

Stressor Load and Stress Resilience: A New Perspective for Occupational Stress

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Abstract. In modern society with fierce competition, occupational stress has become a critical factor for people's health and well-being. Through several outstanding models proposed for occupational stress have been widely used and verified in different industries under various cultural backgrounds, they still have some limitations and/or difficulties in theory and application. Therefore, this paper defines the concept of stressor and stressor load, and puts forward the Stressor Load-Stress Resilience Model (SLSRM) from a new perspective. Based on this model, the perceived stress depends on severity of the stressor in the job context and individual ability to withstand stress (i.e. stress resilience). Stressors are classified into seven categories in this model, including the interpersonal relationship, organizational management, career development, job requirements, working environment, role ambiguity and work-family conflict. The individual stress resilience is determined by the positive personal characteristics, including psychological capital, knowledge/skill, working experiences and personality. Moreover, importance (weight) of stressor for different persons is also taken into account. An overview of a validation research is provided. This model provides a new approach for understanding and measuring the occupational stress and has the potential to be integrated into/developed to a complete stress management framework.

Keywords: Occupational stress model · Stressor · Stressor load · Personal characteristics · Stress resilience

1 Introduction

With the high-speed development and increasing intense competition in the modern society, occupational stress has made a more and more important effect on human health and well-being. Studies show that the occupational stress has significant effects on the staff performance, mental health, job satisfaction, and job burnout, etc. [1, 2]. Occupational stress may cause health hazards and lead to physiological diseases, which have also been certified by many studies [3–5]. Moreover, for some special occupations such as the pilot and doctor, whose occupational stress may not only influences the

individual, but also may threaten the public health and safety. It is considered that the air crash event of the airline Germanwings happened in 2015 was caused due to mental health of the pilot. However, one of the causes leading to his mental health is the over-high occupational stress possibly. Therefore, the occupational stress is taken more seriously by the enterprise and academia.

Currently, there are many kinds of stress theories and models, among which, the most important and empirically most successful ones include the Transactional Model [6, 7], Person-Environment Fit (PEF) [8, 9], Job Demand-Control (-Support) model (JDC(S)) [10–12] and model of Effort-Reward Imbalance at work (ERI) [13]. Although these models have been applied in a wide range of industries, but there are still some problems need to be solved. Transactional Model focuses too much on the individual appraisal process. It is not conducive to identify the stressors in the job context and provides little useful information for effective intervention. PEF model does not specify the particular content dimensions on which person and environment should be examined, and not determine the relationships between content dimensions, as well as their impact on stress. The requirement of commensurate dimensions also makes PEF model more difficult for application. JDC model confines stressors only on the aspect of work characteristic and only treats skill and decision power as control resource without consideration of the effect of personality and psychology capital. While the reward in ERI model is more of a variable as a result, which overlook the process nature of stress. The consequent balance between effort and reward does not mean there is no stress during the work process.

In recent years, the research on occupational stress mainly focuses on the application, reliability and validity of existing stress models in different industries and cultural background [14–16], and some certain extent of improvement, richness and development for the existing models [17–21]. These efforts did not offer us a new perspective to understand and study stress.

The above reasons motivate the effort in this paper. Based on the concept of stressors, this paper puts forward a novel model illustrating the formation mechanism of occupational stress, which was intended to provide a different approach for the understanding and measurement of occupational stress. In this model, a basic assumption is that the individual abilities to withstand stress, determined by skill/knowledge, psychology capital and other personal characteristics, are different. And the relationship between the total stressor load in job context and the individual capacity to resist stress determines the perceived stress level. We do not claim to answer these questions mentioned above, but we want to demonstrate how they can be approached in a somewhat different conceptual framework.

The following contents of this paper are arranged as follows. In Part II, from three aspects of stressor and stressor load, stress resilience, and stressful situations, the assumption, concept and framework of the model proposed in this paper are introduced. In part III, an overview of the development of a special occupational stress scale for Chinese pilots is presented to illustrate the rationality and validity of the SLSRM model. In Part IV, the problems still need to be resolved and the advantages of the proposed model. Part V gives the conclusion and points out the ongoing and future efforts.

