

**NON-OPERATIONAL STRESS, STRAIN AND
FATIGUE IN AUSTRALIAN ARMY SOLDIERS**

SAMANTHA BROOKS

JULY 2002

**A THESIS SUBMITTED FOR THE DEGREE OF
MASTER OF PHILOSOPHY
AT THE AUSTRALIAN NATIONAL UNIVERSITY**

The contents of this thesis, including the collection of the research data reported herein constitutes the sole work of Samantha Brooks and all sources referred to have been acknowledged.

Signed: 

Date: 3 Jul 02

The opinions expressed in this thesis are the authors own and are not necessarily the views of the Australian Defence Force.

The data collected for this thesis is classified by the Australian Defence Force as "Staff-in-Confidence" and authorisation has been given for it to be reported under the auspices of this thesis only. As such, any individual seeking to refer to the results reported herein as part of a paper, presentation, or any other material intended for public release, is asked to contact the author at samantha.brooks@bigpond.com, or via the Directorate of Defence Force Psychology, Canberra, telephone 02 62663912.

The author wishes to thank Professor Don Byrne of the Australian National University who supervised this research. Grateful acknowledgement is also given to Stephanie Hodson for her advice, guidance and support throughout this project. Finally, thanks are extended to Colonel John Platt (former Commandant Army Recruit Training Centre), and all of the soldiers who took time out of their busy schedules to participate in the research.

While occupational stress and fatigue research has proliferated in the general academic literature over the past ten years, very little of this has occurred within the Australian military in non-operational environments. To address this, this thesis attempts to provide a theoretical and empirical examination of occupational stress and fatigue in the Australian Defence Force (ADF), and an overview of the debate over how to measure stress in the military. A case study of soldiers serving at the Army Recruit Training Centre, Kapooka is presented, focusing on the relationship between stress, strain, job satisfaction and social support. The potential risks associated with fatigue are also examined in the context of Dawson and Fletcher's (2001) model of fatigue, alcohol intoxication and performance. The potential utility of the measurement instruments used for the research is reviewed in light of the results obtained, with the view to providing a point of reference for a broader approach to the study of stress and fatigue in the ADF.

Table of Contents

INTRODUCTION.....	5
The Concept of Stress.....	5
Toward a Comprehensive Conceptualisation of Stress	9
Why study stress?.....	14
Stress in Occupational Settings	15
Morale, Esprit de Corps, Organisational Climate and Job Satisfaction.....	21
Stress and Performance	30
Military Stress Research.....	33
Fatigue.....	38
NON-OPERATIONAL STRESS AND FATIGUE IN THE ADF	48
The Army Recruit Training Centre - Kapooka.....	49
ORGANISATIONAL AIMS	50
EMPIRICAL HYPOTHESES.....	51
MEASUREMENT ISSUES	53
Measurement of stress in the military environment	53
Potential utility of existing instruments for the ADF	55
METHOD.....	62
Pilot study 1.....	62
Pilot Study 2.....	67
Longitudinal Study.....	71
RESULTS	75
Pilot Study 1	75
Pilot study 2.....	81
Longitudinal Study.....	90
DISCUSSION	110
Annex A	124
Annex B	134
Annex C	146
Annex D	148
Annex E.....	150
Annex F.....	154
Annex G	157
Annex H.....	162
Annex I.....	164
Annex J	168
REFERENCES.....	176

INTRODUCTION

In the field of organisational behaviour, considerable attention has been devoted to the phenomenon of stress during the past four decades. Ample empirical evidence exists which links work-related stressors to organisational relevant outcomes such as withdrawal, performance, satisfaction and commitment (Bhagat, McQuaid, Lindholm and Segovis, 1985; Gupta and Beehr, 1979; Fisher and Gitelson, 1983). While occupational stress research has achieved legitimacy, as areas of both applied and academic study, very little research has occurred within the Australian military, at least in non-operational environments. The Australian Defence Force (ADF) research community, like many of its contemporaries, tends to conceptualise military stress as that which occurs on operations, or in combat. As such, while much has been done to document and manage stress in the military as a clinical condition arising from trauma, there has been scant recognition of military stress as an organisational health and management issue *in general*. Given these observations, the following review aims to explore both the current conceptualisations of occupational stress in both civilian and military contexts, and the apparent imbalance in military stress research.

The Concept of Stress

The term “stress” has become an often convenient and overused catch-cry in modern society. Soderberg (1967) argued that stress was “the most grandly imprecise term in the dictionary of science”, as the word is used for different purposes to describe numerous situations and behaviours. A layperson may define stress in terms of pressure, tension, unpleasant external forces or an emotional response. Curiously, there is not even academic agreement on the basic definition of the term stress. Contemporary definitions of stress commonly regard the external environment as a stressor (eg. problems at work), the response to the stressor as stress or distress (eg. the feeling of tension) and the concept of stress as something which involves biochemical, physiological, behavioural and psychological changes. Researchers have also differentiated between stress that is harmful and damaging (distress), and stress that is positive and beneficial (eustress). Stressors on individuals can therefore be categorised into external stressors versus internal stressors and stress responses can be adaptive or maladaptive.

Throughout the twentieth century, models of stress have varied in terms of their definition of stress, their differing emphasis on physiological and psychological factors, and their description of the relationship between individuals and their environment. The study of stress in military settings has burgeoned, although it has been largely limited to combat and operational settings. As a result, theoretical perspectives on non-combat military stress are sparse. Nevertheless, MacDonough (1991) has attempted to classify stress models for their application to military settings and stress issues. He highlights the need for civilian stress models to be classified so that they can be evaluated for application to military settings, and a more complete classification of military stress models. To address these two issues, a brief review of widely accepted civilian stress models follows. It is appropriate that these models be considered, as does Cox (1978), in terms of the three widely recognised approaches to the study of stress:

- (a) response – based definitions and models;
- (b) stimulus-based definitions and models; and
- (c) interactional/transactional definitions and models.

Stimulus- based approach

The use of stress in engineering, as an external pressure on an object leading to strain, was adapted as an analogy for the psychological concept of stress. Thus stress, the stimulus, is exerted on an individual, resulting in a response, strain. Removal of the stimulus allows the individual to return to normal functioning. Janis and Mann (1977) provide one of the more widely recognised stimulus based definitions of stress:

“A stressful event is any change in the environment that typically induces a high degree of unpleasant emotion (such as anxiety, guilt or shame) and affects normal patterns of information processing” (p. 50).

This approach assumes that one can pre-determine whether something will cause strain, and that certain environments are a common source of strain for all individuals. Moreover, individual differences as moderators of the stress-strain relationship are overlooked. This limitation is highlighted by Lazarus (1996), who states that “...stress

cannot be defined exclusively by situations because the capacity of any situation to produce stress reactions depends on characteristics of the individual”, (p. 5).

Response-based approach

Although medical interest in stress dates back to Hippocrates (460-377 BC), it was not until the 1920's that physiologist Walter Cannon (1932) confirmed that the stress response is part of a unified mind-body system. He observed that a variety of stressors – extreme cold, lack of oxygen, emotion-arousing incidents – trigger an outpouring of epinephrine and norepinephrine (adrenaline and noradrenaline). These stress hormones enter the bloodstream from sympathetic nerve endings in the inner part of the adrenal glands. When alerted by any number of brain pathways, the sympathetic nervous system increases heart rate and respiration, diverts blood to skeletal muscles and releases fat from the body's stores – all to prepare the body for what Cannon called the adaptive “fight or flight” mechanism. Physiologists have also identified a second stress response system. On orders from the cerebral cortex, the adrenal gland cortex secretes the stress hormone cortisol. Cannon suggested that these physiological changes enabled the individual to either escape from the source of stress or fight. Within Cannon's model, stress was defined as a physiological response to external stimuli.

Canadian scientist Hans Selye's (1976) 40 years of research on stress extended Cannon's findings and helped make stress a major concept in both psychology and medicine. Selye demonstrated that the organism responds in a stereotyped manner to a variety of widely different agents, such as infections, intoxications, trauma, nervous strain, heat, cold and muscular fatigue. The specific actions of all these agents are quite different. Their only common feature is that they place the body in a state of stress. Hence, the stereotyped response represents a reaction to stress as such. Stress is regarded here as the sum of the non-specific biological phenomena. Consequently, stressors are also defined as non-specific, since they produce stress.

Selye's general adaptation syndrome (GAS) was developed in 1956 and described three stages in the stress process. The initial stage was called the “alarm” stage, which

described an increase in activity, and occurred immediately the individual was exposed to a stressful situation. The second stage was called “resistance”, which involved coping and attempts to reverse the effects of the alarm stage. The third stage was called “exhaustion”, which was reached when the individual had been repeatedly exposed to the stressful situation and was incapable of showing further resistance. The resistance stage is of particular interest in this analysis for its explanation of the epidemiology of chronic stress. If a stressor becomes a chronic or enduring feature of the environment, the body is required to be in a state of full-scale mobilisation over a longer period of time. The problem is that the body has to expend many resources to “fight” the stressor, which generally results in decreased resistance over time. In addition, more serious symptoms such as ulcers or atherosclerosis may develop. These physical symptoms may reduce resistance even more.

So, Selye’s early conceptualisation of stress provides explanations of both the effects of relatively sudden demands that require a near term response and the cumulative effects of repeated exposure to stressors. Likewise, more recent examinations of stress have drawn this distinction. For example, while a primary emphasis is placed on acute stress in their review of the stress-performance literature, Salas, Driskell and Hughes (1996) have acknowledged that chronic, persistent stress can too lead to degraded performance over time. They describe chronic stress as often being in the form of daily hassles, yet the following represents a more general and suitable description:

“Chronic stress refers to stress factors that are in the background of our everyday activities, and includes job stress, family stress, and the stresses imposed by organisational requirements”, (Salas, Driskell and Hughes, 1996, p. 7).

Both Cannon’s early fight/flight model and Selye’s GAS regarded the individual as automatically responding to an external stressor and described stress within a straight-forward stimulus-response framework. While Selye has been primarily concerned with the physiological response to stressors, some response-based definitions, such as that proposed by Ivancovich and Matteson (1980) do have a more psychological orientation:

“[Stress is] an adaptive response, mediated by individual characteristics and/or psychological processes, that is a consequence of any external action, situation, or event that places special physical and/or psychological demands upon a person”, (p. 8).

Influential as Selye’s theory has been, its narrowness is not compatible with current views of stress. One major weakness is that it does not account for the psychosocial factors, which are of critical importance to understanding human stress. Nor does it address the cognitive processes that influence the point when demand becomes challenge or when demand becomes threat and thus impacts on performance or health. Finally, it does not consider the role of individual differences in personality or coping strategies. Despite such limitations, Selye’s work has initiated that field of stress research, which focuses upon the physiological effects of stress, including attempts to correlate physiological and behavioural measures of stress. Although the effective combination of physiological and psychological measures in a field study is difficult to achieve, a multi-disciplinary approach is seen as necessary in the long-term and has been critical in the establishment of a link between stress and health.

Toward a Comprehensive Conceptualisation of Stress

There have been many attempts to integrate physiological and psychological components of stress, some long-term and systematic (eg. Lazarus, 1996; Frankenhauser, 1975). The physiological part of Lazarus’ work of electrodermal and peripheral cardiovascular indicators have proven effective in monitoring when a stressor is exerting an effect, or when a coping or adaptive process is mitigating stress. However, they did not (nor intended to) relate the research on physiological processes to that on the psychological ones. The work of Frankenhauser represented major systematic attempts to coordinate behavioural, environmental, or psychological stressors with certain concomitant physiological changes. Importantly, it established that the stress response is not a uniform reaction. Different stressors may initiate different patterns of endocrine secretions, and different people may have distinctive endocrine stress styles of response. The study of stress has a great deal to gain by incorporating physiological indicators with psychological measures, even given the lack of general correspondence between

behavioural, attitudinal and physiological reactions to stressful events. The very nonhomogeneity of behavioural reactions makes the potential availability of a physiological marker an indispensable tool for calibrating the magnitude of the effects produced by the stressful events. Also, the physiological theories suggest mechanisms by which stress can be additive (across different stressors), cumulative (across time), and interactive (diverse stressors cross-potentiating each other) (Singer, 1986).

Selye did later consider psychological factors of the stress response in his “code of ethics” (1980, p.141), whereby he pointed out individual’s attempt to reduce the impact of the demand that environmental stressors have on them. This highlights the viewpoint that stress should be defined as an interaction between the environment and the individual. Dissatisfaction with primary stimulus or response definitions of stress led researchers to develop a more relational or transactional perspective, as provided by McGrath (1976), emphasising the relation between environmental demands and individual response:

“A potential for stress [exists] when an environmental situation is perceived as presenting a demand which threatens to exceed the person’s capabilities and resources for meeting it, under conditions where he expects a substantial differential in the rewards and costs from meeting the demand versus not meeting it”, (p.1352).

Some confusion exists over the differences between transactional and interactional approaches, although Godwin (1985) clarifies this by pointing out that interaction has been unsuspectingly used as a synonym for transaction in the stress literature. As such, he classifies stimulus and response-based models as interaction models as response is balanced against stimulus in a causal interaction.

The approaches to stress covered by the term “interactional” emphasise the intervention of cognitive processes in the individual’s interaction with his environment. While cognitive processes are not entirely ignored by stimulus and response-based models, interactional or transactional models view stress as more directly linked to cognitive processes of the individual’s response to the environment, rather than the properties of the environment. The approach does not ignore physiological processes but prefers to see

them as an outcome of the cognitive processes, and therefore as symptoms of stress. Lazarus (1966) saw stress as a collective term covering an area of study which embraced sociological, psychological and physiological processes, yet any effort to pin-point the origins of this approach have not been made. Kahn, Wolfe, Quinn and Snoek (1964) used the idea of person-environment fit in investigating the relationship between the individual's role and organisational stress, but Lazarus provides a more general psychological base that is of greater use in explaining this approach.

Transactional models of stress

Lazarus and Launier (1978), who regarded stress as a transaction between people and the environment, developed the most commonly used definition of stress. Within this definition, stress involves an interaction between the stressor and distress. In the 1970's, Lazarus' work on stress introduced psychology to understanding the stress response (Lazarus, 1975; Lazarus and Cohen 1973, 1977). In arguing that stress has to be defined in terms of the transactions between individuals and situations, rather than stimuli and responses, Lazarus introduced the moderating variables of threat, and the cognitive process of appraisal. Lazarus' model therefore described individuals as psychological beings who appraised the outside world, not simply passively responding to it. Lazarus defined two forms of appraisal, primary and secondary. According to Lazarus, the individual initially appraised the event itself – defined as primary appraisal. There are three different ways that the event can be appraised (a) irrelevant, (b) benign and positive, and (c) harmful and negative. Lazarus then described secondary appraisal, which involves the individual evaluating the pros and cons of their different coping strategies. Therefore, primary appraisal involves an appraisal of the outside world and secondary appraisal involves an appraisal of the individual. Thus, there is the introduction of the word “coping”, which implies a more structured usage than everyday usage would recognise. Coping plays a large part in determining the stress response, yet changes in external demand or the ability of the individual could also affect the coping process.

The form of the primary and secondary appraisals determines whether the individual shows a stress response or not. According to Lazarus' model, the stress response can

take different forms: (a) direct action, (b) seeking information, (c) doing nothing, or (d) developing means of coping with the stress in terms of relaxation or defence mechanisms. It is in the constant and continuing appraisal process that the meaning of transaction becomes clear. Lazarus proposes a continuing feedback system between individual and environment, as action resulting from the coping process is continually appraised against the perceived threat or challenge.

A later Lazarus model (Lazarus, 1981; Lazarus *et al.*, 1985; Lazarus and Folkman, 1984) purports that stress responses are mediated by five major variables: stress appraisal, coping, person and environmental antecedents of stress and coping, and short and long-term adaptational outcomes.

Lazarus also suggested that we should substitute the term hassles for the frequently used term of stress. The term hassles conveys the sense that pressures are insidious or someone is pressing too hard. More formally, hassles are “the irritating, frustrating, distressing demands that in some degree characterise everyday transactions with the environment”, (Kanner, Coyne, Schaefer and Lazarus, 1981, p. 3). Hassles are less intensive than catastrophic types of stress, but they are persistent, enduring and are more likely to lead to illness than life changes (Nakano, 1989).

Although the transactional theory continues to evolve and mature, it has encountered numerous criticisms. Hobfoll (1989) argued that the model is tautological, overly complex, and not given to rejection”, (p.515). He explains tautological as meaning that demand and coping capacity are not defined separately. However, Hobfoll’s argument appears to reflect a misunderstanding of the basis of the transactional theory. Whether an event is demanding or not depends on coping capacity, and whether coping capacity is adequate depends on demand. This interdependent relationship of demand and coping would render any attempt at separate definition nonsensical. Ultimately, refuting the transactional theory is difficult given that both positive and negative instances of coping can be taken as consistent with the model.

Cox and Mackay (Cox, 1978) have proposed a transactional model which lies between the initial formulation of the Lazarus (1996) model and its most recent expressions in Coyne and Lazarus (1980), and Lazarus (1981). Cox and Mackay's model is reproduced in Figure 1. The important feature of the model is the proposition that strain arises as a result of an imbalance following the individual's appraisal of the demand that he perceives as being placed upon him, and his perceived capability to meet that demand. Feedback loops allow the continual reappraisal of perceived capability versus perceived demand as the system attempts to achieve balance, and thereby emphasise the transactional nature of the system.

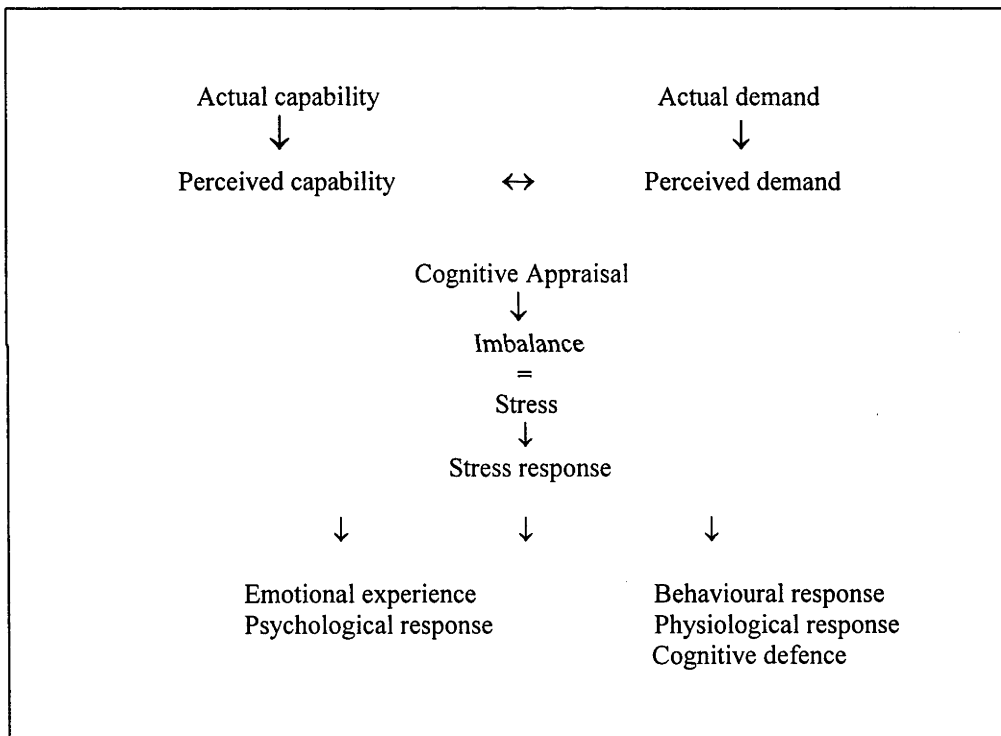


Figure 1. Transactional Model of Stress (Cox, 1978)

As noted previously, stress means many things to many people. Unfortunately, as Hogan and Hogan (1982) point out, the stress literature is “awash in a sea of terminology” (p. 153), not to say ambiguity. Hogan and Hogan (1982) argue that one problem leading to the current fractionalisation and confusion in the stress literature is the traditional psychoanalytic paradigm, which seems to pervade the work of Lazarus and others. Their

perspective purports that people are constantly stressed by chronic pressures or daily hassles, and that those who cope have better developed defences or coping mechanisms. The problem with this view is that it emphasises a relatively small group of people who experience chronic stress, and the goal of research is to discover what coping mechanisms these people lack. Hogan and Hogan (1982) assert that it may be more useful to analyse those in normal circumstances for whom stress can be disruptive but not constant, and we should identify what characteristics make such people cope better.

MacDonogh (1991) has examined the degree to which mainstream stress theories such as these can be applied to military settings. He refers to the work of Snow (1984a/1984b/1984c), who argues that interactional models may have greatest relevance, given that "Effective performance, particularly under stress or dangerous conditions, is most likely a function of personal characteristics and their interaction with training and task situational factors", (Snow, 1984a, p. 597). Indeed, in the case of the Australian military, much of the stress education conducted by its health professionals is based on the interactional approach described by Snow¹. Additionally, both operational and non-operational military stress doctrine is characterised by a mostly interactionist approach².

Why study stress?

Coyne and Lazarus (1980) argue that two questions were of prime interest in early stress research, viz., "Under what conditions of stress does human performance deteriorate?"; and "Who are the people most vulnerable to such deterioration?" (p. 144). Those questions appeared to have been asked from an academic and organisational perspective, whereas current arguments attesting to the pervasiveness of stress and the association of stress to physical and psychological well-being, have guaranteed a level of interest by individuals on their own behalf.

¹ Such education refers to that conducted by Defence Force Psychology Organisation personnel in Recruit and Initial Employment Training establishments, and also in pre-deployment education, Return to Australia (RTA) Brief and post-operational debriefing.

² Such doctrine includes: Australian Defence Force Policy 714: Operational Stress Management; Army Office Single Instruction 28/94 Army Stress Management Policy, and Defence Occupational Health and Safety Manual: Chap 32: Work environment and distress – Managing workplace stressors.

Particularly from the organisational perspective, there is a need to recognise that stress is often cumulative. Individuals might cope well with one stress situation, even if it is highly intense, provided that they can be sure that it won't be repeated. Repeated stressors of a much lower level of intensity may afflict people. The effect on workers of high noise levels, odours, humidity, vibrations, crowding, and the like is normally recognised, and workplace managers are well equipped to guard against them. However, things become more complex in an environment where the causes of stress are hidden, where people are afflicted by their workload, by the way their working lives are organised, by the content of their job or by the network of interpersonal relationships that characterise their day-to-day environment.

Stress is clearly important from both the organisational and the individual perspective. The literature accepts the negative physical and psychological effects of stress (Selye, 1976; Warr and Wall, 1975), effects which are obviously important from both perspectives, but there seems to be less certainty regarding the effects of stress on performance, particularly the chronic, cumulative effects, and in an organisational setting.

Stress in Occupational Settings

Like work, stress is not an isolated phenomenon, but a structural element in all our lives, including our work lives. Thus, the existence of stress in work environments is manifold. Concern over the costs of stress in the workplace is reflected in the burgeoning amount of theoretical and empirical interest in the consequences of work stress for both employees and organisations. Comcare Australia, for example, initiated the Quality of Working Life (Occupational Stress) Research Project in 1990, to investigate the costs, causes and incidence of occupational stress in Commonwealth employment. It was found that by 1992-93, stress-related claims represented 5.62 per cent of all workers' compensation claims and 19.2 per cent of all costs. The estimated total loss, in dollar terms associated with these claims is likely to exceed \$22 million. With 26 % of injuries or illness experienced occurring in the category of stress during 1995-96 (Mitchell and Mandryk, 1998), stress-related claims in the Commonwealth continue to represent the third most costly category of workers' compensation claims behind back injuries, and sprains and

strains, (Toohey, 1993). While such figures are alarming, Johns (1995) cautions that the costs of stress-related workers' compensation claims represent only a small portion of the overall costs of occupational stress: "...the remaining costs-by far the greater proportion-are hidden. These costs arise as a result of absenteeism, poor work performance, work flow interference and the need for staff replacement and retraining", (p. 5).

Models of occupational stress have likewise proliferated, yet it seems that there are some disagreements concerning the definition of occupational stress or strain in research investigations. The lack of conceptual agreement stems partly from the fact that some researchers have focused on the pressures of a particular job, while others have been more concerned with behavioural and health consequences of work stress. However, it seems that the lack of a universally accepted categorisation of work-related stressors remains the greatest source of contention.

Stress or Strain?

In the occupational stress literature, stress is normally referred to either as an external stimulus or a job demand, or as an affective or attitudinal response. These two definitions are differentiated by Lazarus' (1996) appraisal factor. Arnold (1960) distinguished emotional responses such as psychological strain, from the objects with which they were associated, such as job demands. He saw appraisal as the intervening process between the two. Newton (1989) argues that most researchers have not fully comprehended this distinction between the existence of a demand, and the evaluation of that demand. Newton also points out that appraisal is not the same as strain, since strain is concerned with the affective feelings or attitudes associated with the appraisal. Most researchers investigating occupational stress have employed measures of psychological strain which either focus on the affective response to a stressful demand, typically anxiety, by employing anxiety scales such as the State-Trait Anxiety Scale of Spielberger (1983). As this raises the concern of semantic overlap between questionnaire measures of occupational stress and strain (Newton, 1989), occupational stress questionnaires must focus solely on evaluations of the environment, while strain questionnaires focus solely on reported feelings.

Models of Occupational Stress

In 1978, Beehr and Newman identified thirty-seven job or organisational characteristics that might be occupational stressors and these were split into four categories: job demands and task characteristics, role demands or expectations, organisational characteristics or conditions, and organisations' external demands and conditions. Factors that consistently appear to influence job stress include task demands, workload, job security, organisational structure, participation in decision making, locus of control, and utilisation of employee skills. The findings in a number of studies also suggest that the nature, frequency and severity of organisational stressors may differ as a function of occupational level and the type of work performed (eg. Axelrod and Gavin, 1980; Marino and White, 1985; Turnage and Spielberger, 1991). Despite the rapidly increasing research interest in the topic and the identification of more stressors, there is still no clearly accepted, universally used categorisation of stressors. In addition to the four categories indicated above, other categorisations have included the lack of fit between what someone desires and what the job can supply, and the lack of fit between what is demanded of the person by the job and the abilities or resources that the person has to meet those demands (eg. French and Caplan, 1972; French, Caplan and Van Harrison, 1982); organisational characteristics and processes, job demands, work load and role characteristics, job satisfaction and individual characteristics and expectations; and physical environment, individual level stressors, group level stressors, and organisational level stressors (Ivancevich and Matteson, 1980). Cohen and Willis (1985) postulate that social support plays a significant role in buffering the effects of stress, thus moderating the relationship between stress and well being. Indeed, Terry, Neilsen and Perchard (1993) found evidence to suggest that, irrespective of the level of stress, the availability of work-related support buffered the negative effects of work stress, particularly role conflict and work overload. Clearly, there are many opinions about the nature of occupational stressors and more than one way of categorising them. In addition, there is also more than one well-known model of occupational stress.

Person-Environment Fit

Person-Environment Fit (PE-Fit) theory (French and Caplan, 1972; French, Caplan and Van Harrison, 1982) is a widely accepted conceptualisation of occupational stress which has guided the majority of recent research in the field (Chemers, Hayes, Rhodewalt and Wysocki, 1985). The theory adopts the interactional view of stress in that stress and strain in work settings are attributed to the interaction of an individual with his/her work environment. Occupational stress results from an incompatible person-environment fit that produces psychological strain and stress-related physical disorders.

The PE Fit theory can be considered as an elaboration of the properties of the person and the person's environment (both subjective and objective). While the PE-Fit model is rather constrained, research on occupational stress guided by PE-Fit theory has encompassed a wide range of content, although some researchers use PE Fit language quite loosely. To illustrate this, research guided by this theory has examined job and organisational characteristics, job satisfaction, employee skills, individual differences in attitudes and personality, and health status (eg. Beehr and Newman, 1978; Sharit and Salvendy, 1982; Terry, Nielsen and Perchard, 1993). PE-Fit concepts such as role ambiguity and role conflict have been investigated in numerous studies on a variety of occupations (Fisher and Gitelson, 1983; Jackson and Schuler, 1985; Terry, Nielsen and Perchard, 1993). Research suggests that executives and managers perceive more role ambiguity, whereas employees in positions with less responsibility experience more role conflict (Kahn, Wolfe, Quinn, Snoek and Rosenthal, 1964). Despite this, Jackson and Schuler (1985) found no relationship between role ambiguity, role conflict and occupational level.

Demand-Control

Karasek's (1979) Demand-Control model focuses on interactions between the objective demands or pressures of the work environment, and the decision latitude of the worker in fulfilling the requirements of a job (Karasek and Theorell, 1990). The combination of high demand with little control has been found to contribute to psychological strain, lowered productivity, and a greater risk of health problems (Theorell and Karasek, 1996).

While emphasising the importance of autonomy and control as essential for managing the stress associated with demanding work, Sauter and Hurrell (1989) point out that “fundamental questions remain concerning the conceptualisation and operationalisation of the (control) construct” (p. xvi).

Lazarus' Transactional model

PE-Fit and Demand-Control theories focus primarily on the general demands of a job and the skills and abilities of the worker. These models give less attention to how specific job pressures interact with individual differences in personality and coping resources to influence the emotional reactions of workers. To address this, Lazarus' cognitive appraisal theory has been adapted by some occupational stress writers. Lazarus himself (1991) conceptualised occupational stress by describing stress as a process that involves a transaction between an individual and his/her work environment. He distinguishes between stressful antecedent conditions, how these are appraised by individuals, and the moderating effects of individual coping resources. Emotional reactions are evoked when a stressor is perceived as threatening and the person does not have the resources needed to cope with it.

Brief and George (1991) have criticised Lazarus' Transactional Process model for being too ideographic. While it is often useful to focus on individual workers, they assert that, from an organisational perspective especially, it is equally important to identify stressful working conditions that adversely affect groups of employees. Helping group members adapt to occupational stressors or changing job conditions to make them less stressful can reduce strain and increase productivity for members of a working group, but there is often a need to develop strategies to change organisations. In their review of evaluative studies on stress interventions, Oldenburg et al (1994) found that of the 28 studies identified, only 3 interventions were aimed at organisational reform. Ellis (1995) argues that if we are to move to an organisational approach to stress management, conceptualisation from an organisational perspective is required. She offers a model (Figure 2) which reflects this view, and while considering the role of individual factors in the aetiology of stress, focuses only on organisationally relevant outcomes.

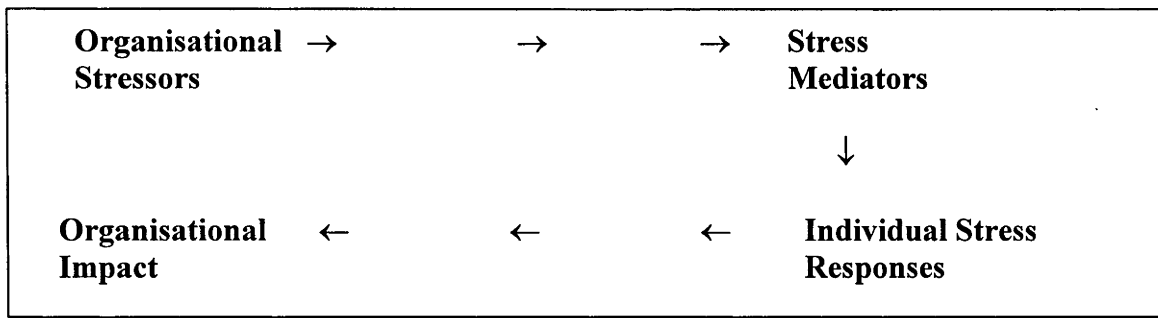


Figure 2. New conceptualisation of stress at work (Ellis, 1995)

The models of occupational stress described above have strengths and limitations, but are clearly complementary rather than competing frameworks for understanding stress in the workplace. Although it is clear that such models do provide a highly useful frame of reference to the analysis of stress in a host of organisational environments, their applicability is limited by the requirement to adopt a highly ideographic approach to the quantification of stress in each unique occupational context. This issue was highlighted by Turnage and Spielberger (1991), who point out that “In order to ameliorate job stress, the characteristics of a job that are perceived as most stressful by particular occupational groups must be identified” (p. 165). The identification and categorisation of stressors needs to be peculiar to the situations in which they occur and to the persons whom they affect.

A further issue of concern in regards to these models relates to the issue of mediators and moderators in the stress – strain relationship. While Lazarus (1991) does account for individual differences that moderate the relationship between stress and outcome in his model, organisational factors are not a feature of any of these models. Nevertheless, support for the moderating effects of such factors does exist, and has tended to focus on social support (Terry, Nielsen and Perchard, 1993; Constable and Russell, 1986) and organisational climate (Leong, Furnham and Cooper, 1996; Cox, 1991). The importance of social support (often referred to in the military as cohesion) is also well-recognised in the military stress literature (eg. Manning, 1991; MacDonough, 1991; Murphy, 2001). While the concepts of organisational commitment, morale and satisfaction have also been examined within the military (eg. Huah and Lee, 1997; Chong, 1997; Snow, 1984a,

1984b, 1984c), their relationship to stress, particularly as moderators of the relationship between stress and strain has largely been ignored. However, it could be reasonably argued that the potential importance of investigating such factors is highlighted not only by the need to identify the cultural context in which many work stressors become "organic" to the military organisation, but also to recognise their often insidious effects on job satisfaction and discharge / resignation rates.

Morale, Esprit de Corps, Organisational Climate and Job Satisfaction

Mediators of the relationship between stress and performance, such as appraisal style and personality are traditionally referred to by military scientists by terms such as morale and esprit de corps. The mental, emotional and spiritual state of the individual has long been recognised as factor crucial to the effective performance of a soldier, and has long been a concept which is central to leadership training in the military.

Morale

In the military context, morale has traditionally been emphasised as an extremely important determinant of unit effectiveness. Manning (1991) asserts that, for the military, "high morale seems to be both a function of and a result of success in wartime", and is "vitally important in keeping stress casualties minimal" (p.453). The Australian Army (1973) defines morale as:

"an attitude of confidence in the mind of an individual and is closely related to the satisfying of a man's basic needs...High morale is a positive state of mind which gives man a feeling of confidence and well-being that enables him to face hardship with courage, endurance and determination", (p.9.1).

Motowidlo *et al* (1976) attempted to summarise definitions of both industrial psychologists and military writers by arguing that most definitions include some aspects of satisfaction, motivation and group membership. In questioning the applicability of concepts such as job satisfaction to wartime contexts, Manning (1991) offers a definition of morale relevant to both wartime and peacetime, emphasising membership in a group and willing participation in the group's work:

“Morale is the enthusiasm and persistence with which a member of a group engages in the prescribed activities of that group” (p.455).

Although these definitions can be readily understood, they have little use in studies of the effect of stress on military performance. Labuc (1991) attempts to develop a working model of morale and performance, based on different attributes of the soldier's background, the soldier himself, and the battle. The soldier's background include the quality of training and leadership, together with unit cohesion and support. Factors specific to the soldier concern his psychological and physical well being, his confidence in himself, his equipment and his commanders, and his identification with group goals. Labuc's model refers to the “battle” as the situational context of morale in this model. If the situation was peacetime rather than war, then morale may be determined by factors such as the social or organisational climate, and also job satisfaction.

Determinants of morale include both individual and group factors. Among the former are biological needs such as adequate food, sleep and protection from the elements, although, as pointed out by Manning (1991), it is the relative rather than the absolute satisfaction of these needs which is important for morale. Other individual needs are psychological, such as a goal, a role, and a need for self-confidence. In terms of group factors, morale encapsulates “a set of attitudes expressed by the individual but based almost completely on group-related factors” (Gal and Manning, 1987). Both Huah and Lee (1997) and Chong (1997), in their discussions of leadership, morale and unit effectiveness in the military, cite research which indicates that these group factors appear to be; confidence (self-confidence and confidence in group), cohesion, satisfaction and commitment. These facets of morale are considered to be important, albeit in varying degrees, on a primary group level (from individuals to sub-unit level), Battalion level, and even at the national level (such as commitment to national defence).

Morale has often been regarded as a concept of group dynamics, such as cohesion, collectivism, socialisation or esprit de corps. Yet cohesion and esprit should be seen as contributors to morale, rather than a synonym or a related but independent concept.

Williams' (1996, p.44) reduces these concepts to a limited number of factors that are critical to cohesion and socialisation, and ultimately to military morale. These are:

1. Attention to the physical, security and economic needs of the individual;
2. Affiliation – friendship with peers and a feeling of belonging;
3. Pride in accomplishment of tasks;
4. Pride in work;
5. Teamwork;
6. Mutual trust;
7. Common values and goals;
8. High level of training on relevant skills;
9. Confidence in other group members and in the group as a whole;
10. Shared norms about self-discipline;
11. Personnel stability (low turbulence in the unit);
12. Organisational emphasis on development;
13. Consistency of organisational goals and policies;
14. Belief in the human element of the organisation;
15. Belief in the worth and dignity of the organisation;
16. Belief in the worth and dignity of the individual;
17. Appropriate leadership style and behaviour at all levels;
18. Effective communication in all directions;
19. Equipment that fosters confidence; and
20. Operational capability that fosters confidence.

