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Taking the Pulse of UK Information Systems Professionals' Health: An Examination of the Job Strain Model and the Role of Social Support.

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Abstract

Information systems (IS) professionals are being subjected to a plethora of occupational demands that can have a negative affect on their psychological well-being. The increasing incidence of absenteeism and high turnover rates are indications that IS professionals are experiencing high levels of job related stress. A factor that has contributed to businesses' unawareness of the stress is the limited theoretical and empirical research that has examined the concept of stress among IS professionals. The job strain model (JSM) is one of the most widely applied theoretical models that have been used to underpin occupational stress research. In this paper, the predictive capabilities of the full JSM, which encompasses job demands, job control and social support, for IS professionals is examined. The results indicate that the JSM can be used to significantly predict employees' psychological well-being in terms of worker health and job satisfaction among the IS professionals sampled in the United Kingdom (UK). The research demonstrated that social support had significant main effects on psychological well-being. Contrary to previous research, however, non-work related support was found to be more significant than work support in alleviating psychological strain.

Keywords

IS professionals, job strain model, occupational stress, social support, UK

INTRODUCTION

Aspects of occupational demands and their deleterious consequences on the psychological well-being of information systems (IS) professionals have received limited attention in the literature (Thong and Yap, 2000; Riolli and Savicki, 2003). It has been widely reported that IS professionals have been experiencing increasing levels of occupational stress (eg, Sonnentag *et al.*, 1994; Engler, 1996; Glass, 1997; Kaluzniacky, 1998; Thong and Yap, 2000; Riolli and Savicki, 2003). Work-related stress can be defined as the inability to cope with the pressure in a job (Ganster and Schaubroeck, 1991). The most significant stressors identified by IS professionals have been work overload, role ambiguity and conflict, career progression (Ivancevich *et al.*, 1983; Ivancevich *et al.*, 1985), the diverse range of personalities encountered in their work environment (Colborn, 1994), changing technology, redundancy, limited resources (Engler, 1995), financial pressures, budget constraints, and solving users trivial but pressing and irksome problems (Vowler, 1995). According to *Computerworld* magazine's job satisfaction survey, most IS professionals ranked their job as being 'stressful' (Engler, 1996). Yet, many businesses are unaware of the level of occupational stress being experienced by their IS personnel (Thong and Yap, 2000). A factor that has contributed to this unawareness is the limited theoretical and empirical research that has examined the concept of occupational stress among IT professionals (Thong and Yap, 2000; Riolli and Savicki, 2003). One of the most widely applied theoretical models that has been used to underpin occupational stress research is the Job Strain Model (JSM) (Fox *et al.*, 1993; Munro *et al.*, 1998; Dollard *et al.*, 2000). Developed by Karasek (1979), the JSM uses a two-dimensional design involving *job demands* and *job control* to predict stress related illnesses. A key strength of the JSM is that it has been tested on a number of occupations, with the exception of IS professionals, and has been shown to have predictive value. The JSM has been expanded to include the construct of social support following studies demonstrating its moderating effects on job strain (Karasek, 1990; Landsbergis *et al.*, 1992; Munro *et al.*, 1998; Dollard *et al.*, 2000). In this paper the

predictive capabilities of the *full* JSM for IS professionals is examined. The full JSM is tested by investigating whether perceived work demands, job control and social support can predict employees' psychological well-being in terms of worker health and job satisfaction.

