

ANALYSIS OF THE RELATIONSHIPS BETWEEN MINDFULNESS AND STRESS FOR CONSTRUCTION PROFESSIONALS

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Stress can result in significantly negative consequences to individuals, organization, and society. Various stress reduction methods have been implemented to reduce stress, including mindfulness-based stress reduction (MBSR) that teaches individuals to cultivate mindfulness to release stress. Although it has been confirmed that mindfulness can release stress, relative contribution of each mindfulness characteristics to stress reduction remain unknown. Hence, this study sets out to fill in the research gap in the context of construction industry. A questionnaire was designed and distributed out to construction professionals. Purposive sampling has been adopted to control the quality of the data, and a total of 84 responses were received. A series of statistical techniques are applied to analyze the collected data for testing the reliability and validity of the questionnaire, and for investigating the relationships between mindfulness characteristics and stress. Factor analysis and reliability test determine ten mindfulness characteristics, including attention, patience, beginner's mind, trust, self-compassion, non-reaction, non-judging, non-striving, letting go and description; and four kinds of stress, including quantitative stress, qualitative stress, emotional stress and physical stress. The results of the study reveals that (1) non-reaction and self-compassion can release quantitative stress, while trust and non-judging can exacerbate it; (2) non-reaction can reduce qualitative stress, while attention increases it; and 3) non-judging and description can relieve CPs' emotional stress, while non-striving will exacerbate it. Based on the research findings, several practical recommendations were proposed to construction organization and construction professionals, including developing emergency response guidelines and promoting the value of self-compassion. This work determined the effect of mindfulness characteristics on stress of construction professionals, which enhance the knowledge of stress management in the construction industry.

Keywords: construction professionals, mindfulness characteristics, stress.

INTRODUCTION

The construction industry is characterized by its complicated, dynamic, and uncertain environment, all of which can induce stress for construction professionals (CPs). In fact, the majority of CPs have been shown to be suffering from stress as a result of working in such a challenging industry (CIOB 2006). Failure to effectively cope with stress not only leads to emotional and physical health problems to individuals, but also negative consequences to organizations (Health and Safety Council 2007; Leung *et al.*

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2008). Accordingly, effective stress management is critical to the success of any construction projects.

Due to personal differences in terms of experience, age, and personality traits, CPs will adopt different coping behaviors, adaptive and/or maladaptive, to deal with stress (Leung *et al.* 2006). Mindfulness-based stress reduction (MBSR) has been used to enhance individuals' level of mindfulness and, in turn, help them to cope with stress (Kabat-Zinn 2001). This has been recognized as good for individual wellbeing and the reduction of distress (Nyklicek and Beugen 2013). Mindfulness as a concept consists of several different characteristics (Cardaciotto *et al.* 2008), but so far no investigation of their respective effects on managing stress in CPs has been carried out. This study therefore set out to investigate the relationship between mindfulness characteristics and four kinds of stress experienced by CPs using a scientific research methodology.

STRESS

Stress is prevalent in the construction industry. It can have negative consequences for individuals and organizations, such as lost productivity, reduced morale, and high turnover (Lossemore and Waters 2004). Job stress results from the source of stress, which resides in the working environment. It occurs when there is a discrepancy between an individual's self-perceived and actual ability to deal with tasks (Edwards 1988). Job stress can be either quantitative or qualitative depending on its source (Gmelech 1982). Quantitative stress is defined as the stress resulting from the quantitative discrepancy (i.e., volume of work) between external demands and individuals' actual ability, while qualitative stress is defined as the stress resulting from the qualitative discrepancy (i.e., difficult of work) between external demands and individuals' actual ability (Leung *et al.* 2014). Quantitative and qualitative stress can be induced by stressors like work-home conflict, work underload, etc. (Leung *et al.* 2007), while chronic exposure to quantitative and qualitative stress can induce burnout, decreased organizational commitment, and lower productivity among CPs (Leung *et al.* 2011).

Facing source of stress could result in emotional stress to individuals, which manifests itself in the form of worry, anxious and being frustrated (Gmelch 1982). This could further lead to emotional exhaustion if individuals are continuously affected by the source of stress (Babe *et al.* 2009). In addition to negative individual consequence, emotional stress also induces negative consequence to organization, such as absenteeism, loss of productivity, diminished organizational commitment (Finney *et al.* 2013).

