



Workplace dimensions, stress and job satisfaction

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Abstract *Applied research indicates strong connections between dimensions of the work place, stress and job satisfaction. Yet, there is an absence of theory to provide conceptual understanding of these relationships. In 1999, Sparks and Cooper advocated using job-specific models of stress as a way of developing a better understanding of the relationships. The current study adopted this recommendation and investigated a specific job context, specifically, naval officer trainees undergoing their sea training. The results indicate that a general model of stress is unhelpful in identifying the predictors of stress and job satisfaction in specific job contexts. Instead, the authors recommend identifying salient workplace dimensions rather than a broad-brush approach when seeking workplace associations with stress.*

Examining stress in a specific job context

There is extensive support in the research literature for the relationship between workplace factors, stress, and job satisfaction (Burke, 1988; Leong *et al.*, 1996; Sullivan and Bhagat, 1992). Despite this wealth of information, the application of the research findings to a particular workplace is not always straightforward. The same workplace factors are not consistently related to stress in all work places, and the relationship between stress and job satisfaction can differ depending on the group being investigated (Rees, 1995; Young and Cooper, 1995).

The lack of consistent findings could be due to research emphasising general relationships rather than examining relationships in specific job contexts. Sparks and Cooper (1999) advocate using more job specific models, encompassing a range of identified job and organisation stressors, as a way of developing more effective interventions in the workplace. The current study adopted this recommendation and investigated the relationship between workplace factors, stress and job satisfaction in a specific job context, specifically, naval officer in the highly stressful environment of training at sea in a navy warship.

The study has an applied emphasis due to organisational immediacy and importance of retaining these trainees. There is a high public cost in replacing trainees and limited training capacity increases the dependency on a steady flow of trainees graduating. Also, the shortage of trained officers means that there is a high need for trainees to complete their training and to crew ships in operational service. Staff surveys have indicated the presence of many potential stressors in sea service and supported management perceptions of the relevance of the impact of stress and poor job satisfaction on the continued service of trainees.



Stress in the workplace

The experience of stress reactions in the workplace is not an isolated phenomenon (Fletcher, 1988). In a large sample study of 7,099 employees from 13 different occupations, Sparks and Cooper (1999) reported significant statistical associations between a number of workplace factors and indicators of mental ill health, such as free-floating anxiety, somatic anxiety and depression.

A number of aspects of working life have been linked to stress. Aspects of the work itself can be stressful, namely work overload (DeFrank and Ivancevich, 1998; Sparks and Cooper, 1999, Taylor *et al.*, 1997) and role-based factors such as lack of power, role ambiguity, and role conflict (Burke, 1988; Nelson and Burke, 2000). The quality of the social environment in the workplace is associated with stress (Sparks and Cooper, 1999) as are certain behaviours of the leader (Carlopio *et al.*, 1997; Cooper and Marshall, 1976). Threats to career development and achievement, including threat of redundancy, being undervalued, and unclear promotion prospects are stressful (Nelson and Burke, 2000). The conflict between home and work and the work impact on personal relationships is stressful (Sparks and Cooper, 1999). Also, physical conditions such as high noise levels, overcrowding in the workplace or a lack of privacy have been associated with stress (Burke, 1988).

Stress and occupational outcomes

Stress is associated with impaired individual functioning in the workplace. Negative effects include reduced efficiency, decreased capacity to perform, dampened initiative and reduced interest in working, increased rigidity of thought, a lack of concern for the organisation and colleagues, and a loss of responsibility (Greenberg and Baron, 1995; Matteson and Ivancevich, 1982). Stress has been associated with important occupational outcomes of job satisfaction, organisational commitment and employee withdrawal behaviour (Naumann, 1993; Sullivan and Bhagat, 1992; Tett and Meyer, 1993; Williams and Hazer, 1986). Satisfaction and commitment have invariably reported a negative relationship to intent to leave and turnover (Arnold and Feldman, 1982; Hollenbeck and Williams, 1986). High levels of work stress are associated with low levels of job satisfaction (Landsbergis, 1988; Terry *et al.*, 1993) and job stressors are predictive of job dissatisfaction and a greater propensity to leave the organisation (Cummins, 1990).

