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The effect of job stress on self-reported safety behaviour in container terminal operations: The moderating role of emotional intelligence

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1. Introduction

An international container terminal is an important interface between sea and land transportation, where containers are loaded onto and discharged from containerships (Lu and Shang, 2005). However, container terminal operations are hazardous since stevedores involved in various risky workplace activities that include operating cranes, lashing, electrical repairs, tally operations and truck driving. The Health and Safety Executive (HSE) (2012) recorded 392 accidents in 2010 due to workers' improper use of equipment in container terminal operations. The Pacific Maritime Association (PMA) (2012) reported that the most common injuries along the U.S. West Coast were sprains/strains/spasms, contusions, cuts/lacerations, hearing impairments, and foreign objects in the eye. Notably, the National Safety Council stated that 94% of all injuries and illnesses in the workplace were associated with human behaviour (Loafman, 1996). While several studies have investigated the determinants of accident occurrences in container terminals (Lu and Shang, 2005; Lu and Yang, 2010), the reasons for such accidents still remain unclear.

Lingard and Yesilyurt (2003) identified job stress as a critical factor impacting on human safety behaviour. The Pacific Maritime Association (PMA) (2012) found that enhanced safety practices, training and technology application decreased workers' job stress at West coastal ports in the USA and resulted in a reduction in workers' accidents. Stress has been identified as a factor with antecedent causes and behavioural consequences (Motowidlo *et al*., 1986). Job stress has been defined as nervousness or anxiety related to the job that impacts on a worker's emotional and physical health (Netemeyer *et al*., 2005) and influences their personal working behaviour (Hoggan and Dollard, 2007). Several studies have found that a highly stressful work environment can impact negatively on human safety (Greiner *et al*., 1997; Greiner *et al.*, 2004; Chen and Cunradi, 2008). Job

stress can increase risk and decrease safety behaviour and performance (Kontogiannis, 2006; Hoggan and Dollard, 2007; McLinton and Dollard, 2010). For example, Leung *et al*. (2012) examined the impact of stress on construction workers' safety behaviours in Hong Kong and found injury incidents were significantly related to construction workers' emotional stress and physical stress. Adam *et al.*, (2014) examined differences in occupational accidents according to nationality in the Danish merchant fleet. They found that the rate of serious injuries of South East Asian and Eastern European seafarers remained significantly lower than that of West European seafarers. Håvold (2005) also found significant differences in safety culture and safety behaviours between nationalities in vessels belonging to a Norwegian shipping company. These findings are not surprising given that wide differences exist in workplace conditions, safety management, competencies and requirements (Adam *et al*., 2014). Notwithstanding, Netemeyer *et al*. (2004) investigated the relationships between job stress, performance and job satisfaction using cross-national samples from the United States, Puerto Rico, and Romania. Their study found measures and effects to be similar across the three samples.

A growing body of prior literature has identified various factors impacting on safety behaviours, including effective training (Kiani *et al.*, 2012); supervisory behaviour (Adebayo and Ogunsina, 2011); nationality (Håvold, 2005; Adam, 2014); safety climate (Zohar, 1980; Griffin and Neal, 2000; Lu and Shang, 2005; Lu and Tsai, 2010);attitudes (Carmeli, 2003; Burt *et al.*, 2009); leadership (Broadbent, 2004; Lu and Yang, 2010); and risk perception (Jones *et al*., 1988; Arnau – Sabates *et al.*, 2012), however, research investigating the impact of job stress on port worker safety is lacking. If supervisors can understand the factors influencing job workers' job stress, they might avoid the high occurrence of accidents (Jones *et al*., 1988; Leung *et al*., 2012).

Emotional intelligence is another factor reported to impact on an individual's work behaviour (Groves et al., 2008). Emotional intelligence is widely considered to be an important variable in training, leadership development and team building by organisations (Joseph *et al.*, 2015). Employees with the ability to effectively manage their emotions and use emotional information have been found to better perform than those who lack such ability (Parke *et al*., 2015). Emotional intelligence is the ability to perceive, assimilate, understand and manage emotion (Mayer and Salovey, 1997), in other words, the ability to process emotional information. Emotional intelligence has also been defined as "the sub-set of social intelligence that involves the ability to monitor one's own and others' feelings and emotions, to discriminate between them, and to use this information to guide one's thinking and actions" (Salovey and Mayer, 1990, p.189). Emotionally intelligent people understand their own feelings better than other people and are better able to communicate them (Mayer and Salovey, 1993). Employees who have high emotional intelligence achieve more in their personal life and the workplace (Carmeli and Josman,

2006). People with high emotional intelligence are more likely to have a positive outlook and be reliable (Mayer and Salovey, 1993). They are less likely to cut corners and undertake unsafe practices to achieve higher performance. Their emotional intelligence influences their safety behaviour at work (Carmeli and Josman, 2006).

A review of prior research highlights the role of emotional intelligence in perceiving and evaluating risk (Rundmo, 2002). According to Arnau-Sabates *et al*. (2012), emotional intelligence plays a primary role in motivating behaviour. Previous studies have confirmed there is a relationship between emotional intelligence and risk taking behaviour (Arnau-Sabates *et al*., 2012). However, an investigation of the influence of emotional intelligence on safety behaviour in the hazardous workplace environment of container terminal operations is lacking. To the authors' best knowledge, this research is one of the first to explore the relationships between emotional intelligence, job stress, and self-reported safety behaviour in the context of container terminal operations. The objectives of the study are to examine the effects of job stress and emotional intelligence on self-reported safety behaviour and to investigate whether emotional intelligence plays a moderating role in the relationship between job stress and self-reported safety behaviour.

This paper is organised as follows: the first section introduces the study and discusses the background. The research model is developed and the hypotheses formulated in the second section. The third section details the development of the research instruments, presents the measurement constructs used in the survey, explains the sampling techniques, and describes the research procedures. In sections four and five analyses results that address the research hypotheses are presented. In the final section, conclusions drawn from the research findings and their theoretical and managerial implications are discussed.

2. Theoretical background and hypotheses

2.1 Self-reported safety behaviour

Safety behaviour can be defined as "the behaviour and attitudes of employees to safety activities" (Burt *et al*., 2009). Parboteeah and Kapp (2008) stated that safety behaviours are critical components since they reflect individuals' real behaviours to maintain a safe work environment. According to Larsson *et al*. (2008), safety behaviour consists of structural safety behaviour (SSB) (i.e. participation in organised safety activities); interactive safety behaviour (ISB) (i.e. management and subordinates' interaction at work in safety activities); and personal safety behaviour (PSB) (i.e. concerned behaviour aimed at personal protection). Broadbent (2004) defined two types of self-reported safety behaviours, namely, compliance and participation. Safety compliance behaviour is the core activities that individuals have to maintain for workplace safety, while safety participation behaviour refers to workers' participation in activities that improve their safety behaviour, such as safety meetings or setting safety goals (Neal and

Griffin, 2006).