Exposure to stress can also provoke the physical adjustments of the human body, such as increased pulse rate, increased blood pressure, and sweating (Schat *et al.* 2005). Over certain time these physical adjustments cannot revert into normal, and physical stress symptoms will result and appears in the form of headache, back pain, and loss of appetite (Mellner *et al.* 2005). Physical stress is particularly detrimental, as in addition to impair performance, prolonged suffering from it will also result in future morbidity and mortality (Nixon *et al.* 2011).

MINDFULNESS

The transactional model suggests that individuals cognitively process information about sources of stress, and then utilize their resources to cope with them (Ganster and Rosen 2013). However, CPs will adopt either adaptive or maladaptive coping

behavior to cope stress (Leung *et al.* 2014). It has been confirmed that MBSR can lead to adaptive coping and stress reduction. For instance, various mindfulness cultivation practises, such as mindful sitting, walking and stretching can lead to positive emotion (Mace 1956), and thus, facilitate the coping process through converting negative appraisal into a positive one and enable the individual to sustain motivation and coping efforts over the long term (Folkman 2010).

MBSR is a clinical program consisting of specific instruction and guidance in mindfulness practice, which intends to cultivate one's mindfulness (Kabat-Zinn 1982). Mindfulness is psychological concept, and has been defined as the process of pay attention in a particular way with present focus, non-judgment, awareness, curiosity, and so on (Kabat-Zinn 2001). In addition to facilitate adaptive coping behaviors, the cultivation of mindfulness through MBSR can be also helpful for relieving stress, mitigating depression, improving physical and mental fatigue, and optimizing task and interpersonal performance (Carmody and Baer 2008). Moreover, mindfulness has wide applicability to every people in spite of their occupations, cultures, and countries (Franco *et al.* 2010).

Some studies of mindfulness have identified a wide range of mindfulness characteristics, including attention, awareness, acceptance, being non-judging, and present focus (e.g., the Five Facets Mindfulness Questionnaire by Baer *et al.* 2006; the Philadelphia Mindfulness Scale by Cardaciotto *et al.* 2008). Although the overall benefits of mindfulness have been well acknowledged, the individual effect of various mindfulness characteristics remains unknown. Given that the comprehensiveness of the mindfulness' definition, this study examines the individual effect of a total of ten mindfulness characteristics that can be cultivated by MBSR, including attention, patience, beginner's mind, trust, self-compassion, non-reaction, non-judging, non-striving, letting go and description.

CONCEPTUAL MODEL

Based on the literature review, a conceptual model has been established to reflect the hypothesized relationships between mindfulness characteristics and stress (see Figure 1). We hypothesized that the ten mindfulness characteristics (i.e., attention, patience, beginner's mind, trust, self-compassion, non-reaction, non-judging, non-striving, letting go and description) can help to release four kinds of stress (i.e., quantitative stress, qualitative stress, emotional stress and physical stress).