JOB STRAIN MODEL

The nature of the stressors experienced by IS professionals such as job demands, workload and work pressures suggests that the JSM could be used to predict job strain. Karasek and Theorell (1990) state that job strain is evident in situations where the individual is presented with high stress circumstances and has little control over the responses. The original JSM highlights control and emphasizes the stress producing properties of job characteristics over subjective perception (Thong and Yap, 2000). The JSM suggests that psychological strain and ill health can be predicted from the interaction of job demands and job control. 'High strain' jobs are those with a combination of high job demand and low levels of job control. High job demand with a high level of control would not be associated with strain because these are active jobs which allow the individual to develop proactive behaviors that can increase motivation to perform and learn (Karasek, 1989). 'Passive jobs', however, are characterized by low demand and low control and are considered to be dissatisfying (Karasek, 1989). As employees adapt to low-control and low-demand situations, they tend to become unable to make judgments, solve problems, and face challenges that they may be confronted with. Increasing employee control, even in low-demand situations, can counter tendencies toward learned helplessness and transform a job into a "low strain" job (Fox *et al.*, 1993). The original JSM proposed by Karasek (1979) was criticized because the central dimension of the model primarily ignored the role of social support (Cohen and Willis, 1985; Beehr *et al.*, 1990). Karasek and Theorell (1990) have acknowledged this criticism and examined the role of social support with the JSM to find a clear association between job strain and levels of social support. Moreover, Karasek and Theorell (1990) have demonstrated that the support of co-workers and supervisors may be one of the most important factors that can be used to reduce stress in working environment. Additional support for this finding can be found in subsequent studies undertaken by Terry *et al.* (1993), Leong *et al.* (1996) and Dollard *et al.* (2000). Considering this, application of the *full* JSM to IS professionals necessitates examination of the following key variables, *job demand*, *job control* and *social support*.

Job demand

Job demands are defined as psychological stressors, such as requirements for working fast and hard, having a great deal to do, not having enough time, and having conflicting demands (Karasek, 1979). It is important to note that these are psychological demands and not physical (i.e. physical exertion on the job, and physical hazards). A swift and hectic work pace may impose physical requirements that can lead to fatigue, but the stress-related outcomes predicted by the JSM are related to psychological effects of the work load. That is, the job strain associated with the need to maintain the pace and the associated consequences of failing to complete the work. Other components of psychological demands are stresses that arise from personal conflict that may have been caused by job insecurity and task pressures. Karasek and Theorell (1990) contend that task requirements or workload are central components of psychological demand.

Job control

Karasek's (1989) concept of control has been developed in conjunction with the concept of psychological demands and relates to the ability to exert some influence over one's environment so it becomes more rewarding or less threatening (Ganster, 1989). The notion of control integrates the workers authority to make decisions on the job with their skills. Fox *et al.* (1993) emphasize that it is the belief in personal control in the workplace that has the most significant impact on experienced strain. Applications of control in the workplace include the scheduling individual rest breaks, utilising flexi-time, choosing holiday leave and personalising work areas. The increasing workloads of IS professionals has restricted the amount of control that they can exercise in the workplace as they are often expected to keep technologies and computer applications functioning around the clock and remain on-call 24 hours, seven days a week (Moore, 2000). Similarly, not being able to take a vacation or having it cut short due to IS related problems at the workplace also can hinder the exercising of job-control (Igbaria and Siegel, 1992; Thatcher *et al.* 2002).

Job demand and control – interactive effects

While there is consensus that worker control is important for health and well-being and that the JSM provides a instrument to study control, criticisms of it have focused on the varying operational definitions for control, the variation between results from occupational and individual level studies and the uncertainty regarding the interactive effects of job demand and job control (e.g., Fox and *et al.*, 1993; Fletcher and Jones, 1993; Munro *et al.*, 1998; Thong and Yap, 2000). It is not always clear what is meant by joint effects between demand and control, though Karasek (1979; 1989) assumed an interactive meaning, but this has been contentious for the purposes of statistical modeling (Landsbergis *et al.*, 1992; Fletcher and Jones, 1993). Instead, it has been

proposed by several researchers that an additive model of demands and control be used rather than an interactive one (e.g., Kasl, 1989; Fletcher and Jones, 1993). To overcome the problems associated with the statistical modelling of interaction, several researchers have suggested its replacement with a multiplicative term (Landsbergis et al. 1992; Fletcher and Jones, 1993; Fox et al., 1993; Munro et al. 1998).

