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Full Length Research Paper

Aviation ground crews: Occupational stresses and work performance

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Aviation ground crews play a very important role in air transportation. Not only does their work pressure affect individual health and organizational efficiency, but aviation safety. The aim of this study is to explore the relationship between various sources of occupational stress and work performance. In this study, the connection among a variety of occupational stress, coping strategies and work performance was also explored, using the Structural Equation Modeling (SEM). The result of the analysis exhibited that occupational stress had a negative impact on work performance, and the coping strategies were the mediator survivals between occupational stress and work performance. The findings of the study argued that we can have a better understanding of the characteristic of aviation ground crews and the causal relationship between occupational stress and work performance, and the proposed model can be beneficial to improve the practices of human resources management and the policies of relevant aviation industries.

Key words: Aviation ground crews, occupational stress, coping strategies, work performance.

INTRODUCTION

Aviation is a more popular scheme of modern tourism. Aviation ground services are very important parts in the aviation industry for the aviation efficiency and safety. The works of aviation ground staff can be divided into check-in, group check-in, VIP lounge, ticket information counters, flight control center, lost and found, customs-immigration- quarantine (C.I.Q.), boarding gate, transit, weight balance and load control, etc. The main work space of aviation ground staff is on airports and airfield. They process the needs of customs directly and damage the chemical material like fuel environment. There are accumulating evidences that stress levels among crews in aviation industry are increasing and that this is manifesting itself in the form of unsafe working practices, higher turnover, lower morale and poorer performance. However, there has been no research into the influence of work performance on stress levels in the crews of aviation ground services.

A major limitation of all past quantitative reviews of the relationships among role stress and work performance is that little of them has investigated theoretically meaningful mediators of these relationships (Fried et al., 2008). As a consequence, in order to address this lacuna in the past study, we discussed the mediators that had an effect on the relationship between occupational stress and work performance.

Cooper and Marshall (1978) found that work stress had an impact on individuals and organizations. A survey of 28,000 workers in 215 organizations in the United States showed that stress at work was linked to poor work performance, acute and chronic health problems and employee burnout (Ivancevich et al., 1990; Kohler and Kamp, 1992). Aviation ground crews considered in this study contain reservation department, ticket service department, passenger service department, airfreight department, shipping department in the airline company and ground service department in airport service companies. They play a very important role in air transportation. Not only does their work pressure affect individual health and

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organizational efficiency, but also it affects aviation safety. There are considerable evidences that professionals are increasingly exposed to a working environment that places their health at risks through workplace stress and difficulties in maintaining an effective work-life balance (Davidson and Cooper, 1983; Greenhaus and Beutell, 1985; Burke, 1994; Dwyer, 1999).

Due to the work of aviation ground crews, the activity duration of flight is urgent and irregular in shifts. Therefore, their work pressure is much heavier than other industry not only affecting individual health and performance, but organizational efficiency and aviation safety. The purpose of this study is to discuss the causal relationship between occupational stress and work performance and to explore the mediator between them, with the expectation that the results can be beneficial to improve the practices of human resources management and the policies of relevant aviation industries.

LITERATURE REVIEW

Stress and effect

In the discussion of a previous study that was conducted, it was seen that stress is not the demand or the source of pressure itself; but it is the perception of that pressure (Cox, 1978; Lazarus, 1966; McGrath, 1970). Lazarus and Folkman (1984) indicated that work stress can be defined as a relationship between the person and the environments. Gellis et al. (2004) indicated the service coordination nature of the work and dealing with crisis situations was a major source of stress frequency and intensity.

According to Williams and Cooper (1998), the different perception of individuals (such as coping and supporting) and the perception of stress outcomes (such as well-being and job satisfaction) should also be measured. Hart and Wearing (1995) made the point that stress cannot be expressed as a single variable and that elements such as personality characteristics, coping processes, and positive and negative work experiences must also be considered.