Esprit de Corps

Esprit de corps is best described as a sense of pride in belonging to a unit. The Australian Army (1973) conceptualises the term as a result of traditions, unique experiences common to the group and competition. Individuals with esprit de corps have satisfaction and identify strongly with the formal organisation or institution to which they belong. While cohesion refers to the relations between the soldier and the primary face to face work group; esprit de corps depends upon relations with others in the organisation. Common backgrounds, shared experiences and clear and meaningful group missions are important components of cohesion that, together, contribute to esprit de corps or commitment. High levels of esprit mean that soldiers' loyalties go beyond their primary face-to-face peers and immediate leaders. Both military and civilian attempts to relate esprit and other elements of morale to peacetime productivity have seldom found high correlations (Motowidlo *et al*, 1976). Manning (1991) explains that this may be because the garrison soldier and the civilian worker belong to many groups other than their work group and have a variety of needs and desires independent of their work satisfaction.

Organisational climate

Both morale and esprit de corps are terms that are commonly used in the military, but are generally synonymous with definitions of organisational climate. Within the organisational behaviour literature, organisational climate is commonly referred to as a number of relatively enduring qualities or attributes of the internal environment, as perceived by its members. According to most models of organisational climate, such qualities are normally grouped into dimensions such as relationships, tasks, structure, rewards and management, which in turn influence behaviour, particularly performance and organisational effectiveness. However, within the relationship dimension of organisational climate, the effect of social support on health has also been examined (eg. LaRocco, House and French, 1980; Anderson, 1991). Social support is defined as the comfort, assistance or information one receives through informal or formal contacts with individuals or groups (Wallston, Alagna, DeVellis & DeVellis, 1983), and is often operationalised as perceptions about the adequacy of interpersonal contact. Numerous studies support the notion that good social support networks within an organisation buffer

the effects of stress (eg. Terry, Nielsen and Perchard, 1993; Cox, 1991; Frese and Zapf, 1988; Lazarus and Folkman, 1984). Such evidence highlights the value of examining aspects of the organisational climate in occupational stress research for the purpose of identifying positive indicators for employee health rather than negative indicators alone.

Job Satisfaction

Job satisfaction is a term that is not referred to extensively in the military, and is often mistaken as being synonymous to morale. The main difference between the two concepts is that while morale incorporates a broad range of individual and group factors, job satisfaction is an element of morale that is restricted more to individual attitudes and feelings.

Job satisfaction, the extent to which employees like their work, has long been an important concept in the organisational study of the responses employees have to their jobs. There have been numerous reports in the literature that high levels of perceived work stress are associated with low levels of job satisfaction. Landsbergis (1988), for example, found that the experience of work stress was predictive of job dissatisfaction in a sample of hospital employees. Other researchers have reported similar results (eg. Cummins, 1990). The earliest systematic attempts to study job satisfaction date back to the 1930's, but the more recent interest in job satisfaction is focused primarily on its impact on employee commitment, absenteeism, and turnover (Steers and Rhodes, 1978), and also its relationship with occupational stress (Terry, Nielsen and Perchard, 1993; McCormick, 1997; Richardsen and Burke, 1991; Ulleberg and Rundmo, 1997; Wallis, 1987; Bogg and Cooper, 1995; Guppy & Gutteridge, 1991). While the precise relationship with occupational stress is complex, generally those who are experiencing stress also have negative attitudes towards their work. Although the relationship between organisational stress and some organisation variables may not be entirely obvious, their relationship with job satisfaction is well-documented (Cooper and Payne, 1988). While being considered as an outcome in its own right, job satisfaction can be regarded as a related work attitude of stress (Bogg and Cooper, 1995).

Although job satisfaction was originally thought to increase productivity, little evidence has been found to support this. Several studies (Brooke and Price, 1989; Michaels and Spector, 1982; Steers and Rhodes, 1978) have shown that job satisfaction can partially explain variation in employees' identification and involvement in a particular organisation (commitment), the missing of scheduled work (absenteeism) and the maintenance of membership in a particular work organisation (turnover). Historically, variations in job satisfaction have mostly been explained by situational variables such as autonomy, routinisation and work group cohesion (Agho, Price and Mueller, 1992). This is illustrated in Mueller and Price's (1986) original model of job satisfaction, which was one of the few job satisfaction models in the literature that provided a comprehensive framework for analysing and understanding employees' job satisfaction. However, it was later revised (Agho, Mueller and Price, 1993) (Figure 3), in response to a number of criticisms

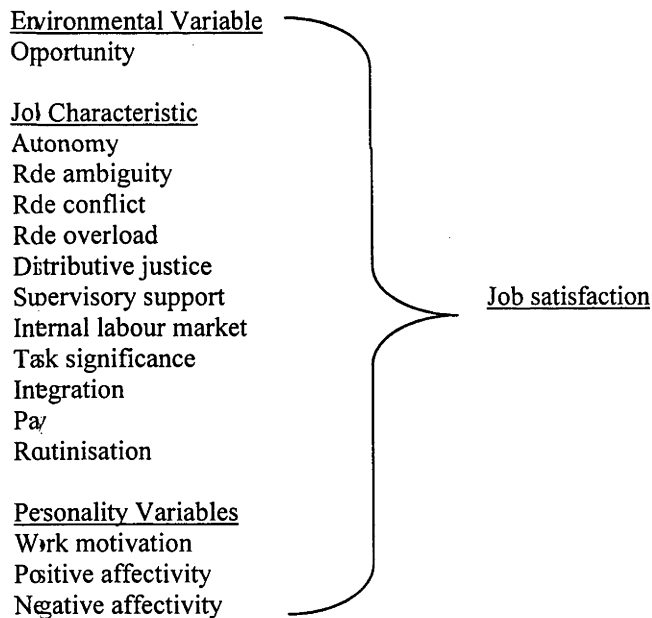


Figure 3. The revised Job Satisfaction Model (Agho, Mueller and Price, 1993).

These included the exclusion of important job characteristics such as role conflict, and the lack of consideration for environmental determinants of satisfaction and individual differences or personality. The concepts of positive and negative affectivity were also included in the new model after previous research indicated that these personality

variables are “stable dispositions that impact on satisfaction and are little affected by situational work conditions (Agho, Price and Mueller, 1992). In evaluating the revised model, Agho, Mueller and Price (1993) found that the degree to which employees like their job is influenced by a combination of characteristics of the environment (opportunity), the job (routinisation and distributive justice), and personality variables (positive affectivity and work motivation).

Morale, organisational climate and job satisfaction in the military

In a broad overview of military research on motivation, morale and performance, Snow (1984b, p. 599) identified four basic dimensions of morale: confidence in commanders, confidence in equipment and in self as user, unit cohesiveness and perceived legitimacy of the mission. Snow (1984a) also emphasises the need to subdivide types of motivation “to serve, enter, stay, and fight in the armed forces” (p. 593).

Clemes (1971) systematically studied the relationship between soldiers’ stress levels and the quality of their units’ social climate. He studied the social climates in three types of US training companies using a scale called the Military Company Environment Index (MCEI). The soldiers’ stress was measured using an adjective checklist. Clemes concluded that soldiers’ “perception of their social environment is significantly related to their feelings of stress as well as their performance”, (1971, p. 34).

Extensive research by the Walter Reed Army Institute of Research was done on the Unit Manning System (Furukawa *et al*, 1987; Marlowe *et al*, 1985) involving over 130 US companies, 1650 interviews and over 26,000 surveys. They developed the concept of “psychological readiness for combat” which comprises four dimensions: horizontal cohesion, vertical cohesion, individual morale, confidence in group capability and confidence in leaders. These dimensions of psychological readiness provide the soldier with supportive relationships that mediate the effects of stress. They provide the soldier with a psychological ‘armor’ of strength and competence through the instrumental and affective bonds that increase his odds for safety and survival in a hostile environment.

Dissatisfaction in the Australian Defence Force (ADF) has grown in recent years, not only with conditions of service and with the way in which the service family is affected by service life, but also with management. In 1988, the Joint Parliamentary Committee on Foreign Affairs, Defence and Trade into Personnel Wastage in the ADF determined personnel wastage to arise largely from disaffection with leadership and lack of career and/or job satisfaction. Recommendations were made for improvements in areas such as staffing levels, leadership, career management, service family-related issues, remuneration, retirement benefits, housing and other conditions of service, (Department of Defence, 1989).

As suggested previously in this review, morale and job satisfaction may be best measured via scales which gather attitudinal information. The 2001 Defence Attitude Survey consisted of items to measure perceptions of service life, leadership, personal career satisfaction and organisational climate and culture (DSPPR, 2001). With the recent climate of change brought about by both the Defence Reform Program (DRP) and Commercial Support Program (CSP), the survey particularly highlighted issues of job security, human resources, and morale. This is reflected in responses by the Army respondents, as reported by DSPPR (2001), a selection of which is listed in Table 1.

Table 1

Percentage distributions of selected 2001 Defence Attitude Survey items (DSPPR, 2001)³.

Item	Good	Fair	Poor
<i>How would you rate your current level of morale?</i>	43.5	32.7	23.8
	Agree	Uncertain	Disagree
<i>I like the work in my present posting/position</i>	73.0	7.5	19.5
<i>Life in the Army is enjoyable</i>	66.0	16.8	17.2
<i>The Army lacks a well-defined role</i>	35.0	18.2	46.9
<i>You surrender too much control of your life by being in the ADF</i>	45.8	12.9	41.2
<i>My training and experience have prepared me well for combat</i>	61.2	18.5	20.3
<i>The Army inspires the very best in me in the way of performance</i>	52.8	18.3	28.9
<i>The Army is the best of all possible organisations for which to work</i>	24.0	28.8	47.2
<i>I am proud to tell others that I am a member of the Army</i>	82.3	8.9	8.8
<i>My overall workload is excessive</i>	47.9	12.4	39.7
<i>I do too much unpaid overtime</i>	70.0	7.5	22.5
<i>We never seem to have enough resources to do our job properly</i>	78.7	7.0	14.3
<i>I want more locational stability for my family</i>	72.9	15.3	11.7
<i>I am actively looking at leaving the service</i>	30.6	16.8	52.6

The results of the 2001 Defence Attitude Survey highlight that members of the armed forces are subject to many conditions which do not usually confront civilian workers. They are subject to military law and discipline and well as civilian law. They may work irregular hours with no change in remuneration for overtime, and they lack the right to withdraw labour or engage in industrial disputation to achieve change. They may experience lengthy separations from family and friends on field exercises and operations, and are liable to have frequent postings, sometimes at short notice, with disturbance of social, educational and other ties. These conditions of service create the potential for psychosocial stress and reduced satisfaction.

³ The results of the 2001 Defence Attitude Survey can be accessed at the following web-site: <http://defweb.cbr.defence.gov.au/dsprr/2001DefenceAttitudeSurvey/>. Information on the rationale and methodology of the survey is presented, and the results are presented in chart form, and where applicable, compared with the results of the 1999 Defence Attitude Survey.

Stress and Performance

Although the requirement for effective performance under stress has been present since our ancestors had to fight for basic survival, the impact of stress on performance is perhaps greater now than at any other time in our history. Modern high technology systems have increased both the stress under which we must perform and the consequences of poor performance. Therefore, the impact of stress on performance has become a primary concern in industry (Spettell and Liebert, 1986), the military (Driskell and Salas, 1991), aviation (Prince, Bowers and Salas, 1994), and other applied settings in which effective performance under stress is required. On the other hand, stress is also of concern in everyday settings, such as organisations where stress can lead to poor productivity, reductions in job satisfaction and high employee turnover. Whether a high demand performance environment or an everyday organisational setting, it is in the best interests for all types of workers that they are able to perform their jobs effectively under conditions of high demand. Whether in everyday settings, or more critical environments such as the military, people may be subjected to various stressors that have been shown to disrupt task performance. These include noise (Cohen and Weinstein, 1981), performance pressure (Baumeister, 1984), anticipatory threat (Paterson and Neufeld, 1987; Wachtel, 1968), time pressure (Wright, 1974), task load (McLeod, 1977), group pressure (Mullen, 1991), fatigue (Bonner, 1997), technology enhancements (Little, 1998), and other stressors.

The deleterious effects of stress on performance are profound and pervasive. Stress may result in physiological changes such as increased heartbeat, laboured breathing, and trembling (Rachman, 1983), emotional reactions such as fear, anxiety, frustration (Driskell and Salas, 1991), and motivational losses (Innes and Allnutt, 1967); cognitive effects such as narrowed attention (Easterbrook, 1959), decreased search behaviour (Streufert and Streufert, 1981), longer reaction time to peripheral cues and decreased vigilance (Wachtel, 1968), degraded problem solving (Yamamoto, 1984), and performance rigidity (Staw, Sandelands and Dutton, 1981), changes in social behaviour, such as loss of team perspective (Driskell, Salas and Johnston, 1995) and decrease in

prosocial behaviours such as helping (Mathews and Canon, 1975); and even lowered immunity to disease (Jemmott and Locke, 1984).

Salas, Driskell and Hughes (1991) propose a model of stress and performance which specifies a number of factors which commonly have an impact on performance, yet which still provides a basic framework for examining stress causes, moderators and responses. Figure 4 illustrates this model as a four stage process: (a) an environmental stimulus becomes salient, (b) it acquires a positive or negative valence through the appraisal process, (c) this leads to the formation of performance expectations, and (d) these in turn determine a number of physiological, cognitive, emotional and social consequences.

Environmental stressors →	Appraisal →	Performance expectations →	Stress outcomes
Noise Time Pressure Task Load Threat Group pressure	Evaluation of the extent of the threat and the resources to meet the demand	Positive or negative expectations of performance competence	Physiological Emotional Social Cognitive Performance

Figure 4. Four stage model of stress and performance (Salas, Driskell & Hughes, 1991).

As specified by the model, stress results in a number of outcomes of interest, including physiological reactions, cognitive effects, emotional reactions, social behaviour and performance outcomes. Physiological reactions include changes in heart rate, pulse rate, salivary immunoglobulin A (IgA), systolic and diastolic blood pressure, catecholamine (adrenaline and noradrenaline) output, glucocorticoid (eg. cortisol) output, muscle tension and respiration rate. Emotional reactions include subjective feelings of fear or anxiety, annoyance, tension and frustration. Measures of self-reported or subjective stress typically assess state or transitory anxiety, although other measures of subjective stress have included trait anxiety, and specific measures of performance anxiety. Indeed, subjective, as opposed to objective measures of stress and somatic complaints have been consistently and positively associated with trait anxiety and related constructs (Costa and McRae, 1987).

The cognitive effects of stress have often been of interest in research focusing on anxiety and individual differences, where anxiety is clearly defined as an organismic state consistent with the state-trait tradition. Eysenck (1983) conceptualises the basic interrelationships among the factors of trait anxiety, state anxiety, environmental stressors and performance, as shown in Figure 5.

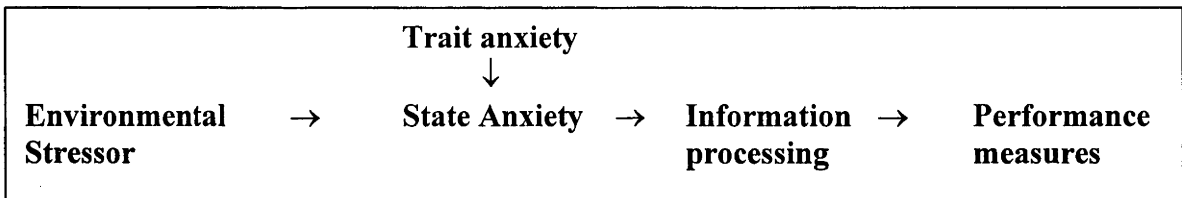


Figure 5. The basic state-trait conceptualisation (Eysenck, 1983)

Eysenck (1983) reviews the experimental work on the effects of anxiety on task performance, and highlights some of the most widely replicated findings:

1. Anxiety leads to increased task-irrelevant cognitive activities, such as worrying;
2. Anxiety leads to increased effort during task performance most of the time;
3. Anxiety reduces digit-span performance (working memory capacity);
4. Anxiety interacts with task difficulty, with adverse effects of anxiety growing as task difficulty increases;
5. Adverse effects of anxiety are more apparent on subsidiary or incidental tasks than on main or primary tasks;
6. Anxiety interacts with type of feedback (neutral versus failure), with high anxiety subjects being more detrimentally affected than low anxiety subjects by failure feedback; and

7. There is a closer relationship between state anxiety and performance than there is between trait anxiety and performance.

Social effects of stress include a reduction in the tendency to assist others, increased interpersonal aggression, neglect of social or interpersonal cues and less cooperative behaviour among team members. Performance outcomes that are typically examined in the research literature include performance accuracy, performance speed and performance variability.

Military Stress Research

The effects of stress on task performance, and the mitigation of these effects are areas of critical concern to the military (see Driskell and Olmstead, 1989). The concern with effects of stress on task performance is of central interest to the military mostly for operational applications, as the military operational environment is, by definition, an extreme stress environment. Combat is inherently stressful, and all wars have resulted in considerable numbers of psychiatric casualties (Ingraham and Manning, 1980). Battle-shock, post traumatic stress disorder, and combat stress reaction are stress-related syndromes that result in the loss of trained combat manpower in the short term, and a potentially chronic medical problem for the affected individual and society in the long term. In addition to these severe reactions to stress, civilians and soldiers are likely to experience stress-related performance impairments. In a soldier, errors in judgement, accuracy and timing affect performance in combat and non-combat settings. Whether performance or health is the outcome of focus, military stress research is mostly restricted to that which arises in combat. As Alpass, Long, MacDonald and Chamberlain (1996) explain, "recent research into the mental and physical health of military personnel has tended to focus on exposure to combat", (p.1). Their investigation of work stress and health in non-combat military personnel is unfortunately unique in the military stress literature. Their study highlights that in the military, like any organisation, work stress is likely to exist amongst all employees, regardless of their role or the operational status of their posting location. For example, for the 1997 Australian Army soldier and officer attitude and opinion surveys, it was reported that stress levels (as measured by the

General Health Questionnaire – 12 (GHQ12)) among Australian Army Officers exceeded the national average, and were even higher than the results expected for disaster victims (MacIntyre, 1998). The stress levels for Army soldiers, while not as extreme as the results obtained from the officer sample, were also excessive. This GHQ12 data, underwent further analysis by Goyne (2001), who reported that one-quarter of the Army personnel surveyed reported four or more clinical symptoms, highlighting the potential health risks faced by Army personnel, and that military life may indeed be “inherently stressful” (p.28). However, MacIntyre (1998) also found that senior Army officers are loyal to the Army, have a high degree of job and career satisfaction, and are committed to serve. Other data on stress levels among Australian military personnel is scarce, with Farrell’s (1990) study of Regular Army personnel working in quartermasters’ stores being the only apparent example of a focused study of occupational stress in military personnel. This study indicated higher levels of stress in its sample than in other working populations, with higher stress in the lower ranks and designations, and higher job satisfaction among the higher ranks.

The 1999 Defence Attitude Survey included 5 stress items in the topical issues supplement. These items are best described as “crude”, with little construct validity, and are of limited interest in a clinical context. Additionally, the items only seek information on respondents’ recent rather than long-term experience of stress, and no contextual information on the characteristics, prevalence and severity of stressors is gathered. Despite these problems, given the paucity of information on stress levels across the ADF, the items may provide a useful general indication of the prevalence of stress among Defence personnel, as illustrated by the summary of data from Army respondents’ in Table 2.

Table 2

Summary of responses of Army respondents' to the stress items in the 1999 Defence Attitude Survey.

Item	Percentage Responses (1)
<i>How much stress is there in your life right now?</i>	<ul style="list-style-type: none"> 43% of respondents said there is 'quite a bit' or 'extreme' amounts of stress in their life right now
<i>Over the past week, the stress I have been experiencing has affected my personal life.</i>	<ul style="list-style-type: none"> 25.5% of respondents said that stress is affecting their personal lives 'quite a bit' or 'extremely'
<i>Over the past week, the stress I have been experiencing has affected the performance of my military job.</i>	<ul style="list-style-type: none"> 10.4% of respondents said that stress is affecting their performance of their military job 'quite a bit' or 'extremely'
<i>Over the past week, how well have you coped with these stressors?</i>	<ul style="list-style-type: none"> 6% of respondents said that they have coped with these stressors 'somewhat poorly' or 'very poorly' 61% of respondents said that they have coped with these stressors 'quite well' or 'extremely well'
<i>How do you rate your current health?</i>	<ul style="list-style-type: none"> 23.7% of respondents said that they rated their current health as 'fair' or 'poor'

The general picture of stress in the ADF described in the above table is further augmented in the ADF Health Status Report (2000). Here, it was reported that the average number of worker's compensation claims relating to stress from financial years 1992-93 to 1996-97 was 122 per year and accounted for an average of 2.3 per cent of all workers' compensation claims received. Further to this, the Department of Veteran's Affairs disability claims for mental health related problems from 1997 – 2001 totalled 31006. Disorders contributing to this figure include post-traumatic stress disorder, alcohol dependence, anxiety conditions, depression, impotence, and adjustment disorder.

Despite the findings described above, research focusing on general organisational climate, such as the 1999 and 2001 Defence Attitude Surveys has far outweighed that which focuses on stress and health issues. This is largely due to the significant increase in wastage across the ADF in recent years within a climate of organisational change, increased employment rates in the employment market, and changes in the demographics and attitudes of the younger members of the workforce. Nevertheless, the psychological health of ADF members is likely to achieve greater attention in the future, with the recent proposal of an ADF Mental Health Strategy. This proposed strategy incorporates health

promotion, prevention and intervention initiatives, along with a much-needed mental health data collection and research capability within the ADF (Cotton, 2001)⁴.

In contrast to the ADF, the United States military has been the subject of more extensive stress and health research, such as that conducted by Bray, Camlin, Fairbank, Dunteman and Wheelless (2001), and more focused studies on specific military occupational groups, such as recruit instructors (Carbone and Cigrang, 2001). Bray *et al*'s (2001) analysis of the 1995 Department of Defense Survey of Health Related Behaviours Among Military Personnel indicates that 39.3% of the 16,193 respondents reported a "Great Deal" or "Fairly large amount" of work stress, and that work and health-related stressors, and depressive symptoms were associated with lower work functioning. Like the stress measures used in the (Australian) 1999 Defence Attitude Survey, the measures used for this survey were crude and did not point to the frequency or locus of stressors. Nevertheless, consistent results were reported by Spielberger and Reheiser (1994), who used the Job Stress Survey (JSS) (Spielberger and Vagg, 1991), an instrument which assesses the frequency of severity of 30 different stressor events.

Carbone and Cigrang's (2001) study of US Air Force recruit instructors represents the only recent and published research on the unique stressors experienced by military training staff. Importantly, it highlights that training staff may be subjected to similar levels of work pressure and lack of respite as their peers in operational environments, yet do not seem to attract the same amount of recognition (empirically and organisationally). This study found that for recruit instructors, the demands that work places on their private lives and perceived burden of work were the greatest sources of stress. Also, a sizeable proportion (40%) of the instructors reported that they would not volunteer for duties as an instructor if given the opportunity again.

Other existing research on the sources of stressors on soldiers can be summarised in terms of where soldiers are located when studied. The focus here is on stressors

⁴ The proposal for the ADF Mental Health Strategy was submitted to the Chiefs of Staff Committee (COSC) in August 2001 for consideration. (COSC Agendum August/2001).

associated with non-combat activities, although research relating to sustained operations (SUSOPS), and continuous operations (CONOPS) is also of relevance. This is because there are implications for theoretical models of sustained perceptual/cognitive functioning which have obvious application to the sustained performance requirements inherent in many non-combat military environments.

Continuous and sustained operations

Military forces have developed sophisticated night vision technology and other battlefield sensors, giving them the capability to fight through the night. These innovations bring about the tactical doctrine of continuous operations (CONOPS): fighting around the clock for successive days, even weeks at a time. Often, during CONOPS, small teams of combatants engage in sustained operations (SUSOPS), working steadily for long periods without relief. Such non-stop operations produce stress, sleep loss and fatigue, which lead to poor performance, accidents, battle-weary psychological stress casualties, and ultimately, reduced mission effectiveness, (Krueger, 1989). CONOPS combatants often accumulate significant sleep debt. Sustained workload combines with fatigue, to inhibit performance, productivity, safety and mission effectiveness. Sleep loss interacts with workload, resulting in reduced reaction time, decreased vigilance, perceptual and cognitive distortions, and changes in affect, all of which vary according to circadian rhythm time of day effects, (Krueger, 1991).

Krueger (1991) reviews the factors associated with sustained work which affect the psychological and physiological conditions of workers and job performance during SUSOPS. These include continuousness of tasks, physical versus cognitive tasks, fatigue, weariness and tiredness, work/rest cycles, and effects of sleep loss. In reviewing the literature, Krueger (1991) points out that sustained operations studies belie conflicting results, due to wide differences in study designs, levels of experimental control, fidelity of simulation, measurement methodology and technology, choices of dependent variables, and subject variables. This has made it difficult to deduce any general principles of a stress-performance link in CONOPS/SUSOPS research.

Research on the adaptive and maladaptive reactions to stressors will be covered in terms of a variety of indicators pointing to the deterioration of soldiers as individuals and in groups. These factors include changes in morale and cohesion, physical exhaustion and sleep deprivation, and changes in job performance.

Fatigue

Fatigue is a term used to describe a constellation of adverse, unwanted effects that can be traced to the continued exercise of an activity. Despite the great number of papers existing in the literature about the issue of fatigue – both in the clinical medicine and in the human factors field – it remains a controversial matter. This difficulty depends on the complexity of defining, recognising and measuring the phenomenon of fatigue and of evaluating its effects on performance. Broadly considered, fatigue can imply: (a) muscular tiredness because of sustained strenuous physical activity, (b) feeling and acting tired after repeated performance of routine tasks because of boredom at the lack of novel stimuli, or (c) feeling weary or sleepy because of the effects of sleep deprivation. It is important, moreover, to divide physical fatigue from psychological fatigue. Bills (1934) distinguishes sharply between subjective, objective, and physiological fatigue. Bartley and Chute (1947) concur, asserting that measures of work output are performance data, which include declines in all types of overt activity. They reserve the term impairment for physiological changes at the tissue level, including changes in neural and motor functions. All that remains to be designated as fatigue proper is the subjective residue of feelings of bodily discomfort and aversion to effort. Their position is consistent with that of Holding (1983) who observes that as “there exist no observable criteria for fatigue.....it is possible for research purposes to regard fatigue as an intervening variable, or perhaps as a hypothetical construct, with a status similar to that of psychological variables” (p.145). While fatigue can be typified in terms of temporal patterns of acute, cumulative, and chronic, the most common approaches to fatigue refer to it as either physical or subjective/perceptual.

Physical fatigue

Physical fatigue refers to an altered homeostasis of the muscular tissue following prolonged contraction, which leads to a progressive loss of function. The condition is not thought to be confined to peripheral structures, but involves the central nervous system (CNS), so that a reduction in the output of the CNS in fact occurs. In this sense, physical fatigue, as described by Webster (1985), may be thought of as the temporary lessening or loss of power to respond, induced in a sensory receptor or motor end organ by continued stimulation. Physiological measures are indirect indicators of fatigue, and are only part of the multidimensional phenomenon of fatigue. However, some investigators argued that one could assess the fatiguing aspects of prolonged or excessive mental activity by measuring the expenditure of physical energy during mental processes. But, as Craig and Cooper (1992) assert, such 'organic fatigue' as was measurable, seemed largely attributable to changes in muscular activity and tension during the performance of a task. Likewise, Holding (1983), in his review of physiological fatigue research, notes that many researchers reject strictly mechanistic interpretations, stressing instead the importance of motivation and pain tolerance: "In general, the first limit encountered during physical exertion seems most often to be a psychological rather than a physiological boundary" (p.147).

Subjective fatigue

Subjective measures have been initially seen as a feeling of tiredness, (Bartley, 1965), and a sense of mental repugnance to do the required work (Thorndike, 1900). Thorndike also stated that an animal was likely to discontinue or decrease its mental work because continuing it annoyed it, rather than because some energy source was running low. He also suggested that work without rest would become less satisfying because it (a) loses novelty; (b) produces boredom, and (c) deprives the worker of the chance to do other things (sleep, leisure activities, socialising etc.) Later, factor analytic studies indicated that the sensation of fatigue had three major components (a) bodily tiredness, (b) weakened concentration, and (c) physical complaints and/or psychosomatic disorders (Gartner & Murphy, 1979). A number of scales have been developed to quantify subjective aspects; nevertheless these scales also measure other dimensions such as

mental workload, mood and motivation that are closely related to fatigue. Japanese ergonomists (such as Yoshitake, 1971,1978) have developed and validated a fatigue rating scale with three components:

1. General drowsiness and dullness;
2. Difficulty concentrating; and
3. Projection onto specific physical disintegration (somatisation of fatigue).

This scale has proved to be one of the more reliable measures of mental fatigue (Craig and Cooper, 1992), although the most used rating scales in operational contexts are the Profile of Mood States (POMS) (McNair, Lorr and Droppleman, 1971) and the Subjective Workload Assessment Technique (Reid, Shingledecker, Ngren and Eggemeier, 1981). These scales have been mutated by the clinical field, together with other measures like the Sickness Impact Profile (SIP) (Bergner, Bobbitt, Carter and Gilson, 1981), the Profile of Fatigue Related Symptoms (PFRS) (Ray, Weir, Phillips and Cullen, 1992), and the Fatigue Impact Scale (FIS) (Fisk, Ritvo, Ross et al, 1994). The subjective approach has however, been insufficient to give an exhaustive account of fatigue, leading to a need for objective measures as well.

Fatigue, performance and safety

Bennet (1998) refers to fatigue in living things as being a deterioration of their performance over time. This deterioration, he asserts, is inherent in impairments of concentration, simple errors and forgetfulness, faulty judgements and perceptions, and disorganisation and psychological breakdown. Bennet (1998) also specifies sleep deprivation as the most common cause of fatigue. He adds that although highly motivated people – such as doctors on duty, soldiers in battle, adventurers in a hostile environment – are able to function with less sleep, even some accumulation of sleep debt does affect their ability to function. Most adults require 7.5 to 8.5 hours of sleep a day to cope with the everyday demands of life. Demanding jobs, high mental workload, circadian disruption, sleep debt and physical exercise will increase the minimum amount of sleep needed to maintain performance (Rodgers, 1999). A loss of 2 hours prime sleep

over a couple of days leads to the development of acute sleep debt (Purificato, 1997). Bonnet and Arand (1995) also report that reducing sleep periods by as little as 1.3 to 1.5 hours for one night results in reduction of daytime alertness by as much as 32%. Dawson and Reid (1997) report that after 17 hours of sustained wakefulness, cognitive psychomotor performance decreases to a level equivalent to the performance impairment observed at the blood alcohol concentration of 0.05%. Therefore, moderate levels of sleep loss equate to moderate levels of intoxication (Dawson and Reid, 1997).

The association between hours of work, fatigue, and occupational health and safety outcomes is the framework in which fatigue and performance is often evaluated. As work-related fatigue and consequent changes in alertness, reaction time, hand-eye coordination, communication and decision making have been identified as major risks for those who work long or irregular hours, evaluations of the cost of sleep-related accidents has been one of the main priorities of public health practitioners and public authorities around the country. Leger (1994) asserts that the role of sleepiness and sleep disorders as a cause of accidents appears to be underestimated in comparison with the classic causes of accidents, such as alcohol and drug abuse, which could also be associated with sleepiness. He also estimates that the total economic cost of sleepiness related to accidents, including motor-vehicle, work-related, home based and public accidents, in the USA was between 43 and 56 billion dollars in 1988. Moreover, "the social and economic impact of accidents related to sleepiness certainly supercede any estimate based on the percentage of accidents occurring during the major period of sleepiness" (Leger, 1994, p.91). Fatigue has been implicated in many of the world's most prominent and costly accidents, including Chernobyl and Three Mile Island nuclear reactor disasters, the Exxon Valdez and Bhopal (Ehret, 1981 in Desmond and Hancock, in press; Coburn, 1997 in Zambelli, 1999).

Sleep deprivation

The profound negative effects of sleep deprivation have been found by a number of researchers (Joy and Goldman, 1964; Manning, 1979, 1985; Naitoh, Englund and Ryman, 1986; West *et al*, 1962; Williams, 1964). A systematic series of sleep deprivation studies

was reviewed by Murray (1965, pp.169-184, pp. 207-208, and pp. 220-224). Naitoh, Englund and Ryman (1986) examine the symptoms of sleep loss and have identified a host of resulting performance decrements. They note that symptoms of sleep loss vary between individuals but generally become more prevalent as sleep debt accumulates. Tolerance to sleep loss, severity of physical workload and time of day are also important factors. When someone is deprived of sleep, the physiological response is sleepiness, which is the brain's signal to obtain sleep. Eventually, when deprived of sleep, the human brain can involuntarily shift from wakefulness to sleep. The more tired the person, the more rapid and frequent are the intrusions of sleep into wakefulness. Such spontaneous sleep episodes can be very short (microsleeps that last only seconds), or extended (lasting minutes). During these periods individuals disengage perceptually from the environment and cease to integrate outside information. These episodes can occur regardless of motivation, professionalism, training, pay or whether inattention would put an individual at risk (Rosekind *et al*, 1996). Signs of performance degradation due to sleep loss include:

1. Mood and motivational changes. Early symptoms of insufficient sleep include changes in mood and decreased willingness to work. This first limit encountered from sleep loss is psychological rather than physiological, and is often regarded by soldiers as a sign of weakness.
2. Impaired attention. Attention span becomes shortened, making it difficult to concentrate on both simple and complex tasks. Individuals also experience decreased vigilance, intrusion of irrelevant thoughts and intermittent loss of focused attention.
3. Memory loss for recent events. Sleep deprived individuals often experience lapses in recent and short-term memory.
4. Variable and slowed responses. The effect of sleep loss on response time appears more as unevenness in response time rather than a general slowing down of all

responses. The danger of sleep loss is the unpredictable failure or slowing down of appropriate responses.

5. Vision illusion/hallucination. These symptoms are usually rare in individuals who are less than 48 hours sleep deprived.
6. Failure to complete routines. Sleep loss can lead to complacency with standard operating procedures and decreased concern with perfunctory tasks.
7. Impaired neurobehavioural performance. Performance is degraded due to impaired short-term memory, decreased ability to concentrate, and intrusive, irrelevant, dream-like thoughts. Studies by Gillberg et al (1994), Tilley and Wilkinson (1984), Linde and Bergstrom (1992), and Lamond and Dawson (1999) have shown that sustained wakefulness significantly impairs several components of performance including response latency and variability, speed and accuracy, hand-eye coordination, decision making and memory. A dramatic consequence of this may be that the primary impairment during sleep loss takes the form of lapses, or micro-sleeps. On a paced task, lapses would inevitably produce a performance decrement, because transient events coinciding with lapses would be missed and non-transient ones responded to only after a delay; on a self-paced task, such lapses merely slow down the process, not interfere with its accuracy. Johnson (1982) has described the tasks most sensitive to sleep loss as those that are long, paced, complex, with high attention and vigilance requirements, with demands on a short-term memory chain and which do not provide information to the subject on how well he/she is performing.
8. Exaggerated feelings of physical exertion. Physical work is performed with a subjective feeling of physical exertion ranging from very light to very hard. This follows a circadian pattern, with greater feelings of physical exertion normally occurring in the morning.

9. Lack of insight in impaired behaviours. With sleep loss, the power of self-observation or insight deteriorates to such an extent that individuals become unaware of impaired behaviour.
10. Failed verbal communication. This is caused by attentional lapses combined with impaired short-term memory. Since sleep deprived individuals fail to remain continuously attentive to ongoing conversations, and fail to remember what is being discussed, their conversation may become fragmented and contain repetitive phrases or ideas. Impatience and/or weariness due to sleep loss makes verbal communication very difficult and tends to result in misinterpretation.

There is a general view that sleep deprivation is a stressor like any other. For example, Alluisi (1972) notes that there are few differential performance effects between stressors such as demanding work/rest schedules, sleep loss and illness. He thought that it is most likely that the behavioural effects of, or performance reactions to, stressors such as sleep loss are for the most part general effects, independent of the specific stress. However, when a specific function is directly affected then the general behavioural reaction will show an overlaid effect based on the impairment of that function.

Sleep deprivation experienced by an individual may largely be dependent on the individual's work schedule. Many work schedules reduce or eliminate the opportunity for normal sleep and recovery by employees. These schedules often require individuals to work when their bodies are biologically driven to sleep. While there has been much empirical focus on the effects of, and countermeasures for, work that entails continuous sleep deprivation or shift work (eg. Bonnet, 1990; LeDuc, Cladwell and Ruyak, 2000; Schweitzer, Muehlbach and Walsh, 1992). Fletcher and Dawson (1997), point out that many work schedules produce cumulative sleep deprivation, not continuous sleep deprivation. This is because the sleep deprivation occurs over a number of nights of shortened sleep as opposed to a single night of no sleep. Cumulative sleep deprivation generally occurs due to reductions in sleep opportunities. The extent of such sleep

deprivation is most measurable when night work is being performed. This is because sleep obtained at night has the most value in terms of recovery.