Social support

Social support at work, the positive or helpful social interaction available from management and co-workers, has been identified as a moderator in the etiology of stress for IS professionals (House, 1981; Weiss, 1983; Karaesk and Thoerell, 1990; Thong and Yap, 2000). While better support may appear to improve coping, the study of social support has become a contentious and complex issue (Johnson and Hall, 1988; Chay, 1993; Munro *et al.*, 1998). In particular, there has been widespread disagreement about how to *define* and *measure* social support (Beehr *et al.*, 1990). For example, certain definitions are more structural in character, pertaining to the frequency of relationships with others (Hammer, 1981; Terry *et al.*, 1994). Others such as Cohen and Willis (1985) have distinguished between the types of support available to meet the specific needs of the situation. More to the point is the controversy that has surrounded the effects of social support. While considerable research has indicated that both *work* and *non-work* related social support reduces, or buffers, the adverse impact of exposure to work-related job stress (Quick *et al.*, 1990; Leong *et al.*, 1996; Munro *et al.*, 1998), it has been suggested that such support can also be counterproductive to psychological well-being (Beehr *et al.*, 1990; Dolan and Renaud, 1992). Apart from the research undertaken by Weiss (1983) there have been limited empirical studies that have been examined the effect of social support (work and non-work) among IS professionals. Both Thong and Yap (2000) and Riolli and Savicki (2003) have posited that social support can provide a significant moderating effect in the stress sequence for IS professionals.

PSYCHOLOGICAL WELL-BEING

Health

Stress can have an adverse influence on individual and organisational performance (Thong and Yap, 2000). At an individual level, work-related stress can contribute to physical and mental disorders. Physical illnesses may include high systolic blood pressure, high cholesterol, and ulcers (Sorenson *et al.* 1985). Poor mental health can include low self esteem, job dissatisfaction and job-related tension. Prolonged work-related stress can result in anxiety and depression occurring (Blazer *et al.* 1987; Faravelli and Pallanti, 1989) and thus contribute to the following psychological and/or disorders being experienced: drug abuse (Krueger, 1981); sexual difficulties (Malatesta and Adams, 1984); insomnia (Hartmann, 1985); nightmares (Cernosvsky, 1989), relationship problems (Daus and Joplin, 1999); and alcoholism (Grunberg *et al.*, 1999). Such adverse effects on individual well-being can often be far reaching and result in organisational outcomes such as absenteeism, reduced productivity and increased turnover (Weiss, 1983; Guimaraes, and Igharia, 1992; Cartwright and Cooper, 1997). Weiss (1983) found that work load was a predictor of IS managers' well-being as it was positively related to psychological and physiological strains. The relationship between psychological stressors at work and adverse health outcomes, and the need to develop coping strategies, are influenced by the effects of social support (Weiss, 1983; Thong and Yap, 2000; Riolli and Savicki, 2003).

Job satisfaction

Job satisfaction is an area that has been examined by several authors in the general IS literature and it has been shown to play a significant role in the IS professional's health and performance (Couger et al., 1979; Goldstein and Rockart, 1984; Goldstein, 1989; Li and Shani, 1991; Thatcher et al., 2002). In the context of IS professionals, job satisfaction has been defined as a function of the match between the rewards offered by the work environment and the individual's preferences for those rewards (Cheney and Scarpello, 1986). According to Thatcher et al. (2002) research into the dynamics of IS professionals job satisfaction is a challenge because of the varying measures that can be used to assess it. Needless to say, low levels of job satisfaction have been associated with high levels of perceived work stress among IS professionals and linked to health outcomes such as anxiety (Huang, 2001; Thatcher et al., 2002). Fox et al. (1993) tested the JSM and found job demand and job control to have a significant impact on job satisfaction and physiological health. Landsbergis et al. (1992) found workers in low strain jobs reported the lowest job dissatisfaction and that workers in high strain jobs reported the highest job satisfaction. Moreover, research undertaken by Hurrell and McLaney (1989) revealed that job demand and job control did not exhibit an interactive effect on job satisfaction, and that job control increased job satisfaction regardless of the perceived levels of job demands.

