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Full Length Research Paper

Faculty's job stress and performance in the undergraduate education assessment in China: A mixed-methods study

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The Undergraduate Education Assessment (assessment) was launched to upgrade faculty's per-formance, but it also tends to intensify their job stress. Considering the little empirical research on the influence of stress on performance in the assessment and the confounded findings in literature, the study collected data with a survey and interviews to explore the characteristics of faculty's job stress and performance and their relationships by distinguishing their levels and nature. The findings include (1) academics were working under moderate levels of stress from their job specificity and organ-izational practice and higher levels of stress from their self-expectations; (2) the U-shaped relation between stress and performance is a product of faculty's compensatory control and (3) work-context stress significantly affects teaching effectiveness, but not research productivity. The author explained the findings in the assessment and proposed practical implications for administrators and faculty mem-bers to manage their stress and stimulate performance.

Key words: University faculty, assessment, job stress, performance, U-shaped relation.

INTRODUCTION

The prevalence of job stress and the enthusiastic pursuit of better performance in a wide range of professions have attracted much research attention. In many studies, job stress is defined as the discrepancy between envi-ronmental and situational factors in their work and employees' capability and resources to handle them (Lazarus and Folkman, 1984; Edworthy, 2000). Perfor-mance refers to either employees' discrete activities and behaviors or their aggregated values to the organizations (Kocak, 2006; Motowidlo et al., 1997). In accordance with the he- avy use of summative assessment of faculty's work in many universities, researchers tend to adopt the product- oriented definition of performance and their analysis focuses on the contribution of faculty's academic work that largely encompasses teaching and/or research (Kr-eber, 2000; Hu and Mo, 2005; Braskamp and Ory, 1994; Centra, 1993).

In the large body of research on job stress or per-formance, studies on their relationship in higher educa-tion institutions are rarer than one would expect. In other contexts, the results are confounded and can be largely summarized with three hypotheses. The positive linear theory holds that stress at low levels makes no significant demands, so people tend to perform poorly, but at a higher level, it challenges individuals to make more efforts, which will upgrade their effectiveness. The nega-tive theory states that stress, no matter it is low, medium or high, consumes an individual's time, energy, attention, health and well-being, so it impairs or inhibits good effec-tiveness. In the inverted-U theory, the initial stage of stress may be mentally stimulating. It motivates people to mobilize their energy, undertake tasks faster and achieve optimal effectiveness. When stress increases beyond the point, feelings of frustration, anxiety and tiredness start to consume energy and stress becomes dysfunctional and detrimental to performance (Muse et al., 2003; Sullivan and Bhagat, 1992).

The hypotheses provide insights into stress-perfor-mance relationships, but there are methodological con-cerns in their sample selection, instrument development and data analysis. Specifically, some studies, such as Oberlechner and Nimgade (2005), Siu (2003), Hourani et al. (2006), select participants from nurses, military per-sonnel, executives and financial traders whose jobs are inherently stressful. The applicability of their findings in other populations has not been tested. Besides, some

enquiries use items with negative connotations of stress and do not distinguish the impact of low and moderate levels of stress on performance (Muse et al., 2003). Moreover, some researchers examine stress and performance as overall constructs. The abstraction of the variables may "fail to adequately consider more complex transactional relationships between stressors and work performance" (Edwards et al., 2007).

In practice, higher education in China is challenged with urgent demands for better quality from all stake-holders. Under the mounting pressure, the government started to investigate the undergraduate education in 2002 based on Criteria for National Undergraduate Edu-cation Assessment. The scheme evaluates all aspects of work in universities (including the missions and visions, teaching contingent, curriculum, learning environment, management, teaching effectiveness and teaching condition) and the result has substantial effect on prospective students' choices, government resource allocations, the development of the universities, etc. It is widely assumed that the high-accountability assessment intensifies faculty's job stress and may be detrimental to their performance, but little systematic research has been conducted to examine to what extent the side effect impairs the goal.