Prior studies have identified various factors that impact on safety behaviour, for example, safety climate (Zohar, 1980; Griffin and Neal, 2000; Lu and Tsai, 2010); safety training (Zohar, 1980; Lu and Tsai, 2010;); safety motivation (Zohar, 1980; Griffin and Neal, 2000; Lu and Shang, 2005); safety policy (Lu and Tsai, 2010; Lu and Yang, 2010); safety communication (Clark, 1999; O'Dea and Flin, 2001; Wu *et al*., 2007); site safety management (Mearns *et al*., 2003; Lu and Tsai, 2008); and organisational safety management (Zohar, 1980; DeDobbeleer and Beland, 1991; Cooper and Phillips, 2004). However, research investigating the impact of job stress and emotional intelligence on safety behaviour is lacking, although job stress and emotional intelligence have been found to significantly influence employee behaviours (Wiegand, 2007; Arnau-Sabates, 2012; Leung *et al.*, 2012). Stress can cause workers to undertake unsafe practices due to reduced awareness of and compliance with safety regulations, which is a major cause of accidents (Leung e*t al*., 2012).

2.2 Job stress and self-reported safety behaviours

Long-term job stress may affect safety behaviour and increase injury risk in the workplace (Larsson *et al*., 2008; Lu and Tsai, 2010; Lu and Yang, 2010). The literature strongly suggests that job stress can adversely impact on employees' work practices (Pettegrew *et al*., 1981). Stress refers to "any condition that causes an individual to have a generalised psycho-physiological response which deviates from a state of equilibrium" (Rehman *et al.*, 2010, p.234). Job stress has been defined as the physical and emotional response of individuals to perceived harmful or threatening workplace conditions (Jamal, 2005; Adaramola, 2012). Devereux *et al.* (2004) found organisational behaviour and the work environment can increase employees' job stress and impact on their physical and mental health.

Sources of job stress have been discussed in prior studies (Wells, 1982; Cummins, 1990; Robbins, 2007). According to Robbins (2007) stressors can be environmental, organisational and individual. Cummins (1990) suggested that sources of job stress include role conflict and ambiguity, underutilisation of skills, work overload, lack of participation, and resource inadequacy. Wells (1982) stated that job stress can be evaluated utilising measures of work quality (e.g. fulfilment and self-esteem), general well-being (e.g. individual life and daily mood), and physical health outcomes (e.g. peptic ulcers and headaches).

As previously indicated, job stress is an important factor affecting individual behaviour (Ford and Bagot, 1978; Rundmo, 1995; Safaria *et al*., 2010; Adebayo and Ogunsina, 2011; Leung *et al.*, 2012; Tsaur and Tang, 2012). Adebayo and Ogunsina (2011) examined the influence of job stress on the behaviour of police personnel in Nigeria and

found that lower job stress can reduce frequent error making. Leung *et al*. (2012) investigated worker injury through the management of personal stress and organisational stressors. Their study suggested that emotional stress is the key factor that affects safety behaviours. Safaria *et al*. (2010) examined the relationship between job insecurity and job stress among Japanese academic staff and found that lower stress easily leads to optimised safety behaviour. Accordingly, we hypothesised that:

H1a: Job stress will be negatively related to workers' safety participation in container terminal operations.

H1b: Job stress will be negatively related to workers' safety compliance in container terminal operations.

2.3 Emotional intelligence and safety behaviour

Emotions are the integral parts of humans that influence their motivations for behaviour, actions and practices (Stanley and Burrows, 2005). Intelligence is an ability that includes problem-finding, problem-thinking and problem-solving correctly (Schmidt and Hunter, 2000). Thorndike (1920) proposed three aspects to intelligence: abstract intelligence, mechanical intelligence, and social intelligence. Social intelligence is thought to contribute to emotional intelligence development (Carmeli and Josman, 2006). Several authors have endeavoured to provide a definition of emotional intelligence over the years (Thorndike, 1920; Moss and Hunt, 1927; Gardner, 1983; Jordan and Troth, 2011). Salovey and Mayer (1990) initially defined emotional intelligence as the competence of people to handle their own and others' emotions. They later defined emotional intelligence as "the ability to perceive accurately, appraise, and express emotion; the ability to access and/or generate feelings when they facilitate thought; the ability to understand emotion and emotional knowledge; and the ability to regulate emotions to promote emotional and intellectual growth" (Mayer and Salovey, 1997, p.10).

Since definitions of emotional intelligence have been refined in recent decades, this has led to some variations in measures of the construct (Law *et al*., 2004). However, two groups of researchers have been of prime importance in developing the emotional intelligence construct, namely, Salovey and Mayer (1990) and Davies *et al*. (1998). Mayer *et al*. (2000a) maintain that conceptions of emotional intelligence should include not only emotion and intelligence per se, but also motivation, non-ability dispositions and trails, and global personal and social functioning. Salovey and Mayer (1990) and Mayer *et al*. (2000b) summarised previous literature and developed a four-dimensional definition of emotional intelligence: the ability to perceive accurately, appraise, and express emotion; the ability to access and/or generate feelings when they facilitate thought; the ability to understand emotion and emotional knowledge; and the ability to regulate emotions to promote emotional and intellectual growth" (Mayer and Salovey, 1997, p.10).

On the basis of factor analysis, Davies *et al*. (1998) concluded that emotional intelligence is elusive as a construct. However, the differences between their definition of emotional intelligence and that of Mayer *et al*. (2000) are minor and tend to be complementary rather than contradictory. Davies *et al.'s* (1998) measures of emotional intelligence cover four distinct areas: emotion perception, regulation, understanding and utilisation (Garrochi et al., 2000, p.540). Due to its clarity, and comprehensiveness Davies et *al.'s* (1998) four dimensional definition of emotional intelligence is adopted in this research, namely: appraisal and expression of emotion in the self (self-emotion appraisal; SEA); appraisal and recognition of emotion in others (others' emotion appraisal; OEA); regulation of emotion in the self (regulation of emotion; ROE); and use of emotion to facilitate performance (use of emotion; UOE).

Previous studies have examined the relationship between emotional intelligence and individual behaviour (Carmeli, 2003; Côté and Miners, 2006; Groves *et al.*, 2008; Deshpande and Joseph, 2009; Siu, 2009; Downey *et al.*, 2010; Jung and Yoon, 2012). Groves *et al*. (2008) analysed the influence of emotional intelligence on individual behaviour based on Mayer and Salovey's (1997) measure model using a sample of business students at a university in the USA. Their study results indicated that emotional intelligence can be developed by training and influencing individual behaviours. Joseph and Newman (2010) and Goleman (1998) found high levels of emotional intelligence were related to operational outcome and organisational success, respectively. Jung and Yoon (2012) investigated the emotional intelligence and work behaviour of employees in a deluxe hotel in Korea. They found use of emotion (UOE) and self-emotion appraisal (SEA) had a positive influence on organisational work behaviour, which suggests that people who have high emotional intelligence can control their emotions and behaviour, and improve their safety behaviour in operations. Accordingly, we hypothesised that:

H2a: Emotional intelligence will be positively related to workers' safety participation in container terminal operations.

H2b: Emotional intelligence will be positively related to workers' safety compliance in container terminal operations.