METHOD

The relationship between job demand, job control, social support and psychological well-being in terms of worker health and job satisfaction among IS professionals has not been addressed in the IS literature. With this

in mind, a questionnaire survey, which contained valid and reliable scales for the aforementioned constructs, was mailed to 250 randomly selected firms from a wide range of industry sectors throughout the United Kingdom (UK). Each firm was asked to select an employee from their IS department or somebody who dealt specifically with day-to-day IS related issues of the firm to complete the questionnaire survey. Responses were received from 89 IS professionals, which equates to a response rate of 36% (Table 1).

Respondents by Job Type	N = 89	%
Chief Information Officer (CIO)	20	22
IT Divisional Manager	9	10
IT Systems Support	14	16
IT Project Manager	19	21
Database Administrator	5	5
Network Manager	6	6
Multi-media/Web Designer	4	4
Systems Analyst	12	13
Industry Sectors		
Manufacturing	13	15
Retail	15	17
Construction and Engineering	5	6
Banking and Finance	7	8
Health	5	6
Pharmaceutical	11	12
Information and Communication Technology	20	22
Tourism	8	9
Wholesale and Distribution	2	2
Transportation	3	3

Table 1. Sample characteristics

Measures

The questionnaire used in this study was divided into eight sections. In the first section, respondents were requested to provide background information such as their age, marital status, job type, gender and industry sector within which their organization operates. The second section included two self-report scales that were designed to measure the dependent variables, health and job satisfaction. The independent variables, job specific stressors, social support, job control, health, and job demand were included in sections three to seven respectively. In section eight respondents were given the opportunity provide comments about occupational stress and the constructs contained within the questionnaire. The measures used for the research presented in this paper are described hereinafter. In line with previous research that has examined the predictive capabilities of the JSM the demographic variables of gender and position type were used in the analysis (Terry *et al.*, 1993; Karasek, 1990; Munro *et al.*, 1998). Gender was coded one for males and zero for females. The position variables, as noted in Table 1, were coded zero for IS management positions (eg, CIO, network manager) and one for support/administrative staff (eg, systems analyst, database administrator).

Job demand

The 11 items used to assess job demands were based on the Quantitative Workload scale developed by Caplan *et al.* (1980). The job demand scale measured perceptions of the pace of each subject's workload, and encompassed physical and psychological job demands. Participants were asked to respond on a five-point scale ranging from 'rarely' to 'very often'.

Job control

The job control scale evaluated the degree of perceived decision latitude (control) IS professionals had over different aspects of their work. The 22-item scale developed by Dwyer and Ganster (1991) was drawn upon to measure job control. The scale covers a range of work domains, including the control over the tasks performed,

pacing, scheduling of rest breaks, procedures and policies in the workplace and the arrangement of the physical environment. Participants were asked to respond on a five-point scale ranging from 'rarely' to 'very often'.

Social support

While the stress moderating effects of social support are well documented, evidence suggests that work based support is central to preventing and or reducing the adverse effects of work-related stress (House, 1981; Beehr *et al.*, 1990). On the basis of these findings, this research measures both *work* and *non-work* sources of social support. Support in work and non-work life was measured separately using a 17-item scale developed by Etzion (1984). The first three items assessed the quality of the relationship between subjects and supervisors, co-workers and subordinates. The subsequent seven items assessed features present in the work environment. The remaining seven questions correspond to support features present outside the work environment. Participants were asked to respond on a five point scale ranging from 'always present' to 'never present'.

Job satisfaction

The job satisfaction was measured using the scale developed by Warr *et al.* (1979). The 15-item scale was designed to measure the level of satisfaction/dissatisfaction felt by subjects in relation to various features of work conditions, management, promotion, salary, job security and co-workers. Participants were asked to respond on a five point scale ranging from 'very dissatisfied' to 'very satisfied'.

Health

The CHQ-12 measures the experienced stress of the respondents (Goldberg and Williams, 1988). The CHQ-12 is comprised of six items that deal with health functioning and a further six that deal with abnormal functioning. The test itself was designed to be a valid indicator of present mental health (Banks *et al.* 1980). Participants were asked to respond on a five point scale ranging from 'not at all' to 'rather more than usual'. Six items in the CHQ-12 scale were reverse coded.