The confounded findings and methodological issues in literature and the scarcity of evidence in the assessment warrant further investigation of the characteristics of and relation between job stress and performance. To fill in the gap, the study chose academics involved in the Assessment, assessed their stress from all important job behaviours and took into consideration the level and nature of stress in analyzing its relation to faculty's performance.

Hypotheses and research questions

The study adopted a mixed-methods design because the integration of statistical findings and interpretive discussions can add meaning and precision to data analysis and add insights, understanding and knowledge to theory and practice (Johnson and Onwuegbuzie, 2004). At the quantitative phase, two hypotheses were postulated:

1. Job tress has negative effect on faculty's academic performance.
2. The effect varies with the level and nature of stress and performance.

In addition, the qualitative stage elicited more information to verify, elaborate and supplement the survey findings with three questions:

1. How do faculty members gauge stress from different sources in the assessment?

2. What do they think of their performance in teaching and research?

3. How does the stress of different levels and from different sources affect their teaching and research?

METHODOLOGY

Participants and data collection

Survey respondents were selected at two stages. The first stage selected a convenience sample of five universities that were interested in the study. Among them, four were preparing for and one was going through the Assessment. In the second stage, the researcher randomly selected one Art and one Science departments from each university and 15 academics from each department to fill in the questionnaire. The return rate was 83.3% (N = 125), but only 98 responses were analyzed after the exclusion of responses that chose the same option for all items or missed more than 10% of them. After the survey, one teacher from each department was randomly selected from those willing to provide further information and a half-an-hour semi-structured interview was conducted for him/her to elucidate the survey findings and answer the three research questions.

Instrumentation

The study evaluated participants' job stress and teaching effectiveness with Faculty Stress Index (FSI) and Student Instructional Report II that are tailored to the context of higher education, cover most of faculty's stressors and teaching activities and have demonstrated good psychometric properties (Gmelch, 1993; Centra, 1998). Both scales were adapted for the study by deleting items inapplicable for the participants and survey context. Examples include community service as a major stressor, the stress from reduced enrolment, evaluation of faculty's command of the instructional language, the clarity of exam questions, the quality of tex-tbooks, the coverage of exam and term papers/projects, etc. After the modification, they were translated, back translated and reviewed by independent translators, experts and faculty members. The final versions of stress and teaching measures consisted of 32 and 19 items respectively and respondents were expected to indicate the applicability of the items on a five-point Likert scale (1 = not applicable at all; 2 = somewhat inapplicable; 3 = somewhat applicable; 4 = applicable; 5 = very applicable).

The study employed a weighted framework to collect data on the quantity and the quality of faculty's research outputs. It categorized journal articles, books, chapters, conference presentations and grants that accounted for over 60% of their research productivity (Print and Harttie, 1997). There are three levels: (1) the outlets published in international media and national grants; (2) outlets published in core national media certified by Beijing University Press and Academy of Beijing Higher Education Library Journals every four years (the list has been employed by most universities to examine the quality of faculty's publications in Chinese journals) and provincial grants and (3) other publications and grants. In the blanks, respondents wrote down the numbers of their outputs in the last three years to "smooth out casual variation from one year to another" (Smeby and Try, 2005) and each entry gotten, four and one point respectively (Ho, 1998).

Data analysis

The study followed the data analysis framework proposed by Onwuegbuzie and Teddlie (2003) for mixed-methods designs. Firstly, the quantitative data were analyzed with descriptive and inferential statistics in SPSS 15.0 to portray the characteristics of and relations between faculty's stress and performance. Then trans-cripts of interviews were processed with Content Analysis to "make replicable and valid inferences from texts to the contexts of their use" (Krippendorff, 2004). The analysis followed the steps of sampling, segmentation, redundancy elimination and framework development as outlined by White and Marsh (2006). After the

Table 1. Faculty's performance at different levels of stress.