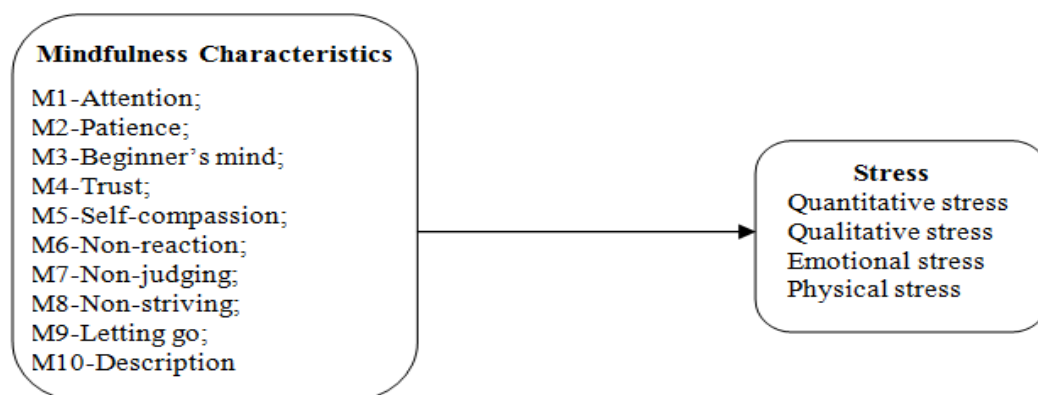


Figure 1 Conceptual Model of Mindfulness-Stress for CPs

RESEARCH METHOD

Measurement

This study focused mainly on CPs with experience of working on construction sites. Based on the extensive literature and our conceptual model, a questionnaire was designed and administered with CPs in Hong Kong to investigate the relationships between stress and mindfulness characteristics. In addition to questions capturing personal information, the survey included scales measuring the mindfulness characteristics (Baer *et al.* 2004, 2006; Brown and Ryan 2003), quantitative and qualitative stress (Leung *et al.* 2008), and emotional and physical stress (Leung *et al.* 2011). All responses were measured using a 7-point Likert-type scale ranging from 1 (strongly disagree) to 7 (strongly agree). As all the scales in the questionnaire have been tested and validated by previous studies (Cardaciotto *et al.* 2008; Leung *et al.* 2008, 2011), this questionnaire is reliable in terms of measuring the underlying constructs and free from random error (Pallant *et al.* 2011).

Sample

Purposive sampling was adopted to control the quality of the data (Patton 1990). A total of 450 questionnaires were distributed to CPs working for developers, public sector employers, main or subcontractors, consultancy firms, or related organizations in Hong Kong. Out of the 450 questionnaires, 84 were returned, giving a response rate of 18.67%.

RESULTS

Factor Analysis and Reliability Analysis

A principal component analysis (eigenvalue-1 cutoff) was applied to reduce the huge amount of items into meaningful factors (Pallant *et al.* 2011). The results confirm ten mindfulness characteristics, and four kinds of stress, with the factor loading of each item ranging from 0.614 to 0.910. Given that the sample size is 84, all the factor loading values are acceptable (Hair *et al.* 2010). To assess the internal consistency of these factors, reliability analysis was conducted using Cronbach's alpha, the most widely used measure. The measures of all ten mindfulness characteristics and four kinds of stress showed acceptable alpha values ranging from 0.661 (beginner's mind) to 0.912 (openness) (Hair *et al.* 1998).

Regression Analysis

Since mindfulness as conceptualized here consists of ten characteristics, it is worthwhile to identify which may make unique contribution to stress reduction. Multiple regression, as one of the sophisticated statistical techniques, serves this purpose (Pallant 2011) by allowing us to test for the unique contribution of the ten characteristics in reducing stress. A stepwise multiple regression analysis was carried out, with the results shown in Table 1. In order to identify the predictive power of each characteristics, the standardized coefficients (beta value), instead of the unstandardized (B value), are presented accompanied by other information such as t-value, R, R squared, and so on.

Only three optimal Mindfulness-Stress regression models were constructed, which reflect the relationships between mindfulness characteristics and quantitative stress, qualitative stress and emotional stress, respectively. None of mindfulness characteristics is the predictor of CP's physical stress, in accordance to their statistical significance. Hence, no regression model was formed for the physical stress and

mindfulness characteristics. Perhaps, mindfulness characteristics are psychological in nature and closely related to CPs' mental symptoms, and are remote to their physical symptoms.

Table 1 Regression Model for Ten Mindfulness Characteristics and three Kinds of Stress

Dependent Variables	Variables	Beta	Sig.	VIF	R square	ΔR square	F(A)	Sig.
1.1 Quantitative stress	Constant	.000			.131	.131	12.346	.001
	Non-judging	.288	.003	1.051				
1.2 Quantitative stress	Constant	.001			.211	.080	10.858	.000
	Non-judging	.308	.003	1.036				
	Trust	.289	.006	1.036				
1.3 Quantitative stress	Constant	.001			.321	.110	12.602	.000
	Non-judging	.311	.001	1.036				
	Trust	.420	.000	1.192				
	Non-reaction	-.356	.001	1.157				
1.4 Quantitative stress	Constant	.001			.357	.036	10.974	.000
	Non-judging	.288	.003	1.051				
	Trust	.475	.000	1.275				
	Non-reaction	-.261	.017	1.405				
	Self-compassion	-.228	.038	1.429				
2.1 Qualitative stress	Constant	.000			.131	.131	12.411	.001
	Attention	.363	.001	1.000				
2.2 Qualitative stress	Constant	.000			.203	.071	10.310	.000
	Attention	.405	.000	1.025				
	Non-reaction	-.271	.009	1.025				
3.1 Emotional stress	Constant	.000			.121	.121	11.245	.001
	Non-judging	-.347	.001	1.000				
3.2 Emotional stress	Constant	.000			.190	.069	9.511	.000
	Non-judging	-.350	.001	1.000				
	Non-striving	.264	.010	1.000				
3.3 Emotional stress	Constant	.000			.233	.043	8.088	.000
	Non-judging	-.402	.000	1.065				
	Non-striving	.242	.016	1.011				
	Description	-.214	.038	1.076				

