Enhancing the Coping Skills of Submariners: An Evaluation of the Effectiveness of Skills Based Stress Management Training

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Declaration

I declare that this thesis is my own account of my research and contains as its main content work which has not previously been submitted for a degree at any tertiary educational institution.

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CHAPTER 1

LITERATURE REVIEW

1.0 Introduction

The focus of this study is on the effects of a multimodal cognitive behavioural work place stress management program on levels of stress, coping, and job outcomes in Royal Australian Navy (RAN) Submarine Service personnel posted to COLLINS class submarines. In particular the aim was to measure the impact of the intervention program on individual and organisational outcomes both alongside (on land) and at sea. The program consisted of education about stress, teaching relaxation, cognitive restructuring, problem solving techniques and dealing with unsolvable problems. To begin with, the stress response and stress in the workplace will be outlined. The prevalence of stress in Submarine Service will be discussed in terms of strain and work outcomes. Treatment options and efficacy will be reviewed and a rationale provided for the stress management program utilised in this study. The rationale and hypotheses of this study will then be presented.

1.1 The Stress Response

Stress involves an appraisal of environmental demands in which the perceived pressure exceeds the person's perceived ability to cope, resulting in negative psychological, behavioural, physiological and social outcomes (Driskell, Johnston & Salas, 2001; Williams & Cooper, 2002).

Some common signs and symptoms of stress are included in Table 1.

Table 1

Symptoms of Stress

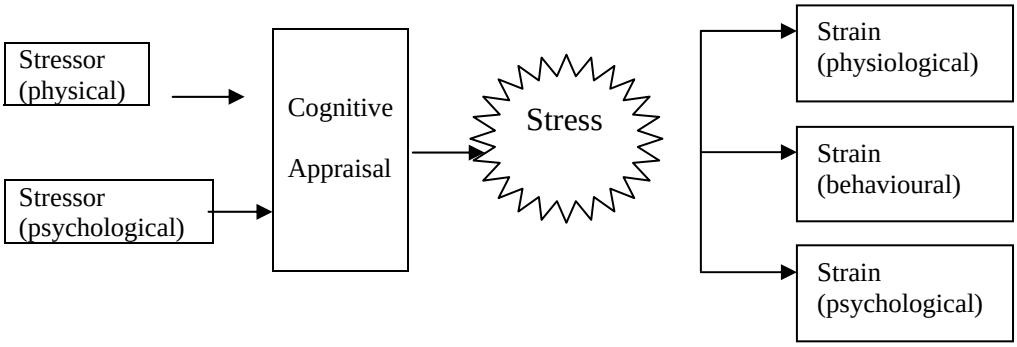
Physical	Tiredness, fatigue, lethargy, muscle tension and aches, headaches, heart palpitations, shallow breathing, bowel disturbance, heart burn, indigestion, sleep difficulties, lowered libido, overeating, loss of appetite
Psychological	Irritability, worry, anxiety, apprehension, moodiness, feeling overwhelmed, aggression, hostility, sadness
Behavioural	Isolation, altered appearance, change in habits, change in communication, withdrawal
Cognitive	Poor decision-making, intrusive and/or racing thoughts, concentration difficulties, inability to prioritise, deterioration in recent memory, confusion

(Elkin, 1999; Williams & Cooper, 2002).

Research has shown serious longer-term effects with links between stress and hypertension, cardiovascular disease and migraine headache (Elkin, 1999; Williams & Cooper, 2002). Stress also exacerbates chronic pain and immune system disorders such as rheumatoid arthritis, cancer metastasis, viral infections, and chronic fatigue syndrome (Elkin, 1999).

It is important to recognise that not all stress has detrimental effects. A certain degree of stress in the short-term can enhance performance and creativity. However, constant readiness for ‘fight or flight’ suppresses the immune system, reducing resistance to colds, flu and respiratory infections (Calvo, Grob, Bertoglio, Martin & Dennis, 1990; Seaward, 2002). It is also associated with general levels of physical and psychological ill health, general debility and adverse effects on social functioning (Bonn & Bonn, 2000; Williams & Cooper, 2002).

The Cognitive Transactional Model of stress developed by Lazarus & Launier (1978) is one of the most influential cognitive models of stress. Following on from this model, Greenberg & Baron (1995) included the experience of strain (stress reaction). Their model of the stress process is represented below in Figure 1. Strain is defined as "deviations from normal states of human functioning resulting from stressful events" (Greenberg & Baron, 1995, pp. 245). This model demonstrates how a person's cognitive appraisal of psychological and physical stressors determines their stress reaction. Strain can be experienced as physiological and medical, behavioural, and psychological.



Source: Greenberg & Baron (1995). Behaviour in Organisations.

Figure 1. Model of the stress process: the interrelationships between stressors, stress and strain

Coping strategies/styles for dealing with stress also play an important role in determining an individual's psychological and physical well-being (Endler & Parker, 1990). Problem-focussed coping has been associated with greater self-efficacy and satisfaction, and better physical and psychological wellbeing. In contrast, emotion-focussed coping has been linked to greater stress, depression, exhaustion and de-personalisation (Greenglass, 1993; Greenglass, 1995).

In applying the cognitive transactional model of stress to the work environment, work stress is viewed as work demands that exceed the worker's coping resources. Several potential sources of work stress are present in all working environments, which involve both the individual and the organization. In addition, families may also be affected in that workers may not only bring their personal problems to work, but problems may carry on into the home (Rice, 1999). Individuals with high tension discharge rate (ability to leave worries at work) report better health than those who carry stress home with them (Matteson & Ivancevich, 1983).

Common sources of stress in the work place can be broadly categorised as: Job-specific stress (job complexity, quantitative and/or qualitative work overload, work underload, unpleasant/dangerous physical conditions, long work hours, shiftwork, lack of sense of job control, new technologies, procedural changes); Role stress (role ambiguity, role conflict, unpredictability, too much responsibility); Interpersonal stress (poor work and social support systems, lack of management care/concern); Career development (job insecurity, frustrated ambitions, lack of promotional or advancement opportunities); Organisational structure and development (inadequate supervision, rigidity, restrictions on behaviour, lack of participation in decision-making); and Home-Work Interface (lack of support from spouse, dual-career stress, marital conflict) (Beehr, 1995; Cooper & Marshall, 1978; Greenberg & Baron, 1995; Grunfeld et al., 2000; Johns, 1995; Rice, 1999; Solomon, 1999).