Cooper and Marshall (1976) have categorized the sources of occupational stress as: intrinsic to the job, role in the organization, relationships at work, career development, organizational structure and climate, and home-work interface. In the models of occupational stress, “intrinsic to the job” included physical aspects of the working environment and personal psychosocial aspects. “Role in the organization” measures how individuals perceive the expectations that others have of them. “Relationships at work” measures the stress originating from personal contacts at work such as lack of social support from superior and office politics. “Career development” is concerned with respondents’ perceptions of their career development, promotion prospects and perceived threats of job obsolescence. “Organization structure and climate” measures stress originating from the bureaucratic nature of the organization, communication problems and morale in the organizations, and lastly, “home-work interface” measures stress originating from difficulties in coordinating family responsibilities with career demands.

Clarke and Cooper (2000) focus on the stress of retail workers. Their study indicated that occupational stress must be negatively perceived and subjected to inadequate coping to result in negative stress outcome, while the experience of stress is also moderated by a number of individual difference variables.

Coping strategies

Coping is the process by which people try to manage the perceived discrepancy between the demands and resources they appraise in a stressful situation (Sarafino, 2005), whereas coping research is defined by a plethora of diverse theoretical models and measurement instruments (Parker and Endler, 1992; Schwarzer and Schwarzer, 1996; Skinner et al., 2003). In theory, there are three main categories of coping strategies, including problem, emotion and avoidance specific behaviours. The coping process is not a single event, and as such, it involves the ongoing transactions with the environment (Sarafino, 2005).

The coping inventory for stressful situation (CISS) measures three dimensions (task, emotion and avoidance oriented coping) that are common across most conceptions of coping strategies. It was developed as a consequence of extending the interaction model of anxiety (Endler, 1982) to include coping variables like the interactional model of stress, anxiety and coping (Endler, 1997). There are personal variables (for example, trait anxiety, vulnerability, cognitive style, heredity and emotionality) that may interact with not only one another, but also with the situation variables (for example, life events, hassles, crises, pain and trauma), which in themselves also interact with one another. That is, there is an interaction between individual and situation variables. In effect, there is a feedback loop and it is a continuous process. One might assess various aspects of the model or assess the model as a whole (Endler and Parker, 1988).

Most of the coping instruments are related to the limitation of unsatisfactory psychometric properties, such as unstable factor structures and low reliability (Endler et al., 2003). The CISS seems much less plagued by psychometric limitations than are most of its predecessors (Schwarzer and Schwarzer, 1996). Rafnsson et al. (2006) investigated 1251 adolescents in Iceland using the CISS finding that the Cronbach's α ranged from 0.82 to 0.92, indicating that there are high levels of internal consistency for CISS.

Work performance

Campbell (1990) claimed that the construct of work performance has not yet been thoroughly mapped. Researchers have not produced a conceptually satisfying set of basic underlying dimensions that can be used to describe the performance requirements of jobs in general (Motowidlo and Van Scotter, 1994).

Campbell (1990) developed a performance model that divided the domain into job-specific task proficiency, non-job-specific task proficiency, written and oral communication, demonstrating effort, maintaining personal discipline, facilitation team and peer performance, supervision and leadership, and management and administration.

Borman and Motowidlo (1993) followed the concept of Campbell (1990) and dissect the performance domain as task performance and contextual performance. Task performance behaviors bear a direct relation to the organization's technical core, either by executing its technical processes or by maintaining and servicing its technical requirements. Contextual performance behaviors do not support the technical core itself as much as they support the broader organizational, social and psychological environment in which the technical core must function (Motowidlo and Van Sccoter, 1994). Moreover, Borman and Motowidlo (1993) identified five categories of contextual performance. They voluntarily carry out task activities that are not formally part of the job, persisting with extra enthusiasm when necessary to complete their own task activities successfully, helping and cooperating with others, following organizational rules and procedures even when it is personally inconvenient and endorsing, thereby supporting and defending organizational objectives.

The stress-work performance theories

Lori et al. (2003) reviewed studies performed over the past 25 years on the stress-performance relation since 1978. The result of their review showed that researchers have been exploring the relation between stress and work performance, but there remains a controversy about whether the relation is best characterized as a negative linear relation, a positive linear relation, or as an inverted-U.