The research literature supports the prediction that workplace factors will have direct effects on stress and job satisfaction as well as stress influencing job satisfaction (Kirkcaldy *et al.*, 1999; Leong *et al.*, 1996; Lyne *et al.*, 2000). Despite the strength of such findings, interpretation of the relationships is still data and not theory driven (Sutton and Staw, 1995). Lacking is a theoretical basis on which to explain why the associations have been found. Likewise, job satisfaction has been described as a theory free concept compared to other

variables in organisational research. This atheoretical approach creates difficulty in predicting which factors in a specific workplace will contribute to stress and which to job satisfaction. In the absence of an integrated theory, the implication of the recommendation by Sparks and Cooper (1999) is that the prominence of workplace factors in the experience of stress may depend on occupational groupings or particular aspects of the workplace. For instance, in a study on occupational stress among senior civil servants, mental ill health was predicted by the pressure associated with the role of management, and a low level of perceived control (i.e. externality), whereas job dissatisfaction was predicted by organizational climate, organizational influence and job constraints (Bogg and Cooper, 1995). Similarly, Kirkcaldy and Martin (2000) pointed to salient features of the occupational environment in hospitals to identify potentially potent stressors for nurses, namely dealing with death and dying on a regular basis, and workload.

Stress in training at sea

Internal staff surveys (Royal Australian Navy, 1996) indicate that 35 per cent of seagoing personnel and 25.9 per cent of officer trainees report that there was too much stress associated with their job. In the current study, an understanding of the stressors identified in capsule environments (Suedfeld and Steel, 2000) has been used to identify salient aspects of the workplace for naval trainees. The comparison is relevant because the crew on an oceanic ship is a small isolated community that works and lives in uncomfortable and restricted conditions.

Physical discomfort is a feature of capsule environments (Suedfeld and Steel, 2000). Similarly, on board ship bare metal surfaces predominate in the physical workplace, and personnel experience noisy, confined work environments. Exposure to environmental conditions include high temperatures, rough movement, and the close proximity of chemicals, vapours, ammunition or explosives, fuel, electromagnetic radiation and working in the absence of light (Warn, 1994).

Capsule environments are typically remote from home and can involve prolonged separation from family and friends (Suedfeld and Steel, 2000). Sea-going personnel experience disrupted interaction and communication with loved ones. The capsule environment contains living and work quarters as well as arrangements on site for all the daily needs of a community (Suedfeld and Steel, 2000). The shift to minimum crewing on ships also means that work roles are overlapping and include varied responsibilities. Although crew numbers have shrunk the range of tasks has increased.

Naval trainees have a busy schedule on board ship, as they are required to learn the many facets of being a naval officer. The role is demanding and varied since there are many secondary duties that have to be covered. The ambiguity of the trainee role and the varied task demands of minimum crewed ships indicate that work role is a potential stressor. Trainees can be faced with

overlapping demands and also find that their duties interfere with their sleep and capacity to keep a regular personal routine. Typically, 50 per cent of personnel performing duties on board naval vessels obtain only broken periods of sleep (Gilks and Buckley, 1995). Suedfeld and Steel (2000) note that disruption to personal sleep routines and capacity to undertake exercise were identified as stressors in capsule environments.

Inadequate leadership, a breakdown in the interpersonal climate and the resultant conflict can be very stressful within the confines of a capsule environment (Suedfeld and Steel, 2000). However, these are extreme events and represent crisis conditions. Under typical operating conditions in a capsule environment, these factors are controlled to a large extent by the presence of clearly defined work roles. Interpersonal interactions are defined and organised around work role. Subsequently it is predicted that leadership, the climate on board ship and perception of teamwork are not related to stress under normal conditions.

The operational hypothesis is that the following dimensions of the working at sea will correlate with stress amongst navy trainees: physical discomfort, work ambiguity and role confusion, isolation from loved ones, disruption of personal routine.

In the absence of a theoretical framework, and given the complex relationship between stress and job satisfaction (Bogg and Cooper, 1995), separate hypotheses for job satisfaction are not considered. However, Lyne *et al.* (2000) outline a model suggesting that the same workplace factors are expected to impact on job satisfaction and as do on stress.