1.2 Stress in Submarine Service

All working environments contain potential stressors. However, military environments are seen to have additional stressors. Commonly associated stressors

in the military include lengthy separation from family and friends, frequent postings (sometimes at short notice), danger, unpaid overtime, sleep disturbances, rank structure, service contracts, military discipline, and disruption to social, emotional and academic ties (Brooks, Byrne & Hodson, 2001; Cotton, 2001). Workers who report suffering from excessive job strain consistently manifest higher than normal levels of psychiatric morbidity (Cropley, Steptoe, & Joekes, 1999). Workers who are emotionally distressed are prone to error and this can have very serious consequences in a military environment (e.g. the loss of life or damage/destruction of expensive weaponry).

Submariners are exposed to further potential stressors such as lack of privacy and cramped living conditions, extended periods of confinement and isolation from social support, repetitive conditions and surroundings, lack of day-night cues, and constant presence of physical danger (Earls, 1969; Moes, Lall & Johnson, 1996; Suedfeld & Steel, 2000). In a recent study by Brown (1999b), Royal Australian Navy submariners were examined in relation to stress and coping, and the impact on work and non work life. Subjects in Brown's study were from four sample groups (*N*=121): submariners serving in HMAS Farncomb; submariners at the Australian Submarine Corporation, submariners based at HMAS Stirling; and Guided Missile Frigate ship personnel. The key areas investigated in Brown's study included working hours at sea and alongside, fatigue, job demands (mental demands, physical demands, time pressure, how hard they are required to work, frustrations on the job, and how successful personnel felt they were in their performance), environmental stressors, occupational strain, training and preparation, submariner specific stressors, health, self-reported stress, coping capacity, mood, and job satisfaction. The current

study was based largely on Brown's (1999b) findings and will be investigating similar areas, particularly now that the boats are fully operational. Work stress within Submarine Service will now be discussed within the context of the different strain modalities.

1.2.1 Psychological Strain

Commonly reported psychological strains as a result of work stress are anxiety, depression, anger, and resentment (Beehr, 1995; Beehr, Jex, Stacy & Murray, 2000; O'Leary, 1992; Rice, 1999), and it is argued that job dissatisfaction is one of the most predictable outcomes of work stress (Beehr, 1995; Cooper & Payne, 1988; Rice, 1999). This is also relevant for military personnel, with greater job satisfaction increasing the likelihood of retention or intention to stay in the military (Becker & Billings, 1993; Kocher & Thomas, 1994; Lakhani, 1991; Prevosto, 2001). Other psychological outcomes of work stress include feelings of isolation and alienation, withdrawal, boredom, mental fatigue, reduced concentration, reduced creativity and lowered self-esteem (Sauter, Murphy & Hurrell, 1990).

Work stress and strain in Submarine Service, particularly with regards to management strategies, has not been heavily researched to date, despite this occupation being recognised as potentially more stressful and dangerous than other occupations within the Royal Australian Navy. However, some of the potential work stressors within this environment, and associated job roles, are similar in nature to other working environments and populations. Thus, comparisons can be drawn from studies in more commonly researched areas of work stress. For example, Officers and Senior Sailors who work on submarines have divisional responsibilities for

managing the training, workload and welfare of their subordinates. This could be seen as comparable to management roles in other work environments.

Role overload was found to be one of the most prevalent stressors for Royal Australian Navy Submarine Officers and Senior Sailors in terms of self-reported strain (Brown, 1999b). Studies of work stress and psychological health in managers have shown the presence of psychological strain. This often presents as depression, anxiety and poor general health (Hobson & Beach, 2000), and increased job search activity, voluntary turnover, and reduced job satisfaction (Cavanaugh, Boswell, Roehling & Boudreau, 2000). A relationship was also detected between the perception of workload and psychological health. These relationships were further demonstrated with the additional work outcomes of reduced organisational loyalty, work withdrawal, increased job search activity, and intention to quit, in a sample of university staff (Boswell, Olson-Buchanan & LePine, 2004).

The findings from the Cavanaugh et al. (2000) study identified the importance of identifying the types of stressors being evaluated (i.e. challenge-related or hindrance-related stress), as opposed to assessing work stress as a unidimensional construct, in relation to different work outcomes. Given that submariners typically choose this specialist occupation within the Navy for the challenges inherent in this Service, it is possible that within this population the presence of challenge-related stress may actually increase such organisational outcomes as job satisfaction. However, despite potential gains in work outcomes, both types of stress factors have been found to produce undesirable effects in terms of strain (anxiety and emotional exhaustion) (Boswell et al., 2004) with exhaustion negatively relating to learning performance

(LePine, LePine & Jackson, 2004). Similarly, Officers and Senior Sailors in Brown's study reported the highest levels of maladaptive strain in the areas of psychological and physical strain with high scores reflecting feelings of depression, anxiety and/or irritability. Furthermore, analysis of the findings from the Australian Defence Force (ADF) Attitude Survey 1999 with regards to self-reported stress, revealed that Senior Sailors and Senior Officers at sea reported the highest proportion of 'quite a bit' or 'extreme' stress (Brown, 1999a).

Significant levels of work stress resulting in emotional distress and health concerns have been reported in general military service personnel (Pflanz, 2001; Pflanz, 2002). An association between lower levels of job functioning and exposure to work–related and health-related stress has been demonstrated in US military personnel, with depressive symptomatology acting as a mediator (Bray, Camlin, Fairbank, Dunteman & Wheeless, 2001). A link between work stress and receipt of mental health care was also established, but the causal direction of this relationship was not clear (Pflanz, 2001; Pflanz, 2002). Role conflict produced a strong and consistent association with individual strain and lack of organisational well being (job dissatisfaction and lack of affective commitment) in Canadian Forces personnel (Dobreva-Martinova, Villeneuve, Strickland & Matheson, 2002). Perceived job pressure and job-related issues were the two strongest predictors of job satisfaction in U.S. Active Duty and Reserve/Guard personnel (Sanchez, Bray, Vincus & Bann, 2004). Higher reporting of job satisfaction was found among older personnel, which the authors attributed to self-selection, and among Officers, possibly due to the different roles and privileges associated with higher rank.

Similar findings were obtained in Brown's (1999b) study with role overload, role insufficiency and responsibility identified as the most prevalent stressors in HMAS Farncomb personnel. Associations were also found between these occupational strains and personal strains (i.e. vocational, psychological, physical, and interpersonal) (Brown, 1999b). Consistent with predicted work stress outcomes in the general population, job satisfaction in this sample was quite poor, with nearly half the personnel indicating they were 'very dissatisfied' or 'dissatisfied' with their current job. Changes to the boat's program and long working hours were the most commonly reported problems. These outcomes are consistent with findings that a balanced workload and variety is most important for those who view their job as a career. In contrast, pleasant social conditions are considered important for those who don't view it as a career (Curry, Wakefield, Price & Mueller, 1986; Wright, 1990).