2 Stressor Loads-Stress Resilience Model

As per the model put forward in this paper, the perceived occupational stress is co-determined by the stressor in working context and stress resilience (personal characteristic) of the employee. One’s coping mode can regulate the psychological, physiological and behavior influences exerted by the perceived stress. The organizational intervention impacts all aspects of the stress indirectly, as shown in Fig. 1. Because the models proposed in this paper focus on the stress production mechanism, the influences from coping and organizational intervention as shown in Fig. 1 are not discussed in details herein. The stress production mechanism is based on the stressor load perspective. Stressor are all factors that may make employees perceive the stress in the occupational context, including the job, organizational management, career development, interpersonal relationship, work-family conflict, etc. Moreover, the stressor has the potential capability for stress production, which is defined as stressor load. The model is based on such a hypothesis that one has a definite stress-withstanding capability that is decided by personal characteristics such as knowledge/skill, psychological capital, personality traits, etc. The stress level perceived by the employee is co-determined by the total stressor load in the working context and individual stress-withstanding capability. The higher the total load is and the lower the individual stress-withstanding capability is, the more stress the employee will experience. The detailed introduction to the stress production mechanism (stressors and personal characteristics) will be provided in the following section.

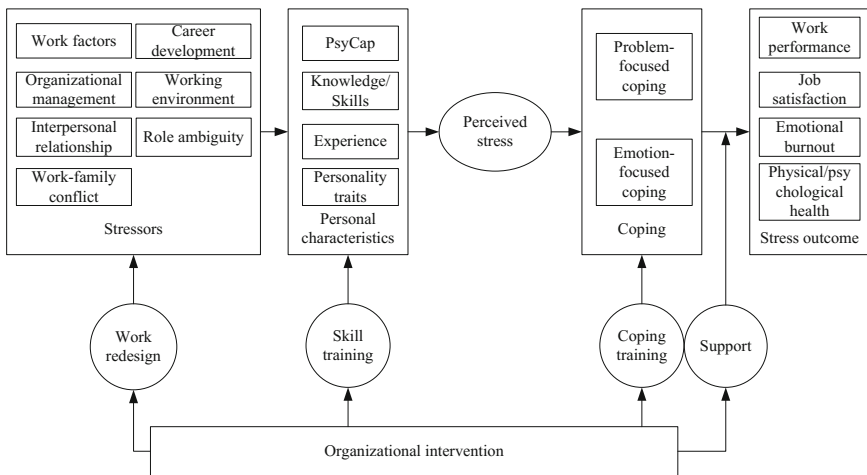


Fig. 1. A novel perspective for occupational stress formation and management

2.1 Stressor and Stressor Load

Stressor and stressor load definition. Stress is formed due to the complex mutual effect between the human and his environment (including physical and social

environments). Existing stress models emphasize different aspects of transaction between the person and the environment, but they all involve the stressor concept in direct or indirect form. According to Lazarus's cognitive theory of emotion, cognitive appraisal or evaluation of an experienced stressor precedes any form of emotional response [22]. Karasek regarded the stressor in the job context such as workload requirement as the job demand [10]. In the JDCS model, support is believed could buffer the effect of stressors on strain [12]. Cohen & Edwards regarded the environment as stressors and researched the moderating effect of personality on relationship between the environment stressors and the health. In the PEF model, environmental requirements, internal and external sources and rewards are similar to the concept of the stressor [9].

However, these models give emphasis on "fit", "imbalance" or "congruence", they do not provide a concrete definition for stressor. Some researches give the definition of stressor but do not reach a consensus. Caplan thought that job stressors were certain job environment characteristics which can threaten the individual, such as workload, job complexity, and role ambiguity, etc. [23]. Jamal thought that job stressors were threats existing in the job context which require certain response to be taken. Tache & Selye held that all life events cause some stress, and the stressor is the stimulus eliciting a need for adaptation [24]. McEwen and Mendelson [25, 26] believed that a stressor was an event that challenged homeostasis, with disease the consequence of failure of the normal adaptive system.

