The Influence of Work Pressure on Airline Personnel's Work Errors in the Internet Age

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Abstract. To explore the influence mechanism of job stress on job errors, on the basis of literature review, this thesis proposes a conceptual model of the effect of job stress on job errors of airline personnel, and explores the mediating effect of perceived organizational support (POS). The analysis of 373 airline questionnaires show that the job stress of airline personnel has a pronounced positive effect on their job errors; airline personnel’s work tasks stress, interpersonal stress, occupational development stress and work-family conflict stress have a pronounced positive effect on their job errors, and the positive effect of role stress and organizational management stress to job errors is not significant; airline personnel’s POS produces a mediating effect between their job stress and job errors. The purpose of the study is to provide a basis for airline’s stress management and safety management, so as to improve safety performance and enhance the safety level of air transportation.

Keywords: Airline Personnel, Job Stress, Perceived Organizational Support, Job Errors

1. Introduction
China is speeding up the leap from a big country of air transportation to a powerful country of air transportation. With the development of the strategic process of a powerful country of civil aviation in the new era, a modern air service system featuring safety, efficiency, convenience, green and harmony will gradually be formed. However, in recent years, civil aviation unsafe events occur frequently. According to the investigation, the proportion of human induced flight accidents is as high as 70% - 80%. The special professional nature of the airline personnel, the complex work content, the high degree of work risk, the long and irregular working hours, lead to the excessive and continuous job stress.

Job stress has a negative impact on the soundness in body and mind as well as a greater negative impact on the organization when the job stress of employees exceeds an appropriate level. Job stress is an important variable that affects job behavior, which may lead to job errors of employees. There are abundant researches and explorations about job stress at home and abroad, including the definition, source, classification, influencing factors, measurement methods and so on. For the research on the influence of job stress, most studies discuss the effect of job performance, job burnout, work attitude and workplace behavior deviation, which needs to be systematically improved in terms of employees'
job errors. In terms of job errors, scholars have carried out relevant explorations and researches on its concept, classification, causes, countermeasures and other aspects. There are many specific industry objects involved in those researches, including aviation, medical, electrical, coal industry, etc., but few scholars have compared and discussed the impact on job errors based on different dimensions of job stress of airline employees. At present, the research of perceived organizational support is in a hot stage. Most of the researches are focused on the direct effect model of perceived organizational support, a few researches are based on the airline personnel's perceived organizational support to explore its direct impact on employees' job errors and the mediating effect of POS between job stress and job errors.

Therefore, this thesis is to select airline personnel as the study subject, and study the impact of job stress on job errors; in addition, in the selection of variables, through the use of POS as an intermediary variable, to discuss the relation between job stress, POS and job errors. To enrich the study on the impact of job stress on job errors in theory further, deepen the research on the intermediary mechanism of job stress and job errors, supplement theoretical research on job stress and job errors in the aviation field; in practice, provide ideas for stress management and error management of Chinese airline personnel, improve safety performance, and improve the economic efficiency of airlines, improve the safety and efficiency of air transportation.

2. Literature Review and Research Assumptions

2.1 Job Stress and Job Errors

Yerkes-Dodson law explains the effect of arousal degree of job stress on one's job performance. When one is in a low stress state, job performance will be at a low level accordingly; when an individual is in a high stress state, job performance will be low. Only in the appropriate level of job stress arousal can job performance reach the highest level. Too much job stress will lead to a high anxiety state of mind and a high degree of job dissatisfaction, while people are prone to unsafe behaviors when they are highly anxious and have resistance to job [1]. Li Li and Cheng Jiulong studied civil aviation pilots and found that the job stress of civil aviation pilots in China was high, which was positively correlated with unsafe behaviors [2]. Li Naiwen et al. made a research on the job stress of miners, and discovered that the job stress of miners has a pronounced positive effect on unsafe behaviors [3]. Li Yang found a pronounced negative relation between job stress and safety performance based on the research of aviation safety officers [4]. Everyone's stress tolerance is different, when the stress level exceeds the individual's tolerance range, the stress will not play a positive role, but will weaken the individual's ability to challenge job, which will lead to errors and accidents [5]. Based on the above theoretical research and analysis, the following assumptions are made for the job stress and job errors of airline personnel. In the light of Cooper and Marshall's classification of job stress sources, the influence of different dimensions of stress on job errors was discussed [6].