Studies combining sleep deprivation with demands for sustained performance, as referred to previously in the discussion of CONOPS and SUSOPS research, has suggested that sleep deprivation mainly affects the ability to sustain performance, rather than causing a decline in any specific capacity; that it induces a disinclination towards activity, and in particular, leads to a decrease in interest and motivation to initiate anything that does not lead to sleep (Meddis, 1982).

Effects of Chronic Fatigue

In discussions of the chronic effects of fatigue, fatigue is often considered as a response to work demands, and it is highlighted that the effects of some demands persist beyond the demand itself and become known as after-effects (Craig and Cooper, 1992). Fatigue is just one of the many symptoms that can result from work stressors, and, like other symptoms, is regarded as a function of individual appraisal processes described by Lazarus and Folkman (1984). In this sense, fatigue is viewed as the result of sustained mental effort in order to preserve performance, whereas tension appears to be concerned with how demands are appraised rather than with the individual's response to those demands. This view reinforces the argument for the multi-level measurement of fatigue and work strain to include performance, physiological and psychological indicators.

The notion of after-effects refers to the idea that prolonged exposure to a stressor may produce effects that appear after the stressor has ceased. After-effects are the costs of adaptation to demands. The after-effects of work have long been considered under the rubric of 'fatigue'. Prolonged work or stress commonly gives rise to a general state, reflected in feelings of subjective tiredness or fatigue, due to increased effort to meet task demands by maintaining adequate performance. Broadbent (1979) noted the extent to which after-effects may affect the organisation of complex performance. Some parts of a performance may be omitted, or performed out of sequence with the whole performance. In particular, greater attention needs to be paid to the problem of fatigue with respect to

safety procedures at work. Fatigue may limit an individual's field of perception and attention, and his/her judgement may be impaired to the extent that risk-taking behaviour could result.

The theme of performance protection as a cause of fatigue is clear, and is particularly relevant to populations in which it is not acceptable nor safe to give up in a crisis, where the maintenance of life or objective a particularly salient goal. However, in the process of adjusting to the demands of a task, costs are accrued for an individual's physical and psychological health. Fatigue is not likely to be considered a problem until normal rest and sleep do not lead to full recovery before the onset of the next set of demands. Chronic fatigue is fatigue which does not dissipate during the normal processes of rest and recuperation. The protection of performance or active coping cannot be maintained indefinitely in the face of repeated or chronic demands, irrespective of the individual's will to persevere (Bartlett, 1953). For example, Kompier, 1988) found a progressive deterioration of health and well-being in city bus drivers, with sleep complaints and subjective fatigue being early predictors of high absenteeism, disability and turnover. The mechanism by which recovery from fatigue is retarded may comprise an emotional component of the previous demand. For example, whilst the individual is concerned with actually performing a task, anxiety may not interfere. However, Lovibond (1965) provides examples of anxiety which peaks after the demand and Cameron (1973) suggested that this emotion may inhibit the recovery process and result in chronic fatigue. Clearly, the duration of the stress response is a critical variable, particularly for those who work particularly long or irregular hours and may have little time in which to recover between work periods.

Fatigue and Stress

The human stress response consumes a large amount of energy and, in this sense, it is fatiguing. Cameron (1973) argued that we should recognise that fatigue represents a generalised response to stress, extended over a period of time. It was the non-specificity of the fatigue response that he emphasised, thereby putting fatigue firmly in the domain of Selye's (1956) general adaptation syndrome. The level of fatigue depends on the

duration of stress, more than on its intensity. The duration of the stress response and its recovery time are key indicators of the severity of fatigue, hence the increasingly common reference to neuroendocrine measures in the fatigue literature. Frankenhauser and her colleagues (Frankenhauser, 1980, 1986; Lundberg, 1980) focus on the neuroendocrine response, and have argued that fatigue is merely one aspect of the general hormonal stress response to the demands of the psycho-social environment. They refer to fatigue as a function of the two main components of stress; the effort expended in combating the stress, associated with active coping and the attempt to gain control of the situation, and the positive feelings of interest, engagement and determination; secondly there is the distress component, associated with the negative feelings of dissatisfaction, boredom, uncertainty and anxiety, and linked with a passive, helpless approach to confronting stressful situations. They usefully distinguish between conditions depending on the conjunction of the presence or absence of effort and stress. Effort with distress is characterised by a significantly increased level of adrenaline and cortisol and is associated with the effects of repetitive, paced work and with less than successful attempts to cope actively with daily pressures. On the other hand, when the effect is not accompanied by distress, cortisol production is reduced, although adrenaline still increases. This conjunction is associated with relatively happy, successful active coping with a feeling of control. Distress without effort however, results in a marked increase in cortisol production, accompanied by a more modest increase in adrenaline, the pattern associated with feelings of helplessness and of losing control, seen in depressed patients and those exhibiting 'learned helplessness'.

Fatigue countermeasures

Professions which entail shiftwork, or continuous or sustained work, particularly the civilian and military aviation communities, have made a significant contribution to the applied fatigue literature in recent years. Much of this has focused on reviewing the body of research dealing with fatigue countermeasures⁵. For the military in particular, concerns over operational effectiveness and "maintaining the edge" during missions has

⁵ In the Australian military context, much of this work has been undertaken by the Institute of Aviation Medicine (AVMED) at RAAF Base Edinburgh, and the Defence Science and Technology Organisation (DSTO).

formed the basis for the interest in sleep logistics and the practical implementation of fatigue management strategies for sustained performance. While this has translated into improved sleep management education (eg. sleep hygiene information provided at an individual or unit level), it has also increased awareness of the need to consider fatigue management on a more strategic level.

In their review of such strategic measures, Krueger (1991), and Caldwell (1998) highlight the following factors as critical to minimising fatigue and maximising sustained military performance:

1. Sufficient personnel staffing to cope with the detrimental effects of high workload or work hours;
2. Modification of tasks, reduction of cognitive workload, cross-training of staff, and equitable division of taskload;
3. Avoiding shifting personnel between normal and reverse (shift) work cycles;
4. Provision of rest and sleep hygiene and discipline training;
5. Scheduling of prophylactic or strategic “naps”; and
6. Avoidance of high cognitive workloads during the first 15-30 minutes after awakening to avoid the deleterious effects of sleep inertia

NON-OPERATIONAL STRESS AND FATIGUE IN THE ADF

While the deleterious effects of combat stress are well documented, the health status of current non-combat military personnel is less widely published. Given the paucity of non-operational military stress research as evidenced by the preceding review, a broader approach to the study of stress in the military is required to acknowledge the unique

demands inherent in all facets of the ADF's roles. As discussed by Brooks, Byrne and Hodson (2000), this highlights the need to re-conceptualise the term 'military stress', such that it is as readily identifiable with stress in non-operational contexts as it is in operational contexts. There is also a need to develop a profile of soldiers serving in non-operational environments, including their physical and psychological health, their morale and their behaviours. The on-going assessment of the utility of various occupational and clinical stress measures for use within the ADF is therefore imperative, along with increased investigation of the prevalence and effect of stress within a host of specific military functions. One particularly important, yet non-operational function for the ADF is training. Such training includes that which prepares military personnel for war and war-like operations, peace-keeping and peace-monitoring operations, and humanitarian aid operations. However, the quality of new ADF personnel is greatly dependent on the quality of their initial training, and the performance of the experienced military personnel who deliver it. As such, in the context of this thesis, one recruit training establishment has been singled out as an appropriate case study in which to examine non-operational stress in the ADF.

The Army Recruit Training Centre - Kapooka

Army recruit training at the Army Recruit Training Centre (ARTC), New South Wales, Australia, consists of 45 days of significant adaptational challenge for new Australian Army recruits. While acute symptoms of stress and fatigue are common reactions to the rigors of training among recruits, the staff who train them are also subjected to a host of unique occupational demands.

The role of training staff at ARTC is unique within the Army as the training, leadership and influence they impart will shape recruits' attitudes towards Army ethos for the rest of their lives⁶. Training staff carry this as a responsibility and a burden, as their role is characterised by very long and irregular hours. Overall, during the 45 day Common Induction Training Course (CIT; recruit training course), recruit instructors at ARTC are

⁶ Palmer (2001) provides a succinct summary of the aims, structure and content of recruit training in the Australian Army. He also offers both a review and examination of the socialisation processes that enlistees undergo while training to be soldiers, and the critical role that training staff play in this process.

required to devote their time almost exclusively to the Platoon of recruits they are training and are wholly responsible for their performance and welfare. The period between November and March has traditionally been the busiest time at ARTC, and has been called the "Surge period". For example, while a total of 2791 recruits were trained in 1998, 1700 were trained during the 1998-1999 "Surge Period". This occupational trend is set to continue as no changes in training policy or structure are anticipated in the future. Additionally, given Cabinet's announcement to increase the Army's strength from 23,000 to 26,000, it is anticipated that approximately 5,000 recruits will be trained at ARTC during the year 2000. Anecdotal evidence from training staff and senior ranked management staff suggests that the unique occupational demands of a posting to ARTC may be detrimental to the health of training staff.

Consequently, senior management staff have become eager to gain a better understanding of the unique pressures and stressors staff experience at ARTC. Such empirical evidence will be used as a basis for improved management guidelines for training staff at ARTC, particularly in relationship to manning issues. As of 1 December 1999, the recruit training staff strength at ARTC consisted of 113 Corporals, 38 Sergeants, and 30 Platoon Commanders, yet a deficiency existed of 23 Corporals, 4 Sergeants and 8 Platoon Commanders. This deficiency remained constant over the following 18 months, with 31 vacancies existing among recruit training staff as at June 2001.

ORGANISATIONAL AIMS

As this research seeks to provide information to the Commanding Officer of ARTC on the welfare of his soldiers, the following organisational aims are proposed:

1. Gain a greater understanding of the occupational stressors unique to soldiers working at ARTC;
2. Gain a greater understanding of the effect of fatigue at ARTC;

3. Assess whether there is an association between occupational stress, psychological strain and job satisfaction among staff at ARTC;
4. Understand how soldiers at ARTC perceive the organisational climate in which they are working; and
5. Assess the utility of several stress, fatigue and social climate measurement instruments for use in a non-operational Army work environment.

EMPIRICAL HYPOTHESES

The preceding literature review highlights that while the nature and effects of stress, strain and fatigue have been widely examined, much less is known about these concepts in the context of the ADF. Furthermore, an examination of stress and fatigue among recruit training staff, rather than recruits, represents the first of its kind. This makes it difficult to establish any specific hunches about stress, strain and fatigue among ARTC staff, nor make generalisations about similar units in the wider ADF. Nevertheless, on the basis of several consistencies observed in the stress and satisfaction literature in particular, and first-hand experience of the ARTC environment, the following empirical hypotheses are proposed in relation to a study of stress, strain and job satisfaction among staff at ARTC:

1. *Increased occupational stress is associated with increased psychological strain.*

Based on the PE-Fit conceptualisation of stress, it is reasonable to expect that increased exposure to occupational stressors is likely to be associated with an elevation in levels of individual distress. While members of the ADF are psychologically screened prior to entry, and are well-trained and motivated to constitute a “high functioning” population of people, this advantage could be offset at ARTC by manning shortfalls, and the almost continuous “training tempo” which exists there.

2. *Job satisfaction and social support moderate the relationship between occupational stress and psychological strain.*

Further to hypothesis 1, it is proposed that a relationship between occupational stress and psychological strain will be moderated by beliefs about personal job satisfaction and social support. For example, it is expected that high job satisfaction and social support would buffer the negative effects of high levels of occupational stress.

The literature generally supports the notion that factors such as social support and aspects of organisational climate such as supervisor support and cohesion buffer the effects of stress (eg. Terry, Nielsen and Perchard, 1993; Cox, 1991; Frese and Zapf, 1988; Lazarus and Folkman, 1984). In contrast, job satisfaction is more commonly regarded simply as an outcome variable in the stress literature, rather than a moderating factor in the stress – strain relationship (eg. Ulleberg and Rundmo, 1997; Guppy and Gutteridge, 1991; Richardsen and Burke, 1991; Bogg and Cooper, 1995). Despite this, qualitative research⁷ conducted with ARTC training staff suggest that regardless of how much stress or pressure they experience, factors such as esprit de corps and satisfaction may be stress-resistance factors. The following quote from a recruit instructor illustrates this point:

"I had done 3 Platoons over the last "Surge period – back to back and even though I was absolutely stuffed, I said yes when I was asked to do a fourth Platoon... .. Yes I was probably too tired but I would never consider saying no... .. It doesn't matter how much I'm flogged because I still think that this is the best job in the world".

3. *Psychological strain is likely to increase over time in posting at ARTC.*

The reduced manning and high “training tempo” experienced at ARTC in recent years have led to reduced opportunities for respite for staff. With fewer periods of leave and longer working hours with fewer breaks, it is expected that levels of strain would increase with increased time in posting at ARTC.

In accordance with the above hypotheses, Figure 6 illustrates the proposed model of stress, strain, social support and satisfaction at ARTC.

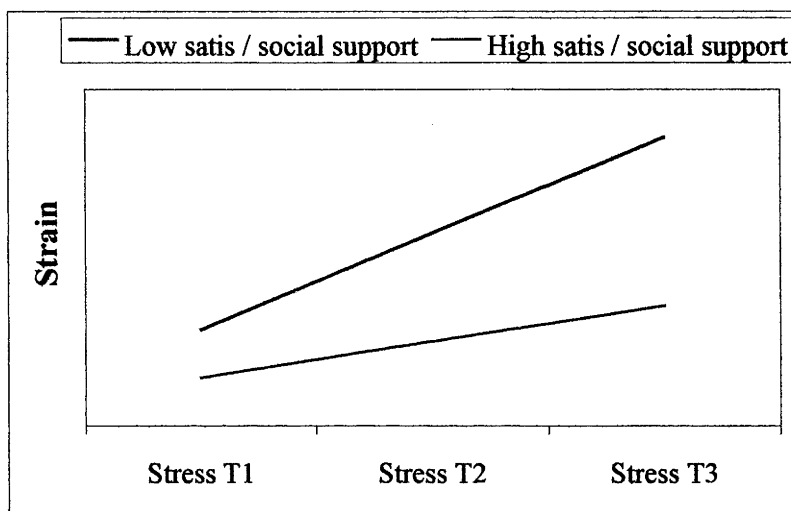


Figure 6: Model of the relationship between stress, strain, social support and satisfaction at ARTC

MEASUREMENT ISSUES

Measurement of stress in the military environment

Recent debate and discussion over the desirability and feasibility of identifying appropriate stress measurement instruments for exclusive use in the Australian Defence Force (ADF) indicates an increased recognition of a need to assess the impact of non-combat occupational stress in the military, (see Goyne, 1998; Chapman, 1999; Chapman, 2000; Chapman, 2001; Office of the Surgeon General, 1999). While much of this discussion has centered on the utility of various stress measurement instruments and methods to the military, there is recognition that there is scope to focus both exclusively on occupational stress and more broadly on life and job satisfaction, (Chapman, 2001). The Office of the Surgeon General (Senate Legislative Committee Brief, 7-8 Jun 99) has identified the following factors as indicative of occupational stress:

⁷ Details of this qualitative research are included in the Method section.

1. Work characteristics (task design; work quantity, diversity and complexity; resources and equipment; time availability and deadlines);
2. The physical work environment (noise, light, ventilation, temperature, space, working hours);
3. The nature of the work and its relation to employee temperament, training skills and experience; and
4. The human environment (organisational structure, management styles, methods and practice, clarity and perceived fairness of conditions, conflict resolution, communications, training and support, relations with peers and clients, the clarity of roles, reasonableness of exceptions and outcome, the usefulness of the work, stability of employment).

In addition to these factors, workplace stressors may be single events, cumulative, continuous or intermittent. The capacity of any one measure or research design to measure these factors is limited. Indeed, the occupational stress literature has long purported that the ability of current measures to determine levels of occupational stress is heavily dependent on item content. Chapman's (2000) review of some of the most widely used generic occupational stress measurement tools highlights that while there are a host of instruments which are of potential utility, this utility is limited by the lack of Australian military normative data. For example, occupational stress instruments such as the Job Stress Survey (Spielberger and Vagg, 1994) are potentially suitable for measuring the factors described above, given that items refer specifically to characteristics of the work environment as potential sources of stress, but is still limited by the lack of Australian military normative data.

In light of these issues, Chapman (2001) offers a number of logical conclusions to the issue of stress measurement in the ADF. Firstly, she points out the need for researchers to avoid criterion contamination by attempting to measure stress using a combination of

objective physiological data, self-report of psychological and / or physiological debilitation and sources of occupational stress. Secondly, and most importantly, she also cautions against the Defence research community endorsing a stress measure as “the instrument of choice”, as the requirements of a given researcher will vary according to research design, preferred methodology and target population.

Potential utility of existing instruments for the ADF

Psychological strain

Self-report measures of stress-related symptoms are necessary to gain an indication of the level of psychological strain. Psychological distress, such as anxiety and depression, can have a significant influence on wellbeing and performance and, because they are often felt to be both psychologically and environmentally determined, they have been of considerable interest to job-stress researchers. Spielberger’s (1983) State-Trait Anxiety Inventory (STAI), is perhaps the most widely used self-report measure of anxiety. It is potentially useful in occupational stress research within the ADF, primarily because it possesses the necessary criteria of reliability, validity and utility in the following ways:

1. The 40 item instrument measures both state (transitory) and trait (stable individual tendency) anxiety, is widely used in social science and medical research, and has extensive normative data, including some military data.
2. The State Anxiety subscale is particularly suited to multiple administration and is thus useful in assessing the cumulative impact of occupational stress over time. The State anxiety subscale will thus constitute the measure of psychological strain for this study.
3. It is both a simple and quick instrument to administer, particularly in a group administration context, and is suitable for self-administration. This quality is particularly important in selecting an instrument for use with military personnel, due to their high mobility, both in operational and training environments, and the difficulties this often creates obtaining good response rates and reliable data.

4. Used in conjunction with a measure of the existence, frequency, severity and sources of occupational stressors, the STAI can provide an indication of the effects of stressors on psychological adjustment and wellbeing.

While such factors make this instrument amenable to use in military contexts, one limitation of the STAI is that it does not indicate the specific nature and duration of the distress experienced by the respondent. That is, given that the STAI's instructions specify that respondents report how they are feeling "right now", unless the instrument is used in a repeated measures design, it does not facilitate the identification of individuals with chronic symptoms. A further limitation with this instrument is that although normative data among US military recruits is available, none exists for military staff of other ranks. This limitation is further compounded in that the use of the STAI in the Australian military has been limited only to clinical assessment applications. One final consideration in the use of the STAI, particularly in light of this study, is possible role of negative affectivity (Watson & Clark, 1984) (which is often measured by trait anxiety) or other personality factors in the reporting of symptoms. Accumulated research has shown that negative affectivity is strongly and consistently correlated with self-report symptom scales (Costa & McCrae, 1985; Watson & Pennebaker, 1989), and raises the question as to whether negative affectivity needs to be controlled for in stress research which relies on self-report measures of strain. In the context of this study, this raises the further question of whether trait anxiety should be viewed as a nuisance variable. However, as pointed out by Vassend and Skrondal (1999), negative affectivity is measured both as a trait or a state. Given that state anxiety (or negative affectivity) is an outcome variable in this study, negative affectivity is not viewed as a nuisance variable in this context. Thus there would seem to be little value in attempting to control for the effects of trait anxiety.

Occupational stress

Interpreting the findings obtained with measures of occupational stress is often difficult because the perceived severity of a particular stressor is either not measured or confounded with how the stressor is encountered. As Dewe (1991) asserts, to gain a

clearer account of the difference between chronic and acute stressors, “there is a need to use rating scales that measure demand associated with work roles rather than just imply it” (p.77). Taking both the severity and frequency of work stressors into account is required to assess their overall impact. In accordance with Dewe’s (1991) recommendation, the perceived severity (intensity) and frequency of occurrence of 30 stressor events are assessed by the Job Stress Survey (JSS: Spielberger and Vagg, 1991). This is a generic occupational stress measure with items focusing on aspects of work situations that often result in psychological strain. Inquiring about the frequency of occurrence of a particular occupational stressor provides trait-like data on how the individual has responded to that stressor. The distinction between the perceived severity of work-related stressor events and how often they are experienced is analogous to differentiating between emotional states and personality traits (Spielberger, 1983). Factor analyses of the JSS-S and JSS-F items have consistently identified two major components of occupational stress, Job Pressure and Lack of Organisational Support, from which the JP and LS subscales were derived. These job stress components have been found for military personnel (Spielberger and Reheiser, 1994).

The potential utility of the JSS for military stress research is enhanced as it possesses many of the same advantages of the STAI in terms of reliability, validity and utility:

1. The JSS is amenable to self and group administration.
2. The inclusion of relatively recent US military (non-recruit) normative data for this instrument makes it attractive measure of stress in military research.
3. The results obtained from the JSS may provide commanders and human resource professionals with an indication of deficiencies in organisational resources, personnel policies and work practices and conditions. The ability to offer such practical information to commanders is imperative if they are to see the value of authorising access to their personnel for research purposes.

Despite these advantages, like the STAI, the development of Australian military normative or comparison data is needed in order to maximise the utility of the JSS. However, the Job Stress Index of this instrument is regarded as being suitable as the primary measure of occupational stress for this study.

Organisational climate

As indicated in the Senate Legislative Committee Brief above, environmental factors are also critical considerations for measuring occupational stress. Measurement of collective perceptions of social or organisational climate is therefore an important adjunct to assessment of symptoms of psychological strain, and perceptions of occupational stressors. One widely used measure is the Work Environment Scale (WES) of Moos (1994) Consisting of 90 true / false statements. The WES assesses the psychological states and emotional reactions of workers assigned to a particular job. Each WES item inquires about the general reactions of workers toward their supervisors or fellow employees, or various aspects of the work environment. It yields a ten-area profile, grouped along three major dimensions: interpersonal relationships, orientation towards personal growth and organisational structure of the work setting. There is no evidence that this instrument has been used in a Australian military environment, and again, the lack of military normative or comparison data is a drawback to its use. Despite this, like the JSS, the generic nature of the WES indicates that it may be amenable to military occupational stress research or unit climate profiling, providing useful feedback to commanders on the “organisational health” of their unit. Two subscales of the WES, Coworker cohesion and Supervisor support will be of particular focus in this study, due to their conceptual suitability as measures of social support. Moos (1994) defines Coworker cohesion as “how much employees are concerned about and committed to their jobs”, while Supervisor support is defined as “the extent to which management is supportive of employees and encourages employees to be supportive of one another”, (p. 1).

Quantifying Work-Related Fatigue

While fatigue related to long and irregular work hours are known to be associated with reductions in alertness and cognitive psychomotor performance, few policy-makers or organisations have adopted management practices that allow quantitative assessment of work-related fatigue to occur. Fletcher and Dawson (1997) argue that laboratory-based studies of workplace environments have limited generalisability, as they typically assess only a small number of work schedules at a time. Therefore, they propose an applied modelling approach of fatigue that would enable organisations to estimate and predict the work-related fatigue in a worksite, drawing on comparative research of performance levels whilst sleep deprived and under the influence of alcohol (Fletcher and Dawson, 1997; Dawson and Fletcher, 2001). Dawson and Reid's (1997) study identified equivalent blood alcohol levels for various levels of fatigue. The research identified that fatigue scores in the "high" range are associated with performance impairment equivalent to a blood alcohol concentration of 0.05%. As this study only used one type of task to measure performance, Lamond and Dawson (1999), conducted a similar study, in which four different types of neurobehavioural tasks were used to assess performance. Their study found that in equating the performance impairment in intoxicated and sleep-deprived individuals, approximately 20-25 hours of wakefulness produced performance decrements equivalent to those observed in a blood alcohol concentration of 0.10%. Both studies indicate that moderate levels of fatigue produce performance equivalent to or greater than those observed at unacceptable levels of alcohol intoxication.

Dawson and Fletcher (2001) propose a model which conceptualises work-related fatigue as a balance between the forces that produce fatigue and forces which reverse the effects of fatigue, or "recovery". The circadian timing, duration and recency of work periods are classified as fatiguing forces, while the circadian timing, duration and recency of non-work periods are classified as recovery forces.

Duration and timing of work periods: The model asserts that fatigue increases as a function of hours of prior wakefulness. In addition, work-related fatigue is also determined by the duration and circadian timing of work shifts, as the rate at which

fatigue accumulates is likely to be greater when the work period occurs during the subjective night than during the subjective day. Similarly, the recovery value of a non-work period is also likely to be dependent on the duration and circadian time at which it occurs. Therefore, by knowing the circadian timing and duration of work and non-work periods, the model allows us to predict the amount of sleep an individual is likely to obtain. This, in turn, provides fatigue and recovery values for a specific work or non-work period.

Recency of work periods: Work and non-work periods that occurred months or years ago are unlikely to contribute to fatigue levels to the same extent as periods in the last week. Functionally, the fatigue or recovery value of previous work or non-work periods will tend towards zero the further in the past they occurred.

Saturation: The model has a saturation function which limits the total value of recovery that can be accumulated at any time, so that recovery values are not stored beyond full recovery. This saturation of recovery reflects the fact that sleep and recovery cannot be stored because individuals find it difficult to extend sleep beyond 10-11 hours in length, irrespective of the amount of prior wakefulness.

Dawson and Fletcher (2001) summarise their model in terms of a “token economy” analogy. The token “value” of a single work or non-work period is dependent on both the duration and timing of that period. In addition, the fatigue or recovery “value” of tokens that are held will decline over time because recently acquired tokens carry greater value than those gained previously. Furthermore, there is a limit to the total “value” of recovery tokens held at any point in time. Due to this limit on the “value” of recovery tokens held, recovery is said to saturate when this limit is reached.

Dawson and Fletcher’s (2001) model is likely to be a useful tool in the analysis of the work and rest schedules of staff from a wide variety of establishments, and has clear utility for the identification of occupational health and safety issues in shiftwork, aviation

and continuous and sustained operations⁸.

Despite the potential utility of the instruments described above, the output or profiles they produce are not likely to provide an adequate picture of characteristics that are unique to various environments and/or populations. Indeed, the uniqueness of many Australian military units and their personnel highlights the need for both initial qualitative research, and subsequent development of instruments that are specific to the environment under investigation. This is an important consideration in designing research for each unique work environment.

A final consideration in evaluating measures for occupational stress research in general is the issue of face validity, and the possibility that respondents may distort their responses for perceived secondary gains. Given that there is an ethical requirement to explain the purpose and objectives of the research, respondents may view their participation in research as an opportunity to express dissent when the research is conducted to evaluate the effect of diminishing resources. None of the instruments described above facilitate a clear assessment of social desirability to determine the likelihood that a respondent is “faking bad”. This highlights the need for caution in interpreting the results of these instruments, particularly in light of how much respondents know about both the organisational and empirical aims of the research.

⁸ Dawson and Fletcher's (2001) model, has been operationalised by the assessment software package titled Fatigue Audit Interdyne (FAID), versions of which can be downloaded at www.interdyne.com.au/faid. Based on the research conducted by Dawson and his colleagues at the Centre for Sleep Research at the University of South Australia, the program converts work and rest schedule data into fatigue risk scores that are comparable to performance impairments resulting from alcohol intoxication. The Defence Safety Management Agency (DSMA), which is responsible for ADF Occupational Health and Safety policy and planning, is currently investigating the utility of this software for use as a fatigue assessment and management tool.

METHOD

Pilot study 1

Aims of pilot study 1:

1. To test the Job Stress Survey (JSS), and the State-Trait Anxiety Inventory (STAI) and ascertain if they are suitable for use with the target population.
2. To pilot test the instruments (Job Satisfaction Questionnaire, Army Work Demands Questionnaire and Subjective Fatigue Scale) developed by the researcher with the target population. Suitability of item content, length, format, and language required assessment.
3. To trial the procedure of collecting information on the work / rest schedules with the pilot sample via a Fatigue Audit Data Sheet.

Participants

43 staff (6 females, 37 males) from the Recruit Training Wing (RTW) of the Army Recruit Training Centre (ARTC) participated in pilot study 1. The sample was obtained via a non-random, voluntary basis. This sample size represents 24% of the RTW population at that time. The majority of the sample (35; 81%) had been posted into RTW on 1 December 1999. The mean age of the sample was 27 years, and the sample consisted of the following rank distributions:

- a. 20 Corporals
- b. 6 Sergeants
- c. 2 Warrant Officer Class 2's, and
- d. 15 Lieutenants.

A description of the structure of ARTC and RTW and the roles of its staff is presented at Annex A.

Materials

Measurement of psychological strain

State-Trait Anxiety Inventory (STAI) (Spielberger, 1983). This 40 item instrument measures both state (transitory) and trait (stable individual tendency) anxiety, and produces subscale scores for each.

Measurement of occupational stress

The Job Stress Scale (JSS). The perceived severity (intensity) and frequency of occurrence of 30 stressor events are assessed by the Job Stress Survey (JSS: Spielberger and Vagg, 1991). Respondents are asked first to rate, on a nine-point scale, the relative amount (severity) of stress that they perceive to be associated with each of 30 JSS job stressors (eg. “excessive paperwork” or “poorly motivated co-workers”) compared with a standard event (assignment of disagreeable duties), which is assigned a value of 5. Respondents then indicate on a scale, ranging from 0 to 9+ days, the number of days on which each stressor was experienced during the previous six months.

The JSS consists of three Indexes and six subscales. The term *index* is used to refer to scales or that combine severity and frequency ratings in an overall indicator of perceived stress level. The indexes and subscales are described below, as in Spielberger and Vagg (1991).

1. Job Stress Index (JSX). The JSX provides an estimate of the overall level of occupational stress experienced by a respondent in his/her work setting. It combines severity and frequency ratings of all 30 JSS items.

2. Job Stress Severity (JSS). The JSS indicates the respondent’s average rating of perceived severity for the 30 JSS stressor events. These scores are based on the respondent’s comparison of each of the 29 Severity items (2A-30A) with the standard stressor (Item 1A), which is assigned a constant mid-scale value of 5.

3. Job Stress Frequency (JSF). The JSF represents the average frequency of occurrence of the 30 JSS stressor events during the past 6 months.
4. Job Pressure Index (JPX). The JPX assesses the occupational stress (combined severity and frequency) experienced by a respondent that can be attributed most directly to the pressures of his/her work, such as working overtime, meeting deadlines, and excessive paperwork. These 10 stressors reflect stressful aspects of the job's structure, design or duties.
5. Job Pressure Severity (JPS). The JPS assesses the average level of perceived severity of the 10 JSS stressor events most directly related to the pressures of a job.
6. Job Pressure Frequency (JPF). The JPF assesses the average frequency of occurrence of the 10 JSS stressor events most directly related to the pressures of a job.
7. Lack of Organisational Support Index (LSX). The LSX assesses the amount of occupational stress (combined severity and frequency) that can be attributed to a lack of organisational support, such as difficulty getting along with co-workers, supervisors and lack of opportunity for advancement. These 10 stressors reflect events involving other people or organisational policies or procedures, rather than specific aspects of the job itself.
5. Lack of Organisational Support Severity (LSS). The LSS subscale assesses the average level of perceived severity of the 10 JSS stressor events that most directly relate to lack of organisational support.
6. Lack of Organisational Support Frequency (LSF). The LSF assesses the average frequency of occurrence for the 10 JSS stressor events that most directly relate to lack of organisational support.

Army work demands questionnaire. Due to the uniqueness of the occupation under investigation, there was a need to include a measure of occupational stress specific to ARTC. The Army work demands questionnaire was developed by the researcher on the basis of qualitative research. Three focus group interviews were conducted in July 1999, each with 4 - 6 participants who had been posted to ARTC for 6-18 months. The focus groups provided qualitative information on the perceived stressors of their work environment, their training roles, and other demands specific to their rank and position. This survey consists of 22 items, which had been consistently reported by focus group participants as sources of pressure or strain in their work. Respondents are asked to rate the degree to which each item is perceived to be a source of pressure on a four point scale, (1 = Definitely is a source of pressure, 4 = Definitely is not a source of pressure). Examples of items on this survey include “Having to be at work for very long hours”, “Delegated tasks which conflict with my primary role of training recruits”, and “Having large recruit to staff ratios”.

Measurement of job satisfaction

Job satisfaction questionnaire. A five-item survey of global job satisfaction, the job satisfaction questionnaire, was developed by the researcher, based on items used in other studies by Terry, Nielsen and Perchard (1993), Terry and Scott (1987) and Eisenberger, Cummings, Armeli and Lynch (1997). A global measure of job satisfaction was deemed to be most suitable for this study, rather than one that assessed satisfaction with specific aspects or characteristics of the job to avoid confounding between the measure of job satisfaction, occupational stress and organisational climate. Respondents are asked to indicate the degree to which they agree with each statement on a 7 point Scale (1 = Strongly agree, 7 = Strongly disagree). Examples of items include “If a good friend of mine told me that he/she was interested in doing my job, I would strongly recommend it”, and “I would accept my job even if I didn’t have to do it”.

The above instruments are presented in full in Annex B.

Measurement of Fatigue

Subjective fatigue scale. The subjective fatigue scale was developed by the researcher, based on items used by Yoshitake (1971, 1978), and was designed specifically to evaluate the subjective perceptions of fatigue. The scale consists of 9 items, each being a common fatigue symptom. Respondents are asked to indicate how frequently they have experienced these symptoms over the last 45 days. Items on the scale include “Tiredness of the whole body”, “Difficulty concentrating”, “Lacking patience” and “Drowsiness”. This scale is presented in full at Annex B.

Fatigue audit data sheet. To collect data required for the evaluation of fatigue in accordance with Dawson and Fletcher’s (2001) fatigue model, participants are asked to maintain a “work hours diary” on a fatigue audit data sheet each day for a minimum of 14 days. Participants were asked to record the following information: work start time, duration and frequency of work breaks, work end time and hours of sleep per 24 hour period. A copy of the fatigue audit data sheet is presented at Annex C.

Finally, biodata of service number, rank, age, gender and platoon was collected for each participant. A copy of the biodata sheet is presented at Annex D.

Procedure

Preliminary information about the nature and rationale of the study was promulgated to RTW staff via Company and Platoon orders, and also Intranet e-mail. A muster parade of all RTW staff was programmed for 2 December 1999, upon the march-in of new staff to RTW, so that the surveys could be administered as a group. All RTW training staff were instructed to attend, and they were given a full brief on the research, ethical issues and what commitment was required of them should they wish to participate. An information sheet, Australian Defence Medical Ethics Committee (ADMEC) Guidelines for Volunteers and Consent Form were distributed to all potential participants. Those who agreed to participate were asked to sign the consent form, and keep a copy of this, along with the information sheet, and ADMEC’s Guidelines for Volunteers. Participants then completed the battery of questionnaires and biodata sheet. Participants were then

briefed that the fatigue audit data sheets needed to be maintained during their next 45 day recruit training course. Once the participants completed the surveys, they were instructed to hand them back to the researcher. The participants were then instructed to return their completed fatigue audit data sheets via internal mail to the Psychology Support Section at ARTC.

A copy of the information sheet, and the consent form for pilot study 1 are presented at Annex E. A copy of ADMEC's Guidelines for Volunteers is presented at Annex F.

Pilot Study 2

Aims of pilot study 2:

1. To examine the anticipated methodological issues which may arise with the use of a mail-out - mail-back methodology for administering the surveys; this being the methodology of the longitudinal study.
2. Provide 'non-Surge' comparison data for future longitudinal research, including a comparison of ARTC's sub and support units.
3. To test the Work Environment Scale (WES) (Moos, 1994) and ascertain if it is suitable for use with the target population.

Participants

The sample consisted of 67 respondents, which represents approximately 18-20% of the posted strength of ARTC. This includes RTW and support units such as Headquarters ARTC (HQ ARTC), Kapooka Medical Centre (KMC), Kapooka Dental Company (KDC), Psychology Support Section-Kapooka (PSS-K), the Australian Army Band-Kapooka and Defence Corporate Support Office (DCSO). The sample consisted of 57 males and 10 females. The mean age of the sample was 30.8 years (minimum 22 years, maximum 52 years).

Table 3 lists the number of respondents from each ARTC sub-unit, while Table 4 lists the number of respondents from each rank. Table 5 illustrates the number of respondents disaggregated by the length of time that they had been posted to ARTC at the time of the study.

Table 3

Distribution of participants by sub-unit – pilot study 2

Sub-Unit	Frequency	Percent of sample
ARTC Headquarters	8	11.9
Recruit Training Wing	21	31.3
Defence Corporate Support	1	1.5
Kapooka Dental Company	3	4.5
Kapooka Medical Centre	6	9.0
Psychology Support Section	5	7.5
Aust Army band-Kapooka	23	34.3
Total	67	100.0

Table 4

Distribution of ranks – pilot study 2

Rank	Frequency	Percent
Lieutenant-Colonel	1	1.5
Major	6	9.0
Captain	6	9.0
Lieutenant	5	7.5
Warrant Officer Class 1	1	1.5
Warrant Officer Class 2	3	4.5
Sergeant/Staff Sergeant	11	16.4
Corporal (E)	16	23.9
Private (E)	18	26.9
Total	67	100.0

Note: The 'E' in parentheses indicates equivalent ranks. For example, Bombadier is an equivalent rank to Corporal, and Craftsman, Musician, and Sapper are equivalent ranks to Private.