2.3 Moderating effect of emotional intelligence

Since container terminal operations involve high risk jobs and workload levels, safety behaviour is of the utmost importance. Emotional intelligence has been found to be positively associated with safety behaviour in the hotel and construction industries (Brymer *et al*., 1991; and Leung *et al*., 2012, respectively) and to significantly moderate the relationship between job stress and individual safety behaviour (Landa *et al.*, 2008; Kalyoncu *et al*., 2012). Research on car drivers (Arnau-Sabates *et al*., 2012), offshore drilling crews (Sneddon *et al.*, 2013), and police personnel (Adebayo and Ogunsina, 2011) found that where employees possessed low job stress or increased emotional intelligence,

safety behaviours were enhanced. Landa *et al.* (2008) investigated the interrelationships among emotional intelligence, job stress and health and reported that nurses with high emotional intelligence better managed their health and job stress. Kalyoncu *et al*. (2012) found a significant relationship between job stress and the emotional intelligence of nurses. They also found emotional intelligence was needed to alleviate job stress and improve safety behaviour. The aforementioned research findings suggest that emotional intelligence moderates the effect of job stress on safety behaviour. Accordingly, this study posited that:

H3a: Emotional intelligence will moderate the relationship between job stress and workers' safety participation in container terminal operations.

H3b: Emotional intelligence will moderate the relationship between job stress and workers' safety compliance in container terminal operations.

3. Methodology

3.1 Research hypotheses

The research's conceptual model, based on previous studies, is shown in Fig. 1. It shows the impact of two antecedent factors, job stress and emotional intelligence, on safety behaviour. Job stress and emotional intelligence are hypothesised to have a direct influence on self-reported safety behaviour in container terminal operations. Emotional intelligence is also hypothesised to moderate the relationship between job stress and self-reported safety behaviour.

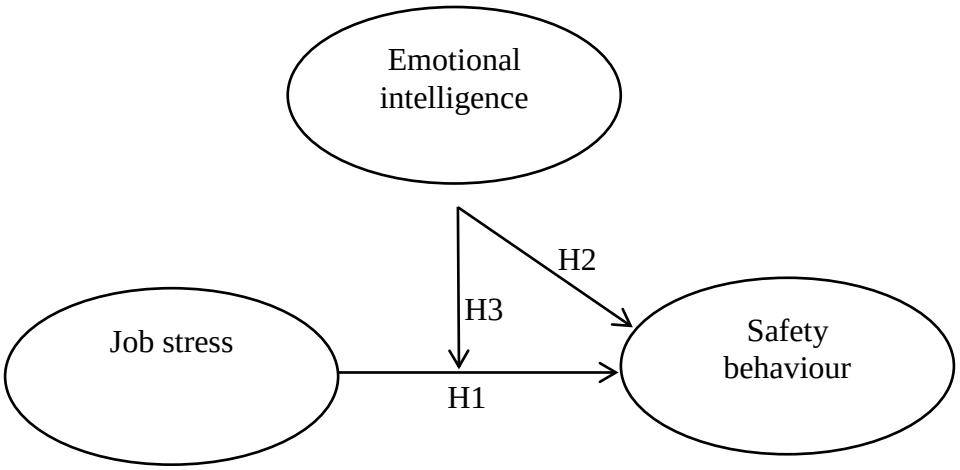

Figure 1. Conceptual model

3.2 Measures

Data for this study were obtained from a questionnaire survey whose development followed the stages outlined by Churchill and Iacobucci (2009). Measurement items for the three constructs of job stress, emotional intelligence and self-reported safety behaviour

were drawn from prior studies and relevant literature. To ensure content validity, the measurement items were tested through interviews with six senior front-line workers, three senior safety executives, and three terminal supervisors at Kaohsiung container terminal. The final version of the questionnaire consisted of 26 measurement items. Respondents were asked to rate their level of agreement/disagreement with the 26 items. Table 1 shows the constructs, their assessment items, and prior research from which they were drawn.

3.2.1 Independent variable

Job stress was measured in terms of how it impacted on workers' emotional and physical stress. The five measurement items for emotional stress were adapted from (Jackson and Maslach (1982); Netemeyer *et al*. (2004); Netemeyer *et al.* (2005); Sehlen *et al*. (2009); Wallace *et al.* (2010); and Ramasundaram and Ramasundaram (2011). The two measurement items for physical stress were adapted from (Rout and Rout, 1994; and Leung *et al.,* 2012). High measurement scores for emotional stress and physical stress suggested that job stress had influenced respondents' daily working life. Each measurement item was assessed using a five-point Likert scale ranging from 1= strongly disagree to 5= strongly agree.

3.2.2 Moderating variable

Emotional intelligence was measured according to four dimensions: self-emotion appraisal (SEA), others' emotion appraisal (OEA), use of emotion (UEA), and regulation of emotion (ROE). The four measurement items for self-emotion appraisal were drawn from (Davies *et al.,* 1998; Groves *et al.,* 2008; Siu, 2009; and Jung and Yoon, 2012). The two measurement items for others' emotion appraisal were drawn from (Davies *et al.,* 1998; Wong and Law, 2002; and Law *et al.,* 2004). The three use of emotion measurement items were drawn from (Davies *et al.,* 1998; Wong and Law, 2002; Law *et al.,* 2004; Ravichandran *et al.,* 2011; and Jung and Yoon, 2012). The two regulation of emotion measurement items were adapted from (Davies *et al.,* 1998; Wong and Law, 2002; Law *et al.,* 2004; and Groves *et al.,* 2008). High emotional intelligence measurement scores implied that respondents could easily control their emotions and behaviours in their employing organisations.

3.2.3 Dependent variable

Self-reported safety behaviour was measured in terms of safety compliance and safety participation. The five measurement items for safety compliance were adapted from (Hayes *et al*., 1998; Glendon and Litherland, 2001; Neal and Griffin, 2006; Lu and Yang, 2010; and Leung *et al*., 2012). The three safety participation measurement items were adapted from (Hayes *et al.,* 1998; Lu and Yang, 2010; and Musicant, 2011). High self-reported safety behaviour measurement scores indicated that respondents liked to

follow safety regulations and participate in safety activities in their workplace.

Table 1
Job stress, emotional intelligence and safety behaviour measurement items adapted from prior research

Measurement Items	Prior research
Job stress	
Emotional stress	
I often complain about problems at work.	Jackson and Maslach (1982)
I feel fidgety or nervous because of my job.	Netemeyer *et al*. (2004), Netemeyer *et al.* (2005), Ramasundaram and Ramasundaram (2011),
Problems associated with work have kept me awake at night.	Netemeyer *et al*. (2004),
I feel nervous before attending meetings in my organisation.	Netemeyer et *al.* (2004),
If I have a heavy workload, it contributes to my job stress.	Sehlen *et al.* (2009), and Wallace *et al.* (2010).
Physical stress	
I believe a good relationship with my colleagues is important.	Rout and Rout (1994)
I feel fatigued in the morning at the thought of having to face another day on the job.	Leung *et al.*, (2012)
Emotional intelligence	
Self-emotion appraisal	
I easily recognize my own emotions as I experience them.	Davies *et al.* (1998), Groves *et al.* (2008), Siu (2009)
I always know whether I am happy or not.	Davies *et al.* (1998), Jung and Yoon (2012)
I really understand what I feel.	Davies *et al.* (1998), Jung and Yoon (2012), Siu (2009)
I know why my emotions change.	Davies *et al.* (1998), Siu (2009)
Others' emotion appraisal	
I always know my friends' emotions from their behaviour.	Davies *et al.* (1998), Law *et al.* (2004), Wong and Law (2002)
I am a good observer of others' emotions.	Davies *et al.* (1998), Law *et al*. (2004), Wong and Law (2002)
Use of emotion	

