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Occupational Stress: A Study of the New Zealand Reserve Bank

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Abstract

Employees in many countries increasingly complain about high and rising levels of stress at work. As stress levels have increased, employers have faced rising medical bills, more accident insurance claims, increased absenteeism, and declining morale. Most corporate efforts to handle the problem have focused on the symptoms of stress, with, for example, therapy, counselling, gym memberships, and in-house exercise facilities. Professor Robert Karasek recommends a different approach based on work re-design for greater job enrichment. He argues that stress is caused by heavy work demands in the job itself, which the unskilled employees with little control over how the work is done cannot adapt to or modify. Our study tests Karasek's theory using a sample of employees from the Reserve Bank of New Zealand. In general, we find that some stress symptoms decline as skill discretion and decision authority increase, even if work demands are light. We also find that some stress symptoms decline as work demands decrease, even if authority and skill levels are high. As a result, we argue that managers could reduce stress in the workplace by enriching jobs, as Karasek advises, but also by reducing work demands.

This study utilizes Karasek's job strain model to predict a variety of potential responses to prolonged stress at the New Zealand Reserve Bank. According to the model, two basic dimensions, work demands and decision latitude, make it possible to predict mental strain. Work demands are the psychological stressors the job places on the worker and include: the volume of work, the speed of work, the lack of time, and the conflicts involved in having to do different types of work at the same time. Decision latitude encompasses decision authority, which refers to the worker's authority to make decisions involving how the work is done, and skill discretion, which refers to his or her opportunity to use a variety of skills on the job. Mental strain results from the combination of heavy work demands and low decision latitude or control. Essentially, heavy work demands create a state of arousal in the worker, typically accompanied by a faster heartbeat and higher blood pressure. In a high control job, the worker has the freedom to develop a coping response to reduce the arousal level. In a low control job, the worker's freedom of action is severely constrained and so arousal levels build up and eventually manifest themselves as heart disease, emotional exhaustion, depression or some other stress-related ailment or disorder (Fox et al., 1993; Karasek, 1979; Schaubroeck and Merritt, 1997).

In 1982, Karasek and his colleagues expanded the model to include social support as a third dimension (Karasek et al., 1982). This development was spurred by the realization that social interaction is a major determinant of behavioural responses to stress. Social support refers to the positive social interaction available on the job from both co-workers and supervisors. It provides a buffering mechanism between stressors and the individual and may also facilitate coping patterns within the individual. According to the extended model, the highest risk of ill-health is found in jobs with high demands, low decision latitude and low social support.

Empirical evidence in recent studies partly supports the job strain model. For example, Landisbergis (1988) found that job dissatisfaction, depression, and psychosomatic symptoms were high in a sample of New Jersey healthcare workers when workload was heavy and decision latitude limited. Similarly, Bromet et al. (1988) reported evidence of an interaction between work demands and control in predicting self-confessed alcohol problems. In a study of 90 male manufacturing employees, heavy objective work demands and low perceived control were positively associated with days late and days sick (Dwyer and Ganster, 1990). In another study of 3,562 male workers in 21 factories across Israel, high work load and low perceived control were stressful, but only for Type A individuals (Kushnir and Melamed, 1991). Additional support for the model comes from Fox et al.'s (1993) study of 136 registered nurses. Significant interactions between both objective and subjective measures of workloads and perceived control were predictive for blood pressure, cortisol, and job satisfaction in the manner hypothesized. Wall et al. (1996) applied the model to 1,451 manufacturing workers and found clear evidence of an interaction between work demands and control, but not decision latitude, in affecting stress. Schaubroeck and Merritt (1997) also found evidence for the model in their study of 77 hospital workers, although the interaction was contingent upon a high level of self-efficacy. Finally, in a study of 1,489 hospital workers, de Jonge, van Breukelen, Landeweerd, and Nijhuis (1999) found evidence for the model with respect to work motivation and job satisfaction, but not for job-

related anxiety and emotional exhaustion.

METHODOLOGY

SAMPLE AND PROCEDURE

Questionnaires were circulated to all 302 of the New Zealand Reserve Bank's staff. A total of 216 responses were received, for a response rate of 72%. Twenty-one were eliminated because of incomplete information, resulting in 195 useable responses. All responses were anonymous.