Table 5

Number and percent of respondents disaggregated by time spent at ARTC – pilot study 2

Time spent at ARTC	Frequency	Percent
<3 mths	3	4.5
3-6 mths	21	31.3
6-12 mths	11	16.4
12-18 mths	14	20.9
18-24 mths	3	4.5
24-30 mths	10	14.9
30-36 mths	1	1.5
>36 mths	4	6.0

11 (16.4%) of participants had been on an overseas deployment at some time prior to being posted to ARTC⁹. 63.6% of these had returned from deployment within the last 12 months, while 36.3% had returned from deployment within the last 1-5 years.

Materials

The same instruments as those used for pilot study 1 were used in pilot study 2. Minor changes were made to the information sheet and consent form to reflect the specific procedure for pilot study 2 (see Annex G). Some minor format changes were made to the Army work demands questionnaire and the fatigue audit data sheet to improve the clarity of the instructions for improved ease of comprehension. The biodata sheet was also changed to capture information on educational level, and posting history (including prior operational experience, and the time since return from deployment) (see Annex H).

Assessment of Social Climate of the Work Setting

Form R (Real) of the Work Environment Scale (WES) was included in the battery of surveys. Consisting of 90 true/false statements, the WES assesses the current psychological states and emotional reactions of workers assigned to a particular job. Each WES item inquires about the general reactions of workers toward their supervisors

⁹ These deployments include the Multinational Force and Observers (MFO) Sinai (Operation Mazurka), the Peace Monitoring Group (PMG) Bougainville, PNG (Operation Bel Isi), the International Force East Timor (INTERFET) (Operation Warden) and United Nations Transitional Authority East Timor (UNTAET) (Operation Tanager).

or fellow employees, or various aspects of the work environment. It yields a ten-area profile, grouped along three major dimensions: interpersonal relationships, orientation towards personal growth and organisational structure of the work setting. A copy of the WES is presented at Annex B.

While it would have been ideal to pilot test the WES during the first pilot study, the first pilot study was conducted when many of the participants had only just arrived at ARTC to begin their posting. As such, it is likely that they would have found it difficult to make judgements on the work environment at ARTC. For this reason, it was considered appropriate to trial the WES during the second pilot study instead.

In an attempt to address the low return rate of the Fatigue Audit Data Sheets in pilot study 1, respondents were instructed to make entries for a minimum of 14 days rather than 45 days. 14 days was set as the minimum, as this is the minimum amount of data required for analysis using the Interdyne Fatigue Audit (FAID) (version 330) software. In accordance with this change, the instructions for the Subjective fatigue Scale were also changed, in that participants were asked to record the number of fatigue symptoms for the past 14 days, rather than the past 45 days.

Procedure

The complete battery of questionnaires, a Fatigue Audit Data Sheet, an information sheet, consent form, ADMEC's Guidelines for Volunteers and the biodata sheet was mailed out to all ARTC personnel in March 2000. Respondents were instructed to read the information sheet, then, if they agreed to participate, complete the consent form, and then complete the questionnaires in accordance with their relevant instructions. They were then instructed to return the completed questionnaires, biodata sheet, and consent form via a supplied pre-addressed envelope. Participants were advised to keep the information sheet, a copy of the consent form and ADMEC's Guidelines for Volunteers. They were also instructed to complete the fatigue audit data sheet for a minimum of 14 days and return it within four weeks' time to the principal researcher via a second, supplied pre-addressed envelope.

Longitudinal Study

Aims of the longitudinal study:

In accordance with the hypotheses outlined in the introduction, the aims of the longitudinal study are:

1. To investigate whether there is an association between occupational stress is psychological strain;
2. To investigate whether job satisfaction and social support moderate the relationship between occupational stress and psychological strain; and
3. To investigate whether psychological strain increases over time in posting at ARTC.

Participants

65 personnel (57 males; 8 females) who had just begun a new posting at ARTC participated in this study. This sample constitutes approximately 90% of the total number of new personnel who were posted into ARTC during the 2000 / 2001 posting cycle. The sample was obtained on a non-random, voluntary basis. The mean age of the sample was 28.6 years (minimum 22 years, maximum 55 years). Table 6 lists the number of participants from each sub-unit, Table 7 lists participants by rank, and Table 8 displays participants by education level. All participants began their posting at ARTC in either December 2000 or January 2001.

Table 6

Distribution of participants by sub-unit – Longitudinal study

Sub-Unit	Frequency	Percent
Recruit Training Wing	58	89.2
ARTC Headquarters	4	6.2
Kapooka Medical Centre	1	1.5
Psychology Support Section	2	3.1
Total	65	100.0

Table 7

Distribution of ranks – Longitudinal study

Rank	Frequency	Percent
Major	5	7.7
Captain	1	1.5
Lieutenant	19	29.2
Warrant Officer Class 2	1	1.5
Sergeant/Staff Sergeant	9	13.8
Corporal (E)	29	44.6
Private (E)	1	1.5
Total	65	100.0

Note: The 'E' in parentheses indicates equivalent ranks. For example, Bombadier is an equivalent rank to Corporal, and Craftsman, Musician, and Sapper are equivalent ranks to Private.

Table 8

Participants by education level – Longitudinal study

Education Level	Frequency	Percent
Year 10	14	21.5
Year 11	8	12.3
Year 12	25	38.5
Bachelor degree or higher	18	27.7
Trade/Apprenticeship	5	7.7
Certificate/Diploma	7	10.8
Other	2	3.1

36 (55.4%) of participants had been on an overseas deployment at some time prior to being posted to ARTC¹⁰. 32 (88.9%) of these had returned from deployment within the last 12 months, while 11.1% had returned from deployment within the last 1-5 years.

Materials

The same questionnaires as those used for pilot study 2 were used for this study. Some minor changes were made to the information sheet and consent form to reflect the specific procedure for the longitudinal study (see Annex I).

¹⁰ These deployments include the Multinational Force and Observers (MFO) Sinai (Operation Mazurka), the Peace Monitoring Group (PMG) Bougainville, PNG (Operation Bel Isi), the International Force East Timor (INTERFET) (Operation Warden) and United Nations Transitional Authority East Timor (UNTAET) (Operation Tanager).

Procedure

Participants for the study were sought during the routine induction briefings for new staff, which were conducted on 23 Nov 00, 5 Dec 00, and 15 Jan 01. A period during the induction briefings was set aside, in which the staff were given a full brief on the research, ethical issues and what commitment was required of them should they wish to participate. Those who agreed to participate were asked to sign the Consent Form, and keep a copy of this, along with the information sheet, and ADMEC's Guidelines for Volunteers. Participants then completed the battery of questionnaires and biodata sheet. Participants were then briefed that the fatigue audit data sheets needed to be maintained during their next 14 days. Once the participants completed the questionnaires, they were instructed to hand them back to the researcher. The participants were then instructed that once they completed their fatigue audit data sheets in 14 days time, they should return them via a supplied pre-addressed envelope to the principal researcher. Participants were thanked for participating, and were informed that they would receive the same surveys two more times over the next 6 months time via mail for follow-up.

Procedure for 1 month and six month follow-up

The same battery of surveys, plus the fatigue audit data sheet, were mailed out to all participants at intervals of one month, and six months. Many were followed – up in person by the researcher, during the six month follow-up. This was done to maintain awareness of the study among the participants, to increase response rates, and to give participants an opportunity to provide qualitative feedback on the research. Table 9 illustrates the data collection timetable for the entire longitudinal study.

Table 9

Data collection timetable for longitudinal study

Date of baseline measurement	1 month follow-up	6 month follow-up
N=53 December 2000	January 2001	July 2001
N=12 January 2001	February 2001	July 2001

Regardless of whether surveys were distributed to participants by mail or in person, they were provided with two pre-addressed envelopes with their survey, and were instructed to use these to return the survey, and then the fatigue audit data sheet when completed after 14 days.

Data Scoring and Analysis – Pilot and Longitudinal Studies

The STAI data was manually scored and normed using Spielberger's (1983) normative data for normal working adults. The JSS was also scored either manually, or with the computerised scoring program, and was normed using normative data for senior United States military personnel (total sample) as reported in Spielberger and Vagg (1991). The WES was manually scored and normed using Moos' (1994) normative data. The responses to the scaled items of the job satisfaction questionnaire, Army work demands questionnaire, and the subjective fatigue scale were manually entered into a Statistical Package for the Social Sciences (SPSS) data base to enable descriptive analysis. The data from the fatigue audit data sheet was analysed using *Interdyne's*® Fatigue Audit trial software (Version 330), to produce fatigue scores that are interpretable in accordance with Dawson and Fletcher's (2001) model of fatigue, alcohol intoxication and performance. Information about this software is presented at Annex J. Fourteen days of data was analysed per participant. All data was stored and analysed using SPSS (Version 10).

RESULTS

The results are divided into three sections, as there were three separate studies conducted. As the purpose of the first two pilot studies, was to trial instruments and data collection procedures, and to provide feedback to the Commander of ARTC, only descriptive results are presented in these sections. The data collected for the third, longitudinal study is used to test the hypotheses specified in the introduction. For all studies, the data was analysed using SPSS (Version 10), and was examined for adherence to relevant statistical assumptions.

Pilot Study 1

Reliability

As the Army work demands questionnaire, job satisfaction questionnaire and subjective fatigue questionnaire have no data concerning their psychometric properties, Cronbach's Alpha coefficients are reported for each measure as an indication of their internal consistency. Coefficients of 0.94, 0.91 and 0.93 were calculated for the Army work demands questionnaire, job satisfaction questionnaire and subjective fatigue questionnaires respectively.

Psychological strain

Table 10 displays the mean State-Trait Anxiety Inventory (STAI) scores for the sample, disaggregated by gender. For comparison, the normative state and trait anxiety scores as reported by Spielberger (1983) are also listed in the table.

Table 10

Pilot sample 1 mean STAI scores and normative data

	Male	Female
State anxiety mean: Pilot sample	46.61	49.0
SD	6.71	3.52
Norm: Working adults	35.72	35.2
SD	10.40	10.61
Norm: Military recruits	44.05	47.01
SD	12.18	14.42
Trait anxiety mean: Pilot sample	46.9	48.8
SD	6.93	4.17
Norm: Working adults	34.89	34.79
SD	9.19	9.22
Norm: Military recruits	37.64	40.03
SD	9.51	9.90

Army Recruit Training Centre (ARTC)-specific stressors

Table 11 provides a summary of responses to selected items of the Army work demands questionnaire. The responses to these particular items were selected on the basis of the large proportion (more than 50%) of respondents who reported these to be sources of pressure.

Table 11

Summary of responses from pilot sample 1 to selected ARTC – specific stressors

Item	% (& No.) of respondents who rated item as either “Definitely a source of pressure” or “Generally a source of pressure”
<i>Having too much work to do</i>	73.8 (31)
<i>Having to work for very long hours</i>	71.4 (30)
<i>Not being able to plan leave and other leisure activities in advance</i>	71.4 (30)
<i>Frequent, unpredictable changes in the requirements or procedures for routine tasks or activities</i>	66.7 (28)
<i>Having to persevere with recruits who are clearly unsuitable for the Army but are not removed from training</i>	64.3 (27)
<i>Insufficient revision of the training throughput to ensure workloads are spread adequately among staff</i>	64.3 (27)
<i>Demands that work place on my private/social life</i>	64.3 (27)
<i>Lack of consultation and communication</i>	61.9 (26)
<i>Having to cope with the start of the ‘Surge Period’ and the posting cycle occurring simultaneously</i>	61.9 (26)
<i>Worrying about the impact of time constraints on the quality of training</i>	61.9 (26)
<i>Frequent, unpredictable changes in the training program</i>	61.9 (26)

Generic Occupational Stress

Table 12 reports the sample’s mean index scores for the Job Stress Survey (JSS), together with the normative data for senior US military officers, as reported by Spielberg and Vagg (1991). While this normative data is not in itself particularly “normal” given that it represents senior military personnel, it is presented to provide some means of comparison.

Table 12

Pilot sample 1 mean JSS scores and normative data

JSS Index	Pilot Sample 1	Norm
Job Stress Index	22.43	20.81
SD	10.10	8.00
Job Stress Severity	4.65	4.98
SD	0.98	0.70
Job Stress Frequency	4.52	4.32
SD	1.79	1.4
Job Pressure Index	26.33	27.46
SD	14.13	10.11
Job Pressure Severity	5.26	4.45
SD	4.07	1.08
Job Pressure Frequency	5.55	6.13
SD	2.54	1.75
Lack of Support Index	19.48	16.31
SD	11.63	11.57
Lack of Support Severity	4.86	5.67
SD	1.09	0.91
Lack of Support Frequency	3.69	2.87
SD	2.08	1.81

Note: Normative data is for Senior Military Personnel, as reported by Spielberger and Vagg (1991) and is provided for tentative comparison only given that it represents senior US military personnel.

Job satisfaction

Responses to the job satisfaction questionnaire by the pilot study 1 sample indicate that between two-thirds and one-half of the respondents reported that they were satisfied with their job, thus indicating that job satisfaction is relatively strong within the sample (as illustrated in Table 13).

Table 13

Summary of responses by pilot sample 1 to selected job satisfaction questions

Item	% (& No.) of respondents who either 'Strongly disagree' or 'Moderately disagree'	% (& No.) of respondents who either 'Strongly agree' or 'Moderately agree'
<i>All in all, I am very satisfied with my current job</i>	5.0 (2)	66.7 (28)
<i>If a good friend of mine told me that he/she was interested in doing my job, I would strongly recommend it</i>	9.5 (4)	64.3 (27)
<i>I would accept my job even if I didn't have to do it</i>	19 (8)	57.1 (23)

Fatigue audit of pilot sample 1

19 participants from pilot sample 1 submitted records of their work/rest schedules at random periods over December 1999 and March 2000. The schedules were recorded over 14 days, while participants were engaged in their normal duties of training recruits. The following results summarise the fatigue score analysis conducted with the Fatigue Audit *Interdyne*[®] (FAID) software as described in the method section.

In accordance with Dawson and Fletcher's (2001) model, while the mean fatigue score of this sample was 77.2 ('moderate'), 10 of the 19 participants yielded an average fatigue score in the 'high' range (80-100), and one participant yielded an 'extreme' average fatigue score (106.46). 17 of the 19 participants reached 'high' fatigue levels on an average of 6 times during the two week analysis period, while 14 of the 19 participants reached 'extreme' fatigue levels on an average of five times during the two week analysis period.

Fatigue score interpretation:

- 'Standard' fatigue represents fatigue scores up to the maximum fatigue level produced by a Monday to Friday 9am to 5pm workweek, that is, a score of 40.

- ‘Moderate’ fatigue scores are those which are up to 200% of the maximum scores produced by the standard work week, that is, a score between 40-80.
- ‘High’ fatigue scores are those which are between 200 and 250% of the maximum scores produced by the standard work week, that is, a score between 80-100. ‘High’ fatigue has been shown to produce similar performance decrements as that seen in individuals with a blood alcohol concentration (BAC) of 0.05% (Dawson & Reid, 1997) (Lamond, & Dawson, 1999).
- ‘Extreme’ fatigue scores are those which are between 250 and 300% of the maximum scores produced by the standard work week, that is, a score between 100-120.

All participants of pilot study 1 were asked to indicate the amount of times they had experienced a number of subjective symptoms of fatigue, during the last 45 days. Table 14 provides a summary of the sample’s ratings of the frequency of fatigue symptoms.

Table 14

Percent of respondents who experienced selected fatigue symptoms 5 times or more during preceding 45 days – Pilot study 1

Symptom	Frequency	Percent
<i>Drowsiness</i>	25	59.5
<i>Tiredness of the whole body</i>	21	50.0
<i>Difficulty concentrating</i>	18	50.0
<i>Lacking patience</i>	18	42.9
<i>Forgetfulness</i>	15	35.7
<i>Headaches</i>	9	21.4
<i>Feeling ill</i>	6	14.3

Pilot study 2

It should be noted when interpreting the results that there was only one respondent from Defence Corporate Support Office (DCSO), 3 from Kapooka Dental Company (KDC), and 5 from Psychology Support Section – Kapooka (PSS-K) and 6 from Kapooka Medical Centre (KMC). The results for the one respondent from DCSO have been omitted to avoid the possibility that this respondent may be identified by his/her responses.

Reliability

The Cronbach's alpha coefficients for the Army work demands questionnaire, job satisfaction questionnaire, and the subjective fatigue questionnaire for pilot study 2 were similar to that of pilot study 1: 0.90, 0.92 and 0.88 respectively.

Psychological strain

Table 15 displays the mean STAI scores for the sample, disaggregated by gender. For comparison, the normative state and trait anxiety scores as reported by Spielberger (1983) are also listed in the table.

Table 15

Mean STAI scores and normative data – pilot study 2

	Male	Female
State anxiety mean: Cross-section sample	47.98	55.0
SD	9.47	9.94
Norm: Working adults	35.72	35.2
SD	10.40	10.61
Norm: Military recruits	44.05	47.01
SD	12.18	14.42
Trait anxiety mean: Cross-sectional sample	48.70	55.7
SD	9.86	11.44
Norm: Working adults	34.89	34.79
SD	9.19	9.22
Norm: Military recruits	37.64	40.03
SD	9.51	9.90

As illustrated by Table 15, for pilot study 2, the average state (transitory, variable) and trait (stable, enduring, personality based) anxiety scores obtained for the sample were almost the same, indicating that participants did not perceive themselves as being under elevated stress levels during the period.

There were no significant differences in state and trait anxiety between sub-units and ranks, and between those who had been on an overseas deployment previously and those who hadn't. However, Figure 7 indicates that state anxiety levels initially increased with increased time spent at ARTC, but then appear to level off during the 12-24 month period.

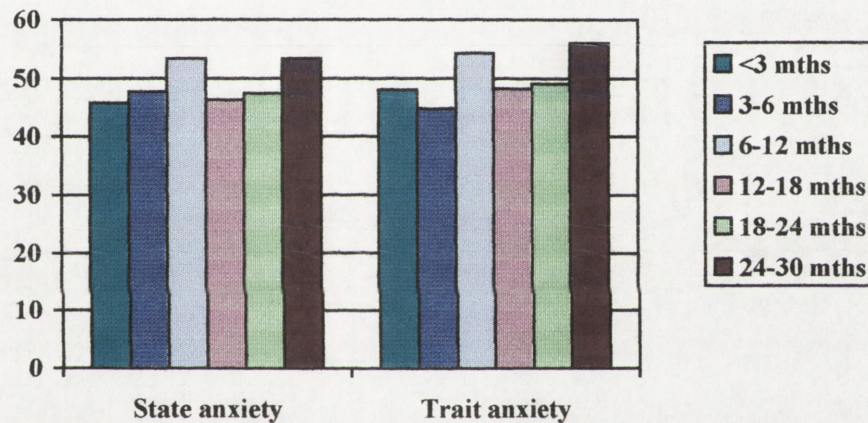


Figure 7. Average state and trait anxiety scores by time spent at ARTC – pilot study 2

Army Recruit Training Centre (ARTC)-specific stressors

Table 16 provides a summary of responses to selected items of the Army work demands questionnaire. The responses to these particular items were selected on the basis of the large proportion (more than 50%) of participants who reported these to be sources of pressure.

Table 16

Summary of responses to selected ARTC-specific stressors – pilot study 2

Item	% (& No.) of respondents who rated item as either “Definitely a source of pressure” or “Generally a source of pressure”
<i>Not being able to plan leave and other leisure activities in advance</i>	68.2 (45)
<i>Having too much work to do</i>	57.6 (38)
<i>Having to cope with the start of the ‘Surge Period’ and the posting cycle occurring simultaneously</i>	54.5 (36)
<i>Lack of consultation and communication</i>	53.0 (35)
<i>Having to work on weekends and public holidays</i>	53.0 (35)
<i>Worrying about the consequences of doing something wrong</i>	53.0 (35)
<i>Demands that work place on my private/social life</i>	51.5 (34)

Generic Occupational Stress

Table 17 reports pilot study 2 mean index scores for the Job Stress Survey (JSS), together with the normative data for senior US military officers, as reported by Spielberg and Vagg (1991).

Table 17

Mean JSS scores and normative data – pilot study 2

JSS Index	Cross-sectional Sample	Norm
Job Stress Index	23.95	20.81
SD	13.32	8.00
Job Stress Severity	4.59	4.98
SD	1.51	0.70
Job Stress Frequency	4.42	4.32
SD	1.74	1.4
Job Pressure Index	27.21	27.46
SD	14.22	10.11
Job Pressure Severity	4.66	4.45
SD	1.63	1.08
Job Pressure Frequency	5.32	6.13
SD	2.09	1.75
Lack of Support Index	21.75	16.31
SD	18.13	11.57
Lack of Support Severity	4.69	5.67
SD	1.89	0.91
Lack of Support Frequency	3.72	2.87
SD	2.29	1.81

Note: Note: Normative data is for Senior Military Personnel, as reported by Spielberger and Vagg (1991) and is provided for tentative comparison only given that it represents senior US military personnel.

As shown in Table 17, average job stress and job pressure scores obtained for the sample were normal and comparable to those seen in American senior military personnel. This was the case for both perceptions of the severity and frequency of job stress and job pressure.

Figure 8 illustrates the sample's average JSS index scores by the time spent at ARTC.

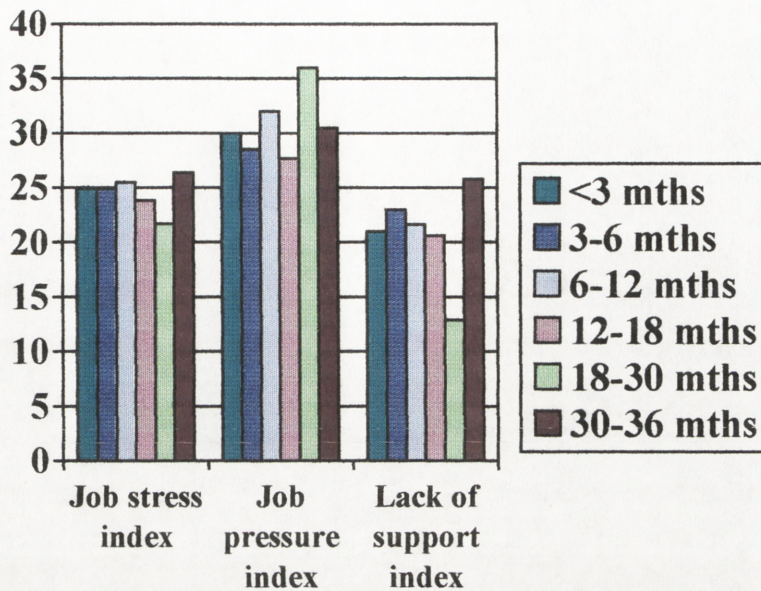


Figure 8. Average scores on JSS indexes by time spent at ARTC – pilot study 2

Perceptions of work environment

Responses to the Work Environment Scale (WES) (Moos, 1994), by support/sub-unit are presented in Figure 9. The adjacent table lists a description of the 10 subscales of this instrument (each representing a certain aspect of the work environment). Scores above 50 on the graph indicate that an aspect is perceived to be more prevalent than other aspects of the work environment, whereas scores below 50 indicate that an aspect is perceived to be less prevalent than other aspects of the work environment. It should be noted that this information was graphed for the benefit of exploring differences among ARTC sub-units at the organisational level, and should be regarded with caution given the very small samples it represents.

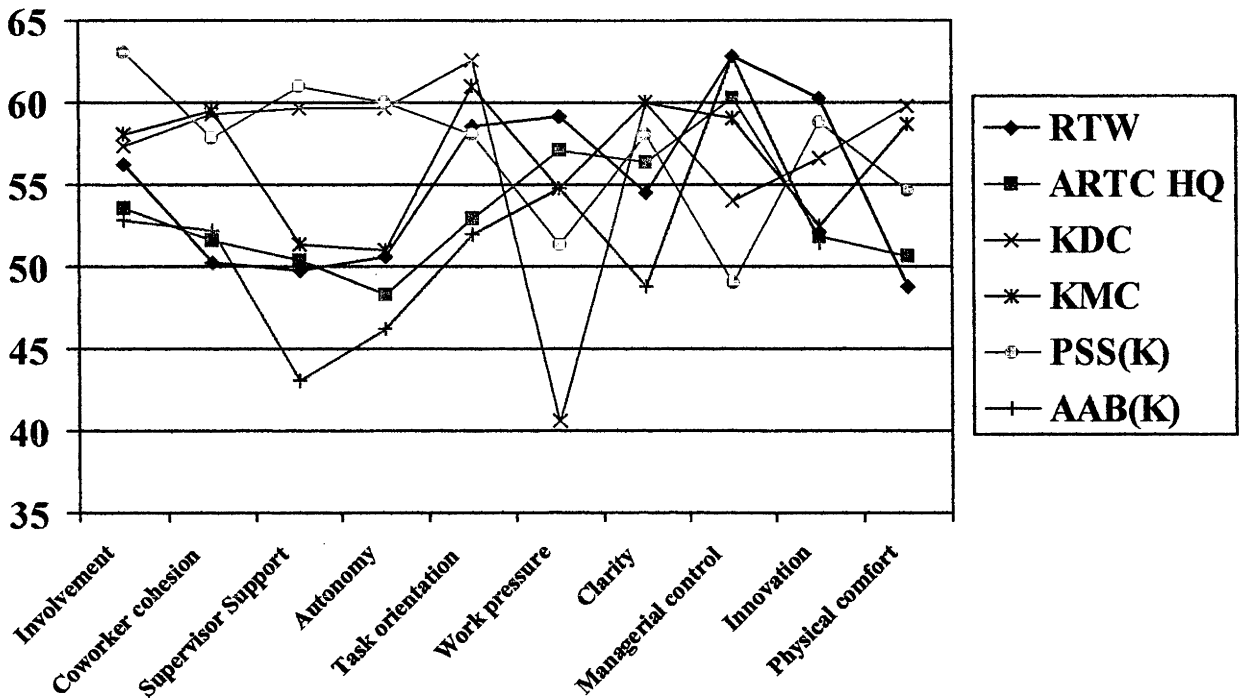


Figure 9. Perceptions of work environment by sub-unit – pilot study 2¹¹

Subscale description
Involvement – the extent to which employees are concerned about and committed to their jobs
Coworker cohesion – how much employees are friendly and supportive of each other
Supervisor support – the extent to which management is supportive of employees and encourages employees to be supportive of one another
Autonomy – how much employees are encouraged to be self-sufficient and to make their own decisions
Task orientation – the emphasis on good planning, efficiency and getting the job done
Work pressure – the degree to which high work demands and time pressure dominate the job milieu
Clarity – whether employees know what to expect in their daily routine and how explicitly rules and policies are communicated
Managerial control – how much management uses rules and procedures to keep employees under control
Innovation – the emphasis on variety, change and new approaches
Physical comfort – the extent to which the physical surroundings contribute to a pleasant work environment

¹¹ RTW = Recruit Training Wing; ARTC HQ = Headquarters Army Recruit Training Centre; AAB(K) = Australian Army band (Kapooka); KDC = Kapooka Dental Company; KMC = Kapooka Medical Centre; PSS(K) = Psychology Support Section (Kapooka).

Job satisfaction

Overall, responses to the job satisfaction items reflect a high degree of job satisfaction, both across all ARTC support/sub-units and within support/sub-units. There was no consistent association of job satisfaction with length of time spent in unit. Figures 10 and 11 illustrate responses to two of these questions, by support/sub-unit.

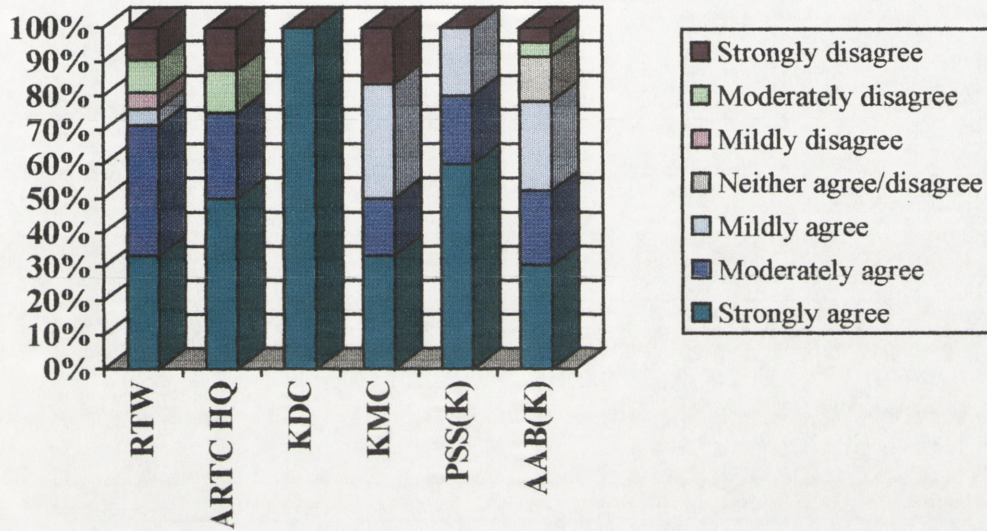


Figure 10. Responses to the item: *If a good friend of mine told me that he/she was interested in doing my job, I would strongly recommend it, by sub-unit – pilot study 2*

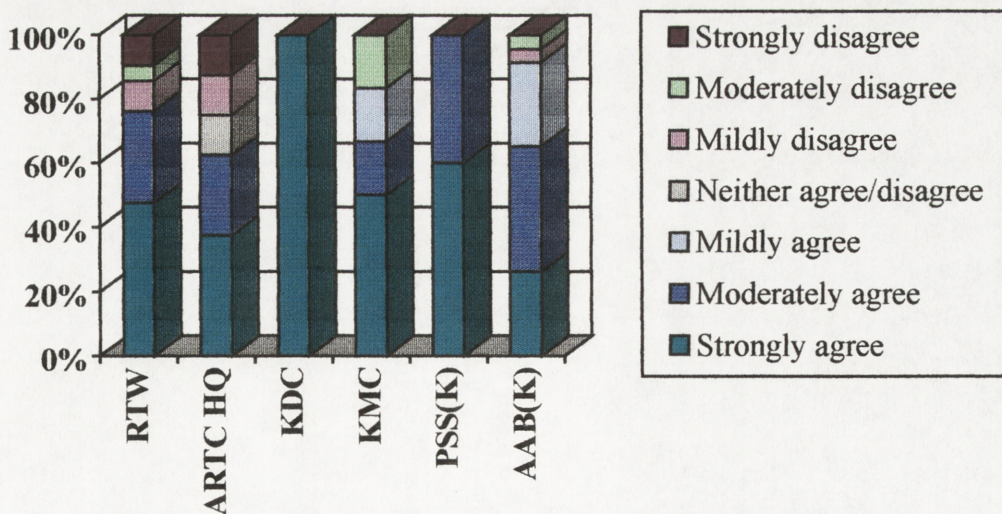


Figure 11. Responses to the item *All in all, I am very satisfied with my current job by sub-unit – pilot study 2*

Fatigue audit – pilot study 2

The work/rest schedules of ARTC staff were also investigated during Mar-Jun 00, although not all of the pilot study 2 participants submitted fatigue audit information. Table 18 lists the response rates from the ARTC support/sub-units.

Table 18

Response rate of fatigue audit information by sub-unit – pilot study 2¹²

Sub-unit	No of individuals who submitted fatigue audit information
Recruit Training Wing	8
ARTC Headquarters	5
Kapooka Dental Company	3
Kapooka Medical Centre	3
Psychology Support Section	Nil
Aust Army Band – Kapooka	7
Total	34

While an acceptable (“standard”) mean fatigue score of 39.28 was calculated for the sample, a minority of individuals yielded ‘extreme’ and/or ‘high’ fatigue levels during the analysis period. 3 individuals from Recruit Training Wing reached both “extreme” and “high” levels of fatigue on at least two occasions during the analysis period, while one individual each from Headquarters ARTC and Kapooka Medical Company (KMC) reached “high” fatigue levels (6 and 9 times respectively). Overall, within the sample, “high” fatigue scores were reached 23 times during the two-week analysis period, while “extreme” fatigue scores were reached 8 times.

Fatigue score interpretation:

- “Standard” fatigue represents fatigue scores up to the maximum fatigue level produced by a Monday to Friday 9am to 5pm workweek, that is, a score of 40.

¹² RTW = Recruit Training Wing; ARTC HQ = Headquarters Army Recruit Training Centre; AAB(K) = Australian Army band (Kapooka); KDC = Kapooka Dental Company; KMC = Kapooka Medical Centre; PSS(K) = Psychology Support Section (Kapooka).

- “Moderate” fatigue scores are those which are up to 200% of the maximum scores produced by the standard work week, that is, a score between 40-80.
- “High” fatigue scores are those which are between 200 and 250% of the maximum scores produced by the standard work week, that is, a score between 80-100. ‘High’ fatigue is associated with a blood alcohol concentration (BAC) of 0.05% (Dawson & Reid, 1997).
- “Extreme” fatigue scores are those which are between 250 and 300% of the maximum scores produced by the standard work week, that is, a score between 100-120.

Participants were also asked to provide an indication of the extent to which they had experienced a number of subjective fatigue symptoms, over the last 45 days. They provided these ratings at the same time as they completed the other surveys. Unlike the low response rate to the fatigue audit, 92.5% of the participants completed this survey. Table 19 lists some of the fatigue symptoms in the survey and the percentage of participants who experienced them five times or more during the preceding 45 days.

Table 19

Percent of participants who experienced selected fatigue symptoms 5 times or more during preceding 45 days – pilot study 2

Symptom	Frequency	Percent
<i>Drowsiness</i>	36	58.1
<i>Tiredness of the whole body</i>	36	58.1
<i>Difficulty concentrating</i>	31	50.0
<i>Back or neck pain</i>	31	50.0
<i>Lacking patience</i>	30	48.4
<i>Forgetfulness</i>	22	35.5
<i>Headaches</i>	15	24.2
<i>Feeling ill</i>	10	16.1

Longitudinal Study

Results for the longitudinal study focus firstly on the variables related to the hypotheses, and are analysed using four methods: means and standard deviations, bivariate correlations, regressions and ANOVA's and t-tests. Firstly, descriptive data is presented to illustrate the actual change in strain, stress and job satisfaction over time. For the bivariate and multivariate analyses, Pearson product-moment correlations and multiple regression analyses were then conducted to illustrate the relationship between these three variables. Finally, t-tests and ANOVA's were conducted to assess differences in mean scores across the three data points of the study.

A data transformation was performed on the items for the job the Army work demands questionnaire, in which scores for each item were summed to produce an overall index of the perceived pressure experienced from ARTC specific stressors (22 = high pressure; 88 = low pressure). The same procedure was used for the job satisfaction questionnaire to produce an overall index of job satisfaction (5 = high satisfaction, 35 = low satisfaction). These summed index scores were used for the test-retest correlations, t-tests, Pearson product-moment correlations and regression analyses. The scores for the coworker cohesion and supervisor support subscales on the Work Environment Scale (WES) were summed to form a composite variable of social support for the regression analyses.

Descriptive dataPsychological strain

Table 20

Mean STAI scores, SD's and normative data – Longitudinal Study

Males					
	N	Mean State Anxiety	SD	Mean Trait Anxiety	SD
March-in ¹³	57	48.77	8.91	47.51	7.96
1 month	42	51.05	8.42	48.33	7.31
6 months	40	51.30	7.47	48.23	7.33
Norm – Normal working adults	1387	35.72	10.40	34.89	9.19
Norm – Military recruits	1893	44.05	12.18	37.64	9.51
Females					
	N	Mean State Anxiety	SD	Mean Trait Anxiety	SD
March-in	8	48.13	12.64	46.63	12.69
1 month	8	47.88	9.83	48.88	12.05
6 months	8	46.63	10.18	47.38	12.84
Norm – Normal working adults	451	35.20	10.60	34.79	9.22
Norm – Military recruits	71	47.01	14.42	40.03	9.90

The data presented in Table 20 indicates that the reporting of state and trait anxiety across the study was stable, with only minor changes in anxiety levels at each point. However, repeated measures t-tests found that there was a significant increase in state anxiety scores from march-in to one month ($t(49) = -2.70, p < 0.01$), and a significant increase from march-in to six months ($t(47) = -2.85, p < 0.01$). Contrary to expectation, differences in state anxiety from one month to six months in posting were not statistically significant ($t(43) = 0.6, ns$). However, these results provide support for the hypothesis that increases in psychological strain would occur over time. State and trait anxiety were highly correlated at all points of the study (March-in: $r(63) = 0.68, p < 0.01$; 1 month: $r(48) = 0.69, p < 0.01$; 6 months: $r(46) = 0.82, p < 0.01$).

¹³ "March-in" refers to the time at which baseline measurement was conducted, when the participants first arrived at ARTC to begin their posting.

Occupational stress

Table 21 presents the means, standard deviations and normative data for all nine subscales of the Job Stress Survey (JSS).