As indicated in the optimal Mindfulness-Quantitative Stress model, quantitative stress was positively predicted by being non-judging and trust, but negatively predicted by non-reaction and self-compassion, explaining 35.7% of the variance. In the optimal Mindfulness-Qualitative Stress model, qualitative stress was found to be positively predicted by attention, but negatively by non-reaction, accounting for 20.3% of the variance. The optimal Mindfulness-Emotional Stress model demonstrated that emotional stress can be released by non-judging and description, but exacerbated by non-striving, and 23.3% variance was accounted for.

DISCUSSION

Figure 1 illustrates the results of the regression analysis regarding the relationships between the ten mindfulness characteristics and three kinds of stress as experienced by CPs. The results show that seven of the ten characteristics predicted, at least, one stress. The emotional stress can be released by non-judging and description, while quantitative stress is reduced by self-compassion and non-reaction, and qualitative stress is negatively predicted by non-reaction. However, the results also show that emotional stress is exacerbated by non-striving, quantitative stress is increased by trust and non-judging, and qualitative stress rises due to attention. Hence, unlike previous studies for other working population, current research results show that different mindfulness characteristics have different positive and negative impact on the stress of CPs.

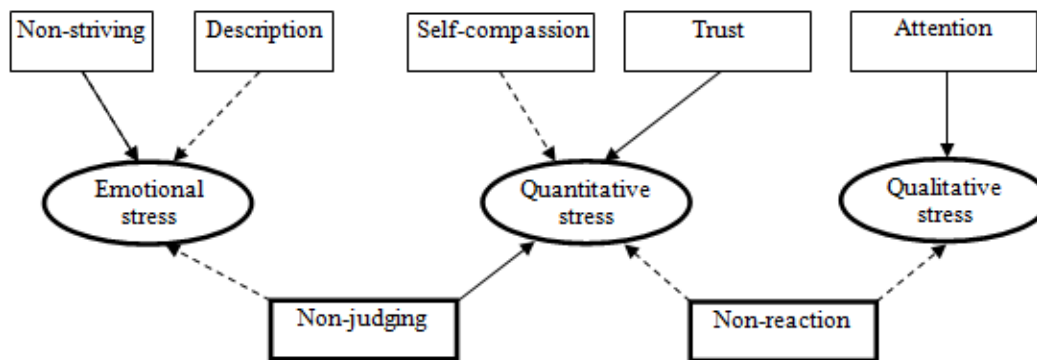


Figure 2 Mindfulness-Stress Model

Note: - - - → significant negative relationship confirmed by regression analysis;
 —→ significant positive relationship confirmed by regression analysis.

Mindfulness Characteristics and Quantitative Stress

As quantitative stress arises from the discrepancy between CPs' expected and actual ability to complete tasks, it will be heavily affected by how they evaluate this gap. Being non-judging may prevent CPs from accurately estimating their quantitative workload. This can increase the magnitude of the discrepancy and ultimately increase quantitative stress. In this study, trust denotes CPs' self-confidence in their ability to finish a job (Schraw and Dennison 1994). However, if a CP is over-confident about his or her productivity, an inappropriate work plan is likely to result (Russo and Schoemaker 1992). The discrepancy between expected and actual ability will therefore increase, because the inappropriate work plan will make it impossible or at least more difficult for the CP to finish the job on time.