ANALYSIS PROCEDURES

Pearson's correlations (two-tailed) were used to examine the pattern of relationships among the variables used in the analysis. Hierarchical multiple regressions were used to explore the predictive nature of the relationships between the independent and dependent variables identified. Regression was used in accordance with past research into examining the predictive nature of aspects of the JSM (Fletcher and Jones, 1993; Fox *et al.*, 1993; Munro *et al.*, 1998). Regarding the ordering of variables entering the regression equation, social support was entered ahead of job demand and job control determine the main effects on psychological well-being (Terry *et al.*, 1993; Munro *et al.*, 1998). The demographics were entered with the support variables to account for personal and position differences in the outcome variables. Consistent with the previous research, the job demand by job control interaction term was entered as the third and final block (Fletcher and Jones, 1993; Munro *et al.*, 1998). The regression analysis was used to determine the additive effects of job demand and control. Then using the *multiplicative term* (Cohen and Cohen, 1983) the differences between the additive and interactive models for worker health and job satisfaction were examined.

RESULTS

All statistical analyses were undertaken using the Statistical Package for the Social Sciences (SPSS) version 11. Pre-analysis screening revealed there were no patterns identified in the missing data and missing values were randomly dispersed among the variables. Missing data were treated using listwise deletion (Roth, 1994). Of the 89 respondents, 66% were male and 34% were female. The age of respondents ranged from 23 to 56, with a mean of 35.24 (SD = 10.02). 55% of respondents were either married or in a de-facto relationship, 20% had never been married, and only 3% were divorced or separated. In terms of educational achievement, 25% were found to have attained a postgraduate degree, 55% had obtained undergraduate degrees or diplomas, 15% indicated they had a qualification from a college of higher education, and 5% of the sample held no tertiary qualifications at all. Mean tenure in the firm as an IS professional was 18 months (SD = 65.20), ranging from 6 months to 15 years. The number of hours worked per week ranged from 35 to 65, with a mean of 47 (SD = 8.25). However, it was pointed out by some respondents that they had on occasions worked in excess of 60 hours when new systems were being rolled-out. The turnover of the firms sampled ranged from £5 million to £800 million with a mode value of £25 million. The Cronbach's alpha (α) coefficient for each of the measures used can be seen in Table 1. The values of these coefficients are at the acceptable level as recommended by Nunnally (1978).

The significant correlations identified in Table 2 are explored by employing multiple regression analyses. A three step hierarchical regression was performed for work health and work satisfaction (Munro *et al.*, 1999). The results of the regression analysis are presented in Table 3. The overall demand equation significantly explains

the variance in worker health, $R^2_{adj} = 0.502$, $F(7,81) = 6.23$, $p < 0.0001$. The overall demand equation was also significant for the outcome measure job satisfaction with $R^2_{adj} = 0.710$, $F(7,81) = 9.45$, $p < 0.0001$. Non-work and work support was found to have significant main effects for both worker health and jobs satisfaction. The demand/control interaction term in block three was not significant and did not contribute beyond the variance explained by the additive model.

Variable	Health	Satisfaction	Work support	Non-work support	Job demand	Job control
Satisfaction	-0.19					
Work support	0.32*	-0.59*				
Non-work support	0.45*	-0.51*	0.58*			
Job demand	-0.05	0.29*	-0.33*	0.31*		
Job control	-0.03	0.71*	-0.39*	-0.34*	0.22	
Mean	21.2	49.87	34.21	23.65	36.01	57.23
Std deviation	5.83	9.89	7.45	5.61	7.34	8.72
α coefficient	0.85	0.91	0.87	0.83	0.81	0.87