Table 21

Mean JSS scores, SD's and normative data – Longitudinal Study

Subscale	March-in	1 month	6 months	Norm
N	65	50	48	382
Job Stress Index	23.02	25.62	25.32	20.81
SD	12.08	11.38	10.45	8.00
Job Stress Severity	4.83	4.72	4.86	4.98
SD	1.14	1.35	1.20	0.70
Job Stress Frequency	4.37	4.83	4.58	4.32
SD	1.89	1.69	1.59	1.40
Job Pressure Index	25.08	29.82	28.73	27.46
SD	13.24	15.56	13.11	10.11
Job Pressure Severity	4.83	4.67	4.77	4.45
SD	1.26	1.58	1.46	1.08
Job Pressure Frequency	5.09	6.19	5.68	6.13
SD	2.25	2.10	1.81	1.75
Lack of Support Index	22.34	21.45	22.99	16.31
SD	13.42	13.69	16.39	11.57
Lack of Support Severity	5.08	4.73	5.10	5.67
SD	1.34	1.68	1.76	0.91
Lack of Support Frequency	3.98	3.82	3.71	2.87
SD	2.19	2.00	2.19	1.81

Note: Normative data is for Senior Military Personnel, as reported by Spielberger and Vagg (1991) and is provided for tentative comparison only given that it represents senior US military personnel.

The data presented in Table 21 suggests that, contrary to expectation, the participants' reporting of the severity and frequency of job stress, job pressure and lack of support remained relatively stable for the duration of the study, with no statistically significant differences in mean scores over time. However, the table also shows that across all points of the study, the sample's perceptions of the overall severity and frequency of job stress and lack of support were slightly higher than that for the comparison sample. The sample's perception of the overall frequency of job pressure was also higher at the one-month and six-month points of the study.

Job satisfaction

The internal reliability of the job satisfaction questionnaire was tested using Cronbach's Coefficient Alpha. These are presented in Table 22, along with test-retest reliability coefficients.

Table 22

Reliabilities estimated by Cronbach's Coefficient Alpha and test-retest coefficients for the job satisfaction questionnaire.

Internal reliability	
Reliability March-in	0.91
Reliability 1 month	0.93
Reliability 6 months	0.95
Test-retest reliability	
Test-retest March-in / 1 month	0.44**
Test-retest 1 month / 6 months	0.64**

** = $p < 0.01$ (two-tailed)

Table 23 presents the distribution of responses to the job satisfaction questionnaire.

Table 23

Distribution of responses to the job satisfaction questionnaire items – Longitudinal study

	March-in	1 month	6 months
<i>1. If a good friend of mine told me that he/she was interested in doing my job, I would strongly recommend it</i>			
Agree	72.3 (47)	76.0 (38)	72.9 (35)
Neither agree nor disagree	10.8 (7)	8.0 (4)	4.2 (2)
Disagree	16.9 (11)	16.0 (8)	22.9 (11)
<i>2. All in all, I am very satisfied with my current job</i>			
Agree	75.4 (49)	72.0 (36)	70.8 (34)
Neither agree nor disagree	15.4 (10)	4.0 (2)	2.1 (1)
Disagree	9.2 (6)	24.0 (12)	27.1 (13)
<i>3. In general, my job measures up to the sort of job I wanted when I took it</i>			
Agree	75.4 (49)	62.0 (13)	66.7 (32)
Neither agree nor disagree	13.8 (9)	14.0 (7)	10.4 (5)
Disagree	10.8 (7)	24.0 (12)	22.9 (11)
<i>4. Knowing what I know now, if I had to decide all over again whether to take my job, I would</i>			
Agree	71.9 (46)	70.0 (35)	72.9 (35)
Neither agree nor disagree	18.8 (12)	12.0 (6)	6.3 (3)
Disagree	9.4 (6)	18.0 (9)	20.8 (10)
<i>5. I would accept this job even if I didn't have to do it</i>			
Agree	64.6 (42)	58.0 (29)	60.4 (29)
Neither agree nor disagree	18.5 (12)	10.0 (5)	10.4 (5)
Disagree	16.9 (11)	32.0 (16)	29.2 (14)

Note: In percentages. Figures in parentheses indicate number of respondents

Mean index scores for the job satisfaction questionnaire were compared via a repeated-measures t-test. A significant decrease in job satisfaction was detected between the march-in and one month data points ($t(49) = -2.34, p < 0.05$), and also between the march-in and six-month data points ($t(47) = -2.52, p < 0.05$). However, the difference between job satisfaction scores for the one-month and six-month points was not significant ($t(43) = 0.22, ns$).

Army Recruit Training Centre (ARTC)-specific stressors

The internal reliability of the Army work demands questionnaire was tested using Cronbach's Coefficient Alpha. These are presented in Table 24, along with test-retest reliability coefficients. Table 25 displays the distribution of responses to a selection of Army work demands questionnaire items across the three points of the study. These

items were selected due to the high number of respondents who had rated them as sources of pressure in the pilot studies, and were therefore considered to be of particular interest.

Table 24

Reliabilities estimated by Cronbach's Coefficient Alpha and test-retest coefficients for the Army work demands questionnaire

Internal reliability	
Reliability March-in	0.93
Reliability 1 month	0.98
Reliability 6 months	0.98
Test-retest reliability	
Test-retest March-in / 1 month	0.29*
Test-retest 1 month / 6 months	0.59**

* = $p < 0.05$; ** = $p < 0.01$ (two-tailed)

Table 25

Distribution of responses to selected ARTC – specific stressors – Longitudinal study

	March-in	1 month	6 months
<i>Having too much work to do</i>			
Definitely a source of pressure	10.8	18.0	35.4
Generally a source of pressure	33.8	44.0	52.1
Generally not a source of pressure	30.8	20.0	6.3
Definitely not a source of pressure	24.6	18.0	6.3
<i>Having to be at work for very long hours</i>			
Definitely a source of pressure	16.9	22.0	14.6
Generally a source of pressure	21.5	22.0	60.4
Generally not a source of pressure	40.0	30.0	18.8
Definitely not a source of pressure	21.5	26.0	6.3
<i>Not being able to "switch off" at home</i>			
Definitely a source of pressure	12.3	22.0	25.0
Generally a source of pressure	23.1	28.0	45.8
Generally not a source of pressure	30.8	26.0	18.8
Definitely not a source of pressure	33.8	24.0	10.4
<i>Not being able to plan leave and other leisure activities in advance</i>			
Definitely a source of pressure	20.0	36.0	29.2
Generally a source of pressure	35.4	14.0	27.1
Generally not a source of pressure	32.3	32.0	31.3
Definitely not a source of pressure	12.3	18.0	12.5

Table 25 (cont).

Distribution of responses to the AWDQ – Longitudinal study

	March-in	1 month	6 months
<i>Worrying about the impact of time constraints on the standard of training</i>			
Definitely a source of pressure	6.3	4.1	8.5
Generally a source of pressure	32.8	44.9	42.6
Generally not a source of pressure	34.4	26.5	29.8
Definitely not a source of pressure	26.6	24.5	19.1
<i>Demands that work place on my private / social life</i>			
Definitely a source of pressure	21.9	24.0	27.1
Generally a source of pressure	31.3	42.0	39.6
Generally not a source of pressure	23.4	18.0	20.8
Definitely not a source of pressure	23.4	16.0	12.5
<i>Having large recruit to staff ratios</i>			
Definitely a source of pressure	7.8	18.8	17.0
Generally a source of pressure	17.2	18.8	34.0
Generally not a source of pressure	39.1	25.0	34.0
Definitely not a source of pressure	35.9	37.5	14.9
<i>Delegated tasks which conflict with my primary role of training recruits</i>			
Definitely a source of pressure	0.00	14.3	15.2
Generally a source of pressure	34.9	22.4	39.1
Generally not a source of pressure	34.9	22.4	23.9
Definitely not a source of pressure	30.2	40.8	21.7
<i>Lack of consultation and communication</i>			
Definitely a source of pressure	9.2	26.0	18.8
Generally a source of pressure	36.9	22.0	31.3
Generally not a source of pressure	32.3	38.0	43.8
Definitely not a source of pressure	21.5	14.0	6.3
<i>Having to cope with the start of the "Surge period" and posting cycle occurring simultaneously</i>			
Definitely a source of pressure	18.8	32.0	33.3
Generally a source of pressure	25.0	26.0	29.2
Generally not a source of pressure	32.8	32.0	25.0
Definitely not a source of pressure	23.4	10.0	12.5

Note: Data is in percentages.

Table 25 illustrates that there was an increase in perceived pressure for many types of stressors (eg. "Having too much work to", and "Not being able to 'switch off' at home") among the respondents. However, the pattern of responding for other items (eg. "Lack of consultation / communication", "Having to be at work for very long hours") suggests that perceptions of pressure from some stressors initially increases, then later decreases,

Multiple regression analyses

Three sets of regression analyses were conducted. The first set was to investigate the main effects of occupational stress, job satisfaction and social support on psychological strain. The second set of analyses was performed to ascertain whether job satisfaction moderates the relationship between occupational stress and strain. The third set of analyses was conducted to examine whether social support (coworker cohesion and supervisor support) moderate the relationship between occupational stress and psychological strain. The analyses were conducted in accordance with procedures described by Baron and Kenny (1986), and Cohen and Cohen (1983), in which different methods are described for the analysis of continuous, categorical and dichotomous variables. The total scores for coworker cohesion and supervisor support were summed to form a composite variable of social support. As job satisfaction required recoding to form a dichotomous variable in order to test its effect as a moderator, and social support is a continuous variable, separate analyses were conducted for each of these proposed moderators. Given this condition, these variables are investigated as separate rather than combined moderators. Pairwise deletion of cases was the method used to deal with missing data.

Main effects of occupational stress on psychological strain

Hierarchical regression analyses were conducted to test for the main effects of the measure of occupational stress on psychological strain (state anxiety). To control for the potential confounding effects of job satisfaction (Satis), and social support, these variables were entered in the first step of the analysis. The measure of occupational stress (Job Stress Index – JSX) was then entered into the second step of the analysis. Table 30 presents the results of these analyses.

Table 28

Correlation matrix – State anxiety (SANX), JSS indexes, Coworker cohesion (PC), Supervisor support (SS) and Job satisfaction – 1 month

	JSX	JPX	LSX	PC	SS	SATIS
SANX	0.24	0.22	0.03	-0.3	0.12	-0.12
JSX		0.77**	0.72**	-0.09	-0.20	0.26
JPX			0.29*	0.01	-0.14	0.10
LSX				-0.13	-0.36	0.17
PC					0.09	-0.13
SS						-0.22

* = $p < 0.05$; ** = $p < 0.01$ (two-tailed)

Table 29

Correlation matrix – State anxiety (SANX), JSS indexes, Coworker cohesion (PC), Supervisor support (SS) and Job satisfaction - 6 months

	JSX	JPX	LSX	PC	SS	SATIS
SANX	0.33*	0.12	0.28	0.06	0.04	0.15
JSX		0.69**	0.80**	-0.04	-0.15	0.29*
JPX			0.21	0.19	-0.00	0.01
LSX				-0.23	0.21	-0.44**
PC					0.21	-0.32*
SS						-0.25

* = $p < 0.05$; ** = $p < 0.01$ (two-tailed)

Tables 27 - 29 illustrate an inconsistent pattern of correlations across the three points of the study. The most consistent result obtained is a positive correlation of job stress in general (JSX), and state anxiety (SANX) at both march-in ($r(63) = 0.30, p < 0.05$) and at six months ($r(46) = 0.33, p < 0.05$). This provides some support for the first research hypothesis that there is a positive relationship between occupational stress and psychological strain. In contrast, there is no significant correlation between state anxiety and job satisfaction, nor state anxiety and supervisor support/coworker cohesion at any point of the study.

A series of one-way ANOVA's were conducted to examine possible reasons for attrition of the sample. There were no significant differences in scores for any of the Job Stress Indexes, nor state and trait anxiety at march-in, between those who dropped out of the study at one month and/or six months. The only significant difference found between those who had been previously deployed on operations and those who hadn't was for the social support variable. At march-in, there was a significant difference in perceptions of social support between those who had previously deployed and those who hadn't ($F(60) = 5.37, p < 0.05$). A significant difference in perceptions of social support between those who had previously deployed and those who hadn't was also found at the one month point of the study ($F(47) = 5.35, p < 0.05$). In both cases, those who had not previously deployed perceived more social support than those who had.

Correlations

A correlation matrix for the variables relating to the research hypotheses are presented in Tables 27, 28 and 29 for the march-in, one month and six month data points. Scores for all five job satisfaction items were summed to form an overall index of job satisfaction. Scores on this index range from 5 to 35, with 5 being high satisfaction, and 35 being low satisfaction. Standard scores for the JSS indexes, Coworker cohesion (PC) and Supervisor support (SS) subscales of the Work Environment Scale (WES) are used for the analysis. Pairwise deletion of cases was the method used to deal with missing data.

Table 27

Correlation matrix – State anxiety (SANX), JSS indexes, Coworker cohesion (PC), Supervisor support (SS) and Job satisfaction – March-in¹⁴

	JSX	JPX	LSX	PC	SS	SATIS
SANX	0.30*	0.35**	0.23	0.03	-0.10	0.08
JSX		0.86**	0.82**	-0.19	-0.32*	0.08
JPX			0.58**	-0.15	-0.24	0.12
LSX				-0.28*	-0.36**	0.12
PC					0.627**	-0.35
SS						-0.35**

* = $p < 0.05$; ** = $p < 0.01$ (two-tailed)

¹⁴ SANX = State anxiety; JSX = Job Stress Index; JPX = Job Pressure Index; LSX = Lack of Support Index; PC = Coworker cohesion; SS = Supervisor support, SATIS = Job Satisfaction

which suggests that respondents may have experienced an "adjustment" phase in the initial stages of their posting, followed by an "adaptation" stage.

Mean index scores for the Army work demands questionnaire were compared via a repeated-measures t-test. A significant increase in the reporting of stressors was found from the one month to the six month data points of the study ($t(43) = 3.20, p < 0.01$), and from march-in to six months ($t(47) = 3.51, p < 0.001$). There were no significant differences in mean scores from march-in to one month ($t(49) = 0.77, ns$).

Social climate

Table 26 presents the means and standard deviations for the Work Environment Scale (WES) subscales.

Table 26

Means and SD's for WES subscales – Longitudinal Study

Subscale	March-in	1 month	6 months
N	62	49	48
Involvement	54.13	53.55	51.42
SD	8.20	7.94	7.95
Coworker cohesion	53.76	52.31	54.25
SD	9.72	10.29	10.05
Supervisor support	48.95	51.41	51.10
SD	9.48	8.04	8.21
Autonomy	53.53	48.57	49.94
SD	8.40	10.01	9.68
Task orientation	59.08	57.02	58.92
SD	7.60	6.61	6.26
Work pressure	58.18	58.53	59.33
SD	8.07	8.20	6.38
Clarity	55.64	51.84	52.50
SD	8.27	10.74	10.26
Managerial control	61.24	60.02	61.48
SD	7.55	8.48	8.44
Innovation	47.69	47.14	47.23
SD	10.56	10.19	9.02
Physical comfort	52.06	50.51	52.38
SD	8.66	10.78	10.01

Table 30

Hierarchical regression of psychological strain on the main effect of occupational stress (JSX): March-in, 1 month and six month data points

Step Predictor	Adj R ²	R ² Ch	F	df	β
March-in					
1. Satis & Soc Spt	-0.03	0.01	0.18	59	0.07 & -0.01
2. JSX	0.04*	0.08	1.85	60	0.30*
1 month					
1. Satis & Soc Spt	-0.03	0.01	0.28	46	-0.10 & 0.23
2. JSX	0.09	0.07	1.39	47	0.28
6 months					
1. Satis & Soc Spt	-0.003	0.04	0.92	45	0.20 & 0.14
2. JSX	0.07*	0.09	2.21	46	0.32*

* = $p < 0.05$ (two-tailed)

Table 30 shows that after controlling for the effects of job satisfaction and social support, occupational stress (JSX) emerged as a positive predictor of psychological strain at the march-in and six month points of the study.

Main effects of job satisfaction on psychological strain

Hierarchical regression analyses were conducted to test for the main effects of the measure of job satisfaction on psychological strain. To control for the potential confounding effects of social support, these variables were entered in the first step of the analysis. The measure of job satisfaction (Satis) was then entered into the second step of the analysis. Table 31 presents the results of these analyses.

Table 31

Hierarchical regression of psychological strain on the main effect of job satisfaction: March-in, 1 month and six month data points

Step Predictor	Adj R ²	R ² Ch	F	df	β
March-in					
1. JSX & Soc Spt	0.05	0.08	2.63	59	0.30* & 0.05
2. Satis	0.04	0.01	1.85	60	0.08
1 month					
1. JSX & Soc Spt	0.02	0.06	1.45	46	0.24 & 0.09
2. Satis	0.02	0.03	1.39	47	-0.17
6 months					
1. JSX & Soc Spt	0.08	0.12	3.09*	45	0.34* & 0.11
2. Satis	0.07	0.01	2.21	46	0.11

* = $p < 0.05$ (two-tailed)

Table 31 indicates that job satisfaction was not a significant predictor of psychological strain at any point of the study.

Main effects of social support on psychological strain

Hierarchical regression analyses were conducted to test for the main effects of the measure of social support on psychological strain. To control for the potential confounding effects of occupational stress (JSX) and job satisfaction (Satis), these variables were entered in the first step of the analyses. The measure of social support was then entered into the second step of the equation. Table 32 presents the results of these analyses.

Table 32

Hierarchical regression of psychological strain on the main effect of social support: March-in, 1 month and six month data points

Step Predictor	Adj R ²	R ² Ch	F	df	β
March-in					
1. JSX & Satis	0.05	0.08	2.65	59	0.28* & 0.05
2. Soc Spt	0.04	0.01	1.85	60	0.08
1 month					
1. JSX & Satis	0.04	0.08	2.04	46	0.27 & -0.18
2. Soc Spt	0.02	0.01	1.39	47	0.06
6 months					
1. JSX & Satis	0.07	0.11	2.87	45	0.32* & 0.06
2. Soc Spt	0.07	0.02	2.21	46	0.14

* = $p < 0.05$ (two-tailed)

Table 32 indicates that the variable of social support was not a significant predictor of psychological strain at any point of the study.

Moderating effects of job satisfaction

The job satisfaction index variable was recoded via a median split of scores into a dichotomous variable of "High satisfaction" and "Low satisfaction", to ensure comparable sample sizes and variances for the two categories.

Baron and Kenny (1986) advise on the use of unstandardised regression coefficients to test moderator hypotheses where the independent variable is continuous and the moderator is dichotomous. As such, two separate regression analyses were conducted to assess job satisfaction as a moderator variable, as represented in the following equations:

1. $State\ anxiety\ (SANX) = a + Job\ Stress\ Index\ (JSX)$ – For “High satisfaction” cases only; and
2. $State\ anxiety\ (SANX) = a + Job\ Stress\ Index\ (JSX)$ – For “Low satisfaction” cases only.

Table 33 displays the results of the regression analyses for all 3 data points of the study.

Table 33

Standard regression of psychological strain on occupational stress (JSX) for high and low satisfaction: March-in, 1 month and six month data points

Predictor	R ²	Adj R ²	F	df	β
March-in: High satisfaction					
JSX	0.04	0.01	1.26	32	0.19
March-in: Low satisfaction					
JSX	0.15	0.13*	5.28*	29	0.39*
1 month: High satisfaction					
JSX	0.00	-0.04	0.02	25	0.01
1 month: Low satisfaction					
JSX	0.26	0.23**	7.38**	21	0.51**
6 months: High satisfaction					
JSX	0.16	0.12*	4.32*	23	0.40*
6 months: Low satisfaction					
JSX	0.08	0.04	1.79	21	0.28

* = $p < 0.05$; ** = $p < 0.01$ (two-tailed)

Table 33 illustrates a consistent pattern across the first two data points, in which occupational stress accounts for a significant proportion of variance in and is predictive of psychological strain among respondents with "Low satisfaction". In contrast, occupational stress is not predictive of psychological strain among respondents with "High satisfaction". However, this trend is reversed at the six month data point, in which occupational stress is predictive of psychological strain among respondents with "High satisfaction", but not so among respondents with "Low satisfaction". Despite this trend reversal, the large magnitude of differences between both R² and Beta values between respondents with "High satisfaction" and "Low satisfaction" across all three points of the study are indicate that job satisfaction moderates the relationship between occupational stress and psychological strain.

Moderating effects of social support

Baron and Kenny (1986) advise on the use of a product variable approach to assess moderators, where both the moderator and the independent variables are continuous.

Here, a new variable was created by multiplying Job Stress Index (JSX) and social support scores. Three further regression analyses were then conducted, in accordance with the following equations:

$$SANX = a + JSX + Soc\ Spt + (JSX \times Soc\ Spt)$$

For each point, Job Stress Index (JSX) and social support were entered into the first step of the analysis to control for their potentially confounding effects on the equation (Cohen and Cohen, 1983). After controlling for the effects of Job Stress Index (JSX) and social support, the product variable of JSX x Soc Spt was entered into the second step of the equation. Table 34 presents the results of the hierarchical regression analyses.

Table 34

Hierarchical multiple regression of psychological strain on the main effect and interaction of occupational stress (JSX) and Social Support: March-in, 1 month and six month data points

Step Predictor	Adj R ²	R ² Ch	F	df	β
March-in					
JSX & Soc Spt	0.05	0.08	2.63	59	0.30* & 0.05
JSX x Soc Spt	0.04	0.00	0.00	60	-0.15
1 month					
JSX & Soc Spt	0.02	0.06	1.45	46	0.24 & 0.09
JSX x Soc Spt	-0.002	0.00	0.00	47	-0.29
6 months					
JSX & Soc Spt	0.08	0.12	3.09*	45	0.34* & 0.12
JSX x Soc Spt	0.06	0.00	0.00	46	0.08

* = $p < 0.05$; ** = $p < 0.01$ (two-tailed)

Table 34 illustrates that there were no significant interactions between occupational stress (JSX) and social support. As such, there is insufficient evidence of a moderating effect of social support.

Other results

Relationship between organisational climate and psychological strain

A Pearson product-moment correlation analysis was conducted with all subscales of the Work Environment Scale (WES) and psychological strain (state anxiety) for all three points of the study. A significant negative correlation between the clarity subscale of the WES and psychological strain was found at march-in ($r(60) = -0.30, p < 0.05$). Significant correlations were also found between the autonomy subscale and psychological strain at the one month and six month points of the study (1 month: $r(47) = 0.32, p < 0.05$; 6 months: $r(46) = 0.30, p < 0.05$).

Hierarchical regression analyses were then performed to assess the main effect of these two subscales on psychological strain at each point of the study. Controlling for the effects of occupational stress, clarity subscale scores accounted for 10% of the variance in psychological strain at march-in ($F(60) = 4.42, p < 0.05$). At one month and six months, autonomy scores accounted for 10% and 13% (respectively) of the variance in psychological strain (1 month: $F(47) = 3.61, p < 0.05$; 6 months: $F(46) = 4.56, p < 0.05$).

Further hierarchical regression analyses revealed that neither clarity at march-in, nor autonomy at one and six months were significant moderators of the occupational stress – psychological strain relationship (march-in: $\beta = -1.59, ns$; 1 month: $\beta = 1.03, ns$; 6 months: $\beta = 0.22, ns$).

Relationship between ARTC specific stressors and psychological strain

A Pearson product-moment correlation analysis was performed with the summed Army work demands questionnaire scores and psychological strain (state anxiety) scores for all three points of the study. A significant correlation was found between these two variables at the march-in point of the study ($r(63) = -0.49, p < 0.01$), indicating that increased pressure from ARTC specific stressors is associated with increased psychological strain.

To assess the overall impact of ARTC-specific stressors on psychological strain at the six month point of the study, a standard multiple regression analysis was conducted, in which Army work demands questionnaire index scores from all three data points were entered into the analysis. Overall, these three predictors accounted for 37% of the total variance in psychological strain at six months ($F(40) = 9.27, p < 0.01$). With Army work demands questionnaire measures for one and six months held constant, the march-in measure was the most predictive of psychological strain at six months ($F(42) = 9.27, p < 0.01$), and accounted for 36% of the variance in psychological strain at six months.

Other significant predictors of psychological strain at six months

The overall impact of occupational stress on psychological strain at six months was assessed via a standard multiple regression analysis in which Job Stress Index scores from all three points in the study were entered into the analysis. Overall, these three predictors accounted for 14% of the total variance in psychological strain at six months ($F(40) = 3.33, p < 0.05$). With Job Stress Index scores from one and six months held constant, the Job Stress Index march-in measure was the most predictive of psychological strain at six months ($F(42) = 3.33, p < 0.05$), and accounted for 11% of the total variance in psychological strain at six months.

The only other significant group of predictors of psychological strain at six months was trait anxiety. Based on the same methodology cited above, trait anxiety measured at all 3 data points accounted for 65% of the total variance in psychological strain at 6 months ($F(40) = 27.78, p < 0.00$).

Fatigue Risk Scores

The fatigue Audit data was analysed using the Fatigue Audit *Interdyne*® (FAID) (Version 330) software, based on the model of fatigue proposed by Fletcher and Dawson (1997; 2001)

Table 35 presents a summary of the fatigue risk scores produced by this analysis. Scores between 80 and 100 (high fatigue) are equivalent to the predicted level of work-related

fatigue achieved after 23-24 hours of continuous sleep deprivation. Performance impairment at such a level of sleep deprivation has been associated with a blood alcohol concentration (BAC) over 0.05% (Dawson & Reid, 1997; Lamond & Dawson, 1999).

Table 35

Summary of Critical Fatigue Risk Score frequencies – Longitudinal Study

	March-in	1 month	6 months
N	48	48	42
No of Fatigue Risk Scores recorded in Range 80<100 (BAC 0.05)	89	136	69
No of participants reaching Fatigue Risk Scores in Range 80<100 (BAC 0.05)	26	24	19
No of Fatigue Risk Scores recorded in Range >100 (BAC 0.1)	34	82	12
No of participants reaching Fatigue Risk Scores in Range >100 (BAC 0.1)	14	12	11

As illustrated by Table 35, average fatigue risk scores across all points of the study were within a moderate range, and do not indicate that the level of fatigue among staff constitutes an occupational health and safety risk. However, the Table shows that, across the three points of the study, critical levels of fatigue were reached by around one-half of the participants who submitted fatigue diaries.

During the first two weeks of their posting to ARTC, 26 (54.2%) of respondents experienced “high” and / or “very high” levels of fatigue on an average of 4.7 times. According to Fletcher and Dawson’s model, these levels of fatigue result in similar performance impairments that would result from a blood alcohol concentration of 0.05% or higher.

Table 35 also shows that high-risk fatigue levels peaked during respondents’ second month at ARTC (the one month follow-up point). At this time, 24 (50.0%) of respondents experienced “high” and / or “very high” levels of fatigue on an average of nine times over two weeks. Of these 24 respondents, 12 (50.0%) reached “very high” fatigue levels on an average of 6.8 times. According to Fletcher and Dawson’s model,

“Very high” fatigue levels result in a similar performance impairment to that resulting from a blood alcohol concentration of 0.1%.

During the six-month follow-up, the proportion of respondents reaching risky fatigue levels was lower. 19 (45.2%) of the respondents reached “high” and / or “very high” levels of fatigue on an average of 4.3 times in two weeks.

In addition to the fatigue diary, participants were asked to provide an indication of the extent to which they had experienced a number of subjective fatigue symptoms over the two week period that they completed the diary. Table 36 lists the fatigue symptoms and the proportion of participants who had experienced them five times or more in that period across each point of the study.

Table 36

Proportion and number of respondents who experienced selected fatigue symptoms five times or more (In percentages. Figures in parentheses indicate the number of respondents).

<i>Symptom</i>	March-in	1 month	6 months
	Percent (Number)	Percent (Number)	Percent (Number)
Tiredness of the whole body	21.3 (10)	40.4 (19)	41.0 (16)
Difficulty concentrating	8.5 (4)	27.6 (13)	25.6 (10)
Headaches	14.9 (7)	12.8 (6)	20.5 (8)
Forgetfulness	23.4 (11)	25.5 (12)	17.9 (7)
Back or neck pain	12.8 (6)	36.2 (17)	12.8 (5)
Drowsiness	25.5 (12)	40.4 (19)	17.9 (7)
Lacking patience	12.8 (6)	31.9 (15)	7.7 (3)
Feeling ill	2.1 (1)	10.6 (5)	7.7 (3)

Table 36 indicates that the proportion of participants experiencing fatigue symptoms generally peaked after one month in posting at ARTC. While the frequency of some symptoms remained stable from this point (eg. bodily tiredness, concentration difficulties, feeling ill), the frequency of other symptoms had reduced from the one month point (eg. forgetfulness, back / neck pain, drowsiness).

DISCUSSION

This research sought to explore a number of concepts which have been extensively investigated in the general occupational stress literature, yet not in the context of the Australian Defence Force. While the two initial studies were conducted for the purpose of "scoping" the target population, and testing the utility of measurement instruments and methodologies, the third main study was conducted with more specific objectives in mind. Firstly, it was predicted that an association would exist between occupational stress and psychological strain, and that this association would be moderated by job satisfaction and social support. It was also predicted that increases in psychological strain would occur over time in posting.

The following discussion seeks to review the research findings, while relating them to the hypotheses and examining the wider theoretical and practical implications. Possible explanations for those results that were not anticipated will be suggested, particularly in light of the limitations of the research methodology and the characteristics of the sample. Finally, measurement and other methodological issues related to this study will be discussed, and some conclusions will be made in regards to possible implications for the study of stress and strain in the wider Defence research community.

The relationship between occupational stress and psychological strain

It was found that occupational stress was a significant predictor of psychological strain when participants first arrived at ARTC, then again at the six month point of the posting. Further, occupational stress is positively correlated with psychological strain at these points. Thus there appears to be a reasonable level of support for the hypothesis that increased occupational stress is associated with increased psychological strain. In terms of consistencies with the stress-strain literature, this finding generally supports both military (eg. Salas, Driskell and Hughes, 1991; MacDonough, 1991) and civilian stress-strain models (eg. Ellis, 1995), although these models describe a much more complex relationship between environmental demands, intervening factors and outcomes, and does not account for non-organisational stressors, and other types of stress outcomes including cognitive, performance and social and organisational impact. Clearly, the variables

examined here oversimplify current conceptualisations of the stress-strain relationship, yet the results do indicate that, as has been found in the general literature (eg. Theorell and Karasek, 1996; Leong, Furnham and Cooper, 1996; Terry, Nielsen and Perchard, 1993; Edwards and Van Harrison, 1993), military personnel can be directly and negatively affected by environmental stressors. While this is accounted for in military stress theories (eg. MacDonough, 1991; Salas, Driskell and Hughes, 1991), military stress research, especially that for the Australian Defence Force has yet to specifically investigate this relationship.

The lack of association between occupational stress and strain at the one month point of the study was not anticipated, as it was proposed that stress and strain would be consistently associated across all three points of the study. Given that no association was detected between occupational stress and strain at this point, it is possible that these results represent a pattern that is indicative of the nature of the stressors at various points during the first six months at ARTC. Specifically, ARTC experiences a staff changeover (march-in / march-out period) of approximately 30% of personnel over the Christmas / New Year period, and this coincides with the busiest period during ARTC's annual training program. This period therefore represents a significant challenge for new staff members at ARTC, and it is reasonable that this intense stage of adjustment would contribute to short-term feelings of insecurity, tension and discomfort. It is possible that staff gradually adjust to their new roles and environment after one month into their posting, yet given the intensity of the training program over the following five months, coupled with little opportunity for respite, it is reasonable that staff would become more sensitive to the effects of work-related stressors by the time they have spent six months at ARTC.

Both the generic measure of stress (the JSS), and the measure of ARTC specific stressors (the Army work demands questionnaire) at march-in were significant predictors of psychological strain at six months. This finding provides a strong indication that initial exposure to work stressors during the march-in and induction period of posting appears to have a significant and enduring impact on individuals. This finding is consistent with the

view of stress as a disease of adaptation (Selye, 1976), in which the effects of some demands persist beyond the demand itself and become known as after effects. In their review of literature relating the chronic effects of stress and fatigue, Craig and Cooper (1992) point out that like chronic fatigue, chronic stress occurs in the context of impaired recovery, and prolonged / continuous exposure to a stressor may produce effects that appear after the stressor stimulation has ceased. After stressor termination, the individual requires a recovery period, during which he / she can return to a normal, pre-stressor level of functioning. As indicated by Frankenhauser (1980, 1986), a return to baseline physiological and emotional levels of functioning is important to the avoidance of chronic symptoms, particularly in the context of repetitive and uncontrollable work conditions.

In a practical sense, the above points highlight that the initial four weeks of a posting at ARTC is a critical time in terms of the adjustment of staff. As discussed previously, the high level of demand incurred by this acute period of work activity, coupled with the other stressors experienced at a time of transition (for example, issues relating to removals, pay, accommodation, spouse employment and finding appropriate childcare or education facilities), may have an adverse effect on new staff at ARTC. Further to this, over the first six months of their posting, while transitional issues are gradually resolved, the training "tempo" does not abate significantly. Overall, such conditions may make it difficult for new staff to fully recover from the initial pressures experienced when starting their posting at ARTC, such that stressors experienced during induction continue to have an impact on strain levels at six months. That there was a significant increase in levels of psychological strain across the six month period of the study also points to the possibility that the first six months of the posting may be particularly arduous for many individuals.

Moderators of the stress-strain relationship

While evidence was found for the moderating effects of job satisfaction on the stress-strain relationship, contrary to expectation, and other research findings, (eg. Terry, Nielsen and Perchard, 1993; Cox, 1991; Frese and Zapf, 1988; Lazarus and Folkman, 1984), no such effects were found for social support.

In regards to social support, the lack of evidence of a moderating effect could be explained in part by the suitability of the supervisor support subscale of the Work Environment Scale (WES) (Moos, 1994) for use with military samples. The supervisor support subscale consists of items such as “The atmosphere is somewhat impersonal”, “Supervisors tend to talk down to employees”, “Employees generally feel free to ask for a raise”, and “Employees discuss their personal problems with their supervisors”. Such items may have lacked meaning for the participants in this study in terms of social support, given that some participants did comment that the wording of the surveys were not appropriate for military respondents. In the context of a highly structured, and hierarchical military chain of command, the relationship between individuals and their supervisors is often impersonal in nature. Indeed, relationships between soldiers, senior non-commissioned officers and junior and senior officers is commonly of a highly formal nature, especially if rank differences are quite large. The relationship between subordinates and superiors in the military would be characterised more by leadership, management and command and control, than by the level of personal or emotional support. To illustrate this point with an example, across all three points of the study, mean standard scores for the coworker cohesion and supervisor support subscales were slightly above average. In contrast, mean standard scores on the managerial control subscale were much higher. Leadership is a highly salient issue to military members, as the concept encompasses a vast range of responsibilities, including sound personnel management. Essentially, this points to the possibility that, within the military, the concept of supervisor support should include a measure of more tangible forms of support at an organisational level or indeed, the quality of leadership, as well as support at a personal level. As suggested by MacDonough (1991), social support could be assessed at an informal level (eg. work peer groups, family and friends), and at a formal level (eg. helping agencies, work leaders).

A second possibility for the lack of evidence of a moderating effect of social support could be related to the fact that all of the participants were new to ARTC, and thus were not familiar with peers and supervisors on a personal level, even by the time they had

been at ARTC for six months. This suggestion is based somewhat on anecdotal evidence and observations of ARTC staff in their work environment. However, it is reasonable given that other studies in which social support was found to be a significant moderator utilised civilian samples (ie. individuals who do not work in highly “mobile” occupations) (Terry, Nielsen and Perchard, 1993; Cox, 1991; Frese and Zapf, 1988; Lazarus and Folkman, 1984). In contrast, the sample used in this study are posted to new locations usually between one and four years, and all were “newcomers” to ARTC. As such, these individuals lacked familiarity with their peers and superiors and therefore might have relied more on other sources of support in location, such as spouses and partners, or friends and family in other locations. Given the intense nature of their work at ARTC, and the assumed high level of commitment, these individuals may not have had sufficient opportunity to develop relationships with peers in particular, and it is possible that work commitments held a higher priority than personal or emotional needs. In light of this consideration, although there is no prior research evidence to confirm this, it is possible that social support may become a more important moderating factor in the stress – strain relationship after a more lengthy period in posting.

While overall levels of job satisfaction decreased over the course of the study, satisfaction was found to be a consistent moderator of the stress – strain relationship. However, while high job satisfaction appears to buffer the negative effects of occupational stress during the initial months of posting, this trend is later reversed in that high satisfaction appears to augment the stress – strain relationship by the time the participants had been at ARTC for six months. As such, while positive work attitudes may initially protect individuals against the effects of high stress during their initial time in posting, it later appears to become a risk factor, rather than a protective factor. It is possible that this trend could be explained by revisiting two particular conceptualisations of morale and job satisfaction. Manning’s (1991) definition of morale emphasises both enthusiasm and persistence in regards to work, while Agho, Mueller and Price (1993) also specify work motivation as a determinant of job satisfaction. If this were the case, it is possible that the high levels of motivation and persistence towards work associated with job satisfaction might actually lead to over commitment in the face of high

occupational stress. In this respect, an optimal level of job satisfaction may be required if it is to buffer the negative effects of occupational stress, much in the same way that an optimal level of stress is required for a high level of performance.