I am a self-motivated person.	Davies *et al.* (1998), Jung and Yoon (2012), Law *et al.* (2004), Wong and Law (2002)
I always encourage myself to try my best.	Davies *et al.* (1998), Jung and Yoon (2012), Law *et al*. (2004), Wong and Law (2002)
I always set goals for myself and try my best to achieve them.	Davies *et al.* (1998), Jung and Yoon (2012), Law *et al*. (2004), Ravichandran *et al*. (2011), Wong and Law (2002)
Regulation of emotion	
I can always calm down quickly when I am very angry.	Davies *et al.* (1998), Law *et al*. (2004), Wong and Law (2002)
I seek out activities that make me happy.	Davies *et al.* (1998), Groves *et al*. (2008)
Safety behaviour	
Safety compliance	
I wear personal protective equipment at work.	Hayes et al. (1998), Lu and Yang (2010)
I use all the necessary safety equipment to do my job.	Hayes *et al*. (1998), Neal and Griffin (2006)
I do not neglect safety, even when in a rush.	
I maintain safety awareness at work.	Hayes *et al.* (1998), Lu and Yang (2010)
I comply with safety rules and standard operational procedures.	Glendon and Litherland (2001), Hayes *et al*. (1998), Leung *et al*. (2012), Lu and Yang (2010)
Safety participation	
I participate in setting safety goals.	Hayes *et al.* (1998), Lu and Yang (2010)
I actively participate in safety meetings.	Lu and Yang (2010)
I act on safety suggestions.	Musicant (2011)

3.3 Sample

The study sample comprised workers employed in container terminals in Kaohsiung, Taiwan, who were engaged in international container terminal operations, tallying, lashing, and stevedore activities. A questionnaire survey was sent to 800 container terminal workers in August 2014. The initial mailing elicited 289 usable questionnaires. After two weeks, a follow-up mailing was sent to enhance the response rate. It elicited an additional 141 usable questionnaires. The total number of usable response was therefore 430, and the overall response rate was 54 percent.

3.4 Non-response bias

A non-response bias test was conducted to compare the responses of first mailing

respondents and second mailing respondents (Armstrong and Overton, 1977). A t-test analysis was employed to test whether there were statistically significant differences between the responses of the two groups. Results showed there was a significant difference in the responses to one item only ($p<0.05$), therefore, non-response bias was not a concern in this study.

3.4 Research methods

The purpose of this study was to investigate the effect of job stress on self-reported safety behaviour in container terminal operations and evaluate the moderating influence of emotional intelligence on the relationship between job stress and safety behaviour. Exploratory factor analysis was performed to identify crucial dimensions of job stress, emotional intelligence, and self-reported safety behaviour. Multiple regression analysis was conducted to test the main effects of job stress and emotional intelligence on self-reported safety behaviour. Additionally, multiple moderated regression analysis was utilised to evaluate the moderating effects of emotional intelligence on the relationship between job stress and self-reported safety behaviour. All analyses were conducted using the *SPSS 18.0* and *AMOS 18.0 for Windows* statistical packages.

3.5 Respondents' characteristics

Table 2 presents the demographic profile of respondents. The majority of respondents (86.7%) were operators and general employees. Because they worked in the operational front-line of container terminals, their responses reinforced the survey findings. As regards work experience, 79.1 percent of respondents had 6 years work experience or more, while 20.9 had 5 years or less. This indicated that most respondents had sufficient work experience to answer the questionnaire survey reliably and accurately. As regards job type, the majority of respondents were engaged in hazardous jobs in container terminals. Over 65 percent of respondents worked in the ship side area, and 18.6% worked in the container yard. In addition, almost half of respondents (49.8%) had participated in safety training on three occasions or more. According to respondents' profiles they had sufficient work experience to answer the survey questionnaire with knowledge and confidence.

Table 2 Respondents' profile

	Number of respondents	Percentage of respondents
Job title		
Vice director or above	4	0.9
Department manager	11	2.6
Director	42	9.8
General employee	96	22.3
Operator	277	64.4
Age (years)		
30 years or below	59	13.7

31-40	161	37.4
41-50	127	29.5
51 or above	83	19.3
Education		
Junior high school or below	27	6.3
Senior high school	249	57.9
College/ University	141	32.8
Master or above	13	3.0
Work experience (years)		
5 years or less	90	20.9
6-10	113	26.3
11-20	125	29.1
21-30	83	19.3
31 or above	19	4.4
Job type		
Stevedore	231	53.7
Driver	90	20.9
Tallying	46	10.7
Lashing	18	4.2
Other	45	10.5
Work area		
Ship side	282	65.6
Container yard	80	18.6
Warehouse	34	7.9
Maintenance	14	3.3
Other	20	4.7
Safety training participation (number of training courses attended)		
Never	12	2.8
1	123	28.6
2	81	18.8
3	76	17.7
4	49	11.4
5 or above	89	20.7

4. Results of empirical analyses

4.1 Exploratory factor analysis

Exploratory factor analysis with VARIMAX rotation was conducted to gain a better understanding of the factors underlying the 26 measurement items. Mean and standard deviation scores for all measurement items are presented in Table 3. According to mean scores, respondents' agreement/disagreement levels ranged from strongly disagree (mean= 2.62) to strongly agree (mean= 4.23). Factors with a factor loading greater than 0.5 were extracted (Hair *et al*., 2010). Factor analysis of job stress attributes is shown in Table 4. The initial factor analysis accounted for approximately 50.51% of the total variance. The item "I believe a good relationship with my colleagues is important" was eliminated

because its factor loading score was less than 0.5. One factor was subsequently found to underlie the remaining six job stress items. It accounted for 58.12% of the total variance. This factor was therefore designated a job stress dimension.

Table 3 Mean and standard deviation scores for measurement items

Items	Mean	S.D.
Job stress		
I believe a good relationship with my colleagues is important.	3.95	0.78
If I have a heavy workload, it contributes to my job stress.	3.26	0.97
I feel fatigued in the morning at the thought of having to face another day on the job.	3.14	0.93
I feel fidgety or nervous because of my job.	2.95	0.96
I feel nervous before attending meetings in my organisation.	2.86	0.22
I often complain about problems at work.	2.85	0.89
Problems associated with work have kept me awake at night.	2.62	0.95
Emotional intelligence		
I really understand what I feel.	3.94	0.70
I easily recognise my own emotions as I experience them.	3.87	0.65
I always know whether I am happy or not.	3.87	0.75
I know why my emotions change.	3.83	0.69
I seek out activities that make me happy.	3.82	0.79
I always set goals for myself and try my best to achieve them.	3.80	0.72
I always encourage myself to try my best.	3.79	0.73
I always know my friends' emotions from their behaviour.	3.69	0.72
I am a self-motivated person.	3.60	0.75
I am a good observer of others' emotions.	3.51	0.75
I can always calm down quickly when I am very angry.	3.48	0.80
Safety behaviour		
I do not neglect safety, even when in a rush.	4.23	0.68
I wear personal protective equipment at work.	4.19	0.77
I maintain safety awareness at work.	4.14	0.71
I use all the necessary safety equipment to do my job.	4.11	0.79
I comply with safety rules and standard operational procedures.	3.98	0.73
I act on safety suggestions.	3.86	0.82
I participate in setting safety goals.	3.85	0.80
I actively participate in safety meetings.	3.77	0.82

Note: The mean score was based on a 5-point scale (1=strongly disagree, 5= strongly agree) and S.D. = stand deviation.