Submariners are exposed to unique and potentially unpleasant environmental conditions. Earlier research has provided consistent evidence of a relationship between lack of windows (in the workplace) and such strain reactions as depression, isolation, tension, restriction, claustrophobia and job dissatisfaction (Finnegan & Solomon, 1981; Sundstrom, 1986). Several studies have demonstrated empirical relationships between physical environment characteristics and appraisal of these characteristics, with work attitudes and wellbeing (Carlopio & Gardner, 1992; Duvall-Early & Benedict, 1992; Sundstrom, Town, Rice, Osborn & Brill, 1994; Wineman, 1986). Unpleasant working conditions such as extreme temperature, noise, darkness, poor air quality and overcrowding have been found to have adverse effects on job satisfaction (Sundstrom, 1986). A more recent study confirmed the importance of sunlight penetration in the workplace, revealing a direct and positive

relationship with job satisfaction and general wellbeing, and a negative relationship with intention to quit (Leather, Pyrgas, Beale & Lawrence, 1998). The adverse effects of job strain, however, were not buffered by area of sunlight penetration.

These findings are particularly important given the submarine environment, and confirm the great potential for strain reactions as a result of environmental conditions. This would also suggest that this strain association would likely be weakened when boats are alongside, given opportunities for exposure to natural light and fresh air, and potentially increase with prolonged periods at sea. However, as suggested by Leather et al. (1998), the impact of adaptation also needs to be considered.

The Profile of Mood States (POMS) was used to assess mood disturbance in Brown's (1999b) study. HMAS Farncomb personnel reported the highest mood disturbance, with a slight non-significant decrease post-sea. Slightly less than one in four reported higher than normal tension, depression and anger. Of note for further investigation is the presence of clinically significant levels of depression, anxiety, anger and fatigue in a small number of personnel. In comparing sample groups, negative mood states were more likely to be experienced by personnel posted to a submarine. Given that negative mood is an indicator of stress/strain, and strong associations were found in this sample group between fatigue, stress/strain, and job performance, Brown suggested that fatigue was a key contributor to negative mood, particularly in sea-going submariners, and needed to be reduced to improve wellbeing.

Coping resources used to deal with workplace stress and alleviating strain were measured on the Occupational Stress Inventory in Brown's (1999b) study. Negative correlations were identified between coping resources, and workplace stressors and strain, indicating that reduced coping is related to higher workplace stressors and strain. Mild deficits in the use of recreation were indicated by 28% of HMAS Farncomb personnel, which could be expected given environmental limitations. However, lower use of recreational activity as a coping mechanism was associated with higher reporting of physical strain and role overload. The use of rational coping and social supports was found across the sample groups.

Similarly, the majority of British military personnel (Navy, Army and Air Force) on unaccompanied tours in the Falklands were found to use positive thinking as a primary coping strategy, and perceived social support was a significant predictor of psychological wellbeing and job satisfaction (Limbert, 2004). One of the most successful coping strategies used in this study was positive reinterpretation and growth, which was associated with higher levels of job satisfaction, and psychological wellbeing. Interestingly, this was identified as a form of emotion-focussed coping, which has previously been linked with negative mood states (Greenglass, 1993; Greenglass, 1995). However, it would seem logical to use this type of coping style to manage enforced situations where there is little or no control. The findings regarding social support are consistent with previous research, which has found it to be important in coping with stressful situations (Cohen & Wills, 1985; Gerpott, 1990; Holahan & Moos, 1981; House, Landis & Umberson, 1988; Kobasa, Maddi & Kahn, 1982; Leavy, 1983; Mitchell, Billings & Moos, 1982). Coping with separation was made easier for soldiers on deployment through resources enabling

communication with their families and keeping updated with events back home (Rotter & Bojeva, 1999). Although opportunities for contact exist when submariners are in a port, communication with usual social supports is unavailable at sea.

Findings from a study of personality and coping strategies suggested that it may not be important to identify an effective habitual strategy over another but rather to identify a person's ability to adapt coping strategies used to meet the demands of the situation (Sandal, Endresen, Vaernes & Ursin, 1999). As noted by Brown (1999b), access to particular forms of coping is limited for sea-going submariners, therefore increasing the importance of personnel having a broad complement of skills and techniques for managing stress that can be adapted within the submarine environment.

1.2.2 Physiological Strain

Given the body's physiological response to perceived stress, research has shown a number of physical health effects linked with stress. Stress produces such biochemical changes as increased levels of adrenaline and noradrenaline and these changes typically are associated with increased heart rate, blood pressure, and muscle tension, gastrointestinal disorders (e.g. ulcers, irritable bowel syndrome), fatigue, headaches, pain, sleep disturbances, and impaired immune function (Gregson & Looker, 1996). The latter is thought to be the pathway by which exposure to chronic stress may lead to infectious disease particularly upper respiratory tract infection (Cohen, 1996). There is also an increased risk of developing acute and chronic health conditions such as hypertension, cardiovascular disease, arthritis, ulcerative colitis, skin disorders, and possibly even cancer (Cordes & Dougherty, 1993; Holt, 1982;

Latack & Kinicki, 1995; Leonard & Miller, 1995; Lovallo, 1997; Pelletier, 1995; Quick & Quick, 1984; Williams & Cooper, 2002; Witek-Janusek & Mathews, 2000). Employee ill health and sickness absence as a result of psychosocial workplace stressors has become recognised as a serious and increasing problem in modern working life (Levi, Sauter & Shimomitsu, 1999).

Musculoskeletal problems/complaints have been linked to physical workload, and such psychosocial factors as time pressure, high workload/demands, high work pace, low intellectual discretion, low control, monotonous work, and low levels of support from work colleagues (Bongers, de Winter, Kompier & Hildebrandt, 1993; Houtman, Bongers, Smulders & Kompier, 1994; Riihimaki, 1991). Low intellectual discretion was also associated with poor general health and indicators of ill-health behaviour (Houtman et al, 1994), whilst high job demands and low job control have been associated with coronary heart disease and hypertension (Karasek & Theorell, 1990; Siegrist, 1996), and general ill health (Schaubroeck, Jones & Xie, 2001). Interestingly, high job control among inefficacious workers was linked with indicators of poor health (for example, more chronic infections, lower immune functions and higher severity of illness).

A study of submariners on 10-day missions reported a significant number of health complaints and high cortisone values at both the first and last week of the mission (Sandal et al., 1999). However, submariners reported fewer health complaints than military recruits. This was attributed to submariners being less neurotic than military recruits, and the possibility that they may underreport health complaints due to high social value in this setting placed on physical strength and mental capacity

(Sandal et al., 1999).