The stressor is the basis of the model proposed in this paper. Therefore, the definition of the stressor is provided here: A stressor means a threat in the occupational context, including any factor that may cause the employee to perceive the stress. In order to present the potential ability for stress production of these stressors, this paper introduces a definition of stressor load, which is elicited from the workload concept in ergonomics. The higher the stressor potential is, the higher the corresponding stressor load is. We suppose the loads of independent stressors in the environment can be added herein, so a sum of all stressor loads is the total stressor load (TSL) in this occupation. The total stressor load mentioned in this model only reflects the capability for generating stress in one occupation and does not indicate the stress level perceived by the employee actually, which is different from methods used by Morano, Riolli, etc. [27, 28]. They gained grades for all stressors by means of self-rating stressor questionnaires and the grade sum served as the employees' stress level directly. Giving the definition of the stressor and the stressor load provides the conceptual foundation for the model proposed in this paper, as well as helps to understand the similarities and differences between existing stress models and theories.

Stressor identification and category. The identification and classification of stressors are correlated to the specific research and occupation closely. Houghton et al. [29] and Roddenberry & Renk [30] made studies on main stressors of undergraduates, ranging from the demands of their academic coursework to challenges in managing interpersonal relationships. Carmen Morano [27] identified 14 problematic behaviors as stressors of disease caregivers. Hatton et al. developed the Staff Stressor Questionnaire (SSQ) and distinguished seven types of stressor in Services for Adults with Intellectual Disabilities, including user challenging behavior, poor user skills, lack of staff support,

lack of resources, low-status job, bureaucracy and work-family conflict [31]. Cooper's four-way model [32] and Robbins's "stressor-perceived stress-stress result" model [33] are general occupational stress models. The four-way model divides the occupational stressor into factors intrinsic to the job, the managerial role, relationships with other people, career and achievement, organizational structure and climate, and home/work interface. Robbins distributed the stressor into environmental factor, organizational factor and personal factor. On the basis of literature review and stressor definition provided herein, the stressor in the model of this paper falls into interpersonal relationship, organizational management, career development, job requirements, working environment, role ambiguity and work-family conflict, with personal factors eliminated. To be mentioned here, most researches or models do not take working environment as a stressor. However, we consider working environment such as bad weather is a key factor in affecting employees' workload for air transportation, offshore oil platform, etc., therefore, the working environment should be taken as a stressor.

Total stressor load. Robins points out that stress factors are addable, and that each new and continuous stress factor will enhance the individual stress level. In fact, one stressor may be insignificant. However, if it is added to a very high stress level, it may become "the last straw". In our model, the total stressor load (TSL) in a specific occupation context is a summation of all independent stressor loads.

However, just as pointed out by Edwards when commentating the PEF model, demands-ability and needs-supply match are considerably more relevant to people when the stimuli are important to them. Edwards has referred to this as dimension importance [12]. We also reckon the stressor means different importance for different persons, for example, someone thinks highly of career development and promotion while others may value family. Thereby the same stressor load from career development and work-family conflict may cause different stress perception for different persons. We advise to take the stressor weight into consideration, which is attained from personal assessment as a representative for individual difference. The total stressor load should be a weighted sum of individual stressor loads.

2.2 Stress Resilience

The stress resilience is defined as a higher-order construct composed of different positive personal characteristics, which indicates one's ability for maintaining high efficiency, health and well-being under stress. In this paper, the term stress resilience and the term ability to withstand stress can be used alternately. The model hypothesizes a definite ability to withstand stress of one person and the stress perceived by one person depends on the suffered total stressor load and comparison of ability to withstand stress. When TSL exceed one's ability to withstand stress, one will be confronted with high stress levels. We think everyone has a certain resilience to stress. The amount of stress a person can withstand depends very much on the individual. Stress-resilient personal characteristics cover psychological capital, knowledge/skill, experience and personality. In our opinion, the person with excellent knowledge/skill, rich experience, high-scored psychological capital and positive personality can resist more stress, thus withstanding

higher stressor load. The model in this paper differs from many stress theories and researches taking personal characteristic as a medium or mediation variable between the stress and result in such aspect that it uses the personal characteristic as a direct factor for determining the perceived stress that results in an adverse stress outcomes.