	Mean	Standard Deviation	Minimum	Maximum	F
Lower	154.8750	62.58528	79.00	267.00	0.789
Moderate	124.8750	46.61169	56.00	185.00	
Higher	140.0000	105.16110	77.00	310.00	

initial analysis, the investigator associated significant quantitative findings with their qualitative explanations in data correlation (correlating the qualitative and quantitative data); data consolidation (combining data from different sources to create more comprehensive data sets); data comparison and data integration (integrating data into a coherent whole) (Onwuegbuzie and Teddlie, 2003).

Findings

Participants' demographic characteristics

Respondents typically (63.3%) work in Science departments. Most of them are lecturers or associate professors (81.7%). About half (46.9%) have worked in the current universities for over nine years. Doctors account for 57.1% of the sample and the largest age group (53.1%) is from 31 to 40. Interviewees' present similar characterristics and chi-square tests did not reveal their significant differences from the respondents.

Validation of the measures

The measures were validated by testing their internal consistency reliability and construct validity. The coefficient alphas of each scale and its dimensions were uniformly high, ranging from 0.73 to 0.93, suggesting that items were consistently measuring the same variable or dimension. Factor analysis was employed to test the degree to which the structure based on the scores corresponded to the theoretical scale. Factors were extracted with principal axis factoring and the matrix was rotated with Oblimin with Kaiser normalization. Factors with eigenvalues less than 1 and items with loa-dings below 0.30 were not included in the analysis. In stress scale, 91.4% of the items had factor loadings close to or above 0.50 on the work content (e.g. writing manuscripts, applying for grants) and work context dimensions (e.g. recognition of research outputs, influ-ence on departmental decisions, available resources and facilities) and they accounted for 42.23% of the total variance. In the teaching scale, 17 out of 19 items accounted for 67.35% of the variance and loaded at or above 0.50 on input (e.g. attitudes towards work, knowledge, course preparation), student interaction (e.g. learning assistance, classroom interaction, supervision) and perceived out-put (e.g. students' learning capacity, students' interests and motivation, students' subject knowledge).

The characteristics of stress, performance and their relations

The stress responses ranged from 50 to 129 with the mean of 85.94 and standard deviation at 18.69, suggesting that the average stress was at a moderate level. The result was consistent with nine interviewees' acknowledgement of certain levels of stress in different aspects of their work. Professor Li can "give good lectures without making too much effort", but "grants are more difficult" for him. Doctor Liu "has some stress in teaching because he is not so familiar with planning lessons, selecting methodology and comm.-unicating with students", although he does not encounter much difficulty in research. At the dimensional level, faculty's work-context stress (Mean = 2.51, SD = 0.69) and work-content stress (Mean = 2.83, SD = 0.63) were beyond the midpoint and the latter was significantly higher than the former ($t = 5.014$, $p < 0.01$). However, work-context stress was distributed in a wider range, suggesting that academics' basic duties are similar, but their working environment varies in different institutions.

In addition to most participants' moderate level of stress measured against their workload and organizational practice, seven interviewees described much higher stress imposed by themselves in their pursuit of professional excellence. To defend his degree higher than those of other departmental colleagues, Dr. Liu "always thinks that (he) should do better in teaching and research" and "has worked on a proposal for a national grant over a month" after his regular work. His stress from the extra work "is much higher". Ms Jin noted that "in addition to meeting the basic job requirements, young teachers want to be promoted and do better than their peers who were recruited together. Some associate professors in their forties want to get full professorship. Therefore, their stress is really high".

Performance scores ranged from 56 to 314 with the mean of 128.29 and standard deviation at 63.83. Around 60% of the respondents got scores lower than the mean, but 70% of interviewees classified themselves in the top 30% of all departmental colleagues. In teaching responses, their mean scores were around the 80% percentile. The result was supported by all interviewees who emphasized their heavy investments in teaching. In their research, four-teen teachers (14.39%) did not have any publications or grants. Other respondents' output scores ranged from 4 to 250 with the mean of 64.1 and standard deviation at 61.43. The skewness index was 1.482 and the data was normalized with logarithmic transformation for further analysis (Stack, 2003). Despite the positive skewness, all interviewees reported that their research outputs had increased in recent three years after the introduction of research as an important constituent in their work.