H1: The job stress has a pronounced positive influence on job errors.
H1a: The work tasks stress has a pronounced positive influence on job errors.
H1b: The role stress has a pronounced positive influence on job errors.
H1c: The interpersonal stress has a pronounced positive influence on job errors.
H1d: The organizational management stress has a pronounced positive influence on job errors.
H1e: The occupational development stress has a pronounced positive influence on job errors.
H1f: The work-family conflict stress has a pronounced positive influence on job errors.

2.2 The Mediating Role of POS

On the basis of social exchange theory and the idea of organizational personification, Eisenberger et al. put forward the concept of POS. They think that POS can meet the social emotional needs of employees at job. If employees feel that the organization is willing and can repay their job, they will work harder for the interests of the organization [7]. Superior support and organizational relationship play a significant role in subordinates' job performance. If employees have a high sense of POS, they
will have a more positive attitude towards job, thus greatly improving their job performance [8]. In terms of the impact on unsafe behaviors, Zhang Yexin and others discovered that there dimensions of POS have pronounced impact on unsafe behaviors of miners [9]. Yan Guiqing's research on employees of chemical enterprises found that job stress was negatively relevant with POS, and POS was positively relevant with safety performance [10]. In general, the relationship between job stress and job performance is an inverted U relationship, which is reduced due to job support [11]. Based on the above analysis, this study makes the following assumptions.

H2: The job stress has a pronounced negative influence on POS.
H3: The POS has a pronounced negative influence on job errors.
H4: The POS plays an intermediary role between job stress and job errors.

3 Research Methods
This study selected some of the airline personnel for interviews and questionnaires. The interviewees include persons in charge of safety related departments, safety supervisors, flight department personnel, cabin department personnel, flight dispatchers and maintenance personnel. To ensure the validity and scientificity of the interview, the semi-structured interview mode is selected to ask questions according to the interview outline. During the interview, the interviewees are followed up with relevant questions and recorded.

The job stress questionnaire of this study is modified and improved on the basis of the occupational stress index scale [12] designed by Cooper et al. The occupational stress index system is the most classic job stress measurement index system. Its reliability and validity have passed the research and test, and has been studied and used by Chinese scholars, which is suitable for the local environment of our country. There are 18 items in the scale, which are divided into six dimensions. The questionnaire of POS is mainly based on the scale developed by Eisenberger et al. [7]. Six items of the original scale with high factor load are selected. Their reliability and validity have been verified and supported by relevant research and used by Chinese scholars, which is suitable for the local environment in China. The job error questionnaire is a human error questionnaire compiled by Shi Changyun [13]. There are 8 questions in the questionnaire, and its reliability and validity have been verified and supported by relevant research in China.

In the questionnaire of this study, we choose the mature scale which has been verified and supported by relevant research. It is proved that its reliability and validity are good, and it is suitable for the local environment of our country. Some personnel of DH, HH and GH airlines were selected as the subjects for questionnaire survey. In the selection of survey objects, we try to involve the airline personnel of different positions, age groups, education background and working time. A total of 373 questionnaires were effectively recovered.

4 Data Analysis

4.1 Reliability and Validity Analysis
By using cronbach's α to evaluate the intrinsic consistency of three scales, the cronbach's α of scale of job stress, POS and job errors were 0.922, 0.958 and 0.930, which were higher than the criterion of 0.7. The overall level of reliability was high.

This study used scales which are all from the mature scale of relevant literature, with good content validity. As for structural validity, exploratory factor analysis was used to test it. KMO values of job stress, POS and job errors were 0.916, 0.914 and 0.924, which were higher than the critical value of 0.8. Through the exploratory factor analysis of the scale by the maximum variance method, six factors are extracted from the job stress rotation factor load matrix, and one factor is extracted from the POS and job errors rotation factor load matrix respectively. The obtained factors are consistent with the pre-set dimensions and have good structural validity.

4.2 Correlation Analysis
In order to comprehend the correlation among the variables, Pearson correlation coefficient method was used. There is a pronounced positive correlation between job stress and job errors ($r = 0.666, P < 0.01$); a pronounced negative correlation between job stress and POS ($r = -0.748, P < 0.01$); a pronounced negative correlation between POS and job errors ($r = -0.605, P < 0.01$). The correlation between all dimensions of job stress and job errors is pronounced positive. The correlation between the variables provides a reference for the follow-up study, and provides preliminary evidence for the research hypothesis.