While the relationship between stress, strain and job satisfaction has been examined in prior research (Guppy and Gutteridge, 1991; Richardsen and Burke, 1991; Ulleberg and Rundmo, 1997), its potential role as an intervening variable has appeared to be overlooked. Given that these studies confirm the common assumption that job satisfaction is negatively related to stress, it is somewhat puzzling that stress and job satisfaction theory and research, both civilian (Ellis, 1995; Guppy and Gutteridge, 1991; Richardsen and Burke, 1991; Ulleberg and Rundmo, 1997; Bogg and Cooper, 1995) and military (MacDonough, 1991) has tended to only examine job satisfaction as an outcome measure. The results reported in this thesis may highlight the importance of satisfaction, and related concepts, particularly morale, to the overall welfare of military personnel and their ability to cope with the unique rigors of their roles.

Relationship between organisational climate and psychological strain

In terms of a relationship between organisational climate and psychological strain, it is particularly interesting that both clarity and autonomy appear to be related to psychological strain, given that these two scales are somewhat opposites conceptually. According to Moos (1994), his measure of clarity refers to knowledge of what to expect in daily routines and the rules and policies that need to be adhered to. In contrast, autonomy refers to how much self-sufficiency and delegation of decision making is encouraged. However, in part, these results make sense intuitively given that decreased perceptions of clarity were associated with increased strain at march-in, whereas increased perceptions of autonomy were associated with increased strain at one month and six months in posting. Although these results have some similarities with those of Terry, Nielsen and Perchard (1993), who found that role related stress, particularly role ambiguity was strongly related to stress, their meaning in a military context can be better understood in the context of military culture. Soldiers are trained to be very accepting of rules and procedures, as they are critical to safety and effective command and control

(Labuc, 1991), so there is little surprise to find that this may be an important factor in anxiety levels. Upon arrival at ARTC, knowledge of policies and procedures would have been actively sought by staff to aid in their induction, and sense of familiarity and security. While it is reasonable to expect that the staff would be more accepting of increased latitude in decision-making after their induction, this did not appear to be the case. As indicated by Labuc (1991) and Manning (1991), given the culture of the Army and the training of its personnel, there is likely to be an expectation of specific rules and procedures for most tasks and roles, and as such, there is little desire, or a sense of preparation for self-sufficiency and delegation of responsibility. This may explain why perception of increased autonomy was a significant predictor of strain among this sample, and it lends support to most mainstream theories of military morale and stress, which emphasise the importance of clear objectives, procedures, and roles (Labuc, 1991; Manning, 1991), and strong leadership (Huah and Lee, 1997; Chong, 1997).

Changes in stress, strain and job satisfaction over time

While there were no significant increases in occupational stress, as measured by the Job Stress Survey (JSS), there was a significant increase in the reported pressure from ARTC specific stressors, as measured by the Army work demands questionnaire over six months. This difference in results for these two instruments may be explained by their differences in content and structure. For the JSS, respondents are required to rate both the severity and frequency of 30 generic occupational stressors. In contrast, for the Army work demands questionnaire, respondents are asked to rate the level of perceived pressure experienced due to 22 different stressors which are specific to the roles of ARTC staff. Given these differences, it is possible that while reporting of the severity and frequency of stress did not appear to change markedly over time, perceptions of pressure *due to stress* did increase. This appears to be plausible given that levels of psychological strain also increased over the six months. Furthermore, the different results obtained for the two instruments indicate, as suggested by Turnage and Spielberger (1991), that the use of a instrument which assesses the stressors unique to a specific environment and occupation may be more sensitive to changes in stress levels over time, than an instrument designed for use across a wide range of organisations and occupations.

Overall, however, it appears as though perceptions of *pressure and strain* tend to increase over time even though perceptions of the *prevalence of stressors* remain stable.

This finding is not entirely surprising given that conceptualisations of occupational stress often differentiate between objective stressors, stressor perception, stressor appraisal and stress reaction (eg. Frese and Zapf, 1988). Specifically, while it cannot be categorised as an objective stress measure, the JSS is more objective than the Army work demands questionnaire in that it has a relatively low dependency on an individual's cognitive and emotional processing in the reporting of facts or events. According to Frese and Zapf's (1991) terminology, the JSS could be best categorised as a measure of stressor perception, while the Army work demands questionnaire measures stressor appraisal. The finding described above appears to reflect what Frese and Zapf (1991) call a dynamic accumulation model of stress and strain. Here, it is proposed that there is an inner dynamic that leads to an increase in perceived strain, regardless of the prevalence or indeed presence of stressors. Consistent with the previous discussion on the results which suggest that stress after effects occurred among this sample, this model also suggests that original stressors may have a general weakening effect on the psychological and physical system such that subsequent stressors have a greater effect regardless of their severity or frequency. Overall, the evidence of enduring stress after effects, increased perceptions of pressure and strain, together with relatively stable perceptions of the prevalence of stressors over time all appear to provide some credibility to the notion that initial exposure to stressors can have an enduring effect over time if there is insufficient opportunity for recovery before more stressors are confronted (Craig and Cooper, 1992; Frankenhauser, 1980, 1986).

The decrease in levels of job satisfaction over the six months of the study was not an entirely surprising result, given that at the time the study was conducted, ARTC's peak training period extended beyond the normal period of between December and March, resulting in less opportunity for respite among staff. Since the commencement of a

common training regime for both Regular and Reserve Army enlistees in 1997¹⁵, ARTC has experienced a “surge” in recruits during the Christmas / New Year period, as this is often the most convenient time for Reserve recruits to undertake the 45 day recruit course. This “surge” usually abated in March, as the number of Reserve enlistees available to take time away from work and / or study dropped. However, in 2001, changes in recruiting practices and targets resulted in an extension of the “surge” period into May and June. For many of the new staff at ARTC, it is likely that they would not have anticipated this. In addition, anecdotal evidence suggests that many staff were unsatisfied with the way in which they were managed over this time, particularly in regard to allocation of leave periods for staff towards the middle of the year, when staffing levels were already critically low and the training load was still quite high.

Fatigue risk and subjective fatigue symptoms

High risk fatigue levels and subjective fatigue symptoms peaked one month into their posting to ARTC. This was not surprising, given that this was one of the most intense periods on the training calendar in terms of the number of recruits undertaking training at the time (approximately 70-80% of ARTC's capacity). However, at the six month follow-up, the proportion of respondents reaching risky fatigue levels was lower, and subjective fatigue symptoms either remained stable or also reduced in frequency. This reduction in fatigue risk levels and symptoms may be explained by the occurrence of block leave periods for ARTC staff from March – September 2001, which provided staff with the opportunity for respite. In addition, anecdotal information from participants at this time also suggests that the fatigue data gathered at this point may not be representative. Many of the participants who did not submit fatigue diaries at this point reported that this was because they were too busy to take on the extra task of completing diary entries. This suggests that the data gathered at the six month point may be more representative of those individuals with lower work demands and shorter work hours.

¹⁵ In 1997, Common Induction Training (CIT) for both Reserve and Regular Army recruits was introduced, comprising of 45 days of training at ARTC. As a result, for Regular Army recruits, the length of recruit training was reduced from 3 months. For Reserve recruits, this entailed the increase of recruit training from two weeks, and the transfer of the responsibility of training from regional training groups to ARTC.

Methodological issues and limitations

The longitudinal study aimed to focus on new staff members who began their posting at ARTC in December 2000 / January 2001 in order to obtain baseline measures. Although the sample obtained represents a high proportion of those who began their posting at ARTC over this time (approximately 90%), its size is undoubtedly a concern in respect to statistical power. Nevertheless, this loss of power has been offset to some extent by the use of a repeated measures design, and in that the sample represents a relatively homogenous group of individuals. Obtaining acceptable sample sizes for all of the studies in this thesis was relatively difficult for a number of reasons. Firstly, in respect to ARTC, access to both staff and recruits for the purpose of conducting research is often difficult to obtain. The intensity of the training regime at ARTC leaves little flexibility for staff and recruits to engage in activities outside of their basic work and training requirements. As such, the Commanding Officer of ARTC normally authorises research on the condition that it entails minimal disruption to normal routines. This issue was particularly salient for this research, given the large manning shortfalls that existed when data was collected. A further issue relates to the fact that the work of ARTC staff is characterised by a high degree of mobility (ie. they are rarely desk bound), which makes it difficult to contact them by mail, telephone and even in person. This made it difficult to maximise the response rate for the each of the studies, and for the follow-up measurement for the longitudinal study.

Such issues of accessibility to military personnel for research are similar across the wider Defence landscape, particularly in light of the high manning shortfalls that exist in many establishments. "Survey fatigue" has become increasingly problematic across Defence, due to the high demand for research data investigating critical issues, such as retention, equity, harrassment, leadership and morale. The belief that participating in surveys and research projects is futile is unfortunately common among personnel, which highlights the need for direct feedback to participants and information as to how the data is being used and for what gains.

The generality of the findings presented in this thesis are mostly limited to the context of military recruit training staff. Indeed, the study only aimed to investigate ARTC as a case study of non-operational military stress, and to explore the issue of measurement. However, within this realm, the main area in which the validity of the study could have been improved is the timing of follow-up measurement. As discussed above, flexibility in choosing an appropriate methodology for the research was limited. Nevertheless, it is likely that extending the research beyond at least twelve months (preferably two years) would have yielded results of greater interest both organisationally and empirically.

One final consideration in assessing the validity of the results relates to the possibility of response bias among the sample. Notwithstanding the amount of information provided to participants on the aims of the research, the longitudinal data collection occurred during a time when there was speculation that recruit instructors were to become the subject of a pay case through the Defence Remuneration Tribunal. Although the formal collection of work activity survey data for this case did not commence until after the completion of the longitudinal study, it is plausible that participants may have believed that the research data would be used as part of this case. As such, it is possible that participants may have been motivated to “fake bad” responses with a view to justifying a case not only for increased wages and allowances, but also for increased manning and resources. As this possibility cannot be ruled out, the internal validity of the results reported herein could be questionable.

Measurement issues

In regards to measurement of stress and other related concepts in a non-operational military environment, the experience gained from this research has pointed to several conclusions:

1. Measurement of both generic sources of stress, as well as stressors specific to the organisation and / or occupations appears to be generally advantageous. Specifically, the use of a generic measure of stress allows for comparison with other occupational groups and facilitates a more “global” assessment of the status of a particular sample. However,

one particular drawback to the use of a generic measure with military personnel is that many items are designed for the civilian workforce and therefore lack meaning and relevance to the military. This issue highlights a significant advantage of the use of specifically tailored instruments, in that experience indicates that participants tend to be more motivated to complete a questionnaire if they perceive that it assesses the unique nuances of their role. A further advantage in using a tailored stress instrument is that if the results are being reported to a unit Commanding Officer or other stake-holders, the results it yields are more meaningful and assist in specifically identifying problematic stressors.

2. The State-Trait Anxiety Inventory (STAI) (Spielberger, 1983) was a relatively appropriate and valid outcome measure for this study, as it appeared to be sensitive enough to assess changes in psychological strain over the study's short time frame. A further advantage with this measure is that, conceptually, it does not overlap with measures of stress, thus avoiding the problem of criterion contamination. The focus on psychological or physical symptoms as outcome measures in stress research is clearly imperative in providing an indication of the impact that stress has on the well-being of employees. For the ADF, identification of this impact is important given that issues such as risk management, safety, health and deployability are critical to the capability of the ADF.

3. The results presented in this thesis indicate that greater consideration should be given to investigating the concepts of morale, cohesion, social support, leadership and satisfaction as moderators of the stress – strain relationship. The importance of both formal and informal social support (often referred to in the military as cohesion) has been well-recognised in the military stress literature (eg. Manning, 1991; MacDonough, 1991). However, with the recent exception of Murphy (2001) the concepts of organisational commitment, morale and satisfaction have tended to be examined in isolation within the military (eg. Huah and Lee, 1997; Chong, 1997; Snow, 1984a, 1984b, 1984c), and as an outcome of stress in the civilian literature (eg. Richardsen and Burke, 1991; Terry, Nielsen and Perchard, 1993; Ulleberg and Rundmo, 1997). Measurement of these

constructs, and that of social support in the military, requires a degree of caution, given that some highly similar constructs are often labelled differently. For example, Manning (1991) points out that “organisational commitment and social support bear a marked resemblance to morale and cohesion, despite very different pedigrees” (p.458). A review of both Manning (1991) and MacDonough (1991) can assist greatly in untangling these concepts, yet tends to describe morale as a concept which encompasses satisfaction, cohesion and commitment, without fully recognising the need for them to be regarded as distinct constructs in the military context. For the ADF in particular, the Human Dimension in Operations (HDO) project, which is currently being conducted by the Defence Science and Technology Organisation (DSTO), is a particularly exciting development for military stress and organisational climate research. The cornerstone of the HDO project is its “omnibus” survey instrument, which consists of measures of stress, strain, coping, morale, cohesion, confidence in leadership, satisfaction and social support (Murphy, 2001). The measures employed by this project, and the model which underpins it, are suited for use in a non-operational environment, and are likely to become a valuable point of reference for military stress researchers in the future.

4. Experience with the application of Dawson and Fletcher’s (2001) fatigue model and Fatigue Audit *Interdyne*© software indicates that this is a potentially valuable means of assessing the risks associated with fatigue in both operational and non-operational military environments. For this research, use of this software to gain an indication of the likely performance decrements due to fatigue has provided invaluable information to ARTC’s command. The future development of software for specific use in aviation and continuous and sustained operations is clearly warranted, yet the results yielded in this research demonstrates that its utility in a training environment is as significant, given that training and operations are equally risky endeavours.

Conclusion

This thesis has sought to explore both civilian and military conceptualisations of stress, strain and fatigue, both theoretically and empirically. While the research itself represents a small case study, and an attempt to examine the utility of various measures for military

stress research, it highlights that a broader approach to the study of stress in the military is required to acknowledge the unique demands inherent in the ADF's primary peacetime role of training. There is also a need to develop a profile of soldiers serving in non-operational environments, including their physical and psychological health, their morale and their behaviours. The on-going assessment of the utility of various occupational and clinical stress measures for use within the ADF is therefore imperative, along with increased investigation of the prevalence and effect of stress within a host of specific military functions.

Annex A

Information on the structure and function of the Army Recruit Training Centre, Kapooka

RECRUIT TRAINING WING - STRATEGY FOR THE CONDUCT OF TRAINING

Recruit Training Wing (RTW) conducts recruit training for the Australian Army to prepare soldiers for initial employment training (IET) and subsequent service as soldiers.

Tasks assigned to RTW are:

- Conduct the Army Recruit Course IAW the TC-A throughput plan and the Course TMP
- Conduct the Recruit Instructor Development Course (RIDC).
- Conduct Small Arms Coaching Courses for the F88 and F89 for Recruit Instructors.
- Conduct Conducting Officer and Safety Officer qualification Courses for the High Wire Confidence Course, the Flying Fox Course and the Bayonet Assault Course.
- Provide developmental training of Recruit Instructors.
- Conduct rank and trade preparation training for area units.
- Provide for the recuperation and continuation training of soldiers returned to ARTC from IET Schools.

Organisation

ARTC currently has two training wings and assigned supporting units. The organisation of ARTC is shown in outline in Figure 1 below:

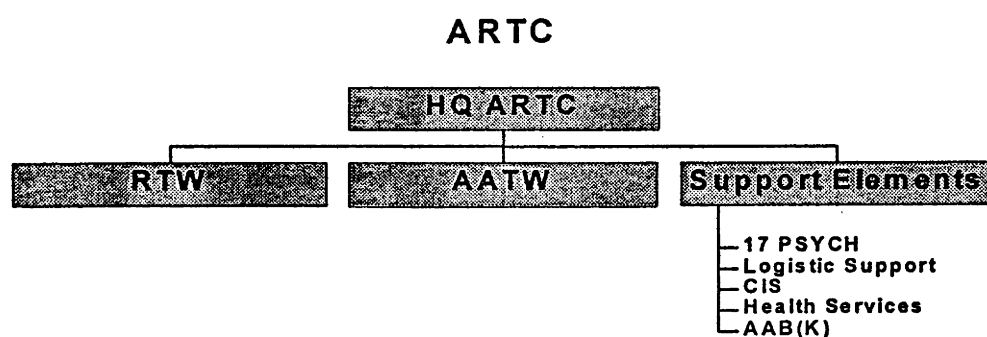


Figure 1

Recruit Training Wing Organisation

Recruit induction is demanding for both trainee and instructor alike. The Recruit Course is an intensive period of training which, when combined with high intake numbers, creates a significant challenge for RTW to achieve training excellence within an effective and balanced working environment. To meet this challenge RTW uses the most appropriate organisational structure and strategy for the conduct of training; the *Wing System*. An explanation of this system is developed in the following paragraphs.

W is structured as a unit, no differently to any major regimental unit in the Army. This facilitates recruit's understanding of Army ways of doing business; its structure, organisations, how internal relationships work and our methods for command and control.

W is commanded by a unit headquarters and consists of four recruit training companies each of recruit training platoons and a Training Support Company consisting of four specialist support platoons. The RTW is capable of training 1160 recruits in 24 platoons of 48 recruits, or if required capable of training 1440 recruits at a time in 24 platoons of 60 recruits. The regimental organisation of W is shown below in figure 2:

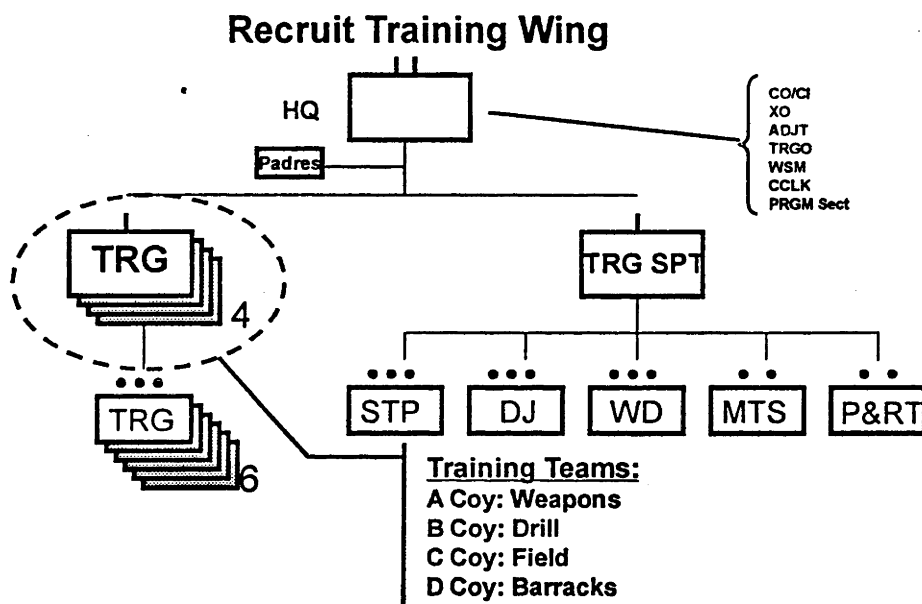


Figure 2

Training Organisation. To fulfil RTW's training requirement recruit training companies are assigned responsibility for delivery of training in a Key Training Area (KTA). Key Training Areas are sections of like training from the Recruit Training Management Package (TMP). The four KTA of the Recruit Course are drill, weapons training, field training and barracks training. All recruit instructors (RI) are assigned to one of the first three KTA to form a 'Training Team'. In this way Training Teams overlay the regimental structure of RTW. The purpose in doing this is to:

- develop and ensure RI proficiency in their KTA;
- ensure consistency of instruction by allowing for RI variance in knowledge, skills and experience;
- allow for surging of recruit numbers and to spread the instructional workload;
- to expose recruits to more than one RI, thus more than one role model and leader;
- to maintain a positive instructional culture by making RI less reliant on use of fear as a motivator and more reliant on developing appropriate learning strategies.

Training Teams. Under the team system A, B and C Company have each been assigned responsibility for one of the three key training areas of the recruit course, (see Figure 2). D Company is assigned responsibility for management of the various components of the TMP grouped under the general heading of *Barracks*. D Company Training Team does not currently have any RIs attached to it. Company responsibilities are as follows:

- A Coy - Weapons Team;
- B Coy - Drill Team;

C Coy - Field Training Team; and
 D Coy - Barracks.

Subject Masters. The CSM of each training company is also appointed as the subject master for the particular Key Training Area assigned to that company.

Role and Organisation of the Recruit Training Company

Role. The role of the recruit training company is to prepare soldiers for their IET and subsequent service as soldiers.

Organisation. The recruit company is established as a standard sub-unit; a company headquarters with six subordinate recruit training platoons. At full strength the company can train 360 recruits simultaneously. The CSM of the company is also the Subject Master for the particular Training Area responsibilities assigned to that company. To assist the CSM a Training Team SGT is established in the Coy HQ. The organisation of a generic recruit training company is shown below in Figure 3:

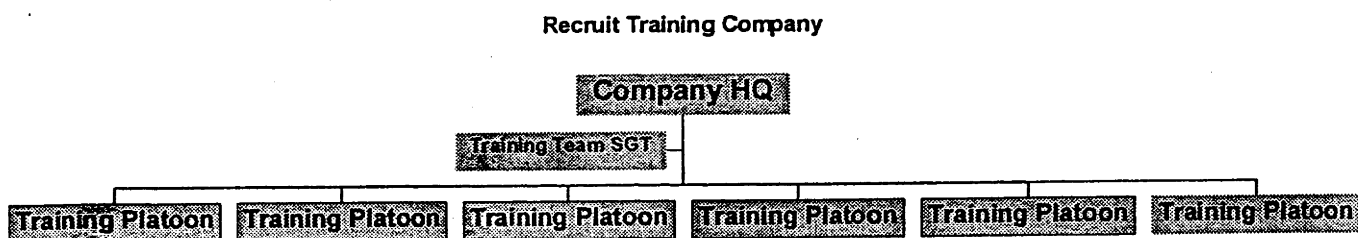


Figure 3

Role and Organisation of the Recruit Training Platoon

Role. The role of the recruit training platoon is to prepare soldiers for their IET and subsequent service as soldiers.

Organisation. The recruit platoon is established as a standard platoon; a platoon headquarters with four, rather than three, subordinate recruit training sections. At full strength the platoon can train 48 recruits simultaneously, or if required surge to 60 recruits for up to two consecutive platoon raises. Ideally the four CPL RI in the platoon will be competent in different Training Teams to facilitate better informal training, extra and additional training during off duty hours. The organisation of a generic recruit training platoon is shown below in Figure 4:

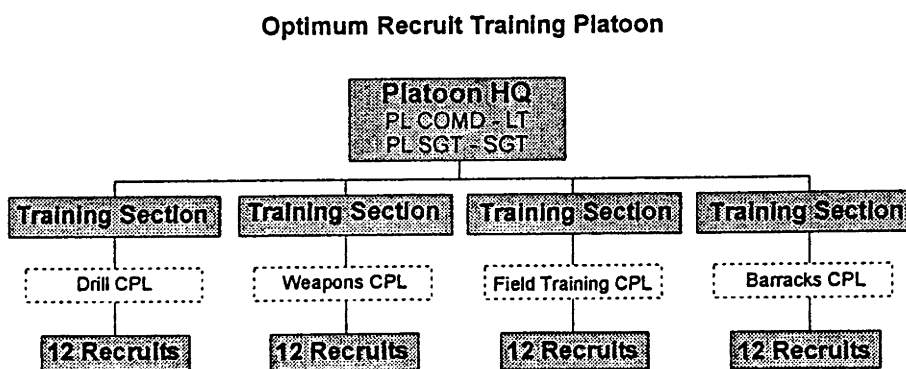


Figure 3

RTW STAFF

RTW is established with command, instructional and administrative staff. The procedures for management of these staff do not deviate from Army norms.

Recruit Instructor (RI) Development

Role of Recruit Instructors

Recruit Instructors (RI) are not just trainers. They develop civilian recruits into soldiers who not only possess the soldier's knowledge and skills but also hold true to the virtues and qualities for which Australian soldiers are renowned. To achieve this RIs must also be leaders, role models and mentors. In fulfilling these functions RIs not only teach the knowledge and skills required of Australian soldiers, they also impart the Army's culture, its ethos and values.

The Training Management Package (TMP) prescribes the knowledge and skills required of trained soldiers. It dictates the formal training that is conducted in the Wing. Underpinning the competency training of the TMP, a process of socialisation passes the Army culture and ethos to new recruits; particularly during their first few weeks of training. RIs have a fundamental role in this early socialisation (acculturation) process. The most *significant* persons with whom a recruit associates in their early Army life are their platoon staff, particularly their CPL RI. While RIs are at the coalface, they are not solely responsible for the acculturation of recruits. It is an organisational mission, a responsibility of RTW and the wider ARTC.

Recognising the scope of training recruits, that is transmission of knowledge, skills and military ethos and culture assists in recognising the full range of functions performed by Wing staff. These functions are in general terms environmental, leadership, instructional and mentoring.

Staff and RI Functions

Environmental. Recruit enculturation occurs through the experience of living in the regimental environment of RTW. Within that environment the functions and roles that exist in standard Army units are replicated. By living the experience of a unit structure recruits absorb and learn the functional relationships, patterns of behaviour, standards and organisational values and ethos.

Leadership - Role Model and Mentor. Leadership is fundamental to the training of recruits and the passing on of military culture, values and ethos. Leadership must vary to match given circumstances, but the best underpinning style is one of *leadership by example*. The leadership role includes guiding and counselling recruits. An RI's leadership style should emphasise their *role model* and *mentoring* functions. RIs should appreciate that they will be copied and mimicked by recruits and hence the power of their positive (or negative) influence. To young impressionable Australians the RI represents their aspirations. The words of one recruit heard talking of their RI describes well the import of RI leadership:

"He is everything I always thought a professional soldier would be like. I want to do well for him. I aspire to be like him."

(Recruit talking about his SECT COMD 16 Dec 9)

Instructional Role. Unlike their other Army schools, RIs are not training soldiers, but training civilians to make them into soldiers. Additionally, recruits represent a wide variety of Australian society; in schooling attainment, social status, physical ability and learning speed. RIs must develop strategies to cope with an often significant variance that may exist within the same platoon. The instructional role of RIs also includes administration tasks and lesson preparation.

CONDUCT OF TRAINING IN RTW

'... a soldier is more than a collection of military skills. To defeat a worthy opponent he must exhibit the virtues of the warrior: the determination, persistence and tenacity to win despite hardship or loss.'

Brown 1999

Aim of Recruit Training

The aim of recruit training is to qualify the maximum number of entrants to the Australian Army to the required standards in core military knowledge and skills, and to develop in them soldierly qualities. The aim can be divided into three parts:

- a. To enable recruits to achieve the competencies required to commence IET.
- b. To inculcate soldierly qualities including: a will to win, dedication to duty, honour, compassion and honesty, mateship and teamwork, loyalty, and physical and morale courage.
- c. To motivate recruits towards developing a military career.

Principles of Recruit Training

Training of recruits in RTW is guided by the following principles:

- a. **Recruit Civilian to Soldier.** Distinctly, the Recruit Course is the only course that trains civilians to create soldiers. Other courses train soldiers. This fact has a broad range of implications concerning the conduct of recruit training.
- b. **Mode and Essence.** A soldier is a complicated set of knowledge, skills and attitudes (KSA) that are not totally, or satisfactorily, described by the Recruit Course TMP. One way of overcoming this complication is to describe these KSA as the *mode* and *essence* of the soldier. The mode, or means of soldiering, is described by the knowledge and skill sets of the TMP. The Army's ethos and values describe the essence or core of soldiering. The Army's ethos and values on an individual level are the qualities or virtues desired of the Australian soldier. Interestingly, the usage of the word soldier in society in phrases such as 'soldier on' (Coderal cold tablet commercial) or 'he's a real soldier' indicates that the word soldier is more about virtues than skill sets. It must be recognised that training a civilian to be a soldier is mostly about inculcating the virtues of the soldier. Training a civilian to be a soldier is therefore very much about behavioural change.
- c. **Continuity.** Behavioural change requires a continuity of effort, not just in terms of time, but with instructors, leadership and role modelling. The principle of continuity teaches us that the Recruit Course should not be modularised or otherwise fragmented.
- d. **Reinforcement.** KSA require continual reinforcement to become instilled behaviours. 45 days is too short a timeframe in which to achieve appropriate inculcation of most Recruit Course skills. Without continuity, reinforcement is seriously disrupted.

Integration. The KSA of the Recruit Course interrelate in a complex synergistic process to produce the training outcome (a soldier). Division of the TMP, or Modularisation of training product, will as a consequence produce a lesser product. Professional discernment induces the opinion that 45 days is the minimum required to produce a basic soldier.

Role Models. Because Recruit Training is mostly about behavioural change, it must be conducted with a human interface. That interface must be high quality. Hence all instructors at RTW, from the CI down, are considered to be, and are, role models and leaders; they are not just trainers. They cannot be replaced by ADELS, CD ROMs, or the ad hoc influence of external instructors.

Duty of Care. The Army has a number of responsibilities in training recruits. First and foremost the mental and physical security of trainees must be assured. Physical and psychological abuse of both male and female recruits has occurred in the past. Society is intolerant of abuses against its youth. In this regard, the ARTC Code of Conduct guides instructor behaviours. Second the Army has a duty of care to ensure soldiers are as competent as possible to be employed in their peace and wartime roles. They must be competent to use the equipment, weapons and ordnance they are exposed to. This also applies to their leader's competency to properly supervise. Lack of competency has previously led to death and injury of ARA soldiers and Reservists. The Army would be culpable if it knowingly employed under-trained soldiers who were killed or injured in training operations.

The Training Program

Following is an example of the 45 day training program.

Annex B

Questionnaires: Pilot and longitudinal studies

Self-Evaluation Questionnaire

A number of statements which people have used to describe themselves are given below. Read each statement and then circle the appropriate number to the right of the statement to indicate how you feel right now, that is, at this moment. There are no right or wrong answers. Do not spend too much time on any one statement but give the answer which seems to describe your present feelings best.

		<u>Not at all</u>	<u>Somewhat</u>	<u>Moderately So</u>	<u>Very much So</u>
1.	I feel calm	1	2	3	4
2.	I feel secure	1	2	3	4
3.	I am tense	1	2	3	4
4.	I feel strained	1	2	3	4
5.	I feel at ease	1	2	3	4
6.	I feel upset	1	2	3	4
7.	I am presently worrying over possible misfortunes	1	2	3	4
8.	I feel satisfied	1	2	3	4
9.	I feel frightened	1	2	3	4
10.	I feel comfortable	1	2	3	4
11.	I feel self-confident	1	2	3	4
12.	I feel nervous	1	2	3	4
13.	I am jittery	1	2	3	4
14.	I feel indecisive	1	2	3	4
15.	I am relaxed	1	2	3	4
16.	I feel content	1	2	3	4
17.	I am worried	1	2	3	4
18.	I feel confused	1	2	3	4
19.	I feel steady	1	2	3	4
20.	I feel pleasant	1	2	3	4

A number of statements which people have used to describe themselves are given below. Read each statement and then circle the appropriate number to the right of the statement to indicate how you *generally* feel. There are no right or wrong answers. Do not spend too much time on any one statement but give the answer which seems to describe how you generally feel.

		<u>Almost Never</u>	<u>Sometimes</u>	<u>Often</u>	<u>Almost Always</u>
21.	I feel pleasant	1	2	3	4
22.	I feel nervous and restless	1	2	3	4
23.	I feel satisfied with myself	1	2	3	4
24.	I wish I could be as happy as others seem to be	1	2	3	4
25.	I feel like a failure	1	2	3	4
26.	I feel rested	1	2	3	4
27.	I am "calm, cool & collected"	1	2	3	4
28.	I feel that difficulties are piling up so that I cannot overcome them	1	2	3	4
29.	I worry too much over something that doesn't really matter	1	2	3	4
30.	I am happy	1	2	3	4
31.	I have disturbing thoughts	1	2	3	4
32.	I lack self-confidence	1	2	3	4
33.	I feel secure	1	2	3	4
34.	I make decisions easily	1	2	3	4
35.	I feel inadequate	1	2	3	4
36.	I am content	1	2	3	4

Staff-in-Confidence (*After first entry*)

	<u>Almost Never</u>	<u>Sometimes</u>	<u>Often</u>	<u>Almost Always</u>
37. Some unimportant thought runs through my mind and bothers me.	1	2	3	4
38. I take disappointments so keenly that I can't put them out of my mind.	1	2	3	4
39. I am a steady person	1	2	3	4
40. I get in a state of tension or turmoil as I think over my recent concerns and interests	1	2	3	4

Job Satisfaction Questionnaire

Please read the following statements carefully, and consider them in light of your current job. Then rate, on the scale provided, the degree to which you agree or disagree with the statements, by circling the number corresponding to the response which best describes how you feel.

- 1 = Strongly agree
- 2 = Moderately agree
- 3 = Mildly agree
- 4 = Neither agree nor disagree
- 5 = Mildly disagree
- 6 = Moderately disagree
- 7 = Strongly disagree

1. If a good friend of mine told me that he/she was interested in doing my job, I would strongly recommend it.

1	2	3	4	5	6	7
---	---	---	---	---	---	---

2. All in all, I am very satisfied with my current job.

1	2	3	4	5	6	7
---	---	---	---	---	---	---

3. In general, my job measures up to the sort of job I wanted when I took it.

1	2	3	4	5	6	7
---	---	---	---	---	---	---

4. Knowing what I know now, If I had to decide all over again whether to take my job, I would.

1	2	3	4	5	6	7
---	---	---	---	---	---	---

5. I would accept this job even if I didn't have to do it.

1	2	3	4	5	6	7
---	---	---	---	---	---	---

Army Work Demands Questionnaire

Sources of pressure in your job.

The items below are all potential sources of pressure in your work. You are required to rate them in terms of how much of a source of pressure they are in your work. Please answer by circling the number of your answer against the scale shown.

- 1** **Definitely is a source of pressure**
- 2** **Generally is a source of pressure**
- 3** **Generally is not a source of pressure**
- 4** **Definitely is not a source of pressure**

1. Having too much work to do
4 3 2 1
2. Having to be at work for very long hours
4 3 2 1
3. Not being able to 'switch off' at home
4 3 2 1
4. Lack of consultation and communication
4 3 2 1
5. Not having my ideas or professional judgement valued by superiors
4 3 2 1
6. Having to work on weekends and public holidays
4 3 2 1
7. Not being able to plan leave or other leisure activities in advance
4 3 2 1
8. Delegated tasks which conflict with my primary role of training recruits
4 3 2 1
9. Excessive administrative tasks and paperwork
4 3 2 1
10. A lack of support from superiors
4 3 2 1
11. Demands that work place on my private/social life
4 3 2 1
12. Having to cope with the start of the 'Surge Period' and posting cycle occurring simultaneously
4 3 2 1
13. Too much change or ambiguity in individual roles
4 3 2 1
14. Insufficient revision of the training throughput to ensure workloads are adequately spread among staff
4 3 2 1
15. Having to sacrifice personal career management due to work commitments
4 3 2 1
16. Being shifted to different platoons too frequently to account for staff shortages
4 3 2 1

Staff-in-Confidence (*After first entry*)

- 1 **Definitely is a source of pressure**
- 2 **Generally is a source of pressure**
- 3 **Generally is not a source of pressure**
- 4 **Definitely is not a source of pressure**

- 17. Worrying about the impact of time constraints on the standard of training
4 3 2 1
- 18. Frequent, unpredictable changes in the requirements or procedures for routine tasks or activities
4 3 2 1
- 19. Frequent, unpredictable changes in the training program
4 3 2 1
- 20. Having to persevere with recruits who are clearly unsuitable for the Army but are not removed from training
4 3 2 1
- 21. Worrying about the consequences of doing something wrong.
4 3 2 1
- 22. Having large recruit to staff ratios
4 3 2 1

Staff-in-Confidence (*After first entry*)

- 1 **Definitely is a source of pressure**
- 2 **Generally is a source of pressure**
- 3 **Generally is not a source of pressure**
- 4 **Definitely is not a source of pressure**

17. Worrying about the impact of time constraints on the standard of training
4 3 2 1

18. Frequent, unpredictable changes in the requirements or procedures for routine tasks or activities
4 3 2 1

19. Frequent, unpredictable changes in the training program
4 3 2 1

20. Having to persevere with recruits who are clearly unsuitable for the Army but are not removed from training
4 3 2 1

21. Worrying about the consequences of doing something wrong.
4 3 2 1

22. Having large recruit to staff ratios
4 3 2 1

Subjective Fatigue Scale

Fatigue can result in a deterioration of your performance over time, resulting in forgetfulness, concentration problems, faulty judgements and simple errors. We are interested in finding out how you are affected by fatigue, especially how it impacts on your work performance. Please complete the questionnaire by reading each of the fatigue symptoms listed below and report the frequency (TIMES) that you have experienced the symptoms during the past 45 days. Draw a circle around one of the response alternatives provided on the scale. For example, if you estimate that you have experienced a symptom 3-4 times during the past 45 days, then draw a circle around "3-4". Even if you are unsure of how many times, or whether you have experienced a symptom listed, please give your best estimate.

