, construction professionals has long been recognized as a stressful occupation. However, stress is not necessarily bad. Previous studies had found both positive and negative impact on performance of an individual. Hence, this study aims to investigate the impact of burnout and physical stress on performance of construction professionals. The study identified two types of stress (i.e., burnout and physical stress) and two types of performance (i.e., task and interpersonal performance). Results of regression modeling indicated that both burnout and physical stress contain negative impact on interpersonal performance of construction professionals. Although stress has no direct impact on their task performance, they affect the task performance of an individual indirectly through influencing one’s interpersonal performance. Based on the results of the current study, further studies are suggested to investigate the in-depth relationships between stress and performance of construction professionals using qualitative methods, like personal interviews and case studies.
9. REFERENCES