Questionnaires were received from all departments but the response rates varied from 31% for the Banking Systems Department (4 out of 13 employees responded) to 100% for the Audit Department (5 out of 5 employees responded). However, response rates for the other, larger departments varied between 56% and 87%, much closer to the average response rate for the whole sample. The sample is comprised of 112 (57%) men and 83 (43%) women. This is representative of the Bank's population, 175 (58%) of whom are male and 127 (42%) are female.

VARIABLES

There are eight dependent variables. Each is an indicator of whether or not the respondent often or sometimes experiences a particular symptom of stress as a result of his or her job ("1" for does experience and "0" for does not experience). These symptoms include: tiredness for short periods; lower back aches; neck, shoulder, arm, or upper back aches; pains, jabs or constrictions in the chest; damp, clammy, or sweaty hands; nervousness, fidgetiness, or tension; difficulty falling asleep; and difficulty remaining asleep.

Five independent variables from the Job Content Questionnaire (JCQ) (Karasek, 1985) were used to test Karasek's theory that work demands increase feelings of stress, unless the employee has the decision latitude to initiate coping behaviours which transform stress into action. These five variables are: skill discretion, decision authority, work demands, the interactions of skill discretion and work demands and of decision authority and work demands. Skill discretion and decision authority are used to measure decision latitude, while the interaction variables are included to differentiate employees who have considerable decision latitude from those who do not, when both groups face heavy work demands. All five variables are dichotomous, so that the condition measured is indicated as either present (independent variable = "1") or absent (independent variable = "0"). For instance, the skill discretion variable indicates whether or not the employee feels that he or she is free to use at least some of his or her skills. The decision authority variable indicates whether or not the employee feels that he or she has a lot of control over his or her job. The work demands variable indicates whether or not the employee finds his or her job demanding. The interaction of skill discretion and work demands variable indicates whether or not the employee has both considerable skill discretion and heavy work demands. The interaction of decision authority and work demands variable indicates whether or not the employee has both authority over decisions and heavy work demands.

Three additional variables are also included to control for the effects co-worker and supervisor social support and job security might have on symptoms of stress. These are also dichotomous. The job security variable indicates whether or not the employee feels he or she has substantial job security. The co-worker social support variable indicates whether or not the employee feels he or she has at least some social support from colleagues. The supervisor social support variable indicates whether or not the employee feels he or she has at least some social support from managers and supervisors. Data for all the variables are from responses to items in the Job Content Questionnaire. Indices for each variable were constructed from the items on the questionnaire, using formulae developed by Karasek (1985). Each index was then collapsed into two categories to create dichotomous variables, with "1" representing higher values above the midpoint and "0" representing lower values.

RESULTS

Binomial logistic regression was used to analyse the data, once in their collapsed form. This mode of statistical analysis uses maximum likelihood to estimate parameters for the independent variables so as to obtain the best fit between predicted and observed values of each stress variable. Each parameter, in turn, indicates how much the odds of being "often or sometimes stressed" (stress variable = "1") rather than "never or rarely stressed" (stress variable = "0") can be expected to change when a particular condition is satisfied (independent variable = "1"). A positive parameter estimate indicates that the odds of being "often or sometimes stressed" as opposed to "never or rarely stressed" increase when an independent variable is equal to "1". Conversely, a negative parameter estimate indicates that the odds of being "often or sometimes stressed" as opposed to "never or rarely stressed" decrease when an independent variable is equal to "1".

Eight different logistic regression models are estimated, one for each of the eight stress variables. The intercept coefficient in each model indicates the odds of often or sometimes suffering a particular stress symptom rather rarely or never, when skill discretion, decision authority, co-worker social support, supervisor social support, and job security variables are equal to zero.