Several theoretical arguments are provided in the literature to support the detrimental effect of occupational stress on work performance. Stress is detrimental to performance and the increasing levels of stress are increasingly detrimental in the negative linear relation model (Pincherle, 1972; Jex, 1998). Studies have found that if there was a low level of stress, challenge does not exist and, consequently, performance is poor (Meglino, 1977). In the positive linear relation model, stress represents a challenge that improves performance (Hatton et al., 1995; Kahn and Long, 1988).

The inverted-U theory of the stress-performance relation represents a merger of the negative and positive linear theories by suggesting that increasing stress is good for performance under a point, beyond which it becomes bad. Theorists seem to prefer the contingency nature of the inverted-U theory, yet the empirical results of stress-performance research weigh heavily in favor of the negative linear relation (Friend, 1982; Jamal, 1984; Jamal, 1985; Westman and Eden, 1991; Westman and Eden, 1996). Moreover, only two stress studies have found support for the inverted-U theory (Anderson, 1976; Srivastava and Krishna, 1991). Leung et al. (2006) indicated that the lack of effective stress management may lead to lower job performance. Based on previous research, it was predicted in the study that the occupational stress has to be assumed to have a negative impact on the work performance of aviation ground crews.

Model development

Estimates of the cost of stress to individuals, organizations and economies are typically in billions of dollars (Guenole et al., 2008). The proposed model provides a method to test the hypothesis that occupational stress and coping strategies can influence work performance. The following three parts are theoretical model, measures and analysis procedure.

Theoretical model

The conceptual model of this study shown in Figure 1 was developed to show the fundamental relationships among occupational stress, coping strategies and work performance.

H_1: "Occupational stress" negatively affects aviation ground crews' work performance.
H_2: "Coping strategies" positively affect aviation ground crews' work performance.
H_3: "Coping strategies" was a mediator between occupational stress and work performance.

MEASURES

The occupational stress indicator

Sources of occupational stress were assessed with 61 items adopted from Cooper et al.'s (1988) occupational stress indicator (OSI) and it was a self-administered questionnaire. Items were scored from 1 (very definitely is not a source of stress) to 6 (very definitely is a source of stress).

Coping inventory for stressful situation

The CISS were assessed with 48 items adopted from Endler and Parker (1999). It was also a self-administered questionnaire in