Psychological capital. Initial research in the Industrial-organizational psychology field confirms a positive relationship between Psychological capital (PsyCap) and well-being [34] as well as other important work attitudes, behaviors, and performance [35]. PsyCap, is a meta-concept that incorporates various traits that have been found to foster psychological resilience. PsyCap is defined as:

“an individual’s positive psychological state of development and is characterized by: (1) having confidence (self-efficacy) to take on and put in the necessary effort to succeed at challenging tasks; (2) making a positive attribution (optimism) about succeeding now and in the future; (3) persevering toward goals and, when necessary, redirecting paths to goals (hope) in order to succeed; and (4) when beset by problems and adversity, sustaining and bouncing back and even beyond (resilience) to attain success.” [36]

According to this definition, psychological capital is conceptualized as a combination of efficacy, optimism, resilience, and hope. Each individual construct of optimism, hope, efficacy, and ego resiliency is imperfect in representing general resilience to stress, and thus their common factor (PsyCap) should provide a more complete index of the domain.

In most researches, PsyCap is applied to the world of work has been hypothesized to aid employees cope with stressors, or play a role of mediator or moderator in the workplace. In accordance with Riolli et al. [28], among undergraduate students from a university, PsyCap mediated between stress and indices of psychological and physical well-being. In the case of Psychological Symptoms and Health Problems, PsyCap buffered the impact of stress so that the relationship between stress and negative outcomes was reduced. In a word, psychological capital buffered stressors with the negative stress outcomes, and augmented the positive outcome. We reckon that the mechanism for these mediating effects is that PsyCap is a key factor in deciding the resilience to stress and only the actually-perceived stress exerts a positive or negative influence on the employee, which is consistent with Riolli’s opinion [28], saying that persons high in PsyCap will more readily withstand stress and maintain physical and psychological well-being and happiness in the face of stress.

Knowledge/skill and experience. In PEF model, knowledge/skills are regarded as a part of one’s ability for satisfying environmental requirements [9]. When mismatched demands-abilities affect the reception of supplies, the stress is generated. According to Edwards, excess abilities may decrease strain by providing supplies for needs, as when being able to complete one’s work more quickly than required creates time for reading, socializing, or other pleasurable activities. Alternately, excess abilities may decrease strain by allowing the person to conserve personal resources (e.g., time, energy) to apply toward future demands. In the model put forward herein, we think that sufficient knowledge/skill is necessary for dealing with difficulties and challenges in the job and assisting employees coping pertinent stressor load such as job requirements, etc., with ease. Consequently, it should be as a favorable factor for stress resilience.

Working experience is an important factor in workload and human reliability analysis (HRA) research field, but it is rarely applied in occupational stress research. However, in Robbins's stress model, working experience is served as a part of individual difference and served to regulate the stress perceived by one. Based on Robbins, the new and uncertain job context brings people stress, but the stress will disappear or decrease greatly when the working experience is attained. The working experience, as a good stress reducer, is in inverse proportion to working stress. For this phenomenon, Robbins considered there are two causes: one for selective withdrawal, indicating that a person with strong stress perception is prone to job-hopping automatically while those persons working in the organization for a long term possess higher stress-withstanding capabilities or could bear more of the kind of stress in the organization where they work; the other is that an anti-stress mechanism will be generated with time, which takes a long period of time. Therefore, seniors in the organization have a stronger adapting capability and perceive little stress [33]. We believe experienced employees are familiar with the work process and ready for challenges or changes possibly occurred in the job and can endure higher stressor load under the same condition.

Personality traits. Personality traits are regarded as regulation variables for the stress in many stress theories, whereas the Type A personality in the personality traits and Locus of Control applied as the moderating variable in OSI scale [37]. The individual difference in Robbins' stress model also involves the Locus of Control [33]. The personality, which is a power system for physical and psychological system inside a person, decides the special regulating mode of one person for environmental characteristics. Personality traits are stable personality characteristics represented by one person in different contexts, which cover gumption, ambition, etc.