Methodology

Sample

The sample consisted of a group of 100 naval officer trainees, comprising 65 males and 35 females. The median age for the group was 21 years and 90 per cent of the group was 25 years or younger. The median length of tenure was three years since most of the trainees had just completed a three-year bachelors degree. Of the sample, 80 per cent were not married.

Measures

A questionnaire was administered at the end of the sea phase of the naval officer training. Questions were devised addressing the dimensions specified in the operational hypothesis. Coefficient alphas (standardised) and examples items for each dimension are listed below:

- Clarity of the work role (7 items) alpha = 0.81: “I was unsure of what was expected of me”; “My work was assessed fairly”; “I was responsible for the tasks I was carrying out”.
- Disruption of everyday routine (5 items) alpha = 0.61: “I went without fresh food”; “I missed meals”; “I did not get as much exercise as I would have liked”.

- Ship climate (12 items) alpha = 0.74: “My ship was high in morale”; “I was fearful of others aboard”; “The attitude of others was positive towards helping people to learn”.
- Disruption of personal relationships (3 items) alpha = 0.79: “Navy demands impaired my personal life”; “I would have liked less separation from my family and friends”; “I felt I had to surrender control of my life by being in the Navy”.
- Teamwork (5 items) alpha = 0.86: “I was a member of a close-knit group”; “I received support for my personal goals”; “I had significant conflict with my peers”.
- Leadership by immediate supervisor (12 items) alpha = 0.93: “My immediate supervisor respected me”; “My immediate supervisor provided feedback on my performance”; “My immediate supervisor had a sexist attitude”.
- Physical environment (7 items) alpha = 0.77: “Whilst performing my tasks I was exposed to conditions of extreme cold”; “My sleeping area was overcrowded”; “My sleeping area was an uncomfortable temperature”.

The following three questions were used to measure job satisfaction: “I am satisfied with my sea training”; “I am satisfied with being in the Navy”; and “I am satisfied with my specialisation”. The standardised coefficient alpha was 0.87 for this scale.

The GHQ-28 version of the general health questionnaire (Goldberg and Williams, 1988) was included to measure stress. The GHQ is a self-administered screening test and represents an individual’s subjective response to social or environmental stressors (Gardiner and Tiggeman, 1999; Graham, 1988). It contains four sub-scales: somatic symptoms; anxiety and insomnia; social dysfunction; and severe depression. However, because of the underlying general factor structure, a single severity score can be derived from the GHQ-28 (Banks *et al.*, 1980). The correlation matrix of the questionnaire results is shown in Table I.

Self-report questionnaires can obtain valid measures of stress. Frese (1985) demonstrated that self-reported measures of stressful workplace factors do correlate with observations made by other people in the workgroup and those made by trained observers. Also additional steps were taken to enhance the reliability and validity of the scales. Responses to the questions were made using a five-point Likert scale that was anchored using frequency descriptors (never, rarely, occasionally, often, and constantly). These descriptors were chosen to neutralise any tendency to over-report difficult conditions. Additionally, the researchers attempted to include items that were written in a positive direction as well as items that were written in a negative direction. However, the final workplace scales did not reflect this balance as some items were eliminated if they did not contribute to the reliability of the scale.

	1	2	3	4	5	6	7	8	9	10	11	12	13	
<i>Work dimensions</i>														
Clarity of the work role	1	1.00												
Ship climate	2	0.62	1.00											
Disruption of personal relationships	3	0.24	0.43	1.00										
Teamwork	4	0.47	0.47	0.24	1.00									
Leadership	5	0.55	0.50	0.25	0.55	1.00								
Physical environment	6	0.24	0.32	0.22	0.19	0.20	1.00							
Disruption of everyday routine	7	0.17	0.24	0.50	0.17	0.15	0.35	1.00						
<i>GHQ scales</i>														
Somatic symptoms	8	-0.35	-0.27	-0.25	-0.12	-0.31	-0.15	-0.35	1.00					
Anxiety	9	-0.34	-0.40	-0.50	-0.27	-0.22	-0.24	-0.47	0.49	1.00				
Social dysfunction	10	-0.54	-0.56	-0.43	-0.42	-0.32	-0.28	-0.42	0.38	0.50	1.00			
Severe depression	11	-0.30	-0.37	-0.39	-0.25	-0.12	-0.24	-0.28	0.17	0.57	0.37	1.00		
Stress	12	-0.50	-0.51	-0.51	-0.34	-0.33	-0.30	-0.51	0.75	0.86	0.73	0.62	1.00	
Job Satisfaction	13	0.42	0.66	0.63	0.44	0.30	0.23	0.40	-0.36	-0.51	-0.65	-0.40	-0.63	1.00