The variables in the first model predict whether or not the employee often or sometimes feels tired (column 1 of Table 1). The intercept term indicates that the odds of the employee reporting often or sometimes rather than rarely or never feeling tired are 2.23:1 if the independent variables are equal to zero, but this coefficient is statistically insignificant. Among the independent variables, only the decision authority and interaction of decision authority and work demands variables are statistically significant. The negative parameter estimate for decision authority suggests that a high degree of control over ones job reduces the odds of often or sometimes feeling tired rather than rarely or never by 84%. The odds of sometimes or often feeling tired decline from 2.23:1 to .36:1, a substantial decline. However, the positive parameter estimate for the interaction of decision authority and work demands indicates that much of the positive effect decision authority has in reducing this stress symptom is offset as work demands rise. Contrary to Karasek's theory, a high degree of control over how the work is done does not appear to protect bank employees from feeling sleep deprived, if they have high-pressure jobs.

The variables in the second model predict whether or not the employee often or sometimes rather than rarely or never has lower back pain (column 2 of Table 1). The intercept term indicates that the odds of often or sometimes having lower back pain are 1.65:1 if all the other variables are zero, but this coefficient is again statistically insignificant. Of the independent variables, only the skill discretion and the interaction of skill discretion and work demands are statistically significant. The negative parameter estimate for skill discretion indicates that highly skilled work reduces the odds of often or sometimes having lowerback aches by 67%. The odds of reporting this stress symptom fall from 1.65:1 to .54:1. However, the interaction of skill and work demands suggests that the stress-insulating effects of skilled work disappear as work demands increase, again contrary to Karasek's theory. As a result, the parameter estimates for skill discretion, work demands, and the interaction of the two taken together indicate that those who do skilled work are actually more likely than those who do unskilled work to report back aches in heavy work demand environments.

The third model predicts the effects of the variables on whether or not the employee often or sometimes rather than rarely or never has neck, shoulder, arm, or upper back aches (column 3 of Table 1). The coefficient for the work demands variable is statistically significant but the other coefficients, including the intercept term, are not. Its positive parameter estimate indicates that heavy work demands dramatically increase stress. The odds of reporting any of the above symptoms increases from 1.13, as indicated by the intercept term, to 3.84:1 if the work load is heavy. Skill discretion and decision authority offer no protection from this general effect, contrary to Karasek's theory. Employees with highly skilled work or substantial control over how they do their jobs are just as likely to suffer these stress symptoms as other employees.

The fourth model predicts whether or not the employee often or sometimes rather than rarely or never suffers pains, jabs, or constrictions in the chest (column 4 of Table 1). Decision authority is the only statistically significant variable. Its negative coefficient suggests that having the authority to make decisions over how work is done dramatically reduces the odds of reporting any of the above stress symptoms. The odds of reporting the stress symptoms declines from .24:1, as indicated by the intercept term, to .02:1. However, contrary to Karasek's theory, the stress-insulating properties of control do not increase as work demands rise. The interaction of decision authority and work demands is statistically insignificant.

The variables in the fifth model predict whether or not the employee often or sometimes rather than rarely or never has damp, sweaty, or clammy hands (column 5 of Table 1). All of the main independent variables have statistically insignificant coefficients. Only the negative coefficient for job security is statistically significant. It shows that job security helps to protect individuals from the above stress symptoms. The odds of reporting often or sometimes having damp, sweaty, or clammy hands declines from .50:1, as indicated by the intercept, to .19:1. Work demands, decision authority, and skill discretion all appear to have no bearing on these symptoms of stress.

The variables in the sixth model predict whether or not the employee often or sometimes rather than rarely or never feels nervous, fidgety, or tense (column 6 of Table 1). The negative intercept term is statistically significant and indicates that the odds of often or sometimes rather than rarely or never suffering the above symptoms is .10:1, when all the independent variables are zero. The positive coefficient for work demands is statistically significant and indicates that an employee with a more demanding job is more likely than someone with a less demanding job to report often or sometimes feeling nervous, fidgety, or tense. Demanding work raises the odds of reporting these symptoms from .10:1 to .41:1. Decision authority and skill discretion have no effect on the likelihood of feeling these kinds of stress, irrespective of the level of work demands. The decision authority and skill discretion variables and their interactions with work demands are all statistically insignificant.

The seventh model predicts whether or not the employee often or sometimes has difficulty falling asleep (column 7 of Table 1). The coefficients for the work demands and interaction of skill discretion and work demands variables are both statistically significant. The other independent variables are not. Demanding work increases the odds of having difficulty falling asleep from .64:1, as indicated by the intercept term, to 6.87:1. However, this effect is mitigated by skill discretion in the manner hypothesised by Karasek. Skill insulates workers from the stressing effects of work demands with respect to difficulties in falling asleep. The odds of often or sometimes having this problem are 1.37:1 for skilled workers as against 6.87:1 for unskilled workers, when both types of workers have demanding jobs.