Frequency of Symptoms

Indicate how many TIMES you have experienced the following symptoms during the past 45 days.

1.	Tiredness of the whole body	Never	1-2	3-4	5-6	7-8	9-10	>11
2.	Difficulty concentrating	Never	1-2	3-4	5-6	7-8	9-10	>11
3.	Headaches	Never	1-2	3-4	5-6	7-8	9-10	>11
4.	Yawning	Never	1-2	3-4	5-6	7-8	9-10	>11
5.	Forgetfulness	Never	1-2	3-4	5-6	7-8	9-10	>11
6.	Back or neck pain	Never	1-2	3-4	5-6	7-8	9-10	>11
7.	Drowsiness	Never	1-2	3-4	5-6	7-8	9-10	>11
8.	Lacking patience	Never	1-2	3-4	5-6	7-8	9-10	>11
9.	Feeling ill	Never	1-2	3-4	5-6	7-8	9-10	>11

WORK ENVIRONMENT SCALE

FORM B

AUSTRALIAN NATIONAL UNIVERSITY and Paul N. Insel
Faculty of Science
Division of Psychology
Psychological Test Library

Session No: ...0048.....

Entered: ...5.7.95.....

Instructions

There are 90 statements in this booklet. They are statements about the place in which you work. The statements are intended to apply to all work environments. However, some words may not be quite suitable for your work environment. For example, the term supervisor is meant to refer to the boss, manager, department head, or the person or persons to whom an employee reports.

You are to decide which statements are true of your work environment and which are false. Make all your marks on the separate answer sheet.

If you think the statement is *true* or mostly *true* of your work environment, make an X in the box labeled T (true).

If you think the statement is *false* or mostly *false* of your work environment, make an X in the box labeled F (false).

Please be sure to answer every statement.

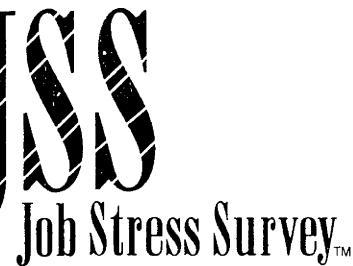


Consulting Psychologists Press, Inc.
3803 E. Bayshore Road, Palo Alto, CA 94303

Copyright © 1974 by Consulting Psychologists Press, Inc., Palo Alto, CA 94303. All rights reserved. This test, or parts thereof, may not be reproduced in any form without permission of the publisher. Printed in the U.S.A. 00 07 06 05 04 03 02 01 00 10 10 17

1. The work is really challenging.
2. People go out of their way to help a new employee feel comfortable.
3. Supervisors tend to talk down to employees.
4. Few employees have any important responsibilities.
5. People pay a lot of attention to getting work done.
6. There is constant pressure to keep working.
7. Things are sometimes pretty disorganized.
8. There's a strict emphasis on following policies and regulations.
9. Doing things in a different way is valued.
10. It sometimes gets too hot.
11. There's not much group spirit.
12. The atmosphere is somewhat impersonal.
13. Supervisors usually compliment an employee who does something well.
14. Employees have a great deal of freedom to do as they like.
15. There's a lot of time wasted because of inefficiencies.
16. There always seems to be an urgency about everything.
17. Activities are well-planned.
18. People can wear wild looking clothing while on the job if they want.
19. New and different ideas are always being tried out.
20. The lighting is extremely good.
21. A lot of people seem to be just putting in time.
22. People take a personal interest in each other.
23. Supervisors tend to discourage criticisms from employees.
24. Employees are encouraged to make their own decisions.
25. Things rarely get "put off till tomorrow."
26. People cannot afford to relax.
27. Rules and regulations are somewhat vague and ambiguous.
28. People are expected to follow set rules in doing their work.
29. This place would be one of the first to try out a new idea.
30. Work space is awfully crowded.
31. People seem to take pride in the organization.
32. Employees rarely do things together after work.
33. Supervisors usually give full credit to ideas contributed by employees.
34. People can use their own initiative to do things.
35. This is a highly efficient, work-oriented place.
36. Nobody works too hard.
37. The responsibilities of supervisors are clearly defined.
38. Supervisors keep a rather close watch on employees.
39. Variety and change are not particularly important.
40. This place has a stylish and modern appearance.
41. People put quite a lot of effort into what they do.
42. People are generally frank about how they feel.
43. Supervisors often criticize employees over minor things.
44. Supervisors encourage employees to rely on themselves when a problem arises.
45. Getting a lot of work done is important to people.
46. There is no time pressure.
47. The details of assigned jobs are generally explained to employees.
48. Rules and regulations are pretty well enforced.
49. The same methods have been used for quite a long time.
50. The place could stand some new interior decorations.
51. Few people ever volunteer.
52. Employees often eat lunch together.
53. Employees generally feel free to ask for a raise.
54. Employees generally do not try to be unique and different.
55. There's an emphasis on "work before play."
56. It is very hard to keep up with your work load.
57. Employees are often confused about exactly what they are supposed to do.
58. Supervisors are always checking on employees and supervise them very closely.
59. New approaches to things are rarely tried.
60. The colors and decorations make the place warm and cheerful to work in.
61. It is quite a lively place.
62. Employees who differ greatly from the others in the organization don't get on well.
63. Supervisors expect far too much from employees.
64. Employees are encouraged to learn things even if they are not directly related to the job.
65. Employees work very hard.
66. You can take it easy and still get your work done.
67. Fringe benefits are fully explained to employees.
68. Supervisors do not often give in to employee pressure.
69. Things tend to stay just about the same.
70. It is rather drafty at times.
71. It's hard to get people to do any extra work.
72. Employees often talk to each other about their personal problems.
73. Employees discuss their personal problems with supervisors.

74. Employees function fairly independently of supervisors.
75. People seem to be quite inefficient.
76. There are always deadlines to be met.
77. Rules and policies are constantly changing.
78. Employees are expected to conform rather strictly to the rules and customs.
79. There is a fresh, novel atmosphere about the place.
80. The furniture is usually well-arranged
81. The work is usually very interesting.
82. Often people make trouble by talking behind others' backs.
83. Supervisors really stand up for their people.
84. Supervisors meet with employees regularly to discuss their future work goals.
85. There's a tendency for people to come to work late.
86. People often have to work overtime to get their work done.
87. Supervisors encourage employees to be neat and orderly.
88. If an employee comes in late, he can make it up by staying late.
89. Things always seem to be changing.
90. The rooms are well ventilated.



by Charles D. Spielberger, PhD, and Peter R. Vagg, PhD

Job stress can have serious effects on the lives of employees and their families. The impact of stressful job events is influenced by both the amount of stress associated with a particular event and the frequency of its occurrence. This survey will determine your perception of important sources of stress in your work. The survey lists 30 job-related events that many employees find stressful. First, you will be asked to rate the amount of stress associated with each event. Then, indicate the number of times within the last 6 months that you have experienced each event. In making your ratings of the amount of stress for each stressor event, use all of your knowledge and experience. Consider the amount of time and energy that you would need to cope with or adjust to the event. Base your ratings on your personal experience as well as what you have seen to be the case for others. Rate the average amount of stress that you feel is associated with each event, rather than the extreme. The first event, ASSIGNMENT OF DISAGREEABLE DUTIES, was rated by persons in a variety of occupations as producing an average amount of stress. This event has been given a rating of "5" and will be used as the standard for evaluating the other events. Compare each event with this standard. Then assign a number from "1" to "9" to indicate whether you judge the event to be less or more stressful than being assigned disagreeable duties. Please read the sample item for Part A (Amount of Stress) and follow the instructions for rating this item. Then, complete the sample item for Part B (Frequency of the Event).

Sample Item-Part A (Amount of Stress):

If the event listed in SA is more stressful to you than the ASSIGNMENT OF DISAGREEABLE DUTIES, circle a number proportionately larger than "5." If this event is less stressful than the ASSIGNMENT OF DISAGREEABLE DUTIES, circle a number proportionately lower than "5." If this event produces about the same level of stress as the ASSIGNMENT OF DISAGREEABLE DUTIES, circle the number "5."

SA. Working on a repetitive task 1 2 3 4 5 6 7 8 9

Sample Item-Part B (Frequency of the Event):

Indicate the approximate number of days during the past 6 months on which you have personally experienced the event. For example, if you have experienced the event listed in SB on 4 days during the past 6 months, circle the "4." If you have not experienced the event on any days during the past 6 months, circle the "0." If you have experienced the event listed in SB on 9 or more days during the past 6 months, circle "9+."

SB. Working on a repetitive task 0 1 2 3 4 5 6 7 8 9+

If you make a mistake or change your mind on any item, DO NOT ERASE. Make an "X" through the incorrect response and then circle the correct response, like this:

SB. Working on a repetitive task 0 1 2 3 4 5 ~~6~~ 7 8 9+

Turn to page 2 and enter your name, age, gender (M or F), and today's date on the first line. Indicate your total years of education, including college degrees, and your current job title or occupation on the next line. Then, read the instructions for Part A and rate items 2A-30A. Next, read the instructions for Part B and rate items 1B-30B.

Psychological Assessment Resources, Inc./P.O. Box 998/Odessa, FL 33556/Toll-Free 1-800-331-TEST/http://www.parinc.com

Copyright © 1992, 1999 by Psychological Assessment Resources, Inc. All rights reserved. May not be reproduced in whole or in part in any form without written permission of Psychological Assessment Resources, Inc. This booklet is printed in blue ink on carbonless paper. Other versions are unauthorized.

Name _____ Age _____ Gender _____ Date _____

Education _____ Job Title _____

Part A. Instructions: For job-related events judged to produce approximately the same amount of stress as the **ASSIGNMENT OF DISAGREEABLE DUTIES**, circle the number "5." For those events that you feel are more stressful than the standard, circle a number proportionately larger than "5." If you feel an event is less stressful than the standard, circle a number proportionately lower than "5."

STRESSFUL JOB-RELATED EVENTS	Amount of Stress								
	Low	Moderate			High				
1A. ASSIGNMENT OF DISAGREEABLE DUTIES	1	2	3	4	5	6	7	8	9
2A. Working overtime	1	2	3	4	5	6	7	8	9
3A. Lack of opportunity for advancement	1	2	3	4	5	6	7	8	9
4A. Assignment of new or unfamiliar duties	1	2	3	4	5	6	7	8	9
5A. Fellow workers not doing their job	1	2	3	4	5	6	7	8	9
6A. Inadequate support by supervisor	1	2	3	4	5	6	7	8	9
7A. Dealing with crisis situations	1	2	3	4	5	6	7	8	9
8A. Lack of recognition for good work	1	2	3	4	5	6	7	8	9
9A. Performing tasks not in job description	1	2	3	4	5	6	7	8	9
10A. Inadequate or poor quality equipment	1	2	3	4	5	6	7	8	9
11A. Assignment of increased responsibility	1	2	3	4	5	6	7	8	9
12A. Periods of inactivity	1	2	3	4	5	6	7	8	9
13A. Difficulty getting along with supervisor	1	2	3	4	5	6	7	8	9
14A. Experiencing negative attitudes toward the organization	1	2	3	4	5	6	7	8	9
15A. Insufficient personnel to handle an assignment	1	2	3	4	5	6	7	8	9
16A. Making critical on-the-spot decisions	1	2	3	4	5	6	7	8	9
17A. Personal insult from customer/consumer/colleague	1	2	3	4	5	6	7	8	9
18A. Lack of participation in policy-making decisions	1	2	3	4	5	6	7	8	9
19A. Inadequate salary	1	2	3	4	5	6	7	8	9
20A. Competition for advancement	1	2	3	4	5	6	7	8	9
21A. Poor or inadequate supervision	1	2	3	4	5	6	7	8	9
22A. Noisy work area	1	2	3	4	5	6	7	8	9
23A. Frequent interruptions	1	2	3	4	5	6	7	8	9
24A. Frequent changes from boring to demanding activities	1	2	3	4	5	6	7	8	9
25A. Excessive paperwork	1	2	3	4	5	6	7	8	9
26A. Meeting deadlines	1	2	3	4	5	6	7	8	9
27A. Insufficient personal time (e.g., coffee breaks, lunch)	1	2	3	4	5	6	7	8	9
28A. Covering work for another employee	1	2	3	4	5	6	7	8	9
29A. Poorly motivated coworkers	1	2	3	4	5	6	7	8	9
30A. Conflicts with other departments	1	2	3	4	5	6	7	8	9

Go on to Part B.

3. Instructions: For each of the job-related events listed, please indicate the approximate number of days the past 6 months on which you have personally experienced this event. Circle "0" if the event did not occur; the number "9+" for each event that you experienced personally on 9 or more days during the past 6 months.

UNSUCCESSFUL JOB-RELATED EVENTS **Number of Days on Which the Event Occurred During the Past 6 Months**

UNSUCCESSFUL JOB-RELATED EVENTS	0	1	2	3	4	5	6	7	8	9+
Assignment of disagreeable duties	0	1	2	3	4	5	6	7	8	9+
Working overtime	0	1	2	3	4	5	6	7	8	9+
Lack of opportunity for advancement	0	1	2	3	4	5	6	7	8	9+
Assignment of new or unfamiliar duties	0	1	2	3	4	5	6	7	8	9+
Slow workers not doing their job	0	1	2	3	4	5	6	7	8	9+
Inadequate support by supervisor	0	1	2	3	4	5	6	7	8	9+
Working with crisis situations	0	1	2	3	4	5	6	7	8	9+
Lack of recognition for good work	0	1	2	3	4	5	6	7	8	9+
Performing tasks not in job description	0	1	2	3	4	5	6	7	8	9+
Inadequate or poor quality equipment	0	1	2	3	4	5	6	7	8	9+
Assignment of increased responsibility	0	1	2	3	4	5	6	7	8	9+
Periods of inactivity	0	1	2	3	4	5	6	7	8	9+
Difficulty getting along with supervisor	0	1	2	3	4	5	6	7	8	9+
Experiencing negative attitudes toward the organization	0	1	2	3	4	5	6	7	8	9+
Insufficient personnel to handle an assignment	0	1	2	3	4	5	6	7	8	9+
Requiring critical on-the-spot decisions	0	1	2	3	4	5	6	7	8	9+
Personal insult from customer/consumer/colleague	0	1	2	3	4	5	6	7	8	9+
Lack of participation in policy-making decisions	0	1	2	3	4	5	6	7	8	9+
Inadequate salary	0	1	2	3	4	5	6	7	8	9+
Competition for advancement	0	1	2	3	4	5	6	7	8	9+
Over or inadequate supervision	0	1	2	3	4	5	6	7	8	9+
Cluttered work area	0	1	2	3	4	5	6	7	8	9+
Frequent interruptions	0	1	2	3	4	5	6	7	8	9+
Frequent changes from boring to demanding activities	0	1	2	3	4	5	6	7	8	9+
Excessive paperwork	0	1	2	3	4	5	6	7	8	9+
Changing deadlines	0	1	2	3	4	5	6	7	8	9+
Insufficient personal time (e.g., coffee breaks, lunch)	0	1	2	3	4	5	6	7	8	9+
Doing work for another employee	0	1	2	3	4	5	6	7	8	9+
Not motivated coworkers	0	1	2	3	4	5	6	7	8	9+
Conflicts with other departments	0	1	2	3	4	5	6	7	8	9+

PLEASE
DO NOT
WRITE IN
THIS AREA

Annex C

Fatigue audit data sheet

Annex D

Biodata sheet – Pilot study 1

BIOGRAPHICAL INFORMATION

Regt No:

Age:

Unit:

Sub Unit:

Appt:

March-in date to current unit:

Date of Enlistment/Appointment:

Posting history: (include any overseas deployments):

Annex E

Information sheet and consent form – Pilot study 1

INFORMATION SHEET

THE CHRONIC EFFECTS OF OCCUPATIONAL STRESSORS ON THE WORK PERFORMANCE OF RECRUIT TRAINING STAFF AT THE ARMY RECRUIT TRAINING CENTRE (ARTC)

You are being asked to engage in a study to help increase our understanding of the work demands of being a Section Commander, Platoon Sergeant, or Platoon Commander at ARTC. The information from this study will be used to improve the management of training staff at ARTC to minimise the impact of occupational stress, particularly during the "Surge Period". We are very interested in your opinions even if you don't feel as though you have experienced stress or pressure in your work. This study is being conducted by CAPT Samantha Brooks, under the supervision of Professor Don Byrne at the Australian National University, and is a joint project between ARTC and the Australian National University.

If you agree to take part in this study, you will be asked to complete some questionnaires which, altogether, take around 45-50 minutes to complete. You will be asked to do this upon your march-in to ARTC, and then after every Platoon you train during the "Surge Period". You will also be asked to maintain a record of how many hours you work over each platoon. You will also be asked to complete another questionnaire at a random time over the course of the "Surge Period". Additionally, it is requested that you provide saliva samples to the investigator for analysis at the same time that you complete the questionnaires. This analysis is designed only to measure the amount of antibodies in your system.

While this study is being conducted independently from the ARTC chain of command, the COMDT ARTC has given the study his full support and approves your release from normal duties in order to participate in the study. You will be considered to be on duty during your participation in this study. This covers participants in regards to compensation in the case of injury or illness resulting from involvement in this study.

If at any stage of the study you decide that you do not wish to complete any of the questionnaires or provide samples, you may withdraw from the study at your own discretion. If you decide to withdraw, this will not affect your career in the ADF or at ARTC. Likewise, information provided by participants will not be released to the ARTC chain of command for the purpose of formal performance reporting or any other reason. This study is independent from the ARTC chain of command, and all information collected will remain the property of the investigator and will be stored under a Psychology-In-Confidence confidentiality marking. All identifying data will be detached from the questionnaires and will be stored in-confidence at the Australian National University. The only purpose of identifying information is to link information across the questionnaires and other data. If any information is

published, only average scores will be included and no identifying information will be released to the chain of command at any time.

As we value your contribution, results will be available by contacting any of the researchers on the telephone numbers listed below. You can also contact any of the researchers for assistance, if you are currently experiencing any stress-related problems.

CAPT Samantha Brooks: (02) 69210 477

MAJ Stephanie Hodson: (02) 69210 476

Professor Don Byrne: (02) 62493974.

The ethical aspects of this study are being conducted according to the principles set out by the National Health and Medical Research guidelines for research with human subjects. All aspects of the research are reviewed by the Australian Defence Medical Ethics Committee and the Australian National University's Ethics in Human Experimentation Committee. Should you have any complaints or concerns about the manner in which this project is conducted, please do not hesitate to contact the researchers in person or, if you wish, you may contact the Australian National University Ethics Committee through its Ethics Officer, Mrs Sylvia Deutsch on (02) 6249 2900. Alternatively, you may contact the Australian Defence Medical Ethics Committee at the following address.

Executive Secretary
Australian Defence Medical Ethics Committee
CP4-6-45
Department of Defence
CANBERRA ACT 2600

Telephone:	(02) 62663925	DNATS 8 66 3925
Fax:	(02) 62664982	DNATS 8 66 4982

CONSENT FROM

THE CHRONIC EFFECTS OF OCCUPATIONAL STRESSORS ON THE WORK PERFORMANCE OF RECRUIT TRAINING STAFF AT THE ARMY RECRUIT TRAINING CENTRE (ARTC)

I,..... give my consent to participate in the project mentioned above on the following basis:

- I have had explained to me the aims of this research project, how it will be conducted and my role in it. I am happy to participate. I understand that I will be asked to take time out of my work schedule to complete questionnaires and provide saliva samples to the researchers, and also keep a record of how many hours I am working, over the course of the “Surge Period”.
- I understand that I am participating in this project in a voluntary capacity and can withdraw at any time without penalty or detriment to my career.
- I am cooperating in this project on the condition that:
 - The information I provide will be kept confidential
 - The information will be used only for this project
 - The research results will be made available to me at my request and
 - Any published reports of this study will preserve my anonymity.

I have been given a copy of the information sheet and this form, signed by me and by the principal researcher, CAPT Samantha Brooks.

I have also been given a copy of ADMEC’s Guidelines for Volunteers.

.....
Participant Date

.....
Principal researcher Date

Annex F

Australian Defence Medical Ethics Committee guidelines for volunteers



AUSTRALIAN DEFENCE MEDICAL ETHICS COMMITTEE

GUIDELINES FOR VOLUNTEERS

Thank you for taking part in Defence Research. Your involvement is much appreciated. This pamphlet explains your rights as a volunteer.

What is ADMEC?

- ADMEC is the Australian Defence Medical Ethics Committee. It was established in 1988 to make sure that Defence complied with accepted guidelines for research involving human beings.
- After World War II, there was concern around the world about human experimentation. The Declaration of Helsinki was made in 1964, which provided the basic principles to be followed wherever humans were used in research projects.
- The National Health & Medical Research Council in Australia published a set of guidelines in 1982 for how human research should be carried out.
- ADMEC follows both the Declaration of Helsinki and the NHMRC Guidelines.

What ADMEC approval means

- If you are told that the project has ADMEC approval, what that means is that ADMEC has reviewed the research proposal and has agreed that the research is ethical.
- ADMEC approval does not imply any obligation onto Commanders to order or encourage their troops to participate, or to release troops from their usual workplace to participate. Obviously, the use of any particular troops must have clearance from their Commanders but Commanders should not use ADMEC approval to pressure troops into volunteering.

Voluntary Participation

- As you are a volunteer for this research project, you are under no obligation to participate or continue to participate. You may withdraw from the project at any time without detriment to your military career or to your medical care.
- At no time must you feel pressured to participate or to continue on if you do not wish to.
- If you do not wish to continue, it would be useful to the researcher to know why, but you are under no obligation to give reasons for not wanting to continue.

Informed Consent

- Before commencing the project you will have been given an information sheet which explains the project, your role in it and any risks that you may be exposed to.
- You must be sure that you understand the information given to you and that you ask the researchers about anything that you're not sure of.
- If you are satisfied that you understand the information sheet and agree to participate, you should initial every page of the information sheet and keep a copy.
- Before you participate in the project you should also have been given a consent form to sign. You must be happy that the consent form is easy to understand and spells out what you are agreeing to. Again, you should keep a copy of the signed consent form

Complaints

- If at any time during your participation in the project you are worried about how the project is being run or how you are being treated, then you should speak to the researchers.
- If you don't feel comfortable doing this, you can contact the Executive Secretary of ADMEC. Contact details are

**Executive Secretary
Australian Defence Medical Ethics Committee
CP4-6-45
Department of Defence
CANBERRA ACT 2600**

**Ph: 02 62663925 or DNATS 8663925
Fax: 02 62664982 or DNATS 8664982
E-mail: hlthpol@bigfoot.com**

More Information

- If you would like to read more about ADMEC, you can look up the following references on the Defence Manager's Toolbox
 - DI(G)ADMIN 24-3 Function, Structure and Procedures for Obtaining Clearance for Research from ADMEC
 - HPD 205 Australian Defence Medical Ethics Committee
- Or, visit our web site on www.bigfoot.com/~dhsb

Annex G

Information sheet and consent form – pilot study 2

INFORMATION SHEET

THE EFFECTS OF OCCUPATIONAL STRESS AND FATIGUE ON AUSTRALIAN ARMY SOLDIERS

You are being asked to engage in a study to help increase our understanding of the work demands of training and support staff at ARTC. The information from this study will be used to improve the management of staff at ARTC, and to minimise the impact of occupational stress and fatigue. As you are aware, in order to sustain our troops in East Timor and in other operations in which Australian soldiers are serving, ARTC has recently incurred a significantly increased training throughput. As such, Training Command-Army is interested in ascertaining the impact this will have on the performance and well-being of staff at ARTC.

All staff at ARTC have been asked to participate in this research, as the researchers are interested in the how the unique demands of your jobs affect your well-being. As such, your involvement in this study is highly valued. The combination of an increased training throughput, together with CSP, manning shortages and a climate of change has made the role of support staff at ARTC very demanding. As such, we are very interested in your opinions, and your perceptions of your work environment, even if you don't feel as though you have experienced stress or pressure in your work.

This study is being conducted by CAPT Samantha Brooks, under the supervision of Professor Don Byrne at the Australian National University, and is a joint project between ARTC and the Australian National University.

If you agree to take part in this study, you will be asked to complete some questionnaires which, altogether, take around 30 minutes to complete. You will also be asked to maintain a record of how many hours you work over a 14 day period, as explained in the enclosed Fatigue Audit Data Sheet. Additionally, it is requested that you provide a saliva sample for analysis after you complete the questionnaires. **This analysis is designed only to measure the amount of antibodies in your system. Specifically, antibodies that are related to immunity can be detected in saliva, and as such they provide a biological indicator of stress.** A more comprehensive indication of stress and its effects is best obtained by looking at both subjective reports of stress, and objective biological evidence. **The sample you provide will not be used for any other purpose than that specified above, and the sample will remain the property of the Hunter Area Pathology Service.**

HQ TRG COMD-A has given the study its support and approves your release from normal duties in order to participate in the study. You will be considered to be on duty during your participation in this study.

If at any stage of the study you decide that you do not wish to complete the questionnaire or provide a sample, you may withdraw from the study at your own discretion. If you decide to withdraw, this will not affect your career in the ADF. Likewise, information provided by participants will not be released to the Army chain of command for the purpose of formal performance reporting or any other reason. This study is entirely independent and all information collected will remain the property of the investigator and will be stored under a Psychology-In-Confidence confidentiality marking. All identifying data will be detached from the questionnaires and will be stored in-confidence at the Australian National University. The only purpose of identifying information is to link information across the questionnaires and other data. If any information is published, only average scores will be included and no identifying information will be released to the chain of command at any time.

As we value your contribution, results will be available by contacting any of the researchers on the telephone numbers listed below. You can also contact any of the researchers for assistance, if you are currently experiencing any stress-related problems.

CAPT Samantha Brooks: (02) 6266 3449
MAJ Stephanie Hodson: (02) 69210 476
Professor Don Byrne: (02) 62493974.

The ethical aspects of this study are being conducted according to the principles set out by the National Health and Medical Research guidelines for research with human subjects. All aspects of the research are reviewed by the Australian Defence Medical Ethics Committee and the Australian National University's Ethics in Human Experimentation Committee. Should you have any complaints or concerns about the manner in which this project is conducted, please do not hesitate to contact the researchers in person or, if you wish, you may contact the Australian National University Ethics Committee through its Ethics Officer, Mrs Sylvia Deutsch on (02) 6249 2900. Alternatively, you may contact the Australian Defence Medical Ethics Committee at the following address.

Executive Secretary
Australian Defence Medical Ethics Committee
CP2-7-66
Department of Defence
CANBERRA ACT 2600

Telephone: (02) 62663925 DNATS 8 66 3925
Fax: (02) 62664982 DNATS 8 66 4982

CONSENT FORM

**THE EFFECTS OF OCCUPATIONAL STRESS AND FATIGUE
ON AUSTRALIAN ARMY SOLDIERS**

I,..... give my consent to participate in the project mentioned above on the following basis:

- I have had explained to me the aims of this research project, how it will be conducted and my role in it. I am happy to participate. I understand that I will be asked to take time out of my work schedule to complete questionnaires and provide saliva samples to the researchers, and also keep a record of how many hours I am working, over a 14 day period.
- I understand that I am participating in this project in a voluntary capacity and can withdraw at any time without penalty or detriment to my career.
- I am cooperating in this project on the condition that:
 - The information I provide will be kept confidential
 - The information will be used only for this project
 - The research results will be made available to me at my request and
 - Any published reports of this study will preserve my anonymity.

I have been given a copy of the information sheet and this form, signed by me and by the principal researcher, CAPT Samantha Brooks.

I have also been given a copy of ADMEC’s Guidelines for Volunteers.

.....
Participant	Date	Principal researcher	Date

Annex H

Biodata sheet – pilot study 2 and longitudinal study

BIOGRAPHICAL INFORMATION

Regt No:

Rank:

Corps:

Age:

Unit:

Sub Unit:

Appt/Position:

March-in date to current unit:

Date of Enlistment/Appointment:

Posting history: (include any overseas deployments *and the dates when you were there*):

Education Level: (Please tick)

Year 10

Year 11

Year 12

Bachelor Degree or higher

Trade/Apprenticeship

Certificate/Diploma

Other accredited course

Annex I

Information sheet and consent form – Longitudinal study

INFORMATION SHEET

OCCUPATIONAL STRESS AND FATIGUE IN AUSTRALIAN ARMY SOLDIERS

You are being asked to engage in a study to help increase our understanding of the work demands of training and support staff at ARTC. The information from this study will be used to improve the management of staff at ARTC, and to minimise the impact of occupational stress and fatigue.

Everyone who is being posted in to ARTC have been asked to participate in this research, as the researchers are interested in understanding the unique demands of your jobs. As such, we are very interested in your opinions, and your perceptions of your work environment, even if you don't feel as though there is any pressure in your work.

- To take part in this study, you will be asked to complete some questionnaires which, altogether, take around 30 minutes to complete.
- You will also be asked to maintain a record of how many hours you work over a 14 day period, as explained in the Fatigue Audit Data Sheet.

Lastly, we ask that you repeat this procedure 3 times over the course of the next twelve months, to see how stress and fatigue levels vary during Surge and non-Surge periods.

If at any stage of the study you decide that you do not wish to complete the questionnaire or provide a sample, you may withdraw from the study at your own discretion. If you decide to withdraw, this will not affect your career in the ADF. Likewise, information provided by participants will not be released to the Army chain of command for the purpose of formal performance reporting or any other reason. This study is entirely independent and all information collected will remain the property of the investigator and will be stored under a Psychology-In-Confidence confidentiality marking. All identifying data will be detached from the questionnaires and will be stored in-confidence at the Australian National University. The only purpose of identifying information is to link information across the questionnaires and other data. If any information is published, only average scores will be included and no identifying information will be released to the chain of command at any time.

As we value your contribution, results will be available by contacting any of the researchers on the telephone numbers listed below. You can also contact any of the researchers for assistance, if you are currently experiencing any stress-related problems.

CAPT Samantha Brooks: (02) 6266 3449
MAJ Stephanie Hodson: (02) 69210 476
Professor Don Byrne: (02) 62493974.

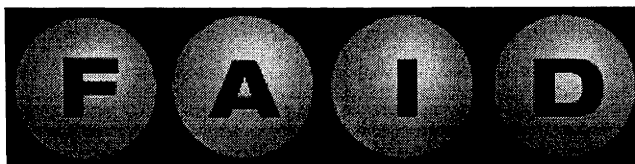
The ethical aspects of this study are being conducted according to the principles set out by the National Health and Medical Research guidelines for research with human subjects. All aspects of the research are reviewed by the Australian Defence Medical Ethics Committee and the Australian National University's Ethics in Human Experimentation Committee. Should you have any complaints or concerns about the manner in which this project is conducted, please do not hesitate to contact the researchers in person or, if you wish, you may contact the Australian National University Ethics Committee through its Ethics Officer, Mrs Sylvia Deutsch on (02) 6249 2900. Alternatively, you may contact the Australian Defence Medical Ethics Committee at the following address.

Executive Secretary
Australian Defence Medical Ethics Committee
CP2-7-66
Department of Defence
CANBERRA ACT 2600

Telephone: (02) 62663925 DNATS 8 66 3925
Fax: (02) 62664982 DNATS 8 66 4982

Annex J

Information on Fatigue Audit *Interdyne*©



Fatigue Audit InterDyne™

[[Risk Management](#)] [[Price List](#)] [[Products](#)] [[Downloads](#)] [[News](#)] [[FAQs](#)]
[[Consultants](#)]

Fatigue Audit InterDyne™ (FAID) has been developed by InterDynamics Pty Ltd, using the fatigue assessment formula and factors developed by the Centre for Sleep Research (CFSR) at the University of South Australia.

- [FAID](#)
-New Features
- [Customisation](#)
- [Dispatcher ID](#) NEW!!!
- [FAID CM](#)
- [FAID 330](#)
- [Evaluation Copy](#)

FAID

The price for the standard FAID is \$AUS4,400 (including GST) per licence.

InterDynamics has concluded the beta testing for FAID and is now releasing the first production of FAID Version 1w3.

NEW FEATURES:

*Released 13/3/00
Version 1w3*

- 'First Time' step through section
- Colour indicators
- Key Performance Indicators - by count or percentage
- Multiple sort options for Outputs
- Gantt Plot with Roster comparisons
- Zoom In on Output Tables

CUSTOMISED VERSIONS OF FAID

We are also able to provide customised versions of FAID to support :

- corporate data structures and sources
- unique analysis
- specific management support requirements

Please contact us to discuss your specific requirements at :
faid@interdynamics.com

DISPATCHER ID

NEW !!!

This product has been developed to assist dispatchers to allocate employees to tasks in a manner which respects Fatigue Risk Management guidelines.

Current customisations have been developed for the Transport Industry, Railway Industry and the Aviation Industry.

For slide show presentations [click here](#).

Please contact us to discuss your specific requirements at :
faid@interdynamics.com

FAID CM

FAID can also be supplied as a Callable Module for use with existing software. The FAID Callable Module is supplied as a Win 32 executable program.

The calling program (typically user supplied rostering or scheduling software) supplies three command line parameters identifying the path and names of three files. Input data, output results and run-time messages are communicated through these three files.

This enables existing corporate rostering or scheduling software to take roster fatigue and the risks associated with roster fatigue into account when creating and managing rosters.

Contact us for more information at faid@interdynamics.com

FAID 330

A copy of the current version of FAID is also available with the following limitations:

The fatigue audit is limited to:

- 3 months (12 weeks)
- 30 people

The price for FAID 330 is \$AUS550 (including GST) and does not include any free upgrades or ongoing support.

EVALUATION COPY

A **FREE** evaluation copy called FAID 303E is also available.

This version is time-limited and will only run for about 45 days.

FAID 303E has been made available for you to evaluate the software.

A licence is required to make use of this software in your commercial operations.

Under a licence arrangement, other more comprehensive versions are available for you to use.

To receive your copy of FAID 303E do the following:

Step 1 - click the "Register here" button to go to the Registration page

Step 2 - fill in the registration details

Step 3 - click the "Register" button to submit your details and go to the Download page

Step 4 - click the "FAID" button to download your **FREE** copy of FAID 303E

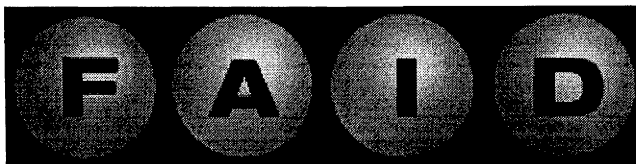
or just follow the easy instructions on the way...

(NOTE: If your browser does not support the buttons provided click here to register)

For more information contact: faid@interdynamics.com

Produced by InterDynamics Pty Ltd

[[Risk Management](#)] [[Price List](#)] [[Products](#)] [[Downloads](#)] [[News](#)] [[FAQs](#)]
[[Consultants](#)]



Fatigue Related Risk Analysis

[[Up](#)] [[Aviation](#)] [[FAID](#)] [[Areas of Impact](#)] [[Fatigue RM](#)] [[Definitions](#)]

RISK RATING - FAID

The task risk rating that are fixed are:

- Low
- Moderate
- High
- Extreme

These relate to the task that is being performed.

For example: a pilot is in command of takeoff or landing - extreme
a pilot is in the office doing photocopying - low

AVIATION INDUSTRY

Other factors to be considered when defining the task risk for a flight :

- Night / Day
- IFR/VFR
- Metro / Country
- Passenger / Freight

And you can further split up the shifts into:

1. Takeoff
2. Cruise
3. Landing
4. Stand-by

TRANSPORT INDUSTRY

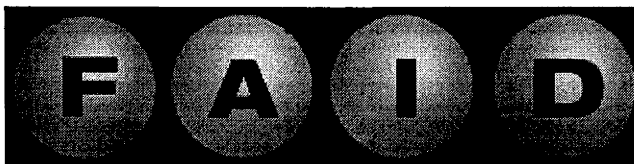
Other factors to be considered when defining the task risk for a trip :

- Night / Day
- Route taken
- Type of Cargo

For more information contact: faid@interdynamics.com

Produced by *InterDynamics* Pty Ltd

[[Up](#)] [[Aviation](#)] [[FAID](#)] [[Areas of Impact](#)] [[Fatigue RM](#)] [[Definitions](#)]



Risk Management

[[Aviation](#)] [[FAID](#)] [[Areas of Impact](#)] [[Fatigue RM](#)] [[Definitions](#)]

Fatigue Related Risk Analysis

The magnitude of consequences of an event, should it occur, and the likelihood of the event and its associated consequences, are assessed in the context of the existing controls. Consequences and likelihood may be determined using statistical analysis and calculations. Alternatively where no past data are available, subjective estimates may be made which reflect an individual's group or group's degree of belief that a particular event or outcome will occur.

To avoid subjective biases the best available information sources and techniques should be used when analysing consequences and likelihood.

Types of analysis

Because of the complexity and the cost of analysis, in practice, qualitative analysis is often used to obtain a general indication of the level of risk. Later it may be necessary to undertake more specific quantitative analysis.