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satisfaction

Table I.
Correlation matrix

Statistical analysis

A just-identified (saturated) recursive path analysis was used to estimate the relationship between workplace dimensions and the two occupational outcomes of stress and job satisfaction (Joreskog and Sorbom, 1989; Kline, 1998). Recursive means that the causal effects are unidirectional (work dimensions influence stress and job satisfaction, and stress influences job satisfaction). In a just-identified recursive model, path analysis yields the same values for coefficients as does multiple regression (Kline, 1998). The advantage of path analysis is that it provides for the simultaneous estimation whereas multiple regression requires separate analysis for each criterion variable, namely stress and job satisfaction.

The work dimensions provided useful estimates of occupational outcomes since they predicted 50 per cent of the score for stress ($R^2 = 0.50$) and stress plus work dimensions predicted 65 per cent of the score for job satisfaction ($R^2 = 0.65$). Overall, stress had a significant negative relationship with job satisfaction ($\beta = -0.28$, $se = 0.09$, $t = -3.18$) (see Table II).

Stress was associated with the lack of clarity in the work role, disruption of everyday routine, disruption of personal life, but not discomfort due to the physical environment, nor were the psychosocial factors of leadership, teamwork and social climate associated with stress or the absence of it. Job satisfaction was influenced by a supportive work climate, the perception of being part of a team, and an absence of feelings that one's personal life had been disrupted.

Interpretation of results

The hypothesis that the arduous physical aspects of the workplace are associated with stress was not supported. This latter finding is surprising given that the physical hardships of the at sea environment are well documented. However, examination of the mean scores for the items indicated that the naval trainees did not report a particularly harsh existence on board

Table II.
Path analysis
coefficients – work
dimensions as
predictors of stress
and job satisfaction

	Stress ($R^2 = 0.50$)			Job satisfaction ($R^2 = 0.65$)		
	β	Standard error	t	β	Standard error	t
Clarity of the work role	-0.30	0.10	-2.96**	0.03	0.09	0.35
Ship climate	-0.15	0.11	-1.42	0.45	0.09	4.78**
Disruption of personal relationships	-0.21	0.09	-2.33*	0.38	0.08	4.74**
Teamwork	-0.04	0.09	-0.40	0.19	0.08	2.37*
Leadership	0.03	0.10	0.29	-0.15	0.09	-1.70
Physical environment	-0.02	0.08	-0.28	-0.04	0.07	-0.57
Disruption of everyday routine	-0.31	0.09	-3.44**	0.09	0.08	1.17

Notes: * $p < 0.05$; ** $p < 0.01$

ship. Life on board ship involved physical deprivation (trainees reported not receiving enough sleep, going without fresh food, and insufficient exercise) but otherwise, trainees did not experience the incessant harshness of a capsule environment.

The psychosocial dimensions of teamwork, leadership and supportive climate were not associated with stress in the current study. However, two of these dimensions, teamwork and supportive climate on board ship were important for maintaining job satisfaction. The general model described by Lyne *et al.* (2000) was not useful for predicting the relationship between workplace dimensions, stress and job satisfaction amongst navy trainees. This general model predicts that the same workplace factors are expected to impact on job satisfaction as do on stress. This was not the case in the current study since disruption of personal relationships was the only workplace dimension that predicted both stress and job satisfaction. Kirkcaldy and Martin (2000) obtained similar results with a group of nurses. In that study, home/work conflict was associated with loss of job satisfaction and psychological ill health whilst a climate of organisational support was associated with job satisfaction. It would appear that job satisfaction is influenced by factors distinct from those related to stress, as well as being influenced by stress.