Finally, the eighth model predicts whether or not the employee often or sometimes has difficulty remaining asleep (column 8 of Table 1). Work demands is the only statistically significant, independent variable. It suggests that employees with heavy work demands are more likely to report often or sometimes having difficulty remaining asleep than employees with light work demands. The odds of having this difficulty rise from .36:1, as indicated by the intercept term, to 1.20:1. Contrary to expectation, skill discretion and decision authority have no effect on the

likelihood of these symptoms, regardless of work demand levels.

DISCUSSION AND SUGGESTED MANAGERIAL ACTION

Our results are consistent with Karasek's theory in some key respects. For instance, the parameter estimate for the work demands variable carries a positive sign in seven of the eight models, indicating that heavy work demands increase the odds an employee will report often or sometimes feeling some symptoms of stress. Furthermore, the parameter estimates for the decision authority and skill discretion variables carry negative signs in five and four of the models, respectively, suggesting that employees who have either a lot of authority or considerable freedom to use their skills are less likely to often or sometimes experience stress symptoms than those who have neither. This implies that employees who are given more control over their jobs experience less stress, regardless of work demands. However, the statistical insignificance of most of the interaction effects, and the positive signs on two of the three statistically significant interaction effects, suggest that the stress reduction effects of decision authority and skill discretion are not normally amplified as work demands increase. Contrary to Karasek's prediction, decision authority and skill discretion don't appear to offer workers with demanding jobs any more protection from stress than their co-workers with less demanding jobs.

Our study has two lessons for employers. The first is that work redesign to enrich jobs with more autonomy and greater skill variety can lower employee stress levels, even if employees don't have demanding jobs. The second is that lightening work demands can lower stress levels, even if employees have considerable decision-making authority and many opportunities to use their skills. At first glance, lightening the work demands may seem incompatible with the need for high productivity in today's competitive, market-driven economy. However, this need not be the case. Excessively bureaucratic rules, multiple chains of command, and poorly organized work systems may require employees to work harder and faster just to cope with the confusion and chaos generated by a relatively unproductive work environment. Simplification of these rules, structures, and systems may offer the possibility in many cases of both higher productivity and lower stress.

REFERENCES

- Bromet, B., Dew, M., Parkinson, D. & Schulberg, H. (1988). "Predictive Effects of Occupational and Marital Stresses on the Mental Health of a Male Workforce." *Journal of Organizational Behavior* 9, 1-14.
- Cooper, C. L. & Cartwright, S. (1994). "Healthy Mind; Healthy Organization – A Proactive Approach to Occupational Stress." *Human Relations* 47(4), 455-471
- Cooper, C. L. & Payne, R.L. (1992). "International Perspectives on Research into Work, Well Being and Stress Management." In *Stress and Well-Being at Work*. Ed. J.C. Quick, L.R. Murphy, and J.J. Hurrell. Washington D.C.: American Psychological Association. pp. 348-368
- De Jonge, J., van Breukelen, G., Landeweerd, J. & Nijhuis, F. (1999). "Comparing Group and Individual Level Assessments of Job Characteristics in Testing the Job Demand-Control Model: A Multilevel Approach." *Human Relations* 52(1), 95-122.
- Dwyer, D. & Ganster, D. (1991). "The Effects of Job Demands and Control on Employee Attendance and Satisfaction." *Journal of Organizational Behavior* 12(7), 595-608.
- Fox, M., Dwyer, D. & Ganster, D. (1993). "Effects of Stressful Job Demands and Control on Physiological and Attitudinal Outcomes in a Hospital Setting." *Academy of Management Journal* 36(2), 289-318.
- Karasek, R. (1979). "Job Demands, Job Decision Latitude and Mental Strain: Implications for Job Redesign." *Administrative Science Quarterly* 24, 285-311
- Karasek, R. (1985). *Job Content Questionnaire*. Los Angeles, California: Department of Industrial and Systems Engineering, University of Southern California.
- Karasek, R., Triantis, K. & Chaudhry, S. (1982). "Co-worker and Supervisor Support as Moderators of Associations Between Task Characteristics and Mental Strain." *Journal of Occupational Behaviour* 3, 147-160.
- Kushnir, T. & Melamed, S. (1991). "Work-Load, Perceived Control and Psychological Distress in Type A/B Industrial Workers." *Journal of Organizational Behavior*, 12(2), 155-168.
- Landisbergis, P. (1988). "Occupational Stress Among Health Care Workers: A Test of the Job Demands-Control Model." *Journal of Organizational Behavior* 9(3), 217-239.
- Matteson, M.T. & Ivancevich, J. M. (1987). *Controlling Work Stress – Effective Human Resource and Management Strategies*. London: Josey-Bass Inc.
- Schaubroeck, J. & Merritt, D. (1997). "Divergent Effects of Job Control on Coping with Work Stressors: The Key Role of Self-Efficacy." *Academy of Management Journal* 40(3), 738-754.
- Schnall, P. L., Landsbergis, P. A. & Baker, D. (1994). "Job Strain and Cardiovascular Disease." *Annual Review of Public Health* 15, 381-411.