Table 2. Correlations and descriptive statistics

* Significant at $p < 0.05$

Block Predictor	<i>Health</i>			<i>Satisfaction</i>		
	B	β	R^2 (Cum)	B	β	R^2 (Cum)
(1) Gender	2.184	0.161		2.476	0.132	
(1) Position	-0.392	-0.296		.0748	0.029	
(1) Non-work support	0.397	0.393**		.0785	0.446**	
(1) Work support	0.271	0.301*	0.496	0.431	0.312	0.537
(2) Job demand	0.006	0.007		0.103	0.067	
(2) Job control	0.134	0.212	0.512	0.536	0.512**	0.796
(3) Job demand	-0.003	-0.378	0.516	-0.004	-0.256	0.792
Job control constant	-13.345			-17.892		

Table 3. Regression analyses of IS professionals health and job satisfaction

Significant at $p < 0.05$ *, Significant at $p < 0.01$ ** , all cumulative R^2 are significant at $p < 0.0001$

DISCUSSION

The results provide strong support for the predictive capabilities of the JSM on well-being. For the IS professionals sampled, the increase in control over tasks, job execution, and work environment reduce the ill-effects that can arise from the workplace. Social support demonstrated a significant main effect on well-being. Moreover, the results indicate that social support was the primary variable that contributed to both worker health and job satisfaction for the IS professionals sampled. Besides examining the additive effects of the JSM, the research explored the interactive effects of job demand and job control. Using the multiplicative term, the differences between the additive and interactive models for worker health and job satisfaction were found to be moderate.

Job demand and job control

The JSM emerged as a significant predictor for worker health and to a larger extent job satisfaction. It was revealed that job control demonstrated a significant main effect on job satisfaction. This is consistent with previous research that has examined the main effect of job control on job satisfaction in other disciplines such as nursing (Fox *et al.*, 1993; Munro *et al.*, 1999). Li and Shani (1991) found a similarly effect when examining organisational contextual factors (i.e. role ambiguity and conflict) and job satisfaction. Igarria and Guimaraes (1992) and Sethi *et al.* (1999) found high levels of role ambiguity and/or role conflict among IS employees can

lead to IS stress and often result in them having intentions to leave their organisation. The level of job control experienced by IS professionals sampled may be related to the degree of autonomy that they are often given in the workplace. This proposition is supported by Karasek's (1979) suggestion that job control is related to an organisation's structure. However, IS employees by and large have to deal with many different parties within their organisations and fulfil the expectations of users, customers, clients, managers and departments (Lim and Teo, 1996). The interaction with different parties within an organisation can often induce stress, especially in technologically orientated organisations (Huang, 2001). The technological sophistication of the organisation may influence the demands and thus the job control that an IS employee can exercise (King, 1995). For example, those organisations that rely on leveraging the strategic capabilities of technology often expect IS employees to keep technology and systems operating 24 hours a day as well as work longer hours without a commensurate increase in remuneration.

In contrast, there are some organisations that have recognised the adverse affects that stress can have on employee performance and job satisfaction such as *Sterling* – a software developer – that discourages their employees from working more than 40 hours a week. In addition, they allow employees to set their own hours as long as specific deadlines are met (McGee, 1996). Noteworthy, working in excess of 48 hours per week doubles the risk of death due to coronary heart disease among young and middle aged workers (Buell and Breslow, 1960). From the findings presented, it would appear that the IS professionals sampled generally worked within the European Union's Directive, which was designed to restrict the number of working hours to 48 per week (European Foundation for the Improvement of Living and Working Conditions, 1999). By having a degree of autonomy, the productivity of IS employees is maintained through the high demand and control component of an active job. Accordingly any attempts to decrease the amount of control employees perceive themselves as having can result in decreased problem-solving skills, poor judgments and learned helplessness. As IS employees are subjected to constant change and a high degree of unpredictability in their workplace, the research indicates that the maximisation of employee control is necessary to promote their well-being.