The relation of different levels of stress to performance was examined by dividing the respondents into three groups with low stress (-1SD below the sample mean), moderate stress (half a SD to the mean) and high stress (+1SD above the sample mean) (Table 1)

Faculty's mean performance decreased when stress rose from low to moderate and increased when stress continued to grow, but the differences were not significant and performance at higher level of stress was not as good as when stress was low. The curvilinear (U-shaped) relationship was supported with the comparison of linear curve ($R^2 = 0.018$, $F = 1.54$, $p > 0.05$) and quadratic curve estimation ($R^2 = 0.115$, $F = 5.28$, $p < 0.01$), in which the latter explained a significantly larger variance in performance. Interviewees' description of their work at the three levels of stress offered evidence to the result. At lower levels of stress, Professor Zhou "has more time to read journal articles and put ideas into words". Doctor Yang "spends more time thinking about why a lecture is not as successful as expected". Under moderate stress, Ms Yang and Ms Qin "feel that tasks are piling up" and they have to "rush from one task to another". When stress is very high, Professor Li "stops collecting stamps and goes to work on weekends". Different from the majority's responses, Dr Li shifts her attention to part-time jobs and family when she perceives little stress from her work and Dr Ma suffers psychological pressure and can not concentrate on his work when stress is high.

As to the dimensions, the relation of the two stressors to research outputs was not significant, but both work-context ($r = -0.313$, $p < 0.01$) and work-content stress ($r = -0.240$, $p < 0.05$) correlated negatively with teaching at significant levels. Regression analysis demonstrated that work-context stress was a significant predictor of faculty's teaching performance ($F = 6.345$, $p < 0.05$) and accounted for 6.2% of the variance. Further correlations of the two stressors with three teaching dimensions indicated that tea-chers who scored higher on the stress scale did not invest less in course preparation, but they significantly reduced their interactions with students and perceived less course outcome. According to Ms Yang, the Assessment required faculty to "write teaching diary, prepare lesson plans in detail, do other paper work". They were so preoccupied with completing the tasks before deadlines that they did not have much time to interact with students. From Dr. Ma's point of view, the administrative stress in the Assessment forced teachers to behave on the safe side by "selecting classroom tasks based on their control". The teacher-centered approach did not facilitate their interactions with students.

DISCUSSION

The section elaborates on the quantitative and qualitative findings by comparing them to relevant studies and developing explanations for them. Firstly, the participants worked under stress from their work context, work content and self -expectations. These stressors are consistent with the discussions in other studies. Endres and Wearden (1996) identify the top stressor as desire for perfection in job performance in 304 mass communication academics in U.S. Shi et al (2003) find that the major stressors of 123 academics from Beijing Normal University are lack of autonomy and independence in work, the work environment and their interpersonal relationship with co-workers. Kim et al. (2006) review of academics' stress encompasses workload, insufficient time, high expectation, securing financial support as well as inadequate reward and recognition.

Among the three sources, the work-context factors suggest that job stress stems not only from "the way that (academics) evaluate and respond to the potentially stressful situation" (Hartney, 2006). It is also organizational and structural and can not be separated from the characteristics of their work environment. As Karasek (1979, cited in Veldhoven et al., 2002) contends, jobs with higher demands (amount of attention or efforts needed) and/or less control (decision-making freedom and employees' available skills and resources) are more stressful. Therefore, researchers advocate "interventions directed at improving quality of workers and/or work environment" (Veldhoven et al., 2002) and "structural strategies to pro-actively manage stress at work" (Kinman and Jones, 2005).