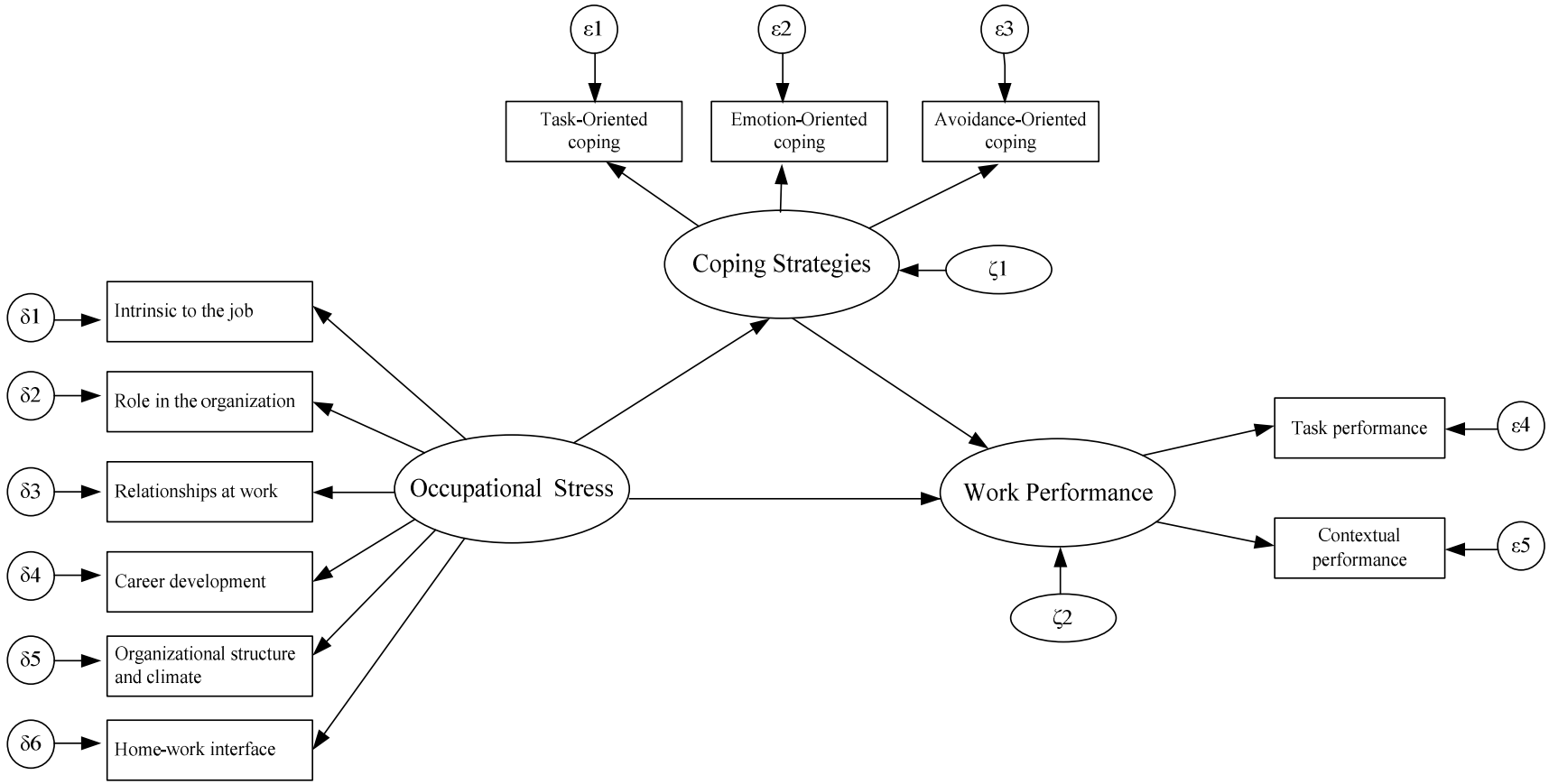

Figure 1. The model for occupational stress, coping strategies and work performance.

which questionnaire in which 16 items assessed task-oriented coping, 16 items assessed emotion-oriented coping, and the rest 16 items assessed avoidance-oriented coping. Each item on a 6-point frequency scale ranged from 1 (never) to 6 (all the time).

Work performance survey

The work performance survey, assessed with 23 items Adopted from Yu (1996), follows the consequence of Borman and Motowidlo (1993). It was a self-administered questionnaire, in which 8 items assessed task performance and 15 items assessed contextual performance. Items were scored from 1 (never) to 6 (all the time).

Analysis procedure

Initially, the demographic data were displayed and the reliability analysis with Cranach's α coefficient was performed to identify the reliability of this survey. Next, correlations analysis was applied to assess the relation of all factors in this study. Finally, we analyzed the connection among occupational stress, coping strategies and work performance by using the structural equation modeling (SEM) (Jöreskog and Sörbom, 1988) and the AMOS 7.0 software package. This method allowed us to identify latent variables and structural equation coefficients simultaneously using covariance structure modeling. We developed and test a structural equations model to identify the interrelationships among the variables, with a set of simultaneous equations. However, we used this model to formally test

the three hypotheses.

RESULTS

Data collection

The target population of this study was aviation ground crews working in Taoyuan International Airport, Taiwan. The questionnaire was sent to 604 aviation ground crews. Firstly, descriptive statistics was performed. Of all these respondents, 342 (male =198 and female = 144) had completely filled out the self-administered questionnaires, accounting for an effective response rate of 56.62%, and their ages ranged from 21 to 64 years with the mean age being 35.97 years (SD = 8.73 years).

Reliability analysis

The value of the diagonal in Table 1 was reported on the Cronbach's α coefficient of each construct and was validated on the internal-consistency reliability. Consequently, all values of Cronbach's α were greater than 0.7 (DeVellis, 1991), indicating a high reliability.