In Brown's (1999b) study the most frequently reported symptoms in sea-going submariners included flu, general aches, headaches, tired/lacking energy and trouble sleeping. There was a positive correlation between higher reported stress, and greater reporting of physical health symptoms and overall negative mood. A positive correlation between self-reported health and reported ability to cope with stress was also found. Forty percent of personnel reported maladaptive levels of physical strain (physical illness complaints and/or poor self-care habits), the highest of the participant sample groups in Brown's (1999b) study. The Australian Defence Force Attitude Survey found that submariners and Senior Sailors at sea reported the highest proportion of 'poor' or 'fair' health (Brown, 1999a). 'Responsibility' and 'role overload' correlated with physical strain. Across ranks physical strain was consistently reported higher than other forms of strain, with Senior Sailors recording the highest percentage of maladaptive levels. As measured by the POMS, tension, depression and anger was reported by one in four personnel from this sample, and one in three reported above average levels of fatigue. Strong positive correlations were found between fatigue and self-reported stress, strain, effects of stress on personal life, and military performance, as well as positive associations with tension, depression and anger, and a negative association with vigour.

There has been increasing evidence of the negative impact of shiftwork on both psychological and physiological wellbeing (particularly sleep quality and quantity) (Barton et al., 1995; Cervinka, 1993; Frese & Semmer, 1986; Jamal & Baba, 1992; Jamal & Baba, 1997; Krausz & Koslowsky, 1995; Smith et al., 1999; Totterdell,

Spelten, Barton, Smith & Folkard, 1995). An association between role stressors (e.g. role ambiguity, role overload) and strains (e.g. anxiety, low organisational commitment, intention to leave) with shiftwork has been suggested (Jamal & Baba, 1992; Jamal & Baba, 1997; Krausz & Koslowsky, 1995). Submariners operate on a watchkeeping system (shiftwork), which Brown (1999b) examined in detail with regards to fatigue levels. At least 50% of sea-going submariners' working hours were spent at dangerously high levels of fatigue, with Officers and Senior Sailors incurring a greater sleep debt. This has serious implications in terms of performance, safety, and mental and physical wellbeing.

1.2.3 Behavioural Strain

Behavioural symptoms of work stress include: procrastination, avoidance, absenteeism, lowered performance and productivity, increased accidents, appetite disorders, violence, outright sabotage on the job, vandalism, stealing, withdrawal from the organization, increased risk-taking behaviour, deterioration in interpersonal relationships and suicide. Work stress has also been linked to an increase in substance use and abuse (Cooper, 1986; Cooper & Cartwright, 1994; Farrington, 1995; Johns, 1995; Rice, 1999). Research has consistently demonstrated the degrading effects of high levels of stress on performance (Cannon-Bowers & Salas, 1998; Driskell, Salas & Johnston, 1999; Huey & Wickens, 1993), and two major theories purport that it restricts attentional capacity (Combs & Taylor, 1952; Easterbrook, 1959) and distracts from the task-at-hand (Teichner, Arees & Reilly, 1963). However, the experience of physical and psychological stressors does not always degrade performance, and may be mediated by such factors as an individual's experience, skills and ability, motivation, and task complexity. Arousal is also an

important component of the stress and performance relationship.

The behavioural symptoms of work stress are costly to organizations in that they interfere with the work flow, reduce efficiency and safety, may result in staff replacement and retraining, potentially increase the workload for other workers due to absenteeism, and result in excessive psychological and medical health care costs and compensation claims. As well as mental and physical illness, and suicide, violence is another response to unbearable stress (Braverman, 1999). It has been argued that people under stress are acting out in the workplace, exhibiting such behaviours as being chronically late for work, yelling obscenities at each other, acting aggressively and using alcohol and/or drugs (Solomon, 1999).

Performance decrements were found in a sample of F-117 pilots during a 37 hour period of sustained wakefulness (Caldwell, Caldwell, Brown & Smith, 2004). Response times during a monitoring task and tracking accuracy were progressively impaired, and increased operator sleepiness also resulted in decrements in central nervous system arousal. A substantial decline in vigour was found, as well as increased ratings for depression, confusion and fatigue, as a result of extended wakefulness. Most changes occurred around or after 25 hours without sleep.

Similar cognitive and subjective changes were obtained with US Navy and Marine Corps personnel following a period of sustained psychological and physical stress (Harris, Hancock & Harris, 2005). Following one week of a highly stressful military training exercise, subjective reports indicated increased fatigue and physical discomfort, and reduced vigour. Concentration difficulties were also noted. In terms

of performance, simple reaction time slowed and capacity to maintain effort levels decreased with time on task, post-training. Vigour and concentration were related to variations in cognitive performance, although interestingly fatigue changes were not found to be related to performance deterioration. The authors concluded that military personnel operating equipment or performing tasks requiring complex information processing could be expected to experience difficulties, and this would likely increase with length, number, and complexity of tasks.

Short activity breaks and changes in body posture have been found to be beneficial for maintaining alertness and enhancing arousal in commercial pilots (Caldwell, Prazinko & Caldwell, 2003; Neri et al., 2002). Although such manipulations are not possible for military pilots, they may have some utility within the submarine environment.

Sea-going submariner Officers in Brown's (1999b) study reported the highest levels of vocational strain, which is associated with poor attitudes to work and may include reporting of errors in work, accidents, concentration problems and absenteeism (Osipow, 1998). Sea-going submariners had the lowest percentage rating of their performance as 'good' or 'very good' compared to the other sample groups. This indicated lower confidence in their performance on the job. Confidence in performance may have been affected by poor reporting in terms of training and preparation to meet the operational requirements of their job, and preparedness to undertake the technical aspects of the job. In contrast, ship personnel reported greater preparedness in these areas, as well as the highest performance ratings.

Brown's (1999b) study revealed strong correlations between effects of stress on personal life and on military performance. Sea-going submariners reported a moderate impact of stress on performance, which increased markedly following a two-week period at sea. Overall findings indicated that personnel in sea postings were more likely to report stress/strain. This is further confirmed through analysis of the Australian Defence Force Attitude Survey (Brown, 1999a).

European Space Agency simulation studies (Sandal, Vaernes & Ursin, 1995) and polar expeditions (Sandal, Bergan, Warncke, Vaernes & Ursin, 1996) investigating length of stay in confined and isolated environments, found psychological stress reactions to be linked to different stages of the period of isolation, independent of the actual total duration. Halfway through and toward the end of the isolation were found to be crucial periods marked by notable decline in team functioning, mood and morale.