Table 4 Factor analysis of job stress attributes

Job stress attributes	Factor one
Factor1 (job stress)	
I feel fidgety or nervous because of my job.	0.84
If I have a heavy workload, it contributes to my job stress.	0.78
I feel nervous before attending meetings in my organisation.	0.77
Problems associated with work have kept me awake at night.	0.77
I often complain about problems at work.	0.76
I feel fatigued in the morning at the thought of having to face another day on the job.	0.64
Eigenvalues	3.49
Percentage variance	58.12

Factor analysis of the emotional intelligence attributes (see Table 5) revealed two underlying factors. They accounted for 59.36% of the total variance and are described below:

(1) Factor one, a self-emotion appraisal dimension, comprised six items: "I really understand what I feel", "I always know whether I am happy or not", "I know why my emotions change", "I easily recognise my own emotions as I experience them", "I always know my friends' emotions from their behaviour", and "I am a good observer of others' emotions". Since most items were related to self-emotion appraisal, this factor was therefore labelled a self-emotion appraisal dimension. "I really understand what I feel" had the highest factor loading. Factor one accounted for 45.87 percent of the total variance.

Table 5 Factor analysis of emotional intelligence attributes

Emotional intelligence attributes	Factor one	Factor two
Factor1(Self-emotion appraisal)		
I really understand what I feel.	**0.83**	0.19
I always know whether I am happy or not.	**0.81**	0.21
I know why my emotions change.	**0.79**	0.24
I easily recognise my own emotions as I experience them.	**0.72**	0.25
I always know my friends' emotions from their behaviour.	**0.69**	0.18
I am a good observer of others' emotions.	**0.55**	0.28
Factor2 (Use of emotion)		
I always encourage myself to try my best.	0.25	**0.85**
I am a self-motivated person.	0.13	**0.83**
I always set goals for myself and try my best to achieve them.	0.22	**0.81**
I can always calm down quickly when I am very angry.	0.23	**0.57**
I seek out activities that make me happy.	0.28	**0.55**
Eigenvalues	5.05	1.48
Percentage variance	45.87	13.49

(2) Factor two, a use of emotion dimension, comprised five items: "I always encourage

myself to try my best", "I am a self-motivated person", "I always set goals for myself and try my best to achieve them", "I can always calm down quickly when I am very angry", and "I seek out activities that make me happy". Because most of the items were related to the individual's ability to use their emotion, this factor was therefore labelled a use of emotion dimension. "I always encourage myself to try my best" had the highest factor loading. Factor two accounted for 13.49 percent of the total variance.

The initial factor analysis of self-reported safety behaviour attributes accounted for 72.99% of the total variance. The item "I maintain safety awareness at work" was eliminated because its factor loading score was over 0.5, between two factors. Two factors were subsequently found to underlie the remaining seven self-reported safety behaviour items (see Table 6). These two factors accounted for 74.45% of the total variance. They are detailed below:

(1) Factor one, a safety participation dimension, consisted of four items: "I participate in setting safety goals", "I comply with safety rules and standard operational procedures", "I actively participate in safety meetings", and "I act on safety suggestions". Since these items were related to participation in safety activities, this factor was therefore designated a safety participation dimension. "I participate in setting safety goals" had the highest factor loading. Factor one accounted for 56.54 percent of the total variance.

Table 6 Factor analysis of safety behaviour attributes

Safety behaviour attributes	Factor one	Factor two
Factor1 (Safety participation)		
I participate in setting safety goals.	**0.86**	0.20
I comply with safety rules and standard operational procedures.	**0.84**	0.22
I actively participate in safety meetings.	**0.83**	0.20
I act on safety suggestions.	**0.78**	0.28
Factor2 (Safety compliance)		
I use all the necessary safety equipment to do my job.	0.14	**0.87**
I wear personal protective equipment at work.	0.25	**0.84**
I do not neglect safety, even when in a rush.	0.32	**0.79**
Eigenvalues	3.96	1.25
Percentage variance	56.54	17.90

(2) Factor two, a safety compliance dimension, comprised three items: "I use all the necessary safety equipment to do my job", "I wear personal protective equipment at work", and "I do not neglect safety, even when in a rush". Since these items were related to compliance with safety activities, this factor was labelled a safety participation dimension. "I use all the necessary safety equipment to do my job" had the highest factor loading. Factor two accounted for 17.90 percent of the total

variance.

4.2 Reliability test

We utilised Cronbach alpha statistics and corrected item-total correlation coefficients of the collected data to evaluate the consistency and reliability of each construct. Table 7 shows the Cronbach alpha values and corrected item-total correlation coefficients of each factor achieved the recommended level of 0.7. The results therefore showed adequate inter item reliability (Nunnally, 1978; Churchill and Iacobucci, 2009). Respondents' level of agreement with each factor's measurement items is also shown in Table 7. Respondents agreed more with self-emotion appraisal items (mean =3.79) than use of emotion items (mean =3.70), suggesting that self-emotion appraisal was more important for work safety than use of emotional information. Also, respondents agreed more with safety compliance items (mean =4.18) than safety participation items (mean =3.87), suggesting they considered safety compliance more important than safety participation for safety behaviour in the workplace.

Table 7 Reliability test results

	No. of items	Mean	S.D.	Cronbach's alpha	Range of corrected item-total correlation
Job stress	6	2.95	0.71	0.85	0.81-0.85
Emotional intelligence					
EI1. Self-emotion appraisal	6	3.79	0.50	0.86	0.51-0.74
EI2. Use of emotion	5	3.70	0.58	0.82	0.48-0.73
Safety behaviour					
SB1. Safety participation	4	3.87	0.63	0.88	0.71-0.76
SB2. Safety compliance	3	4.18	0.55	0.83	0.61-0.71

4.3 Confirmatory factor analysis

Confirmatory factor analysis (CFA) was used in this study to examine the measurement model, including the unidimensionality, reliability and validity of the latent and manifest variables (Hair *et al*., 2010). Figure 2 shows a measurement model consisting of three latent variables, namely, job stress, emotional intelligence, and self-reported safety behaviour, and their corresponding indicators. Six observed variables (J1- J6) were loaded onto job stress, two observed variables (EI1- EI2) were loaded onto emotional intelligence, and two observed variables (SB1 and SB2) were loaded onto safety behaviour.