Next, respondents' stress from their job description and organizational practice in the survey goes beyond the midpoint. It is higher than the level in universities that are not experiencing the Assessment. For instance, in Yi et al. (2007) survey, faculty's mean stress from workload, institutional management, student-related issues, etc is in the lower half of the total score. Shi et al. (2003) finds that out of eight stressors, their 123 participants' ratings of five are below the mid point. The difference suggests that the Assessment slightly increases faculty's job stress from their work load and administrative context. What's more important, interviewees demonstrated that the Assessment creates the competitive working environment and drives faculty to meet much higher self-expectations. The indirect effect brings them significantly more stress from overcoming the difficulties in achieving their goals and the challenge of doing tasks to the best of their ability all the time (Endres and Wearden, 1996; Yi et al., 2007; Hartney, 2006).

Thirdly, the study added the moderate level of stress in the analysis of stress-performance relationship based on Muse et al. (2003) argument and found the U-shaped relation between stress and performance. In addition to partly supporting the negative theory, the result concurs with some empirical studies. In AbuAlRub's (2004) correlational descriptive survey with 303 hospital nurses, those under moderate levels of stress believe that they do not work as well as colleagues under higher and lower levels of stress. Kim et al. (2007) also find that faculty members with lower workload are more productive in research than others. Hockey (1997) explains the relation with human compensatory control in the regulation of their performance under stress and high workload (Figure 1).

In the cognitive-energetical framework, Loop A represents "the automatic control of well-learned skills under the well-established performance goals". The situation applies to the lower levels of stress. With the anticipated resources and skills to handle the tasks, faculty members are more likely to achieve optimal performance. When the perceived levels of difficulties rise to a moderate level, two control options are available. The passive cop-ing mode adjusts the goal downwards by reducing the required levels of speed, accuracy, quality etc. In the strain coping mode, "target performance criteria can be maintained, but only at the expense of an increase in energetical costs" (ibid). Because "operating at higher levels of effort for any length of time is…uncomfortable" (ibid), faculty tends to shift towards less resource-intensive strategies, which more or less tarnishes their performance. For example, to spare time and resources for paper work and other non-academic tasks in the Assessment, faculty members may be satisfied with meeting the minimum requirements in teaching and research instead of doing better in their work. When stress continues to increase, many academics are forced to concentrate on their work with the maximum effort expenditure.

In this case, the primary performance (e.g. teaching effectiveness and research productivity) is protected, but other aspects of the overall performance (e.g. rest, entertainment, family) can only be dealt with limited resources available. The model can be used to interpret the majority's responses in the study, but it may not be applicable to all participants because it is motivational in origin and

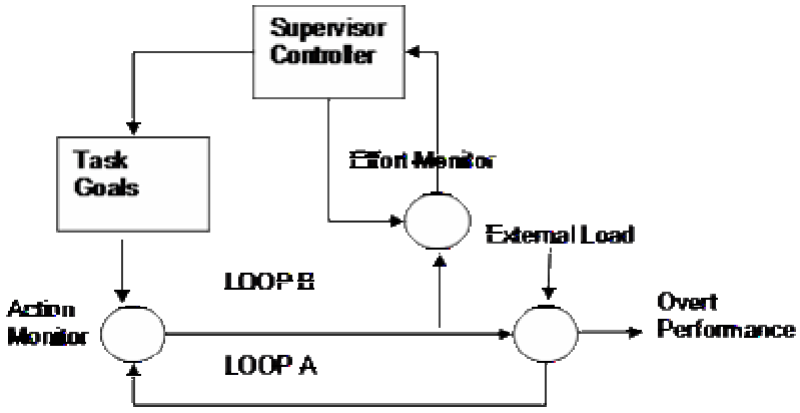

Figure 1. Compensatory control model of performance regulation Adapted from Hockey, 1997, p. 79. Loop A: Routine regulatory activity Loop B: Effort-based control'

subject to considerable individual differences "in the perceived value of task goals, in the response to challenge, in the capacity for sustained work and in the tolerance of aversive states" (ibid). The compensatory control pattern also needs modification when stress at different levels becomes chronic. Kinman and Jones' (2005) interviews with 45 working adults find that lower stress in a shorter period may be stimulating, but when it becomes chronic, the effect on performance may be damaging. The proposition needs further investigation, but it is possible that temporary higher stress may explore faculty's potentials in academic capability, but the effect is contingent on how long they can handle the challenges at the expense of other aspects in their life and work.