These findings regarding decline in performance over time, and deterioration in team functioning towards the end of the isolation period, are significant in terms of prolonged exposure to stress, leading to burnout. Burnout is typically characterised by emotional, mental and physical exhaustion, loss of enthusiasm, cynicism, depersonalisation, professional disengagement and feelings of low personal accomplishment in one's vocation (Beehr, 1995; Cordes & Dougherty, 1993; Lee & Ashforth, 1996; McGuigan, 1999). It is often accompanied by feelings of frustration and tension due to the person's reduced ability to meet their own or others' expectations. Individuals experiencing burnout may distance themselves from others and appear detached, and they may act cynically towards coworkers. They may also

show declining work performance, increased absenteeism and seek organisational withdrawal (Chernis, 1992; Cordes & Dougherty, 1993; Evans & Fisher, 1993; Leiter, 1991; McElroy, 1982). Other factors that contribute to burnout include occupational frustration, lack of success and reinforcement, lack of support, social and intrapersonal conflicts, time management difficulties, psychological and environmental stressors, and job-skills mismatch.

In a sample of medical oncology personnel (i.e. physicians) working under pressured conditions, work overload, undermanning, time pressure, role conflict, and disruption to home life were strongly correlated with high levels of global stress (Grunfeld et al., 2000). These stress factors are also evident within Submarine Service, with subjects in Brown's (1999b) study identifying additional stressors such as personnel shortages, program pressures, concern over operational capability, lack of task variety, lack of free time when in port, and multiskilling leading to additional responsibilities. More than one-third of participants in the study of medical oncology personnel reported high levels of emotional exhaustion and low levels of personal accomplishment. These findings are consistent with research on burnout, which has identified work overload as a significant antecedent of burnout. Emotional exhaustion has been consistently directly related to this factor, and burnout is related to intention to leave the job (Cordes & Dougherty, 1993; Felton, 1998; Leiter, Harview & Frizzell, 1998; Lloyd, Streiner & Shannon, 1994).

In comparing the sample groups in Brown's (1999b) study, HMAS Farncomb personnel reported the highest levels of mental demand, time pressure, hard work required and second highest level of physical demand. Correlations were found

between job demands (mental demand, time pressure, and hard work required) and the occupational strains of role overload and responsibility. In a sample of Australian police officers, negative work experiences (organizational and operational job characteristics) directly predicted such withdrawal behaviours as sick leave, stress leave, and turnover behaviours (Hart & Cotton, 2003). Furthermore, over time, low levels of job satisfaction predicted turnover intentions in this same work population (Brough & Frame, 2004). These findings suggest the possibility of such predictive relationships in the submarine population.

A number of studies have demonstrated a positive relationship between elevated strain levels and employee turnover (Drake & Yadama, 1996; Todd & Deery-Schmidt, 1996; Wright & Cropanzano, 1998). Truck drivers have potentially stressful jobs due to the long periods of concentration required, traffic and road users, long-distance driving, isolation, repetitive work and physical demands. A two-year longitudinal study investigating stressful work (job demands and control), psychological job strain (need for recovery after work and fatigue) and employee turnover was conducted with Dutch truck drivers (N=820). At the end of the two-year period 23% of respondents had voluntarily changed jobs, notably drivers with higher levels of physical job demands, supervisor job demands, need for recovery after work, and fatigue. In contrast, drivers with more job control were less likely to change jobs (de Croon, Sluiter, Blonk, Broersen & Frings-Dresen, 2004).

Further recent research has confirmed that job demands, in particular situational constraints and low job control, are positively related to need for recovery, fatigue and loss of wellbeing. Quantity of work, daily hazards, and /or lack of support also

predicted need for recovery. Engaging in social and physical activities had associations with less need for recovery (Sonnentag & Zijlstra, 2006).

A meta-analysis, including 25 articles, of human service workers found reduced organisational commitment and professional commitment, burnout and lack of job satisfaction to be the best predictors of intention to quit, which, in turn, was the single strongest predictor of actual turnover (Mor Barak, Nissly & Levin, 2001). The top predictors of turnover in other occupations such as nursing, the military, information technology and manufacturing, were lack of job satisfaction, job search behaviours, absenteeism, reduced organisational commitment, individual performance and intention to leave (Fuller, Hester, Dickson, Allison & Birdseye, 1996; Horn, Caranikas-Walker, Prussia & Griffeth, 1992; Kopelman, Rovenpor & Millsap, 1992; Mitra, Jenkins & Gupta, 1992; Tai, Bame & Robinson, 1998; Tett & Meyer, 1993; Vandenberg & Nelson, 1999; Williams & Livingstone, 1994). Personnel reporting higher stress levels in the Australian Defence Force Attitude Survey had significantly lower organisational commitment to the Royal Australian Navy than those reporting low stress. Additionally, these personnel reported a significantly lower number of expected remaining years service in the Royal Australian Navy (Brown, 1999a).

Data collected from health service staff over a three year period provided strong support for a link between psychological distress and absence, as well as an association between job dissatisfaction and absence (Hardy, Woods & Wall, 2003). Their findings of an association between job-related depression and absence levels are also consistent with earlier research (Kessler & Frank, 1997; Tweed, 1993).

Although not measured in Brown's (1999b) study, the high levels of psychological strain and job dissatisfaction in submariners suggest that they would be at risk of increased absence in the workplace. As submariners at sea cannot be truly absent from the workplace, this behavioural strain reaction may present itself in the form of sick bay attendance.

Submariners serving at sea are faced with prolonged exposure to stress due to the unique and dangerous conditions, and extended isolation and confinement. There is also significant disruption to the submariner's personal life. Even when alongside there is often ongoing pressure to ensure the submarine's capability prior to deploying. Lack of personnel due to leave periods, or further training requirements, can create additional pressures when alongside. Submarine personnel in Brown's (1999b) study indicated a lack of shore time to recover and that working alongside did not give them a break in their workload. With retention being of concern within the Submarine Service, work overload would seem to be a key area to address, with efforts made to prevent burnout.

Research on the affective personality dimensions of neuroticism, extraversion and agreeableness in relation to emotional social support (coping) and burnout found that conversations with coworkers with positive content was significantly associated with reduced levels on the dimensions of burnout (i.e., emotional exhaustion, depersonalisation, diminished personal accomplishment). Empathic conversations were associated with increased perceptions of personal accomplishment. Engaging in more conversations with a negative content was associated with increased levels on the dimensions of burnout. Consistent with research on the affective personality

dimensions, extraverts reported more conversations of all content types. Individuals high in agreeableness used more empathic, non-job content and emotional support, whereas individuals high in neuroticism engaged in more conversations with a negative focus (Zellars & Perrewe, 2001).