Construct model modification decision should include squared multiple correlations, standardised residual covariance, and model fit indices. The χ^2 value ($\chi^2(32) = 100.46$, $p< 0.000$) was statistically significant at the level of 0.05, which demonstrated that dissimilarities between the model-implied covariance matrix $\sum$ and data-observed S were significantly large. Unidimensionality is an important condition for construct validation and reliability (Anderson and Gerbing, 1988). Since goodness-of-fit indices exceeded the recommended level of 0.9, our measurement model could be accepted (Bagozzi and Yi, 1988; McDonald and Ho, 2002). The goodness-of-fit index (GFI) was 0.955, the comparative fit index (CFI) was 0.953, and the adjusted goodness-of-fit index (AGFI) was 0.923, all of which exceeded the standard recommended 0.9 level. The root mean square residual (RMR) was 0.028 and the root-mean-square error of approximation (RMSEA) was 0.07, both below the recommended levels of 0.05 and 0.08, respectively (Hair *et al.*, 2010). Thus, the overall fit of the confirmatory factor analysis was good and complied with commonly accepted thresholds for the evaluation of measurement models (Hu and Bentler, 1998; Hair *et al.*, 2010).

4.4 Convergent validity and item reliability

Convergent validity and item reliability can be identified by the critical ratio (C.R.) values, which should be greater than 1.96 or smaller than -1.96 for the model estimate to be acceptable (Dunn et al., 1994; Koufteros, 1999; Hair *et al.*, 2010). Table 8 reveals all C.R. values were significantly greater than 1.96, and all the indicators of each construct showed good convergent validity and unidimensionality (Anderson and Gerbing, 1988). The reliability of a particular observed item or variable can be estimated by the R^2 value. In our study, the R^2 value of each measurement item was over 0.3 (Koufteros, 1999), providing evidence that each item was significantly linked with its theoretical construct (Carr and Pearson, 1999; Hair *et al.*, 2010).

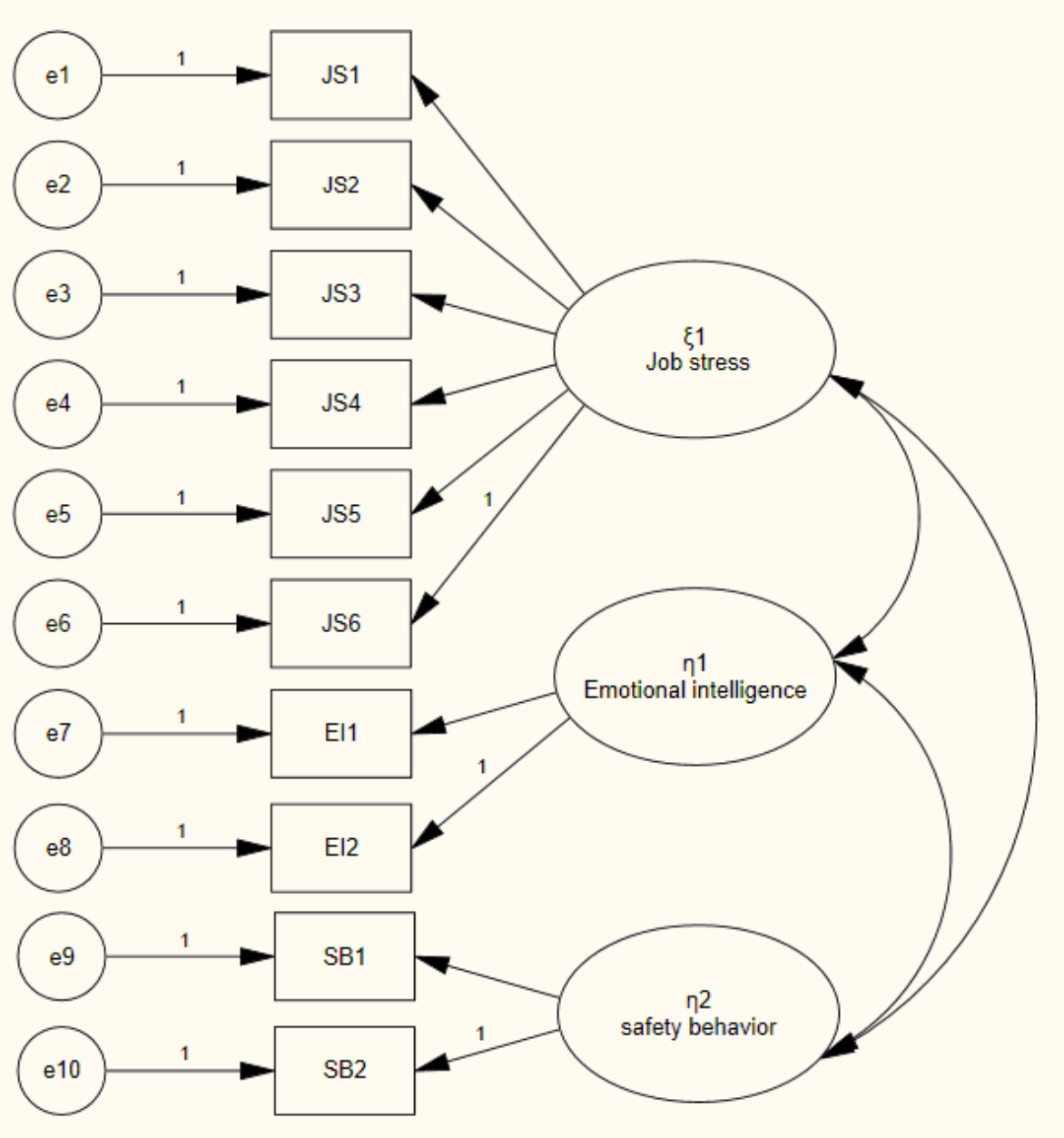

Figure 2. Path diagram representing the measurement model

Note:
J1: I often complain about problems at work.
J2: I feel fidgety or nervous because of my job.
J3: Problems associated with work have kept me awake at night.
J4: I feel nervous before attending meetings in my organisation.
J5: If I have a heavy workload, it contributes to my job stress.
J6: I feel fatigued in the morning at the thought of having to face another day on the job.
EI1: Self-emotion appraisal.
EI2: Use of emotion.
SB1: Safety participation.
SB2: Safety compliance.

Table 8 Parameter estimates, standard errors, critical ratios, and R^2 for the final model

Latent Variable Item	Completely standardised factor loading	Standard error[a]	Critical ratio[b]	R^2
ξ1 Job stress				
J1	0.690	0.115	10.375	0.48
J2	0.819	0.135	11.356	0.67
J3	0.714	0.125	10.582	0.51
J4	0.719	0.121	10.627	0.52
J5	0.728	0.128	10.697	0.53
J6	0.553	-[c]	-[c]	0.31
η1 Emotional intelligence				
EI1	0.753	0.099	9.906	0.57
EI2	0.728	-[c]	-[c]	0.53
η2 Safety behaviour				
SB1	0.732	0.119	9.392	0.58
SB2	0.692	-[c]	-[c]	0.48
Goodness-of-fit statistics				
$\chi^2(32) = 100.46$, p= 0.000, NFI = 0.933; GFI = 0.955; AGFI = 0.923; CFI = 0.953; RMR = 0.028; RMSEA = 0.071				

[a] S.E. is an estimate of the standard error of the covariance.

[b] C.R. is the critical ratio obtained by dividing the estimate of the covariance by its standard error. A value exceeding 1.96 represents a level of significance of 0.05.

[c] Indicates a parameter fixed at 1.0 in the original solution.