Moreover, work-context stress is a significant predictor of academics' self-evaluation of teaching, but not their research outputs. The discrepancy appears to concur with some empirical studies that find little connection between the two essential components of scholarship as measured by quantified rating forms and publication counts. For instance, Hattie and Marsh (1996) report a meta-analysis of the relation between teaching and research based on 498 correlations in 58 articles and find that the overall correlation was 0.06. However, the low correlation is not always supported in other studies. In Smeby's (1998) survey and interviews, faculty from different disc-iplines and levels (undergraduate and post-graduate) believe that their research influences their teaching and their teaching has a positive effect on their research. Stack (2003) also reports a significant relation between students' ratings of teaching and faculty's research productivity after the transformation of the skewed data. The contradictory findings on the teaching-research relation do not seem to provide sufficient evidence for their different relations to work-context stress.

Alternatively, the more prominent effect of work-context stress on teaching can be attributed to the more frequent individual-institution interactions in the process. The sample universities are all teaching-oriented. To complete the primary task successfully, faculty members need appropriate resources and incentives and the institutions have the responsibility to provide them. The mismatch between the need and supply may render faculty members psychologically, intellectually or motivationally unable to present optimal teaching effectiveness. In contrast, research is always left for faculty members to do by themselves in addition to their regular teaching load. The insufficient organizational involvement in faculty's research process has been discussed in other studies. Sharobeam and Howard (2002) find that many academics in predominantly undergraduate institutions have to do research with little support from teaching assistants, lab technicians, research stipend, recess time, intra- and inter-department collaborations. These constraints are also prevalent in some PhD awarding universities (Gmelch, 1993; Edworthy, 2000). The condition weakens faculty's research capability, which compromises the effect of prioritizing research in the assessment system because despite their strong motivation, faculty members do not have the skills, time, facilities or other resources to yield more publications and win more grants.

Implications for administrators, faculty members and future researchers

The study found that (1) academics were working under moderate levels of stress from their job specificity and organizational practice and higher levels of stress from their self-expectations; (2) the U-shaped relation between stress and performance is a product of faculty's compensatory control and (3) work-context stress significantly affects teaching effectiveness, but not research productivity. The results and discussion yield some practical implications for administrators and faculty members.

i) The Assessment intensifies faculty's job stress, espe-

cially that from their self- expectations. It is necessary to attach more importance to the indirect effect on their psychological well-being and performance.

ii). Academics' job stress is beyond the control of individuals, so the management program needs to adopt an organizational approach to establish more supporting environment.

iii). The Assessment brings teachers more tasks in addition to their regular work. To avoid the priority of speed and quantity over quality, the excessive exploitation of their potentials or putting faculty under chronic pressure, administrators need to delegate only important tasks to teachers, allow them appropriate time and offer them sufficient support.

iv). Administrators need to take into consideration the significant impact of organizational policies and measures on faculty's teaching performance and make more decisions that help to facilitate teaching and motivate teachers.

v).The insignificant effect of work-context stress on research outputs suggests the insufficient organizational involvement and support. More provision of resources, time, training, funding, exchange opportunities, etc helps to strengthen faculty's research competence and effect relevant policies.

The study explored the characteristics of and the relation between faculty's job stress and performance in the Assessment and inferred practical implications, but researchers need to take caution in generalizing the findings because in addition to the characteristics of the assessment context, there may be a selection bias in the sample universities and interviewees who were chosen based on their willingness to participate in the study and provide further information. Besides, the findings were based dominantly on teachers' responses and reflections and the measure of research productivity with weighted publication counts was not sufficiently objective in classifying the outputs and assigning them specific points. In future studies, it is helpful to transcend the limitations, develop relevant measures of stress from self-expectation and collect more compatible data in China to test the generality of the findings.

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