A positive working atmosphere was particularly important for the job satisfaction of trainees. They reported a positive learning environment aboard ship and rare or no incidence of harassment, or being fearful of others on board. Indeed, they reported a prevalent attitude of the crew being positive towards men and women working well together. This positive perception could be attributed to the success of Navy policy promoting “good working relations” in the workplace.

The hypothesis that stress detracts from job satisfaction for navy trainees was supported. Although often reported, a negative relationship is not always the case (Brown *et al.*, 1996). The job strain model (Karasek, 1979) postulates that the potentially stressful demands of a job can be moderated if a worker has decision latitude. In a recent study, De Jonge *et al.* (2000) showed that the risk of emotional exhaustion, psychosomatic complaints and job satisfaction increased with the combination of heightened job demands and lessening control over determining elements of the job. The current study involved a homogeneous group of trainees who lack decision latitude and who work in a demanding training environment. Decision latitude is unlikely to change with experience due to the practice of relying on standard operating procedures and the need to achieve coordination. However, job demands might be perceived as less ambiguous and less strenuous as a result of experience and increased competency in performing required tasks. Indeed, Beland and Quester (1991) indicate that the experience level of a crew is associated with the efficient functioning of the ship, as measured by the percentage of time free of serious failures. This relationship poses problems for managing stress at sea. Increased

time at sea is needed to improve competency in the work role but at the expense of continued disruption of personal life.

The current study indicates that aspects of the daily work life at sea contribute to stress in a systematic way and that stress cannot be regarded solely as an individual weakness or lack of suitability. Stress has been associated with a number of dysfunctional outcomes in the workplace so there exists good reasons to rectify work practices that contribute to it. Disruption to personal rest and sustenance, and uncertainty about work role aboard a navy ship can stem from resource constraints. One clear example is the shift to minimum crew ships on which crews have to cover additional tasks to compensate for the downsizing of crew numbers. Other problems relate to job design issues and the failure to match training activity with competency level or the readiness of trainees for a task. According to the integrative model of stress, successful interventions would need to increase the individual's certainty over desired job related outcomes, and shorter training cycles may impair this confidence.

The experience of stress was also found to negatively influence the job satisfaction for naval trainees. This link with job satisfaction has important implications for turnover and provides an additional reason for reducing the levels of experienced stress. Conflict between the demands of navy life and the expectations of personal relationships contributed to lower job satisfaction. Key problems were the amount of separation from family and friends, and loss of control over one's personal life. The nature of the job makes it difficult to reduce separation from family and friends. However, important features of stress are uncertainty and loss of control. Alleviating these aspects of separation is likely to help reduce stress. Finally, the results of the current study suggest that different strategies are required for alleviating stress in the at sea environment for navy trainees than that required for improving job satisfaction.

Theoretical issues

Individual traits and learnt coping skills have been associated with decreased propensity to stress or strain although most studies perceive selected individual qualities as moderators of the relationships between stressors and stress symptoms (Beehr and Newman, 1978; Cooper and Marshall, 1976; Kirkcaldy *et al.*, 1999).

The influence of some workplace contingencies may interact with the coping styles of the individual. Although Munro *et al.* (1998) found that the absence of social support was an important source of stress for nurses, Kirkcaldy and Furnham (1995) established an interaction effect between the individual's preference for social support as a coping style, and both physical and mental ill health. Also, their explanation of the double-edged nature of social support, ("the more you receive the more you are usually expected to give" (Kirkcaldy

and Furnham, 1995, p. 124)) cautions against expecting that all effects will be monotonic.

The personality traits of external locus of control and type A behaviours are associated with higher perceived levels of stress originating from work place dimensions (Kirkcaldy *et al.*, in press). Internal locus of control linked to better psychological health and a lower level of occupational stress, and greater job satisfaction. However, in the same study, different trait combinations responded differently to the various workplace dimensions. This pattern of results indicates that there are general effects due to personality traits, as well as interactions with environmental dimensions.