Correlations among occupational stress, coping strategies and work performance

Correlations among occupational stress, coping strategies and work performance were calculated based on the total valid sample, and the results shown in Table 1 are the coefficients of correlation and their statistical significance. The factors among occupational stress severity scores are correlated with each other significantly ($p < 0.01$) and positively, whilst the coefficient of correlation is from 0.73 to 0.87 for occupational stress. Also, the factors among coping strategies severity scores are correlated with each other significantly ($p < 0.01$) and positively, and it is shown that the coefficient of correlation is from 0.20 to 0.38 for coping strategies. Furthermore, the factors in work performance severity scores are also correlated with each other significantly ($p < 0.01$) and positively, and it is shown that the coefficient of correlation between task performance and contextual performance is 0.70. According to the analysis, all factors in the survey are correlated significantly ($p < 0.01$) and positively. After closely examining the relationship between occupational stress and work performance, we found that it was positive, but not significant. Therefore, we used the structural equation modeling (SEM) to test the relationship between them.

Structural equation modeling

We tested the overall fit of the hypothesized model using structural equation modeling, whereas the basic causal model, incorporating the hypothesized relationships, is presented in Figure 1. Before testing the structural model proposed in Figure 1, we assessed the validity of the multiple-item scales by analyzing the measurement model using confirmatory factor analysis (CFA) with maximum likelihood estimation (Arbuckle, 1999). The study used AMOS 7.0 to evaluate measurement model and structural equation modeling; then the overall fit of the hypothesized model shown in Figure 1 was tested. The results tested by the structural equation analysis are presented in Figure 2. The x^2 divided by the degree of freedom is 4.67 (Chin and Todd, 1995; Gefen et al., 2000). The goodness of fit index (GFI) is 0.91 (greater than 0.9) and the adjusted goodness of fit index (AGFI) is 0.85, which indicates a good fit between the data and the proposed model (Hayduk, 1987). The root mean square error of approximation (RMSEA) is 0.10 (Browne and Cudeck, 1993; Hu and Bentler, 1999). Nonetheless, the standardized path coefficients of the proposed model of relationships are shown in Figure 2.

The completely standardized solution in Figure 2 indicated the effect of the model, and it was seen that all the values in the model were significant ($p<0.01$). The direct effect between occupational stress and coping strategies was 0.23, while the direct effect between occupational stress and work performance was -0.21 and the direct effect between coping strategies and work performance was 0.75.

However, the indirect effect between occupational stress and work performance by way of coping strategies was -0.16 (-0.21 × 0.75). The total effect between occupational stress and work performance was -0.37 [-0.21 + (-0.16)]. Totally, the latent variable “coping strategies” was a mediator between occupational stress and work performance.

Table 2 showed the composite reliability (CR) and the average variance extracted (AVE) of the full model. All values of CR were greater than 0.5, indicating a high reliability, while the values of AVE were greater than 0.5 (except the construct “coping strategies”), indicating that the observed variables can explain the latent variables.

DISCUSSION AND CONCLUSION

Occupational stresses are phenomena that are more common in modern times than it is generally believed. It has a large impact on both individual and society. An understanding of the nature and effects of occupational stress suggest that it poses a significant hazard to employees’ health and it also acts as a source of business cost (Shanton et al., 2001). The purpose of this study was to explore the determinants of work performance. The paper proposes and empirically evaluates a model which generates a series of hypotheses regarding stress by using the decisions and variables that are likely to influence work performance.