Submariners are screened in terms of personality with personnel identified as more extraverted and low in neuroticism being preferred applicants. The ability to work within a small team environment is also important. Emphasis on the use of social support within this team environment is likely to be an important factor in reducing burnout in the operational environment. A positive finding from Brown's study was that the submarine crew believed they worked well as a team. This is important given the buffering effects of social support against workplace stress, and the periods of separation from usual supports in this population (Cohen & Wills, 1985; Holahan & Moos, 1981; Mitchell et al., 1982).

A review of the literature examining the psychological effects of Submarine Service included 18 studies involving US and Norwegian Navies, US Army personnel and occupations involving extreme and/or isolated conditions (Swann, 2002). The review considered both transient psychological hardships (effects whilst still aboard the submarine) and permanent effects (post-mission). Swann concluded that personality, specific environmental conditions, and social factors are key determinants of whether or not a submariner will experience psychological distress. He argued that the research reviewed did not provide sufficient evidence to conclude that serving on a submarine in itself leads to transient or permanent psychological effects.

As a result of Brown's (1999b) study, a number of measures were taken to improve Submarine Service, such as trialling changes to the watchkeeping system and increased support alongside. Additional measures undertaken by the Royal Australian Navy have been annual mental health screens (Health Bulletin, 2003a), psychological screening immediately on return from deployment and a three-month follow-up screen (Health Bulletin, 2003b). This enables early detection and treatment of any psychological issues. However, there are certain potential stressors that through their nature cannot be accommodated (for example, confined conditions, isolation, lack of privacy and separation from social supports). Brown recommended implementing a stress management program that encompasses both an organisational and individual focus. This had yet to be undertaken with COLLINS class submariners or with other navy submariners.

1.3 Treatment Options

To date stress management programs have been aimed at a variety of populations targeting a range of stress outcomes. From the vast array of research available, treatment options can be broadly categorised into four intervention types: relaxation techniques, cognitive-behavioural approaches, multimodal interventions, and organization-focussed interventions (van der Hek & Plomp, 1997; Van der Klink, Roland, Blonk, Schene & van Dijk, 2001). Each of these intervention types are described below.

1.3.1 Relaxation Techniques

Long-term stress can disrupt the relaxation response, resulting in a continued state of high arousal. The stress response can result in breathlessness, increased heart rate

and an increase in blood pressure, and also increases the likelihood of the person experiencing headaches and fatigue. Relaxation techniques are typically aimed at deactivating the body's physiological state of arousal ('fight or flight') and return it to a state of physiological homeostasis (Seaward, 2002). Techniques include diaphragmatic breathing, progressive muscle relaxation, guided imagery, meditation and autogenic training.

1.3.2 Cognitive-Behavioural Approaches

In the work stress literature these approaches have involved skills training to modify the cognitive appraisal process in the stress response, and the development of behavioural skills to better manage stressors. Cognitive restructuring is commonly employed to assist people to alter their thinking patterns in relation to the identified stressor (Murphy, 1996). Stress Inoculation Training (SIT) is a commonly used cognitive behavioural approach in work settings. It comprises an educational component about the person's past responses to previous stressful experiences, learning and rehearsal of new coping skills (e.g. relaxation, cognitive coping), and application of these skills in simulated conditions (Meichenbaum, 1985).

1.3.3 Multimodal Interventions

Multimodal interventions address the impact of the stress response on cognitions, emotions, behaviour and physiological systems. They also incorporate problem-focussed and emotion-focussed forms of coping through teaching active and passive coping skills.

1.3.4 Organisation-Focussed Interventions

Organisational interventions target three main categories of change:

(i) organisational characteristics, which include structure, selection and training

(ii) task characteristics, for example job design, and

(iii) role characteristics, such as increasing participative decision-making, and reducing role conflict and role ambiguity (Newman & Beehr, 1979).

1.4 Summary of Treatment Efficacy

To establish the efficacy of each of the different treatment interventions, relevant meta-analytic and critical review findings of workplace stress interventions and their effect on various physiological, psychological, somatic, and job-related outcomes are reviewed and discussed.

A quantitative meta-analysis to determine the effectiveness of stress management interventions in the work place was conducted by Van der Klink et al. (2001). The meta-analysis included 48 experimental studies, categorised as using either individually-focussed interventions – relaxation techniques (17), cognitive behavioural interventions (18), multimodal programs (8), or organisation-focussed interventions (5). The effectiveness of these interventions on the outcome categories of quality of work, psychological responses and resources, physiology, complaints and absenteeism was also examined, and reported effect sizes of .17, .28, .30, .27 and –.03 respectively. Due to the small effect sizes of the organisation-focussed interventions, a separate analysis of the individually-focussed interventions on the outcome variables was conducted and found the following effect sizes of .41, .48,

.30, .42 and –.12 respectively. Except for the outcome category of absenteeism, all effect sizes were significant at $p<.05$.

For individually-focussed interventions the mean interval between pre and post measures was nine weeks (*SD* = six weeks), due to intervention duration differences, with a mean drop out rate of 11%. In contrast 38 weeks was the mean interval for organisation-focussed programs, due to longer intervention durations and post intervention assessment intervals, with a mean drop out rate of 26%. Cognitive behavioural interventions were found to have a moderate effect (.68) and were significantly more effective than relaxation techniques and marginally more effective than multimodal interventions. Organisation-focussed interventions were the least effective. With their moderate effect sizes and cost effectiveness (short treatment duration; low attrition rate), the authors concluded that cognitive-behavioural interventions were the treatment of choice, followed by multimodal interventions.

A review of the literature on psychological treatment for workplace stress confirmed this finding and argued cognitive-behavioural and multimodal interventions to be the most effective, particularly in relation to psychological resources and responses, complaints, and perceived quality of work life (Hewson-Bower, 2002). It was argued that although cognitive-behavioural interventions are considered more cost-effective than multimodal interventions, the complex nature of work stress may see this type of intervention as unjustifiable. Multimodal cognitive behavioural treatment was recommended as the most defensible practice for workplace stress. Assessment of internal and external factors was recommended (for example, level of stress, depression and anxiety, appraisal of control over work tasks, perception of general

work conditions (as listed by the National Institute for Occupational Safety and Health), frequency of lifestyle events related to fun and relaxation, belief in personal abilities, coping strategies, and disruption to the basic-rest-activity-cycle). Treatment should be tailored to such internal factors and guided by factors known to increase resilience, alteration of external factors, and be based on empirically justified approaches as identified in the research literature (DeRubeis & Crits-Christoph, 1998). Short-term interventions of about 12 sessions were recommended (Hewson-Bower, 2002).