We followed the technique recommended by Churchill and Iacobucci (2009) to examine construct reliability in this study. When a construct has a high reliability value, this demonstrates its indicators are measuring the same latent construct. Table 9 shows the construct reliability values for job stress, emotional intelligence, and safety behaviour scales were 0.86, 0.71 and 0.67, respectively, all of which exceeded the recommended level of 0.6, considered an acceptable value for newly developed measures (Fornell and Larcker, 1981; Bagozzi and Yi, 1988; Hair *et al*., 2010). If indicators are truly representative of a latent construct, the average extracted value (AVE) should exceed 0.5 (Fornell and Larcker, 1981; Bagozzi and Yi, 1988; Hair *et al*., 2010). Table 10 shows that the Average variance extracted (AVE) values of job stress, emotional intelligence and safety behaviour were 0.50, 0.55 and 0.51, respectively, suggesting adequate convergent validity (Fornell and Larcker, 1981; Hair *et al*., 2010).

Table 9 Descriptive statistics and construct reliability for each measure

Measure	Mean[a]	S.D.[b]	Construct reliability[c]
Job stress	2.95	0.71	0.86
Emotional intelligence	3.75	0.49	0.71
Safety behaviour	4.00	0.58	0.67

[a] The mean scores of job stress, emotional intelligence and safety behaviour are based on a five-point scale

Table 10 Assessment of average variance extracted and construct reliability

Measures	AVE[a]	Job stress	Emotional intelligence	Safety behaviour
Job stress	0.50	1	0.06	-0.08
Emotional intelligence	0.55	0.06	1	0.51**
Safety behaviour	0.51	- 0.08	0.51**	1

** Correlation is significant at the 0.01 level.

[a] Average variance extracted (AVE) = (sum of squared standardised loading)/[(sum of squared standardised loadings)+(sum of indicator measurement error)]; Indicator measurement error can be calculated as 1- (standardised loading)^2.

4.5 Hierarchical regression analysis

This study employed hierarchical regression moderated regression analysis to test the research hypotheses (Jaccard *et al*., 1990). Table 11 presents the results. First, control variables, namely, education, and work experience were entered into the regression models (Model 1 and Model 4). Second, physical stress and emotional stress were placed into the regression as a block (Model 2 and Model 5). Third, we entered emotional intelligence as a moderator variable into a block (Model 5 and Model 6). If the interactions between emotional intelligence and job stress were significant, then this would suggest emotional intelligence had a significant moderating effect on the relationship between job stress and self-reported behaviour.

It is important to avoid the multicollinearity problem in regression analysis (Aiken and West, 1991). In order to examine the multicollinearity, we calculated the Durbin-Watson (D-W) value for each regression equation. The Durbin-Watson values all fell in the range 1.691 to 1.758 (see Table 11), which indicated the residuals were not correlated and the autocorrelation problem was not a problem in our research (Hair *et al*., 2010).

As can be seen in Models 1 and 4, of the 3 control variables, age and education had a significant influence on safety participation and safety compliance. This suggested age and education may be important factors impacting on safety behaviour.

Table 11 Regression analysis results (standard β coefficients)

	Safety participation Model 1	Safety participation Model 2	Safety participation Model 3	Safety compliance Model 4	Safety compliance Model 5	Safety compliance Model 6
Control variables						
Age	0.138**	0.100*	0.105*	0.200**	0.152**	0.144**
Education	0.086**	0.018	0.018	0.157**	0.096**	0.096**
Experience	- 0.081	- 0.060	- 0.063	- 0.047	- 0.024	- 0.019
Main effects						
Job stress		- 0.017	0.006		- 0.094**	- 0.135**
Emotional intelligence		0.457***	0.463***		0.407***	0.397***
Moderating variables						
Job stress X Emotional intelligence			- 0.062			0.108**
F-value	2.701**	24.274***	20.562***	8.041***	24.220***	21.321***
R^2	0.019	0.223	0.226	0.054	0.222	0.232
Adjusted R^2	0.012	0.213	0.245	0.047	0.213	0.221
Durbin-Watson	1.691	1.649	1.665	1.758	1.751	1.742

Note: * Significant at $p < 0.1$ level.
** Significant at $p < 0.05$ level.
*** Significant at $p < 0.01$ level.

In the Model 2 regression model (β = -0.017, p > 0.1), the coefficients of job stress were negative and had no significant influence on safety participation. Thus, the research hypothesis (H1a) was not supported. Further, in the Model 5 regression model (β = -0.094, p < 0.5), the coefficients for job stress were negative and significant for safety compliance. Results thus suggested that job stress is negatively related to safety compliance. Our research hypothesis (H1b) was therefore supported. In Model 2 (β = 0.457, p < 0.000) and Model 5 (β = 0.407, p < 0.000) the coefficients of emotional intelligence had a significant impact on safety participation and safety compliance. Research hypotheses H2a and H2b were therefore supported in this study.

The regression Models 3 and 6 examined the moderating effect of emotional intelligence on safety participation and safety compliance, respectively. Model 3 showed that the interaction between job stress and emotional intelligence (β = -0.062, p > 0.1) was negative and not significant. Therefore,hypothesis H3a was not supported. With regard to Model 6, which examined the moderating effect of emotional intelligence on safety compliance, the interaction between emotional intelligence and job stress (β = 0.108, p < 0.000) was positive and significant. Figure 3 shows a strong negative relationship between job stress and safety compliance when emotional intelligence is high. Figure 3 also demonstrates that job stress is associated with safety compliance when emotional intelligence is high rather than low. Accordingly, the results suggested that emotional

intelligence moderates the relationship between job stress and safety compliance in container terminal operations. Thus, H3b was supported in this research.

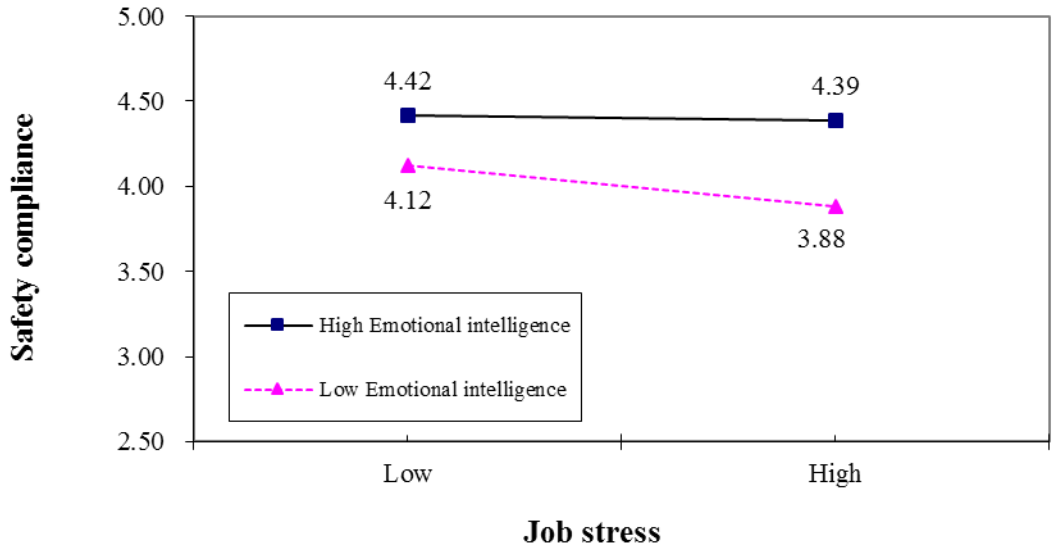

Figure 3. The moderating effect of emotional intelligence on job stress and safety participation.