Table 1. The correlation of occupational stress, coping strategies and work performance.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
(1) Intrinsic to the job	0.8200										
(2) Role in the organization	0.8706**	0.8700									
(3) Relationships at work	0.8184**	0.8681**	0.8600								
(4) Career development	0.7762**	0.7823**	0.7577**	0.8100							
(5) Organizational structure and climate	0.7943**	0.8079**	0.8142**	0.8249**	0.8700						
(6) Home-work interface	0.7865**	0.8238**	0.8005**	0.7260**	0.7322**	0.8800					
(7) Task-oriented coping	0.1691**	0.1909**	0.1366**	0.1831**	0.1430**	0.0897	0.9100				
(8) Emotion-oriented coping	0.3150**	0.2639**	0.2654**	0.2991**	0.2335**	0.2665*	0.2039**	0.8800			
(9) Avoidance-oriented coping	0.1123*	0.0884	0.0792	0.2082**	0.1162*	0.0903	0.3519**	0.3809**	0.8500		
(10) Task performance	-0.0602	-0.0336	-0.0860	0.0719	-0.0245	-0.0941	0.5276**	-0.0221	0.1931**	0.9100	
(11) Contextual performance	-0.0247	-0.0078	-0.0488	0.0283	-0.0328	-0.0927	0.5228**	0.0348	0.2219**	0.7011**	0.9200
Mean	32.2700	38.6700	32.5000	33.5700	40.0200	33.9100	67.2100	56.9800	60.6600	38.8800	69.0100
SD	7.1700	9.4200	8.5300	7.2900	8.9400	9.5400	11.0400	11.3500	11.400	5.3100	9.9200

** $p < 0.01$; *$p < 0.05$. The value of the diagonal is Cronbach's α.

The results of this study yielded some important findings and generally supported previous researches. The results indicated that occupational stresses made significant contributions to coping strategies, and that both occupational stress and coping strategies made significant contributions to work performance. As such, the fit of the study's hypothesized partial mediation model was tested by the SEM approach. Conclusively, the analysis results showed that occupational stress has a negative impact on work performance (Pincherle, 1972; Jex, 1998), and our findings supported the expected partial mediation effects of coping strategies on the occupational stresses (that is, work performance relation). Consistent with the transactional (Lazarus, 1984; Fried et al., 2008) model, stressed employees' responses to their stressful experience, probably reflect further damage to their psychological state, which in turn weakens their work performance. These findings are quite consistent with previous studies of occupational stresses and work performance.

The present findings are partially consistent with previous studies (Clarke and Cooper, 2000) in identifying a causal relationship between occupational stress and work performance. In essence, the negative effect of stress can be mediated by coping. In short, employees who perceive low occupational stress and high coping tend to have higher work performance. Managers traditionally have administered human resources by applying the same policies and methods to all employees, but the analytical results presented here suggest that employees differ, and that the differences are manifested in perceptions of occupational stress and coping strategies. The mediator roles of coping show the effectiveness of coping strategies in the workplace (Kitaoka-Higashiguchi et al., 2003).

The study argued that we can have a better understanding of the characteristic of aviation ground crews and the causal relationship between occupational stress and work performance. Using the model of this study, each of the variables showed a direct effect on aviation ground crews. Therefore, the proposed model can be beneficial to improve the practices of human resources management and policies of relevant aviation industries.

The findings have several implications for the managers and researchers of aviation ground crews. They suggest that personnel managers in particular need to be aware of important psychological characteristics between occupational stress and work performance, and specifically, that coping strategies determine how employees are treated in an organization and influence how they respond. The long-term consequences of high levels of job stress and low coping crews need to be taken into consideration when calculating the short- versus long-term benefits of the psychological support system building of an organization. The results can be used to help researchers and managers predict employees' work performance