The effectiveness of three types of occupational stress interventions: psychotherapy (specific, formal, structured programs such as CBT) and counselling services (analysed separately), stress management training (pre-packaged) and organisational level interventions (total of 23 studies) was reviewed (Reynolds, 2000). The review mainly included randomised controlled trials and focussed on individual and organisational outcomes. Reynolds concluded that formal psychotherapy, such as cognitive behaviour therapy, was the treatment of choice for employee mental health problems. Only small effects were found for counselling services (support), and organization-focussed interventions were found to be of no individual or organisational benefit. Pre-packaged stress management training generally resulted in modest but only short-term improvements.

Reynold's review confirmed the effectiveness of cognitive behaviour therapy in reducing symptoms of anxiety and depression. However, the interventions often lacked objective measures of organisational outcomes.

The cost, benefits and limitations of organisation level interventions for workplace stress were reviewed by Briner & Reynolds (1999). It was argued that individual differences and the work context play pivotal roles in determining which organisational conditions the employee will experience as pleasant or unpleasant. Even if conditions are found equally unpleasant, these influential factors will mean that a particular organisational change will not have the same effect for each employee, and may in fact have negative consequences for some employees. This argument is consistent with research indicating, for example, that only those individuals high in self-efficacy benefit from increased control in the workplace, and that those low in self-efficacy are likely to experience increased anxiety with increased levels of workplace control (Fisher, 1984; Schaubroeck et al., 2001; Schaubroeck & Merritt, 1997). It was concluded that organisational interventions alone are not sufficient in addressing complex problems associated with undesirable employee states and behaviours. This concurs with the above mentioned meta-analytic and review findings (Reynolds, 2000; Van der Klink et al., 2001).

A report on a systematic review of workplace counselling research published over the past 50 years (1954-2000), which included more than 80 studies, showed that for at least 50% of subjects in two-thirds of the studies, work-related symptoms and stress returned to the normal range after counselling. Furthermore, in studies evaluating sickness and absence, a 25-50% drop in levels was demonstrated (Mayor, 2001). Smaller significant positive effects were reported for the effect of counselling interventions on work functioning, job satisfaction, job commitment and substance misuse. Findings of this review provide support for the use of short-term counselling interventions.

A critical review of 64 work-site stress management interventions on health effects included a variety of intervention techniques such as muscle relaxation, meditation, biofeedback, cognitive-behavioural skills, and combinations of these techniques (Murphy, 1996). The outcome measures included physiological (e.g., adrenaline, noradrenaline, cholesterol, blood pressure), and psychological (e.g., anxiety, depression, irritability) measures, somatic complaints (e.g. sleeping difficulties, headaches, muscle tightness, nervousness, shortness of breath), and job-related measures (e.g., job satisfaction, health care costs, clinic visits, absenteeism).

Of the studies included in this review, nearly 75% (47 of 64) were preventive in nature, that is, the training was offered to all workers and not just those experiencing high levels of stress. Murphy (1996) indicated this has evaluation implications in that it is more difficult to detect a statistically significant decrease in anxiety in subjects with normal levels than those with high levels. Despite this, 79% of the prevention-oriented studies reported positive results. Findings showed that using a combination of stress-management techniques (e.g. progressive muscle relaxation + cognitive behaviour therapy + other) produced the most consistent significant findings across the various health outcome measures. For each health outcome measure, 60% or more of the studies produced a significant effect, and in more than 60% of these studies, significant results were obtained for job-related measures (Murphy, 1996). When assessed separately, muscle relaxation interventions were most effective for physiological outcomes, cognitive-behavioural skills were most effective for psychological symptoms, combinations of techniques were most effective for somatic complaints, and more specifically-focussed techniques were most effective for job-related outcomes.

Although each of the treatment types have their own limitations, based on the findings and conclusions of these meta-analyses and reviews, a multimodal cognitive behavioural program would appear to be the most effective in addressing the various individual and organisational outcomes of workplace stress.

1.5 Rationale for the Present Study

Work stress has become an increasing focus for many organisations due to the serious mental health problems for the employee and resulting organisational costs through compensation claims, absenteeism, accidents, illness, and staff turnover. Similar concerns are evident in the military. Submarine Service has been identified as an occupation encompassing a variety of psychological and physical/environmental stressors, and Brown (1999b) identified the need for COLLINS class submariners to be provided with stress management training. Much survey-like research has been conducted with submariners. However, of the research reviewed, it was apparent that provision of stress management training has not yet been trialled with this occupational group. Brown (1999b) noted that negative psychological outcomes, in relation to high levels of stress and perceived poor coping, may worsen when the COLLINS class boats became fully operational and had lengthier deployments. Therefore, it seems pertinent to investigate in detail the current state of the Royal Australian Navy Submarine Service in relation to organisational and psychological issues, and to provide submariners with a workplace stress management program that is applicable within their unique working environment.

The Submariner Health and Wellness Program used in this study is a multimodal cognitive behavioural program, which includes an educational component, relaxation training, cognitive skills training, problem-solving skills, dealing with unsolvable problems and addressing disruptions to the basic-rest-activity-cycle (the outline of this program will be detailed in the next section). The following provides the rationale for this treatment program with this occupational group.

As previously stated, cognitive-behavioural and multimodal programs have been identified in the research literature as being most effective for addressing the complexities of workplace stress. De Rubeis & Crits-Christoph (1998) review of efficacious treatments for adult psychological disorders clearly identifies cognitive-behaviour therapy as the 'best practice' treatment for conditions such as anxiety and depression. Therefore, to ensure defensible practice for workplace stress, it was considered that cognitive-behaviour therapy should be used to address these specific internal factors. As well as these psychological symptoms, this study aimed to investigate somatic complaints, and job-related outcomes such as job satisfaction, sick bay visits, and perception of overall job performance. To adequately target each of these outcome areas, the research indicates that cognitive-behaviour therapy alone would not be optimal and that a combination of techniques would be more appropriate and effective (Hewson-Bower, 2002; Murphy, 1996).

Muscle relaxation training has typically been used in stress management programs and has been found to be effective in reducing physiological symptoms of the stress response (Murphy, 1996). Relaxation techniques need to have utility in the face of stress (e.g. during a meeting with a supervisor, observing displays for information

that may require a reaction), unlike visualisation methods, for example, which lack applicability in the face of direct stress (McKay & Fanning, 1987). The submarine environment itself involves cramped and confined conditions, which make it difficult to implement certain relaxation techniques when needed during peak periods of work, such as yoga, progressive muscle relaxation and meditation. However, paced diaphragmatic breathing can be easily implemented in any working environment and context (e.g., when sitting in front of the console, working in the engine room or galley, or in one's rack). In addition, submariners are medically screened during the selection process and are ineligible for Submarine Service if they are found to have a sinus condition. Therefore, all submariners should be physiologically capable of applying this relaxation technique.