Locus of Control shows one's attitude towards life; for example, some regard themselves as the master of destiny with control right, which are called internals; while others think they are controlled by external forces and all changes in life rely on fortunate and opportunity, which are called externals. It is researched that the internals search for information positively before making decision and have strong motivation for achieving success, thus prone to control of the environment. Persons with this personality allow individuals to view events more positively, less negatively, so they do well in the job full of challenges and can withstand more stress.

If some persons are always willing to participate in high-strength competition activities and perceive time stress for a long term, they have Type A personality, who push themselves to do more work in the shortest time and attack other persons or events hindering their efforts, thereby resisting higher stressor load. Based on the opinion from the model put forward in this paper, personnel with Type A personality should be able to endure more stress theoretically.

2.3 Stressful Situations

As per this model, the perceived stress level (PSL) is determined by the total stressor load (TSL) and individual stress resilience (ISR). Their relationship is as shown in formulation (1):

$$\text{PSL} = \text{nTSL}/\text{nISR} \quad (1)$$

In which, nTSL and nISR refer to normalized total stressor load and individual stress resilience respectively. The bigger the PSL value is, the higher the stress level experienced by the employee is. When $\text{PSL} = 1$, the employees are under full load. Based on PEF or ERI models, only when “misfit” or “imbalance” appears, there will be stressful experience. However, this model is different from the preceding ones and the PSL in this model is always greater than 0, indicating stress is existent all the time. Only when PSL is small enough, one will not experience the stress obviously. Only when PSL reach a certain value, the stress can be perceived and this point is referred as perceptible stress point (PSP). The specific value of the PSP should be determined via further researches, but we think it is a value less than 1, that is, employees should have experienced the stress before they are under full load. Before PSL reaches 1, the stress is good to the job performance. However, it will exert an adverse influence on the job performance after exceeding 1, that is, the inverted U relationship between the stress and performance appears and “ $\text{PSL} = 1$ ” is the critical point. However, long-term full load or near to full load will exert adverse effect on psychological and physical health and wellbeing.

3 Occupational Stress Survey Using SLSRM Based Scale

To illustrate the rationality and validity of the SLSRM model, a special occupational stress scale for Chinese pilots is developed based on this mode and a 385 pilots joined stress investigation is conducted then. The special scale, named “Chinese civil aviation pilot occupational stress scale”, included two sub-scales, as the stressor subscale and the individual characteristics subscale. The original list of stressors were derived from open-ended questionnaire survey and review of relevant literatures. Then they were tailored by factor analysis after the large-scale investigation. The questionnaire used a six-point Likert-type Scale, 6-1 represented for strongly agree, agree, agree a bit, disagree a bit, disagree and strongly disagree, respectively.

Modified by item analysis, the final occupational stress subscale contains 64 items classified into 7 dimensions, including interpersonal relationship, organizational management, intrinsic to the job, work environment, occupational role, family factor, and career development were extracted. The personal characteristic subscale of this questionnaire was formed by the combination of the psychological capital scale compiled by Luthans and the self-compiled personal ability scale, which was consisted of 40 items.

The procedure of questionnaire score calculation includes three steps: (a) calculate the sum scores of each subject of the subscale respectively; (b) score normalization process; (c) calculate the ratio of normalization score obtained by the scale of pressure source and the scale of the personal characteristics. By fitting Minnesota Satisfaction short scale, the question score was adjusted.

KMO test was used for validity analysis. The KMO test results of stressors and personal characteristics subscales are 0.757 and 0.943 respectively and the significance of Bartlett test results of the two scales are less than 0.01, which means the score met the requirements of factor analysis. For reliability analysis, two estimates of the

reliability of the occupational scale for Chinese Civil Pilots were determined: split-half and internal consistency. The results show that the questionnaire has a good consistency reliability and indicate a satisfactory level of consistency among items. The result of the stress survey is compared and contrasted with that of the job satisfaction scale to check its validity and to demonstrate it can serve as alternative of other successful stress scales. Pearson correlation coefficient, chosen as the criterion validity, is -0.609 , the correlation of external validity is significant.

The overview of the development of the Chinese civil aviation pilot occupational stress scale and the large-scale stress survey aims to illustrate the rationality and validity of the SLSRM model. The detail description of these efforts will be presented in another paper.

