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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2007

CHAPTER 5

STUDY 1

5.0 Historical Comparisons

5.1 Introduction

Brown (1999b) conducted a study of stress and coping in the workplace with Royal Australian Navy personnel. Subjects were from four sample groups within Defence (*N*=121): 1) submariners serving in HMAS Farncomb, 2) submariners at the Australian Submarine Corporation, 3) submariners posted to HMAS Stirling, and 4) Guided Missile Frigate (FFG) ship personnel. At the time of this study the new COLLINS class submarines had recently been introduced and were not yet fully operational. Brown investigated a number of organisational and individual factors within Submarine Service. The aim of Brown's study was to examine the potential stressors of Submarine Service against submariners' coping ability, and to determine the impact of these stressors on performance, attitudes, non work life, and health.

5.2 Data Collection

Brown collected data from the four sample groups whilst ashore (or alongside for seagoing personnel). For the two seagoing vessels (HMAS Farncomb, and the FFG) data was again collected post-sea on their return alongside. Brown used the FFG personnel as a comparison group. 'Pre-sea' data included: demographic data, job perceptions (job satisfaction, manpower and working hours, training and preparation), job demands (mental demands, physical demands, time pressure, how hard they are required to work, job frustrations, and perceptions of job performance), estimates of working and resting periods during a 24hr period), views on the Navy, health and wellbeing (health rating, stress rating, impact of stress on personal and

working life, symptoms checklist, occupational strain, mood state), and views on being a submariner. Only job perceptions (estimates of working and resting periods during a 24hr period), and health and wellbeing (as above) were included in the post-sea data collection. For HMAS Farncomb personnel, pre-sea questionnaires were administered after the boat had been alongside for seven days, and post-sea questionnaires were administered after a period of two weeks at sea. 'Post-sea' questionnaires for FFG personnel were administered following a period of five weeks at sea.

5.3 Outcomes

Brown determined that moderate to high levels of stress were being experienced by a proportion of submariners, in particular Officers and Senior Sailors. Stressors identified as significant in these findings were fatigue, job demands (mental demand and time pressure), occupational strain factors, namely role overload, role insufficiency, and responsibility, lack of personnel, family separation, safety, media attention, psychological strain, and physical strain. A proportion of respondents also indicated difficulties coping with workplace stress. Brown (1999b) concluded that such issues as minimum manning, intermediate support, support personnel, and public perceptions were underlying causes of stress and fatigue in submariners. Some remedial and longer-term actions aimed at these issues were recommended. Since then all six COLLINS class boats have been introduced and become fully operational. It was considered important to determine if any notable changes have occurred, and if the Navy has been successful in terms of reducing stress and strain in personnel and improving work outcomes. Comparisons between the alongside pre-test findings, from HMAS Farncomb personnel (n=40) in Brown's study and this

current study, are discussed. Only findings from HMAS Farncomb personnel were examined, as this was the only operational (sea-going) sample group in Brown's study, thus being the most directly comparable to submariners being investigated in the present study. Analyses were in the form of t-tests or chi-square tests, depending on the data available from Brown's reports.

5.4 Data Analysis

5.4.1 Statistical Approach

Multiple comparisons of the data were made in this study. To reduce the likelihood of Type I errors, Bonferroni corrections were calculated for sets of comparisons. More confidence can be placed on findings which achieved statistical significance when this stringent criterion was employed. However, other findings at the traditional .05 significance criterion were also noted because they signal interesting trends, which may turn out to be important if confirmed in future studies. This statistical approach was used in the remaining studies.

5.4.2 Manpower and Working Hours

In the present study, the seven items referring to attitudes regarding manpower and working hours were taken directly from Brown's (1999b) study to allow a direct comparison of findings alongside. Respondents were asked to rate their degree of agreement. Table 6 shows the means and standard deviations by sample group, as well as t-test results.