4.3 Hypothesis Test

For the test of interaction among job stress, POS and job errors, regression analysis was carried out. As shown in Table 1, control variables such as gender, age, education level, marital status, working seniority and position category are included in model 1. The $\Delta R^2 (0.010)$ of M1 indicates that the control variables explain an additional 1.0% of POS variation. In model 2, regression test of job stress on POS was carried out. The outcome indicates that the job stress of airline employees has a pronounced negative influence on the POS ($\beta = -0.754, P < 0.001$). Hypothesis H2 is verified. In model 3, regression test of job stress on job errors was carried out. The test outcome indicates that the job stress of airline personnel has a pronounced positive influence on job errors ($\beta = 0.652, P < 0.001$). Hypothesis H1 is verified. In model 4, the POS of airline employees was included in the regression. The test results showed that the POS of airline employees had a pronounced negative influence on job errors ($\beta = -0.227, P < 0.001$). Hypothesis H3 is verified.

| Table 1. Hierarchical regression analysis results of each variable |
|---------------------------------------------------------------|
|                  | POS         | Job errors |
|                  | M1          | M2          | M3          | M4          |
| Control variables:                                         |             |             |             |             |
| Gender           | -.003       | -.054       | -.045       | -.057       |
| Age              | .053        | .051        | -.110       | -.098       |
| Education level  | .069        | .074        | -.057       | -.040       |
| Marital status   | .046        | .000        | -.083       | -.083       |
| Working seniority| -.144       | -.024       | .063        | .057        |
| Position category| -.052       | .100        | .130        | .107        |
| Independent variable:                                     |             |             |             |             |
| Job stress       | -.754***    | .652***     | .481***     |             |
| Intermediary variable:                                   |             |             |             |             |
| POS              |             |             |             | -.227***    |
| $R^2$            | 0.026       | 0.570       | 0.475       | 0.497       |
| $\Delta R^2$     | 0.010       | 0.562       | 0.465       | 0.486       |
| $\text{VIF}$     | <4          | <4          | <4          | <4          |
| $F$              | 1.657       | 69.100**    | 47.116**    | 44.943***   |

**. When the degree of confidence is 0.01, the correlation is pronounced.
***. When the degree of confidence is 0.001, the correlation is pronounced.

In order to test the influence of the dimensions of job stress to job errors, regression analysis was carried out. When the job error is taken as the dependent variable, the work tasks stress has a pronounced positive influence on the job errors ($\beta = 0.119, P < 0.05$). Hypothesis H1a is verified. The positive impact of role stress on job errors was not significant ($\beta = 0.039, P > 0.05$). Hypothesis H1b is not tenable. Interpersonal stress had a pronounced positive influence on job errors ($\beta = 0.207, P < 0.001$). Hypothesis H1c is verified. The positive effect of organizational management stress on job errors was not significant ($\beta = 0.122, P > 0.05$). Hypothesis H1d is not tenable. Occupational development stress had a pronounced positive influence on job errors ($\beta = 0.131, P < 0.05$).
Hypothesis H1e is verified. Work-family conflict stress had a pronounced positive influence on job errors ($\beta = 0.220$, $P < 0.001$). Hypothesis H1f is verified. In order to discuss the role of POS between job stress and job errors, the mediating effect in the conceptual model was analyzed by MPLUS software. The output results are shown in Table 2. The confidence interval of the indirect influence of airline personnel job stress on job errors does not include 0 ($\text{BootLLCI}=0.136$, $\text{BootULCI}=0.900$), the mediating effect is significant, hypothesis H4 can be tested.

### Table 2. Test results of intermediary effect

| Job errors | Standard error | LLCI | ULCI |
|-------------|----------------|------|------|
| The indirect effect of job stress on job errors through POS | 0.102 | 0.417 | 0.983 |

Note: LLCI = 95% lower limit confidence interval. ULCI = 95% upper limit confidence interval.

### Conclusions

By combining theory with practice, using the methods of model construction and data statistics, this study draws the following conclusions: (1) The job stress of airline personnel has a positive influence on their job errors. (2) The work tasks stress, interpersonal relation stress, career development stress and work-family conflict stress of airline personnel have a pronounced positive influence on their job errors, the positive influences of role stress and organizational management stress on job errors are not significant. (3) The job stress of airline personnel has a negative predictive effect on their POS. (4) The POS of airline personnel has a negative predictive effect on their job errors. (5) The POS of airline personnel plays a partial intermediary role between their job stress and job errors.

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