Emphasising the role of individual differences in relation to stress in the workplace could present the temptation to see stress as a personal weakness or failing not as a systematic problem of work design. Taylor *et al.* (1997) maintain that individual characteristics are nested within social environments and reject the notion that health effects of environments can be reduced or explained by individual-level factors. Furthermore, when these environments come under the control of management practices within the organisational setting, there exists the opportunity for management to take action that can influence the workplace risk factors. Occupational health and safety initiatives typically identify the physical risk factors in the environment. Likewise, personnel practices can be used to minimise the risk factors in the occupational and social environments of the organisation (Frank, 2000).

Potentially, the person-situation triad (Funder, 2001) provides a useful model for handling both individual differences and the presence of workplace design issues. The situation has physical as well as psychosocial dimensions (Emslie *et al.*, 1999). The physical environment scale in the current study referred to features of the workspace and was similar to the physical working conditions scale used by Emslie *et al.* (1999). The disruption of everyday routine scale used in the current study identified another aspect of the work place, namely the direct impact of work on bodily cycles (e.g. food and sleep). Additionally there are work design characteristics, such as decision latitude, that are distinctly different to psychosocial perception and could be expected to interact with personality traits such as locus of control. Defining dimensions in this manner may provide an alternative typology for classifying the salient characteristics of the situation.

Implications

The results of the current study justify the observation by Sparks and Cooper (1999) on the need to develop more job specific accounts of the relationship between workplace dimensions and stress. Although comparison with capsule environments provided a rationale for generating specific hypotheses, an underlying theoretical explanation was not used. The next step is to attempt to

explain the results by reference to a model of stress. Beehr and Bhagat (1985) describe an integrative model of stress that is potentially relevant. They propose that stress is a function of the perceived uncertainty in obtaining outcomes, perceived importance of these outcomes, and duration. According to this model, stress was experienced due to loss of control over obtaining desired outcomes on the job (due to ambiguity of work role, lack of experience with work patterns and lack of control over managing the impact of absence on personal relationships).

The concept of controllability provides a basis for developing theoretical linkage between stress and job satisfaction. Bussing *et al.* (1999) outline a model of work satisfaction in which a person builds up a state of steady relaxation as a result of met expectations and needs or conversely, indistinct dissatisfaction as a result of unsatisfied needs and expectations. The met expectations depend on aspirations and controllability over aspects of the work situation. Controllability serves as primary means of regulating the person-work interaction and influences the development of forms of work satisfaction. Different work practices have been found to increase sense of control experienced by workers. The attraction of this approach is that aspects of workplace design can be used to predict the level of uncertainty without reference to individual factors such as personality or coping skills (Lazarus, 1993), although interaction effects may still be present (Kirkcaldy *et al.*, in press).

Limitations

Several limitations of the study need to be considered. First, it was cross-sectional. This limitation was addressed by referring to the literature on capsule environments in order to specify the prominent factors in the workplace. This approach avoided a shotgun approach. Another limitation of a cross-sectional design is that it is not possible to determine the causal relationship between stress and job satisfaction. However, this problem stems principally from the lack of clear theory defining the relationship between the two variables. The current study contributes by identifying potential grounds for theoretical links.

Second, the measures were self-report which could result in a possible inflation of the relationships between independent and dependent variables. Self-report measures mean that cause and effect can be inflated due to common method variance. This limitation was handled through survey design, discussed in the method section, and the choice of statistical analysis that enabled variance to be partitioned. A strength of the current study is that respondents did not rate their satisfaction with workplace dimensions but rather rated the frequency of certain behaviours or events. The importance of this approach is that distinct dimensions of the workplace were being measured without reference to stress or satisfaction.

Conclusion

The authors recommend that workplace surveys measuring job satisfaction and occupational stress incorporate distinct measures of workplace dimensions in order to avoid confounding the two sets of measures. Relevant workplace dimensions can be identified by comparison with workplaces that share salient characteristics. This approach identifies important similarities that provide the basis for generalisations that can be tested to evolve theoretical understanding.

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