Social support

The research has shown that social support demonstrated significant main effects in both equations; serendipitously however, support from outside the work environment was more significant than work-related support. This finding is not consistent with previous studies that have examined the role of work related social support (Quick *et al.*, 1990; Leong *et al.*, 1996; Munro *et al.*, 1999). The autonomy that IS employees tend to have and the continual demand to service user demands as well as attend to technical problems with systems may contribute to hindering the development of workplace social support. Often, IS employees feel they are depersonalised (i.e. blamed) by non-IS employees for problems that arise (Huang, 2001). Consequently, this may contribute to IS employees seeking non-work support from their family and friends. While support from family is essential, an over reliance on such support could adversely impact the balance between home and work life. Given that IS professionals are more likely to have partners who come from similar socioeconomic backgrounds, have comparable education levels, and have jobs of similar status and demands, the problem of home-work balance could potentially become acute within this occupational group (Durkin, 1995), especially if their partner is also being subjected to stress in their workplace. Training IS professionals to adopt and implement strategies to cope with their stress as well as provide support mechanisms within the organisation could alleviate the reliance on non-work support. By providing a social support mechanism within the organisation, management would be able to better understand the issues that IS employees are confronted with. This would then provide the impetus for the development of appropriate coping and stress reduction strategies. Regardless of the source of social support, the research demonstrates that social support protects the sampled IS professionals against the ill-effects of occupational stress. Those IS professionals who perceive themselves as having greater job control and social support both in the workplace and in their lives are healthier and more satisfied.

LIMITATIONS

Some limitations of the research need to be acknowledged. The sample is relatively small (89), though comparable to other studies that have looked at stress among IS professionals (Li and Shani 1991; Lim and Teo, 1996). As the sample is small and not representative, the findings presented are not generalisable to the wider population of IS professionals in the UK. Thus, research involving additional samples is needed to ensure the appropriate generalisation of the results. By using the standardised scales to measure the variables used within the study, the obtained data can be used as a basis for a cumulative record of research about the influences of job demands, job control and social support among IS professionals (Moore, 2000). While there have been limited studies that have examined occupational stress among IS professionals, it is anticipated that further studies that are conducted using the JSM will be able to determine the boundaries of generalisability. While reliable and valid scales were used to assess demands, there may be other more salient demands that IS professionals face. This could have also been the case for job control and social support variables. While the respondents were from the same discipline group their role within their respective organisations differed and so

there would be in large disparities in the types of demand and degree of control that they experienced, though the research did not identify this. Of course, it is possible that other factors across organisation, such as management styles, varied with the job demands of interest and might explain their effect, though this possibility always exists in non-experimental research (Fox *et al.*, 1993). The research also employed a cross-sectional design and therefore the results that are presented are limited to the period that the participants were surveyed. The ability to develop firm conclusions regarding the generic components of the JSM would be strengthened by a longitudinal study.

CONCLUSION AND IMPLICATIONS FOR FUTURE RESEARCH

Studies have indicated that work-related strain among IS professionals is reaching epidemic proportions. One of the first steps to addressing the issue of job strain is to understand the situation and conditions that influence its occurrence. Generic models such as the JSM have been used to investigate the work characteristics that contribute to occupational stress. In this paper the predictive capabilities of the *full* JSM, which incorporated job demands, job control, and social support, was examined for a sample of UK IS professionals. The model was found to significantly predict employees' psychological well-being in terms of worker health and job satisfaction among the IS professionals sampled in the UK. For the specific sample, the JSM captured the key characteristics that contributed to the job strain that they experienced. With the exception of non-work related social support, the results support previous studies that examined the predictive capacity of the JSM. The JSM can be used as a foundation to examine occupational stress among IS professionals. A model that incorporates a wider range of variables should be developed to account for the variance in strain between different roles that IS professionals adopt within an organisation so they can be useful for job design. Factors relevant to job strain not only reside in the job environment. The way in which job characteristics interact with organisational and individual characteristics is an area that requires further examination. The relative influence of generic and job specific stressors should also be included in the JSM to predict the strain experienced by IS professionals. It would also be interesting to examine the predictive capabilities of the *full* JSM in different countries. Akin to prior research on the generalisability of organisational theories, there may be differences in some aspects, particularly the role of social support, in different countries because of their cultural diversity and behavioural attitudes toward work. Only through further empirical research in different countries will the generalisability of the *full* JSM be determined.

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