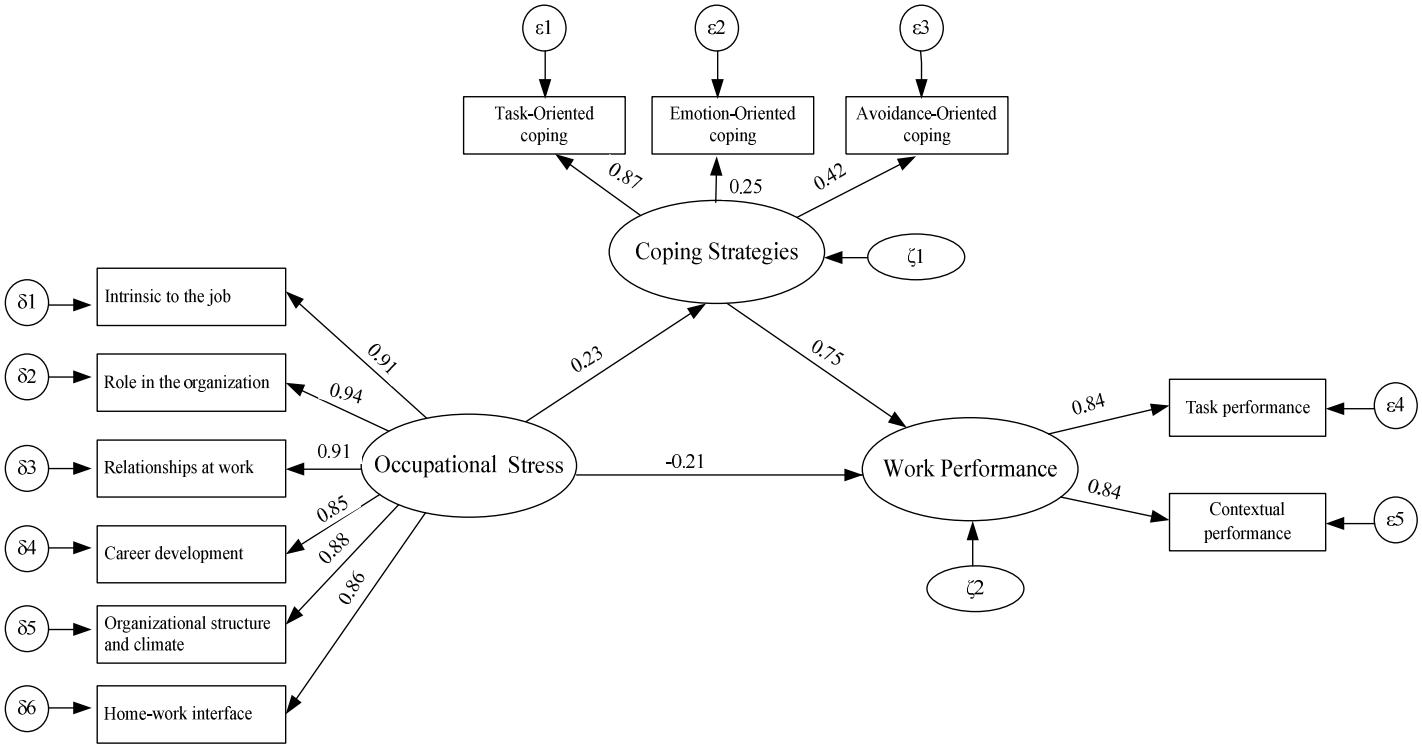

Figure 2. The standardized path coefficients of the proposed model of relationships.

Table 2. Composite reliability and average variance extracted.

Variable	Observed variable	Standard parameter	Error	R^2	CR	AVE
Occupational stress	Intrinsic to the job	0.91	8.69	0.83	0.96	0.80
	Role in the organization	0.94	9.91	0.89		
	Relationships at work	0.91	11.96	0.84		
	Career development	0.85	14.68	0.72		
	Organizational structure and climate	0.88	18.18	0.77		
	Home-work interface	0.86	23.02	0.75		
Coping strategies	Task-oriented coping	0.87	29.04	0.76	0.54	0.33
	Emotion-oriented coping	0.25	120.10	0.06		
	Avoidance-oriented coping	0.42	107.14	0.17		
Work performance	Task performance	0.84	8.35	0.70	0.83	0.71
	Contextual performance	0.84	29.49	0.70		

and help companies take employee's personality characteristics into account. Perhaps, the research has some limitations. First, we have proposed longitudinal stability for the causal relationship between occupational stress and work performance in the absence of a longitudinal design. The relation between cause and effect of the model would therefore benefit from the longitudinal research to show that it is settled. This research also benefit from replication using measures other than self reports. Finally, since all variables were measured in the same questionnaire, the findings were susceptible to problems associated with the common method of variance, that is, they may be distorted due to correlation inflation. However, the appearance of several low variable correlations, adequate sample size and the reliability levels of the measures suggest that the common variance methodology used here did not create credibility problems (Lindell and Whitney, 2001).

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