4 Discussion

The SL-SR model brought forward in this paper is based on the stressor, which is mentioned in most kinds of stress theories and models. Some researches even use the appraisal of stressors as the perceived stress, such as Staff Stressor Questionnaire, but do not define the stressor definitely due to emphasis on “appraisal”, “fit”, “imbalance”, etc. Based on the consensus implied in those theories, models and researches, this paper provides a definition for the stressor and puts forward the concept of stressor loads for representing the severity of stressor. The proposed stressor and stressor load concepts will assist further understanding for commonness in current stress theories. The stress model put forward in this paper supplies a new route for knowing the production mechanism of occupational stress and has remarkable advantages in stress coping and intervention aspects. However, some questions should be taken into consideration during actual application of the model.

Firstly, it is the determination of stressor load. Self-report is a commonly used method in the stress research field, with which a reasonable outcome can be procured through approval by the application research. Consequently, the self-report will serve as a useable stress load measuring method. However, self-report measures of stressor loads always have already contained some degree of the actually-experienced stress by the employee and individual difference influence and do not reflect the stressor load objectively. It might be predicted that persons with high-score and low-score personal characteristics perceive identical stressor quite differently, with the former giving lower ratings for stressor simply because their ability to withstand stress render those events less troublesome. These problems do not invalidate the use of self-report measures, but it is important to include objective measures to guard against them. Except bringing about the objective measures of stressor load, another method is to reduce the influence on individual characteristics by using elaborate stressor questionnaires. Taking the work complexity as an example, the question “Compared with other jobs, my job possesses more complexity” can be asked to the subject instead of “I think my job is very complex”.

Secondly, it is the determination of stress resilience. This model present that the individual resilience to stress depends on the knowledge/skills, working experience, psychological capital and personality traits, but appraisals on those traits are not direct measurement for resilience to stress. Therefore, when $PSL = 1$, it does not necessarily

mean balance between the total stressor load and individual resilience to stress. The real balance point may be determined via further researches.

Both of the above problems also exist in a great deal of stress theoretical models. For example, there is much less research assessing the congruence of self- and objective ratings for job demands than that for job decision latitude. A self-report of a “demanding” job on the indicator probably will also express an element of subjective perception of stress [38]. Though above-mentioned problems needs resolutions, this model offers a new route for effectively understanding the stress production process, and compared with other models, can be easily integrated with occupational stress coping and intervention to constitute a complete occupational stress management framework, as shown in Fig. 1.

Stress models such as Transactional Model, PEF model, JDC(S) model and ERI model pay more attention to the stress production process. They are not complete stress management models because they do not provide more detailed operational suggestions for stress management method. At present, the researches on relationship between the occupational stress and result variable, and functions of the mediating variables and moderating variables are always independent from stress model. The relationships between different variables are researched individually [2, 27, 39–42] and a systematic complete stress production and management models are not formed. In order to construct a complete stress management model, management practices and operational connotations of stress model should be enriched from individual and organizational dimensionalities besides researches on stress production and influence mechanism.

5 Conclusion

This paper is the initial effort of developing a novel occupational stress model which is motivated by the problems emerged in existing stress models and theories. The fundamental concepts of the SLSRM model, stressor and stress resilience, are extracted from the common elements of existing occupational stress models and theories. The proposed model may not able to answer all these questions mentioned above, but we try to provide a different approach for understanding and control occupational stress. Furthermore, the SLSRM model can give practical recommendations for stress management and has the convenience to be developed to a comprehensive stress management framework.

Stress management aims at effective integration and dispelling of different occupational stress factors, regulation of mental strain, creation of excellent occupational stress environment and turning of stress into power, thus allowing employees to work efficiently in a healthy occupational stress status under continuous stimulus. The established structural cognition and analysis frameworks for the occupational stress will help find out possible causes for the stress and resolutions to facilitate systematic stress management in the organization. In future work, we will improve the stress scale based on the survey result, identify useable coping measures and organizational intervention plans, research on methods for assessing their influences and effects, and constitute a complete occupational stress assessment and management framework eventually.

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