Long term excessive demands, internal or external, break down the natural cycle in sympathetic-parasympathetic activity (Kleitman, 1969; Rossi & Cheek, 1988; Werntz, Bickford, Bloom & Shannahoff, 1983). The parasympathetic cycle is typically overridden, interrupting the relaxation response. The Basic-Rest-Activity-Cycle (BRAC) involves working with the natural 90-120 minute ultradian rhythm, and engaging in activities likely to stimulate parasympathetic function (Kleitman, 1969; Rossi & Cheek, 1988; Werntz et al., 1983). In this study subjects were encouraged to take 15 minute breaks following 90 minutes of purposeful work. Subjects were then to return to normal duties and repeat this 90/15 cycle throughout the work day. In discussions with submariners it was noted that this may not be possible during certain work activities for particular personnel (for example, Officer of the Watch duties). However, it was agreed that it would be largely applicable for the majority of personnel and was therefore included.

Research has identified the importance of both active (problem-focussed) and passive (emotion-focussed) coping skills for dealing with the array of problems that may be encountered in the workplace (Holahan & Moos, 1985; Troup & Dewe, 2002). The Submariner Health and Wellness program encouraged the use of both of these coping techniques through having participants identify personally relevant problems, which they would like to work on, and encouraging problem-solving skills. In identifying which problems they would like to work on and ways in which to address each problem, participants were asked to consider the level of controllability and predictability associated with each. The program also encompassed a component providing them with strategies (distraction and compensatory techniques) for dealing with unsolvable problems, that is, those over which they have little or no control. This was considered important noting the additional potential stressors that are inherent in this unique working environment (e.g. separation from family and friends, confined environment, lack of privacy, general duties).

Although it is noted that integrated health programs incorporating physical exercise, aerobic and dance programs, health and nutrition aspects have been effective (Ihlebaek, Eriksen & Ursin, 2002; Pruitt, 1992), it was considered that these more conventional techniques would not be easy to apply in submarines. Although not a focal part of treatment, it should be noted that as part of one of the primary components of the Submariner Health and Wellness program, participants were encouraged to undertake physical activity where possible (e.g. hand weights, exercise bike). Nutrition and diet were not directly addressed because the provision of meals to the crew are largely outside of their control and the meal options are more limited.

The survey component of this research study asked submariners about their views and experiences and specifically measured such things as job satisfaction, perceived level of performance, training and preparation, manpower and job demands, and views on being a submariner. Subjects also rated their perception of a range of work conditions as listed by the National Institute for Occupational Safety and Health, according to level of stress experienced and perceived level of coping with each potential stressor, and the importance of this by identifying whether it was a problem for them or not. This would help identify commonly reported stressful working conditions and those with which participants perceived a poor level of coping, which could then be used to target areas for change.

As Brown's (1999b) study indicated that submariners serving in a COLLINS class submarine reported high levels of stress and strain, and a significant percentage perceived poor levels of coping with such demands, it was decided to include only submariners serving in COLLINS class submarines. This sample group was also chosen to trial the intervention program to determine its effectiveness both alongside and at sea. Using submariners in a sea-going role, as opposed to those posted ashore, was also seen as more useful as there are a greater number of potential stressors associated with the sea-going environment, such as danger, living conditions, separation from family and friends, restricted activities, and increased workload and time pressures.

1.6 Outline of Multimodal Cognitive Behavioural Program

The present study sought to use a program that focussed on stressors identified by participants as personally relevant to their lives, which they attempted to resolve

through application in the actual work environment, as opposed to just training in coping skills, and rehearsal in the learning (classroom) environment. The Submariner Health and Wellness program focuses on a multimodal cognitive behavioural approach and aimed to include techniques with greater utility and acceptability for operational submariners.

The Submariner Health and Wellness program was conducted in 1.5 hour sessions twice weekly for a total of eight sessions and 12 hours. The treatment duration was selected taking into account the literature findings regarding successful cognitive-behavioural and multimodal programs, key stake holder opinions, and the programs of each of the boats (and the possibility of unpredictable, short-notice changes to programs limiting the possibility of longer-term interventions). Van der Klink et al. (2001) found no significant predictive influence of number of weeks, number of contact hours, and number of sessions on overall effect size. Analyses revealed an inverse correlation between number of sessions and effect size ($r=-.27$, $p<.05$) for cognitive-behavioural interventions, indicating that shorter programs were more effective. As previously stated the mean interval between pre and post testing sessions was nine weeks (*SD* = six weeks) for cognitive-behavioural interventions, and the mean number of sessions for cognitive-behavioural studies with large effect sizes was 6.8, and 7.6 for all cognitive-behavioural studies reviewed. The treatment duration of this program in this study fits with these findings and would provide opportunities for submariners to also attend career courses (e.g. promotional courses, advanced technical training) and gain respite whilst alongside.

Given that teamwork and group cohesion has been found to be an important supportive element in Submarine Service (Brown, 1999b), it was considered that the program would be more effective if delivered in a group format for this subject population. These same groups would potentially be serving together on the submarine at the completion of the intervention program, which would enable subjects to continue to access group support in addressing their personally relevant problems.

1.7 Aims

The present study aimed to examine the effect of the work stress intervention on self-reported stress, anxiety and depression, perceived level of coping, somatic complaints, occupational strain, job satisfaction, and perceived job performance. The rationale for utilising a multimodal cognitive-behavioural program was to target the stress modalities to improve psychological and physical well-being, and improve the organisational outcomes of job satisfaction, sickness level and job performance. The information gathered from this study was also designed to provide a comparison of the current state of the Royal Australian Navy Submarine Service with the previous findings from Brown's (1999b) study, and to provide the organisation with information regarding potential areas for organisational change. It was also hoped that information gathered would provide further insight into the characteristics of successful submariners, so that this could be used to aid selection of personnel into Submarine Service.

1.8 Hypothesis

Based upon previous research, it was hypothesised that:

1. *The participants in the intervention group would benefit from the intervention on the following dependent variables:*

    a) *depression, anxiety and stress symptoms*

    b) *occupational and personal strain indicators (as measured on the Occupational Stress Inventory – Revised)*

    c) *coping resources*

    d) *job satisfaction*

    e) *overall job performance*

    f) *general health and wellbeing, and sickbay attendance.*