Examples or risk definition and classification

Qualitative measures of consequence or impact:

Level	Descriptor	Example Detail Description
1	Insignificant	No injuries, low financial loss
2	Minor	First aid treatment, on-site release immediately contained, medium financial loss
3	Moderate	Medical treatment required, on site release with no detrimental effects, major financial loss
4	Major	Extensive injuries, loss of production capability
5	Catastrophic	Death, toxic release off-site with detrimental effect, huge financial loss

NOTE: Measures used should reflect the needs and nature of the organisation and activity under study.

Qualitative measures of likelihood:

Level	Descriptor	Description
1	Almost certain	Is expected to occur in most circumstances
2	Likely	Will probably occur in most circumstances
3	Possible	Might occur at some time
4	Unlikely	Could occur at some time
5	Rare	May occur only in exceptional circumstances

NOTE: These tables need to be tailored to meet the needs of an individual organisation.

MATRIX

Likelihood	Consequences				
	Insignificant	Minor	Moderate	Major	Catastrophic
A (almost certain)	1 H	2 H	3 E	4 E	5 E
B (likely)	M	H	H	E	E
C (moderate)	L	M	H	E	E
D (unlikely)	L	L	M	H	E
E (rare)	L	L	M	H	H

NOTE: The number of categories should reflect the needs of the study

Legend

E: extreme risk; immediate action required

H: high risk; senior management attention needed

M: moderate risk; management responsibility must be specified

L: low risk; manage by routine procedures

For more information contact: faid@interdynamics.com

Produced by InterDynamics Pty Ltd

[[Aviation](#)] [[FAID](#)] [[Areas of Impact](#)] [[Fatigue RM](#)] [[Definitions](#)]

REFERENCES

- Agho, A.O., Mueller, C.M. & Price, J.L. (1993). Determinants of employee job satisfaction: An empirical test of a causal model. Human Relations, 46(8), 1007-1027.
- Agho, A.O., Price, J.L. & Mueller, C.M. (1992). Discriminant validity of measures of job satisfaction, positive affectivity and negative affectivity. Journal of Occupational and Organisational Psychology, 65, 185-196.
- Alluisi, E.A. (1972). Influence of work-rest scheduling and sleep loss on sustained performance. In W.P. Colquhoun, (Ed). Aspects of Human Efficiency (pp.199-215). London: English Universities Press Ltd.
- Alpass, F., Long, N., MacDonald, C. & Chamberlain, K. (1996). The effects of work stress on the health of military personnel. Report to the New Zealand War Pensions Medical Research Trust Board.
- Anderson, J.G. (1991). Stress and burnout among nurses: A social network approach. Journal of Social Behaviour and Personality, 6, 251-272.
- Arnold, M.B. (1960). Emotion and personality. New York: Columbia University Press.
- Australian Army (1973). Leadership theory and practice. Headquarters Training Command, Sydney.
- Australian Defence Force Publication No. 714. (1997). Operational Stress Management. Department of Defence, Canberra.
- Axelrod, W.L. & Gavin, J.F. (1980). Stress and strain in blue-collar and white-collar management staff. Journal of Vocational Behavior, 17, 41-49.
- Baron, R.M. & Kenny, D.A. (1986). The moderator-mediator variable distinction in social psychological research: Conceptual, strategic and statistical considerations. Journal of Personality and Social Psychology, 51(6), 1173-1182.
- Bartlett, F.C. (1953). Psychological criteria of fatigue. In W.F. Floyd & A.T. Welford (Eds.) Symposium on Fatigue. London: H.K. Lewis.
- Bartley, S.H. (1965). Fatigue: Mechanisms and management. Springfield, IL: Charles C. Thomas.
- Bartley, S.H. & Chute, E. (1947). Fatigue and impairment in man. New York: McGraw-Hill.

- Baumeister, R.F. (1984). Choking under pressure: Self-consciousness and paradoxical effects of incentives on skillful performance. Journal of Personality and Social Psychology, 46, 610-620.
- Beehr, T.A., & Newman, L.E. (1978). Job stress, employee health, and organisational effectiveness: A facet analysis model and literature review. Personnel Psychology, 31, 665-699.
- Bennet, G. (1998). Fatigue. In R.L. Gregory (Ed.) The Oxford Companion to the Mind, pp. 255-256, Oxford: Oxford University Press.
- Bergner, M., Bobbitt, R.A., Carter, W.B. & Gilson, B.S. (1981). The Sickness Impact Profile: Development and final revision of a health status measure. Medical Care, 19, 787-805.
- Bhagat, R.S., McQuaid, S.J., Lindholm, H. & Segovis, J. (1985). Total life stress: A multimethod validation of the construct and its effects on organizationally valued outcomes and withdrawal behaviors. Journal of Applied Psychology
- Bills, A.G. (1934) General experimental psychology. New York: Longmans Green.
- Bogg, J. & Cooper, C. (1995). Job satisfaction, mental health and occupational stress among senior civil servants. Human Relations, 48(3), 327-341.
- Bonner, M.C. (1997). Stress and fatigue in Army air traffic controllers: Validation of RAF IAM protocol (A working paper). Canberra: 1st Psychological Research Unit.
- Bonnet, M.H. & Arand, D.L. (1995). We are chronically sleep deprived. Sleep, 18(10), 908-911.
- Bonnet, M.H. (1990). Dealing with shift work: Physical fitness, temperature and napping. Work and Stress, 4(3), 261-274.
- Bray, R.M., Camlin, C.S., Fairbank, J.A., Dunteman, G.H. & Wheelless, S.C. (2001). The effects of stress on job functioning of military men and women. Armed Forces and Society, 27(3), 397 – 418.
- Brief, A.P., & George, J.M. (1991). Psychological stress in the workplace: A brief comment on Lazarus' outlook. In P.L. Parrewe (Ed.) Handbook on Job Stress. (pp.15-20). Corte Madeara, CA: Select Press.
- Broadbent, D.E. (1979). Is a fatigue test now possible? Ergonomics, 22, 1277-1290.
- Brooke, P.P., Jr. & Price, J.L. (1989). The determinants of employee absenteeism: An empirical test of a causal model. Journal of Occupational Psychology, 62, 1-19.

- Brooks, S.K., Byrne, D.G. & Hodson, S.E. (2000). Non-combat occupational stress and fatigue: A review of factors and measurement issues for the Australian Defence Force. Australian Defence Force Journal, 145, Nov/Dec, 35-50.
- Caldwell, J. (1998). Fatigue facts for aviators...and everybody else! Flying Safety, 54(9), 20-25.
- Cameron, C. (1973). A theory of fatigue. Ergonomics, 16, 633-648.
- Cannon, W.B. (1932). The Wisdom of the Body. New York: Norton.
- Carbone, E.G. & Cigrang, J.A. (2001). Job satisfaction, occupational stress and personality characteristics of Air Force military training instructors. Military Medicine, 166, 800-802.
- Chapman, S.E. (2000). The measurement of stress in Australian Defence personnel: A discussion. Australian Defence Force Journal, 141, 19-27.
- Chapman, S.E. (1999). The General Health Questionnaire: A Review and Discussion. DSPPR Technical Note 1/99.
- Chapman, S.E. (2001). The use of the General Health Questionnaire in the Australian Defence Force: A flawed but irreplaceable measure? Australian Psychologist, 36(3), 244-249.
- Chemers, M.M., Hays, R.B., Rhodewalt, F. & Wysocki, J. (1985). A person-environment analysis of job stress: A contingency model explanation. Journal of Personality and Social Psychology, 49, 628-635.
- Chong, L.B. (1997). Leadership, morale and unit effectiveness in the military. Catalyst, 2(2), 2-11.
- Clemes, H. (aka Stanley, R.) (1971). Relationship of military environments to stress and performance. (Contract No. DA-49-193-MD-2637). Palo-Alto, CA: Mental Health Institute.
- Cohen, J. & Cohen, P. (1983). Applied multiple regression/correlation analysis for the behavioural sciences (2nd Ed.). Hillsdale, NJ: Erlbaum.
- Cohen, S., & Weinstein, N. (1981). Nonauditory effects of noise and behavior and health. Journal of Social Issues, 37, 36-70.
- Cohen, S. & Willis, T.A. (1985). Stress, social support, and the buffering hypothesis. Psychological Bulletin, 98, 310-357.

- Constable, J.F. & Russell, D.W. (1986). The effect of social support and the work environment upon burnout among nurses. Journal of Human Stress, Spring, 21-26.
- Cooper, C.L. & Payne, R. (1988). Causes, coping and consequences of stress at work. Chichester, England: Wiley.
- Costa, P.T. & McCrae, R.R. (1985). Hypochondriasis, neuroticism, and aging. When are somatic complaints unfounded? American Psychologist, 40, 19-28.
- Costa, P.T. Jr & McCrae, R.R. (1987). Neuroticism, somatic complaints, and disease: Is the bark worse than the bite? Journal of Personality, 55, 299-316.
- Cotton, A. (2001). Non-operational military stress management in the ADF: Where have we been, and where are we going? In G. Kearney, M. Creamer, R. Marshall & A. Goynne (Eds.), The management of stress in the Australian Defence Force, (pp. 1- 6). Canberra: Department of Defence.
- Cox, T. (1991). Organisational culture, stress and stress management. Work and Stress, 5(1), 1-4.
- Cox, T. (1978). Stress. London: MacMillan.
- Coyne, J.C. & Lazarus, R.S. (1980). Cognitive style, stress perception and coping. In I.L. Kutash & L.B. Schlesinger (eds.), Handbook on stress and anxiety: Contemporary knowledge, theory and treatment, (pp. 144-158). San Francisco: Jossey Bass.
- Craig, A., & Cooper, R.E. (1992). Symptoms of chronic and acute fatigue. In A.P. Smith & D.P. Jones (Eds.) Handbook of human performance (pp. 289-339). San Diego, CA: Academic Press.
- Cummins, R.C. (1990). Job stress and the buffering effect of supervisory support. Group and Organisation Studies, 15, 92-104.
- Dawson, D. & Reid, K. (1997). Fatigue, alcohol and performance impairment. Nature, 388, 235.
- Dawson, D. & Fletcher, A. (2001). A quantitative model of work-related fatigue: Background and definition. Ergonomics, 44 (2), 144-163.
- Defence Health Services Branch (2000). Australian Defence Force Health Status Report. Canberra: Department of Defence.
- Department of Defence (1989). Government Initiatives for Defence Force Personnel. Canberra: AGPS.

- Desmond, P.A. & Hancock, P.A. (in press). Active and passive fatigue states. In P.A. Hancock & P.A. Desmond (Eds.). Stress, workload and fatigue. Lawrence Erlbaum & Associates.
- Dewe, P. (1991). Measuring work stressors: The role of frequency, duration and demand. Work and Stress, 5(2), 77-91.
- Directorate of Strategic Personnel Planning and Research (1999). 1999 ADF Attitude Survey Summary of Responses – Army. DSPPR Research Note 13/99.
- Directorate of Strategic Personnel Planning and Research (2001). 2001 Defence Attitude Survey Report. DSPPR Research Report 5/2001.
- Driskell, J.G. & Olmstead, B. (1989). Psychology and military: Research applications and trends. American Psychologist, 44, 43-54.
- Driskell, J.E. and Salas, E. (1991). Overcoming the effects of stress on military performance: Human factors, training and selection strategies. In R. Gal and A.D. Mangelsdorf (Eds.), Handbook of Military Psychology, pp. 183-193, Chichester: John Wiley and Sons.
- Driskell, J.E., Salas, E & Johnston, J. (1995). Does stress lead to a loss of team perspective? Unpublished manuscript.
- Easterbrook, J.A. (1959). The effect of emotion on cue utilisation and the organisation of behavior. Psychological Review, 66, 183-201.
- Edwards, J.R. & Van Harrison, R. (1993). Job demands and worker health: Three-dimensional re-examination of the relationship between person-environment fit and strain. Journal of Applied Psychology, 78(4), 628-648.
- Eisenberger, R., Cummings, J., Armeli, S. & Lynch, P. (1997). Perceived organisational support, discretionary treatment and job satisfaction. Journal of Applied Psychology, 82(5), 812-820.
- Ellis, N. (1995). The organisational approach to stress management. In P. Cotton (Ed.). Psychological health in the workplace: Understanding and managing occupational stress, (pp.31-50). Carlton, Victoria: APS.
- Eysenck, M.W. (1983) Anxiety and individual differences. In G.R.J. Hockey (Ed.) Stress and fatigue in human performance, (pp. 273-298). London: John Wiley.
- Farrell, K.T. (1990). Work-related stress in Army storemen. Unpublished thesis submitted for Master of Public Health, University of Sydney.

- Fisher, C.D. & Gitelson, R. (1983). A meta-analysis of the correlates of role conflict and ambiguity. Journal of Applied Psychology, 69, 320-333.
- Fisk, J.D., Ritvo, P.G., Ross, L. et al (1994) Measuring the functional impact of fatigue: Initial validation of the Fatigue Impact Scale. Clinical Infectious Diseases, 18 (Suppl 1), S79-83.
- Fletcher, A. & Dawson, D. (1997) A predictive model of work-related fatigue based on hours of work. Journal of Occupational Health Safety-Aust NZ, 13(5), 471-485.
- Frankenhauser, M. (1975) Experimental approaches to the study of catecholamines and emotions. In L.Levi (Ed.) Emotions: Their parameters and measurement. New York: Raven.
- Frankenhauser, M. (1980) Psychoneuroendocrine approaches to the study of stressful person-environment interactions. In H. Selye (Ed.). Selye's guide to stress research, Vol.1. New York: Van Nostrand Reinhold.
- Frankenhauser, M. (1986) A psychobiological framework for research on human stress and coping. In H.H. Appleby & R. Trumball (Eds.) Dynamics of stress: Physiological, psychological and social perspectives, (pp. 101-116). New York: Plenum.
- French, J.R.P., Jr, & Caplan, R.D. (1972). Occupational stress and individual strain. In A.J. Marrow (Ed.). The failure of success, (pp.30-66). New York: Amacon.
- French, J.R.P., Jr., Caplan, R.D. & Van Harrison, R. (1982). The mechanisms of job stress and strain. Chichester, England: Wiley.
- Frese, M. & Zapf, D. (1988). Methodological issues in the study of work stress: Objective vs subjective measurement of work stress and the question of longitudinal studies, In C.L. Cooper & R. Payne (Eds.), Causes, coping and consequences of stress at work, (pp. 375-411). Chichester, England: Wiley.
- Furukawa, T.P., Ingraham, L.H., Kirkland, F.R., Marlowe, D.H., Martin, J.A. and Schneider, R.J. (1987). Evaluating the Unit Manning System: Lessons learned to date. (Report WRAIR-NP-87-10). Washington, DC: Division of Neuropsychiatry, Walter Reed Institute of Research.
- Gal, R. & Manning, F.J. (1987). Morale and its components: Across-national comparison. Journal of Applied Social Psychology, 17(4), 369-391.
- Gartner, W.B., Murphy, M.R. (1979). Concepts of fatigue. In Advisory Group for Aerospace Research and Development (NATO): AG-246 1-2.

- Gillberg, M., Kecklund, G. and Akerstedt, T. (1994). Relations between performance and subjective ratings of sleepiness during a night awake. Sleep, 17(3), 236-241.
- Godwin, J.R. (1985). A preliminary investigation into stress in Australian Antarctic expeditioners. 1 Psych Research Unit Research Report 1/85.
- Goyne, A. (2001). The measurement of organisational stress in the Australian regular Army. In G. Kearney, M. Creamer, R. Marshall & A. Goyne (Eds.), The management of stress in the Australian Defence Force, (pp. 21-34). Canberra: Department of Defence.
- Goyne A. (1998). Use of the GHQ in an Australian Army population. DSPPR Research Report 4/98.
- Guppy, A. & Gutteridge, T. (1991). Job satisfaction and occupational stress in UK general hospital nursing staff. Work and Stress, 5(4), 315-323.
- Gupta, N. & Beehr, T.A. (1979). Job stress and employee behaviors. Organisational Behavior and Human Performance, 23, 373-387.
- Hill, R. (1949). Families under stress. New York: Harper and Row.
- Hobfoll, S.E. (1989). Conservation of resources: A new attempt at conceptualising stress. American Psychologist, 44(3), 513-524.
- Hogan, R. & Hogan, J.C. (1982). Subjective correlates of stress and human performance. In E.A. Alluisi and E.A. Fleishman (Eds.). Human performance and productivity: Stress and performance effectiveness, (pp.141-163). Hillsdale, N.J.: Lawrence Erlbaum Associates.
- Holding, D.H. (1983) Fatigue. In G.R.J. Hockey (Ed.). Stress and fatigue in human performance, (pp.145-167). Chichester: John Wiley & Sons.
- Holmes T.H. and Rahe, R.H. (1967). The social readjustment rating scale. Journal of Psychosomatic Research, 11, 213-18.
- Huah, L.H. & Lee D. (1997). Psychological preparation of troops for war. Catalyst, 2(2), 13-23.
- Ingraham, L.H. & Manning, F.J. (1980). Psychiatric battle casualties. Military Review, 60, 19-29.
- Innes, L.G., & Allnutt, M.F. (1967). Performance measurement in unusual environments. (IAM Technical Memorandum No. 298). Farnborough, England: RAF Institute of Aviation Medicine.

- Ivancevich, J.M. & Matteson, M.T. (1976). Stress diagnostic survey (SDS): Comments and psychometric properties of a multidimensional self-report inventory. Houston: FD Associates.
- Jackson, S.E., & Schuler, R.S. (1985). A meta-analysis and conceptual critique of research on role ambiguity and role conflict in work settings. Organisational Behavior and Human Decision Process, 36, 16-78.
- Janis, I.L. & Mann, L. (1977). Decision-making: A psychological analysis of conflict, choice and commitment. New York: The Free Press.
- Jemmott, J.B., Borysenko, J.Z., Borysenko, M. *et al.* (1993). Academic stress, power motivation and decrease in secretion rate of salivary secretory immunoglobulin A. Lancet, 1, 1400-2.
- Jemmott, J.B., & Locke, S.E. (1984). Psychosocial factors, immunologic mediation, and human susceptibility to infectious diseases: How much do we know? Psychological Bulletin, 95, 78-108.
- Johns, G. (1995). Occupational stress and well-being at work. In P. Cotton (Ed.). Psychological health in the workplace: Understanding and managing occupational stress, (pp.3-6). Carlton, Victoria: APS.
- Johnson, L.C. (1982) Sleep deprivation and performance. In Wilse B. Webb (Ed.) Biological rhythms: Sleep and performance, (pp. 111-141). Chichester: Wiley.
- Joy, R.J.T. and Goldman, R.F. (1964). Microenvironments, modern equipment and the mobility of the soldier. In Symposium on medical aspects of stress in the military climate, pp. 101-124. Washington, DC: Walter Reed Army Institute of Research and Walter Reed Army Medical Center.
- Kanner, A.D., Coyne, J.C., Schaefer, C. & Lazarus, R.S. (1981). Comparison of two modes of stress measurement: Daily hassles and uplifts versus major life events. Journal of Behavioral Medicine, 4, 1-39.
- Kahn, R.L., Wolfe, D.M., Quinn, R.P., Snoek, J.D., & Rosenthal, R.A. (1964). Organisational stress: Studies in role conflict and ambiguity. New York: John Wiley and Sons.
- Karasek, R.A., Jr. (1979). Job demands, job decision latitude and mental strain: Implications for job redesign. Administrative Science Quarterly, 24, 285-308.
- Karasek, R., & Theorell, T. (1990). Health work: Stress, productivity, and the reconstruction of working life. New York: Basic Books.
- Kompier, M.A.J. (1988). Work and health of city bus drivers. Delft: Eburon.

- Krueger, G.P. (1989). Sustained work, fatigue, sleep loss and performance: A review of the issues. USAARL Technical Report No. 89-22. Fort Rucker, AL: US Army Aeromedical Research Laboratory. (DTIC No. AD:A215-234).
- Krueger, G.P. (1991). Sustained military performance in continuous operations: combatant fatigue, rest and sleep needs. In R. Gal and A.D. Mangelsdorf (Eds.), Handbook of Military Psychology, pp.255-277, Chichester: John Wiley and Sons.
- Labuc, S. (1991). Cultural and societal factors in military organisations. In R. Gal & D. Mangelsdorf (Eds.) Handbook of Military Psychology, (pp. 471-489). Chichester: Wiley.
- Lamond, N. & Dawson, D. (1999). Quantifying the performance impairment associated with fatigue. Journal of Sleep Research, 8, 255-262.
- Landsbergis, P.A. (1988). Occupational stress among health care workers: A test of the job demands-control model. Journal of Organisational Behaviour, 9, 217-239.
- LaRocco, J.M., House, J.S. & French, J.R.P. (1980). Social support, occupational stress and health. Journal of Health and Social Behaviour, 21(3), 202-218.
- Lazarus, R.S. (1996). Psychological stress and the coping process. New York: McGraw-Hill.
- Lazarus, R.S. (1991). Psychological stress in the workplace. In P.L. Parrewe (Ed.), Handbook on job stress (pp. 1-13). Corte Madeara, CA : Select Press.
- Lazarus, R.S. (1981). The stress and coping paradigm. In C. Eisdorfer, D. Cohen, A. Kleinman, and P. Maxim (Eds.). Models for clinical psychopathology, pp. 177-214. New York: Spectrum.
- Lazarus, R.S. (1975). A cognitively oriented psychologist looks at biofeedback. American Psychologist, 30, 553-61.
- Lazarus, R.S. and Cohen, F. (1973). Active coping processes, coping dispositions and recovery from surgery. Psychosomatic Medicine, 35, 375-89.
- Lazarus, R.S. and Cohen, J.B. (1977). Environmental stress. In L. Altman and J.F. Wohlwill (Eds.). Human Behaviour and the Environment: Current Theory and Research, Vol 2, pp. 98-127. New York: Plenum Press.
- Lazarus, R.S., DeLongis, A., Folkman, S., and Gruen, R. (1985). Stress and adaptational outcomes: The problem of confounded measures. American Psychologist, 40(7), 770-779.

- Lazarus, R.S. and Folkman, S. (1984). Stress, appraisal, and coping. New York: Springer.
- Lazarus, R.S. & Launier, R. (1978). Stress-related transactions between person and environment. In L.A. Pervin & M. Lewis (Eds.), Perspectives in interactional psychology, (pp. 287-327). New York: Plenum Press.
- LeDuc, P.A., Caldwell, J.A. & Ruyak, P.S. (2000). The effects of exercise as a countermeasure for fatigue in sleep-deprived aviators. Military Psychology, 12(4), 249-266.
- Leger, D. (1994). The cost of sleep-related accidents: A report for the National Commission on Sleep Disorders Research. Sleep, 17(1), 84-93.
- Leong, C.S., Furnham, A. & Cooper, C.L. (1996). The moderating effect of organisational commitment on the occupational stress outcome relationship. Human Relations, 49(10), 1345-1363.
- Linde, L. & Bergstrom, M. (1992). The effect of one night without sleep on problem-solving and immediate recall. Psychological Research, 54(2), 127-136.
- Little, G.P. (1988). 1997 WUNDARRA (Land 125) trials: Soldier's responses. Canberra: 1st Psychological Research Unit.
- Lovibond, S.H. (1965). Anxiety, fear, tension and stress response. (Manuscript).
- Lundberg, U. (1980) Catecholamine and cortisol excretion under psychologically different laboratory conditions. In E. Usdin, R. Kventriansky & I.J. Kopin (Eds.) Catecholamines and stress: Recent advances, (pp. 455-460). New York: Elsevier/North Holland.
- MacDonough, T.S. (1991). Non-combat stress in soldiers: How it is manifested, how to measure it, and how to cope with it. In R. Gal and A.D. Mangelsdorf (Eds.), Handbook of Military Psychology, pp. 531-558, Chichester: John Wiley and Sons.
- MacIntyre, A.T. (1998). Senior Army Officer attitudes and opinions: An insight into stress and organisational factors. Canberra: 1st Psychological Research Unit.
- MacKinnon, L.T., Ginn, E. & Seymour, S. (1993). Decreased salivary immunoglobulin A secretion rate after intense interval exercise in elite kayakers. European Journal of Applied Physiology, 67, 180-184.
- Manning, F.J. (1979). Continuous operations in Europe: Feasibility and the effects of leadership and training. Parameters-Journal of the U.S. Army War College, 9 (3), 8-17.

- Manning, F.J. (1985). Human factors in sustaining high rates of artillery fire (Report WRAIR NP-84-7). Washington, DC: Division of Neuropsychiatry, Walter Reed Institute of Research.
- Manning, F.J. (1991). Morale, cohesion and esprit de corps. In R. Gal & D. Mangelsdorf (Eds.). Handbook of Military Psychology, (pp. 453-470). Chichester: Wiley.
- Marino, K.E. & White, S.E. (1985). Department structure, locus of control, and job stress: the effect of a moderator. Journal of Applied Psychology, 70, 782-784.
- Marlowe, D.H., Furukawa, T.P., Griffith, J.E., Ingraham, L.H., Kirkland, F.R., Martin, J.A., Schneider, R.J. and Teitelbaum, J.M. (1985). New Manning System field evaluation. (Report No 1). Department of Military Psychiatry, Walter Reed Army Institute of Research, Washington, DC.
- Mathews, K.E., & Canon, L.K. (1975). Environmental noise level as a determinant of helping behavior. Journal of Personality and Social Psychology, 32, 571-577.
- McGrath, J.E. (1976). Stress and behaviour in organisations. In M. Dunnette (Ed.), Handbook of industrial and organisational psychology, (pp. 1350-1396). Chicago: Rand McNally.
- McKormick, J. (1997). An attribution model of teacher's occupational stress and job satisfaction in a large educational system. Work and Stress, 11(1), 17-32.
- McLeod, P. (1977). A dual task response modality effect: Support for multiprocessor models of attention. Quarterly Journal of Experimental Psychology, 29, 651-667.
- McNair, D.M., Lorr, M., & Droppleman, L.F. (1971). EITS Manual for the Profile of Mood States. San Diego, CA: Educational & Testing Services.
- Meddis, R. (1982) Cognitive dysfunction following loss of sleep. In E. Burton (Ed.). The pathology and psychology of cognition, (pp.225-252). London: Methuen.
- Michaels, C.E. & Spector, P.E. (1982). Causes of employee turnover: A test of the Mobley, Griffith, Hand, and Meglino Model. Journal of Applied Psychology, 67, 53-59.
- Mitchell, R. & Mandryk, J. (1998). The 1995 Australian workplace and industrial relations survey (AWIRS 95): An OHS perspective. Canberra: Occupational Health and Safety Commission.
- Moos, R.H. (1994). Manual of the Work Environment Scale (3rd Edition). Palo Alto CA: Consulting Psychologists Press.

- Moos R.H. and Swindle R.W. Jr (1990). Stressful life circumstances: Concepts and Measures. Stress Medicine, 6, 171-8.
- Motowidlo, S.J., Dowell, B.E., Hopp, M.A., Borman, W.C., Johnson, P.D., & Dunette, M.D. (1976). Motivation, satisfaction and morale in army careers: A review of theory and measurement. (ARI Technical Report TR-76-A7). Arlington, VA: US Army Research Institute for the Behavioural and Social Sciences.
- Mullen, B. (1991). Group composition, salience and cognitive representations: The phenomenology of being in a group. Journal of Experimental and Social Psychology, 27, 297-323.
- Murphy, P.J. (2001). The Human Dimension in ADF Operations in East Timor, (presentation). 43rd International Military Testing Association Conference, Canberra, 23-25 October, 2001.
- Murray, E.J. (1965). Sleep, dreams, and arousal. New York: Appleton-Century-Crofts.
- Naitoh, P., Englund, C.E., and Ryman, D.H. (1986). Sleep management in sustained operations: User's guide. U.S. Naval Health Research Center Report. (Report No. 86-22). San Diego, CA: Ergonomics Dept., US Naval Health Research Center.
- Nakano, K. (1989). Intervening variables of stress, hassles and health. Japanese Psychological Research, 31, 143-148.
- Newton, T.J. (1989). Occupational stress and coping with stress: A critique. Human Relations, 42(5), 441-461.
- Office of the Surgeon General (1999). Stress in the ADF. Senate Legislative Committee Brief, 7-8 Jun 99.
- Oldenburg, B., Ellis, N., Kelenshian, N., & Pan, J. (1994). Review of effectiveness of interventions for the management of stress at work. Brisbane: Queensland University of Technology.
- Palmer, G.N. (2001). The transformation from civilian to soldier in the Australian Army. Unpublished thesis, Master of Education, Southern Cross University.
- Paterson, R.J., & Neufeld, R. (1987). Clear danger: Situational determinants of the appraisal of threat. Psychological Bulletin, 101, 404-416.
- Prince, C., Bowers, C.A., & Salas, E. (1994). Stress and crew performance: Challenges for aeronautical decision-making training. In N. Johnston, N. McDonald, & R. Fuller (Eds.). Aviation psychology in practice (pp. 286-305). Hants, England: Avebury.

- Purificato, R. (1997). The tireless war against fatigue. Combat Edge, 5(12), 13-15.
- Rachman, S.J. (Ed.) (1983). Fear and courage among military bomb-disposal operators (Special issue). Advances in Behaviour Research and Therapy, 4(3), p. 175
- Ray, C., Weir, W.R.C., Phillips, S. & Cullen, S. (1992) Development of a measure of symptoms of fatigue syndrome: The Profile of Fatigue-Related Symptoms (PFRS). Psychological Health, 7, 27-43.
- Reid, G.B., Shingledecker, C.A., Nygren, T.E., & Eggemeier, F.T. (1981) Development of multidimensional subjective measures of workload. Proceedings of the International Conference on Cybernetics and Society. Atlanta, Georgia.
- Richardson, A.M. & Burke, R. (1991). Occupational stress and job satisfaction among Canadian physicians. Work and Stress, 5(4), 301-313.
- Rodgers, M. (1999). Maintaining the maintainers: Alertness management for maintenance personnel. (AVMED 3-99). Adelaide Australia: Royal Australian Airforce Institute of Aviation Medicine.
- Rosekind, M.R., Gander, P.H., Gregory, K.B., Smith, R.M., Miller, D.L., Oyung, R., Webbon, L.L. & Johnson, J.M. (1996). Managing fatigue in operational settings 1: Physiological considerations and countermeasures. Behavioural Medicine, 21, 157-165.
- Salas, E., Driskell, J.E. & Hughes, S. (1996). Introduction: The study of stress and human performance. In J.E. Driskell & E. Salas, (Eds.). Stress and human performance, (pp.1-45). Mahwah, N.J.: Lawrence Erlbaum Associates.
- Sauter, S.L., & Hurrell, J.J., Jr. (1989). Introduction. In S.L. Sauter, J.J. Hurrell, Jr., & C.L. Cooper (Eds.). Job control and worker health (pp. XIII-XX). Chichester, England: John Wiley & Sons.
- Schweitzer, P.K., Muehlbach, M.J. & Walsh, J.K. (1992). Countermeasures for night work performance deficits: The effect of napping or caffeine on continuous performance at night. Work and Stress, 6(4), 355-365.
- Selye, H. (1980). The stress concept today. In I.L. Kutash & L.B. Schlesinger (Eds.), Handbook on stress and anxiety: Contemporary knowledge, theory and treatment (pp. 127-143). San Francisco: Jossey Bass.
- Selye, H. (1976). The stress of life (2nd Ed.). New York: McGraw-Hill.
- Sharit, J. & Salvendy, G. (1982). Occupational stress: Review and reappraisal. Human factors, 24, 129-162.

- Singer, J.E. (1986). Traditions of stress research: Integrative comments. In C.D. Spielberger & I.G. Sarason (Eds.). Stress and anxiety: A sourcebook of theory and research (Vol 10.), (pp. 25-33). Washington: Hemisphere.
- Snow, R.E. (1984a). Military motivation and morale: The Second NATO Symposium. In L.E. Shaffer (Ed.). European scientific notes, pp. 593-599. London: US Office of Naval Research Branch Office.
- Snow, R.E. (1984b). Military motivation and morale: Questionnaire assessment of coherence of appraisal under stress. In L.E. Shaffer (Ed.). European scientific notes, pp.599-603. London: US Office of Naval Research Branch Office.
- Snow, R.E. (1984c). Military motivation and morale: Assessment by group situational performance tests. In L.E. Shaffer (Ed.). European scientific notes, pp. 603-605. London: US Office of Naval Research Branch Office.
- Soderberg, U. (1967). Neurophysiological aspects of stress. In L. Levi (Ed.). Emotional Stress. Basle: Karger.
- Spettell, C.M., & Liebert, R.M. (1986). Training for safety in automated person-machine systems. American Psychologist, 41, 545-550.
- Spielberger, C.D. (1983). Manual for the State-Trait Anxiety Inventory (Form Y). Palo Alto, CA: Consulting Psychologist's Press.
- Spielberger, C.D. & Reheiser, E.C. (1994). Job stress in university, corporate and military personnel. International Journal of Stress Management, 1(1), 19-31.
- Spielberger, C.D. & Vagg, P.R. (1994). Professional Manual for the Job Stress Survey (JSS). Odessa, FL: Psychological Assessment Resources.
- Staw, R.M., Sandelands, L.E., & Dutton, J.E. (1981). Threat-rigidity effects in organisational behavior: A multi-level analysis. Administrative Science Quarterly, 26, 501-524.
- Steers, R.M. & Rhodes, S.R. (1978). Major influences on employee attendance: A process model. Journal of Applied Psychology, 63, 391-407.
- Streufert, S., & Streufert, S.C. (1981). Stress and information search in complex decision-making: Effects of load and time urgency (Technical Rep. No.4). Arlington, VA: Office of Naval Research.
- Tabachnick, B.G. & Fidell, L.S. (1996). Using multivariate statistics, 3rd Ed. Northridge, CA: HarperCollins.

- Terry, D.J., Nielsen, M. & Perchard, L. (1993). Effects of work stress on psychological well-being and job satisfaction: The stress buffering role of social support. Australian Journal of Psychology, 43(3), 168-175.
- Terry, D.J. & Scott, W.A. (1987). Gender differences in correlates of marital satisfaction. Australian Journal of Psychology, 39, 207-221.
- Theorell, T. & Karasek, R.A. (1996). Current issues relating to psychosocial job strain and cardiovascular disease research. Journal of Occupational Health Psychology, 1(1), 9-26.
- Thorndike, E. (1900) Mental fatigue. Psychology Review, 7, 466-82.
- Tilley, A.J. & Wilkinson, R.T. (1984). The effects of restricted sleep regime on the composition of sleep and on performance. Psychophysiology, 21, 406-412.
- Toohy, J. (1993). Quality of working life project: A study of occupational stress in Commonwealth Government agencies. Canberra: Comcare Australia: AGPS.
- Turnage, J.T. & Spielberger, C.D. (1991). Job stress in managers, professionals, and clerical workers. Work Stress, 5 (3), 165-176.
- Ulleberg, P. & Rundmo, T. (1997). Job stress, social support, job satisfaction and absenteeism among offshore oil personnel. Work and Stress, 11(3), 215-228.
- Vassend, O. & Skrondal, A. (1999). The role of negative affectivity in self-assessment of health. Journal of Health Psychology, 4(4), 465-482.
- Wachtel, P.L. (1968). Anxiety, attention and coping with threat. Journal of Abnormal Psychology, 73, 137-143.
- Wallis, D. (1987). Satisfaction, stress, and performance: Issues for occupational psychology in the 'caring' professions. Work and Stress, 1(2), 113-128.
- Wallston, B.S., Alagna, S.W., DeVellis, B.M. & DeVellis, R.F. (1983). Social support and physical health. Health Psychology, 2(4), 367-391.
- Warr, P.B. & Wall, T.D. (1975). Work and well-being. Harmondsworth, Middix: Penguin.
- Watson, D. & Clark, L.A. (1984). Negative affectivity: The disposition to experience aversive emotional states. Psychological Bulletin, 96, 465-490.
- Watson, D. & Pennebaker, J.W. (1989). Health complaints, stress and distress. Exploring the central role of negative affectivity. Psychological Review, 96, 234-254.

- Webster, M. (1985). Webster's ninth new collegiate dictionary. Springfield, MA: Merriam-Webster.
- West, J.W., Janszen, H.H., Lester, B.K. and Cornelison, F.S. Jr. (1962). The psychosis of sleep deprivation. Annals of the New York Academy of Science, 96(1), 66-70.
- Williams, G. (1996). The power of many: The human factor and air power. Air Power Studies Centre, Canberra.
- Williams, H.L. (1964). Decrement in performance due to sleep deprivation. In Symposium and medical aspects stress in the military climate, pp. 187-202. Washington, DC: Walter Reed Army Institute of Research and Walter Reed Army Medical Center.
- Wright, P. (1974). The harassed decision-maker: Time pressures, distractions and the use of evidence. Journal of Marketing Research, 44, 429-443.
- Yamamoto, T. (1984). Human problem solving in a maze using computer graphics under an imaginary condition of "fire". Japanese Journal of Psychology, 55, 43-47.
- Yoshitake, H. (1971) Relations between the symptoms and the feelings of fatigue. Ergonomics, 14, 175-185.
- Yoshitake, H. (1978) Three characteristic patterns of subjective fatigue symptoms. Ergonomics, 21, 231-233.
- Zambelli, N. (1999). Shiftwork, fatigue and continuous operations: How to maximise performance whilst minimising sleep. DSTO-R: Department of Defence.