5. Summary

Container terminal operations are hazardous. Although container terminal operators attempt to assure workplace safety, they are not completely successful in eliminating accidents due to unsafe human behaviours. While previous studies have identified various predictors of safety behaviour such as safety climate, safety training and site safety management (Zohar, 1980; Griffin and Neal, 2000; Lu and Tsai, 2010), an investigation of the influence of job stress and emotional intelligence on safety behaviour is lacking.

The present research developed a theoretical model to explain employees' safety behaviours in the container terminal context and empirically validated the model. It highlighted the importance of job stress and emotional intelligence in explaining unsafe human behaviour in container terminals. It illustrated how job stress and emotional intelligence influence employees' safety behaviours, including safety participation and safety compliance. It also showed that emotional intelligence has a moderating effect on the relationship between job stress and employees' self-reported safety behaviours. To the best of our knowledge, this is the first study to provide empirical evidence of the importance of job stress and emotional intelligence in explaining safety behaviour in the

workplace. More specifically, our study fills a gap in the literature since there is a void of studies examining employees' safety behaviours in container terminal operations.

This study used hierarchical moderated regression analysis to examine the effects of job stress and emotional intelligence on self-reported safety behaviour in terms of safety participation and safety compliance. The main findings of this study were as follows. First, a negative and significant relationship was found between job stress and safety compliance. Thus, research hypothesis H1b was supported. This finding was consistent with that reported in previous research (Safaria *et al*., 2010; Adebayo and Ogunsina, 2011; Leung *et al*., 2012). Second, emotional intelligence played a significant role in safety participation and safety compliance. Specifically, emotional intelligence had a stronger impact on safety participation than safety compliance. Finally, the multiple moderated regression analysis results suggested that emotional intelligence positively moderated the effect of job stress on safety compliance. As shown in Figure 3, a high emotional intelligence level reduced the negative effects of job stress on workers' safety compliance. Accordingly, hypothesis H3b positing that emotional intelligence moderates the relationship between job stress and workers' safety compliance was supported.

5.1 Managerial implications

The results of this study have important implications for container terminal managers to improve workplace safety. First, since job stress is one of the important factors influencing employees' safety behaviour in container terminal operations, it must be taken into consideration by terminal managers. We found that when job stress is high, employees' safety behaviours can decrease. In addition, the safety behaviour of container terminal employees is a critical antecedent to injury incidents. Therefore, to enhance employees' safety behaviour and reduce terminal injury incidents, job stress should be a major concern. This study's results suggest that container terminal operators could enhance safety behaviour by effectively managing employees' stress level through sufficient provisions of stress management training and equipment. This is consistent with findings in the construction and hotel industries in the studies of Brymer *et al.* (1991) and Leung *et al.* (2012). Brymer *et al*. (1991) suggested that stress management training would be useful to foster awareness of organisational stressors and teach stress reduction skills to employees.

The study findings also indicate that emotional intelligence is positively associated with employees' safety behaviours. This suggests that high emotional intelligence may be good for work safety behaviour. The environment of container terminal operations is dynamic. Front-line workers should report any factors negatively influencing ship and container operations to their supervisors to prevent accidents. People who have high emotional intelligence are inclined to control their emotions and behaviours, to participate

in safety decision-making, and to report potential risk, thereby reducing accident occurrence. This study suggests that emotional intelligence is an important variable to consider when hiring employees to work in container terminals. This finding is consistent with findings reported in previous studies (Groves *et al.*, 2008; Jung and Yoon, 2012; Joseph *et al*., 2015; Parke *et al*., 2015). Container terminal managers should therefore endeavour to increase employees' capabilities in managing their emotional states and responses to work requirements and implement training programmes to increase employees' emotional intelligence. This would likely lead to improved safety behaviour and reduced occurrence of accidents.

More importantly, this study indicated that emotional intelligence interacts with the influence of job stress on safety behaviour. An interesting finding is that emotional intelligence significantly moderates the relationship between job stress and employees' self-reported safety behaviours. Self-reported safety behaviour decreases for container terminal workers when job stress is high and emotional intelligence is low. Specifically, job stress leads to lower safety compliance behaviour when emotional intelligence is low rather than high (see Figure 3). This implies that in container terminal operations where workers possess lower job stress or increased emotional intelligence, safety behaviours can be enhanced. The aforementioned research findings are consistent with those reported in prior research focusing on car drivers (Arnau-Sabates *et al*., 2012), offshore drilling crews (Sneddon et al., 2013), police personnel (Adebayo and Ogunsina, 2011), nurses (Kalyoncu *et al*., 2012; Najimi *et al*., 2012), construction workers (Leung *et al*., 2012), and hotel workers (Brymer *et al*., 1991; Zohar, 1994).

5.2 Limitations and future research

Several limitations arose in this research, which provide meaningful directions for future research on this topic. First, a number of previous studies have highlighted the potential causes of job stress. For example, Michie (2002) stated that stress may be caused by the pressures of examinations or work deadlines, family demands, job insecurity, or long commuting journeys. Netemeyer *et al.* (2004) identified three major sources of job stress in the retail sales context: work-family conflict, family-work conflict, and work role conflict. Their study indicated that the effects that work-family conflict and family-work conflict have on job-related outcomes are greater than the influence of work role conflict and work role ambiguity. Najimi *et al*. (2012) stated that the causes of nurses' job stress include work load, personality clashes with colleagues, concerns about patients, and nursing tasks and policies. Leung *et al*. (2012) demonstrated that organisational stressors are major causes of construction workers' job stress and include inappropriate safety equipment, lack of goal setting, inadequate training, unfair rewards and treatment, and a poor physical environment. To facilitate an in-depth understanding of the relationships

between job stress, emotional intelligence, and safety behaviour, future research could consider the causes of job stress and performance utilising the model developed in this study.

Second, despite emphasising that the information gathered in the study survey would be treated in the strictest confidence and no individual could be identified from the survey form, self-reported safety behaviour data and respondents' perceptions of job stress in container terminal operations may have been subject to bias due to workers' unwillingness to respond and report accurately for fear of recriminations from their managers. Further research might therefore measure workers' safety behaviours by means of actual observation. We suggest future research could seek to explain how job stress and emotional intelligence influence safety performance outcomes (i.e. operational accidents or injuries). Third, the causal nature of job stress and emotional intelligence could not be determined due to the cross-sectional design. Future research could take a longitudinal or experimental approach to examine the relationships between job stress, emotional intelligence, and self-reported safety behaviour. Fourth, this research focused specifically on workers in container terminals in Taiwan. It would be valuable to collect data from workers in container terminal operations in other countries in order to obtain a balanced view of the relationship between job stress, emotional intelligence and worker safety behaviours. It might be interesting to find out if some nationalities have better job stress management and higher emotional intelligence than other nationalities and thereby better exhibit safety behaviour in the workplace.

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