Wall, T., Jackson, P., Mullarkey, S. & Parker, S. (1996). "The Demands-Control Model of Job Strain: A More Specific Test." *Journal of Occupational and Organizational Psychology* 69(2), 153-166.

Table 1
LOGISTIC REGRESSION MODELS
(STANDARD ERRORS IN PARENTHESES)

Variable	Parameter Estimates							
	1	2	3	4	5	6	7	8
Intercept	0.80 (1.01)	0.50 (0.91)	0.12 (0.93)	-1.43 (1.19)	-0.69 (1.12)	-2.36** (1.05)	-0.45 (1.02)	-1.01 (0.92)
Skill Discretion	0.86 (0.73)	-1.10* (0.63)	-0.78 (0.61)	0.54 (1.03)	-1.18 (1.07)	0.84 (0.74)	0.49 (0.65)	-0.01 (0.64)
Decision Authority	-1.85*** (0.70)	-0.49 (0.62)	0.29 (0.61)	-2.72** (1.24)	-0.13 (1.00)	-0.75 (0.70)	0.78 (0.64)	0.40 (0.64)
Work Demands	0.59 (0.66)	0.16 (0.63)	1.22* (0.66)	0.62 (0.84)	-1.24 (0.91)	1.42** (0.68)	2.37*** (0.72)	1.20* (0.65)
Skill*Demands	-0.55 (0.86)	1.82** (0.79)	0.51 (0.78)	-0.68 (1.18)	1.72 (1.25)	-0.96 (0.87)	-1.63** (0.81)	-0.64 (0.78)
Authority*Demands	1.76** (0.87)	-0.69 (0.87)	-1.01 (0.79)	1.84 (1.39)	1.19 (1.23)	0.66 (0.85)	-0.73 (0.81)	-0.15 (0.80)
Co-worker Support	-0.23 (0.88)	0.05 (0.78)	-0.25 (0.79)	-1.42 (0.97)	-0.35 (0.93)	0.53 (0.89)	-1.44 (0.90)	-0.42 (0.76)
Supervisor Support	-0.24 (0.59)	-0.29 (0.55)	0.01 (0.55)	0.90 (0.86)	0.00 (0.74)	0.71 (0.55)	0.50 (0.56)	0.51 (0.55)
Job Security	-0.70* (0.36)	-0.03 (0.34)	0.21 (0.33)	0.59 (0.54)	-0.96** (0.45)	-0.09 (0.34)	0.07 (0.34)	0.01 (0.33)

*p-value<.10, ** p-value<.05, *** p-value<.01

1. Often or sometimes tired for short periods
2. Often or sometimes have lower back aches
3. Often or sometimes have neck, shoulder, arm or upper back aches
4. Often or sometimes have pains, jabs, constriction in chest
5. Often or sometimes have damp, sweaty, or clammy hands
6. Often or sometimes feel nervous, fidgety, or tense
7. Often or sometimes have difficulty falling asleep
8. Often or sometimes have difficulty remaining asleep