The results also indicate that non-reaction and self-compassion can reduce quantitative stress. Non-reaction means that CPs recognize the stress but avoid any instant reaction to it. Recognition of stress is helpful in properly evaluating its source and identifying the discrepancy between expected and actual ability, namely quantitative stress. In addition, non-reaction also prevents CPs from taking instant but ineffective action. These two aspects of non-reaction therefore prevent a further increase in quantitative stress. Self-compassion refers to forgiving, caring for, and loving oneself. This not only allows CPs some freedom from the negative consequences of quantitative stress, but also stimulates improved performance for managing complicated tasks, alleviating stress as a result (Breines and Chen 2012).

Mindfulness Characteristics and Qualitative Stress

Like quantitative stress, qualitative stress results from CPs' perceptions that they lack the competence to complete complex tasks. Therefore, it is also strongly affected by self-perception. As the mechanisms which bring about quantitative and qualitative stress are similar, non-reaction is also helpful in relieving the latter. By taking a nonreactive stance, CPs will be better able to recognize that they are under qualitative stress on the one hand, and can prevent themselves rushing into inefficient action on the other. Attention denotes concentrating on the job when performing a task. Working with attention can sometimes help CPs to enhance their productivity. However, it is not uncommon for CPs to come up against unresolvable problems during the construction process. It was found that paying more attention to these problems will not result in good solutions, but instead increase qualitative stress of CPs.

Mindfulness Characteristics and Emotional Stress

Emotional Stress has been found to be positively predicted by non-striving, but negatively predicted by non-judging and describe. Non-striving indicates CPs has no inclination to strive for any specific goal but accept whatever naturally happened. This passive attitude can prevent CPs from adopting adaptive coping behaviours, such as positive reappraisal and planful problem solving (Bandura 1992), thus exacerbating emotional stress.

Non-judging refers to avoid evaluating things and own thoughts with labels (Baer *et al.* 2004). According to the transactional model (Lazarus and Folkman 1984), stress results from the appraisal of things as threatened and hard to cope. Without judgment of own thoughts and feelings, emotional stress can be prevented. The ability to describe is also helpful for preventing emotional stress, as having this ability would likely result in a greater capacity to distinguish feelings from bodily sensations unrelated to emotional arousal and to understand the complex nature of emotional states (Baer *et al.* 2004).

RECOMMENDATIONS

The results of this study show that the ten mindfulness characteristics exert different influences on stress. Some have no influence on stress at all, some exacerbate it and some release it. Hence, it is recommended that only those mindfulness characteristics that are shown to reduce stress should be facilitated in stress reduction interventions.

As shown above, non-reaction can alleviate both quantitative and qualitative stress. Therefore, it is recommended that CPs should keep calm and avoid acting hastily at work. Responding to stress by taking urgent but ineffective actions may worsen the problem and increase stress levels, given that tasks in a construction project are often complicated and interrelated. In addition to offering CPs MBSR training, construction organizations should also promote the attitude of non-reaction by designing emergency response guidelines through which CPs can learn how to handle complicated problems under great stress (Sime 2007).

The findings also show that self-compassion can facilitate stress reduction for CPs, so it would be worthwhile intentionally fostering this capability. During MBSR training, it will be necessary to encourage CPs practicing self-compassion, as repetitive practice is a way for them to develop this capacity. In addition, construction organizations should also promote the value of self-compassion by advertising its benefits and holding specific training events to teach staff how to develop and use self-compassion.

CONCLUSIONS

It is widely recognized that the majority of CPs suffer from stress at work. Not only does this have negative individual consequences, such as headaches, back pain, and anxiety, but it affects the organization in terms of reduced productivity and increased absenteeism and turnover. Cultivation of mindfulness has been regarded as one effective way to manage stress. However, mindfulness consists of several characteristics, with little so far known about their individual influence on the stress levels of CPs. This study therefore set out to investigate the individual contribution of each mindfulness characteristics to stress reduction among CPs.

Ten major mindfulness characteristics have been identified in this study, as well as their influence on four kinds of stress. The results show that 1) quantitative stress can be relieved by self-compassion and non-reaction, but is increased by trust and being non-judging; 2) qualitative stress is decreased by the adoption of non-reaction but increased by paying more attention to the job; and 3) emotional stress of CPs was exacerbated by non-striving, but released by non-judging and description. Based on these results, a series of practical recommendations are made to enhance instrumental mindfulness characteristics among CPs, including designing emergency response guidelines for fostering non-reaction, and encouraging them to develop the value of self-compassion.

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