Table 6

Means and Standard Deviations for Attitudes Towards Manpower and Working Hours by Sample Group

Item	Current Study (*n*=56) (1=Strongly Disagree; 5=Strongly Agree)		Brown Study (*n*=40) (1=Strongly Disagree; 5=Strongly Agree)		T-Test
Current manning levels mean I don't get enough shore time to recover	**Mean**	3.5	**Mean**	4.2	3.46**
	SD	1.1	***SD***	0.8	
We have enough personnel to ensure the job gets done properly	**Mean**	2.7	**Mean**	1.0	-8.05**
	SD	1.1	***SD***	0.9	
I can't perform my job effectively due to current manning levels	**Mean**	2.8	**Mean**	3.4	2.93*
	SD	1.0	***SD***	1.0	
In general, I am happy with my current working hours	**Mean**	2.9	**Mean**	2.3	2.66*
	SD	1.1	***SD***	1.1	
I don't get to spend enough time with my family and friends	**Mean**	3.8	**Mean**	4.0	1.02
	SD	1.0	***SD***	0.9	
Constant changes to the work schedule make it difficult to plan family or leisure activities	**Mean**	4.1	**Mean**	4.7	3.53**
	SD	1.0	***SD***	0.5	
Working alongside gives me a break in my workload	**Mean**	2.3	**Mean**	2.1	-0.85
	SD	1.1	***SD***	1.2	

*p<.05 (without Bonferroni correction)
**p<.007 (significant after Bonferroni correction)

Personnel in the current study indicated agreement that constant changes to the work schedule made it difficult to plan activities. They also indicated that there were insufficient personnel to get the job done properly, that working alongside did not give them a break in their workload, and that they were unhappy with their current working hours.

An analysis of historical and current data was conducted. Results obtained were very similar in the current study and Brown's study, with only slightly less agreement for Item 1 indicating some ambivalence regarding if there is sufficient shore time for recovery with current manning levels. T-tests showed this difference to be significant [t (94) =3.46, p<.007], and suggests there have been some minor improvements in obtaining shore time for recovery since Brown's study. There was also significantly less disagreement amongst the current sample group regarding the impact of manning levels on job outcomes, [t (94) =-8.05, p<.007]. The same trend

was detected for individual performance, [t (94) =2.93, $p<.05$, without Bonferroni correction].

Overall both sample groups indicated their dissatisfaction with their working hours, although the current group were less dissatisfied [t (94) =-2.66, $p<.05$, without Bonferroni correction]. This difference is consistent with current views regarding manning levels. Both groups agreed they don't get to spend enough time with family and friends, and identified an impact on planning family and leisure time. Brown's sample group held stronger views regarding the latter [t (94) =3.53, $p<.007$], which ties in with their greater concerns over manning issues. Finally, neither sample group considered working alongside to be a respite from their workload.

5.4.3 Training and Preparation

Respondents rated their level of preparedness to meet job requirements on a scale from (1) Very Poorly to (5) Very Well. Mean ratings indicated that current personnel (n=56) believed they were ‘adequately’ prepared to meet operational requirements (M=3.23, SD=.97), the technical or specialist aspects of the job (M=3.21, SD=0.93), and the lifestyle changes caused by the job (M=3.02, SD=0.88). Table 7 represents the number of personnel indicating that they were either ‘poorly’ or ‘very poorly’ prepared to undertake their job requirements compared with Brown’s group. Chi-square findings are also presented.

Table 7

Percentage of Personnel Reporting they were 'Poorly' or 'Very Poorly' Prepared to Undertake their Job

Item	Current Study (*n*=56) Frequency (%)	Brown Study (*n*=40) Frequency (%)	Chi-Square
Prepared to meet operational requirements	12 (21.5%)	10 (26%)	0.03
Prepared for technical/specialist aspects	9 (16%)	13 (33%)	2.69
Prepared for lifestyle changes	13 (23.3%)	10 (26%)	0.0016

Note. None of the chi square tests were statistically significant

Current submariners are solely trained on the COLLINS class submarines, whereas in Brown's study some of the personnel changed over from the OBERON class boats. Despite the potential for training and adjustment difficulties, chi square analyses did not reveal any statistically significant differences between these two sample groups on any of the training items.

5.4.4 Job Demands

Items pertaining to the demands of the job (derived from the NASA Task Load Index) were also taken directly from Brown's study (Hart & Staveland, 1988). The task load variables measured mental and perceptual activity, physical activity, time pressure, how hard they work, and frustrations on the job. Findings are in Table 8.

Table 8

Means and Standard Deviations for Each of the Job Demand Items

Job Demands	Mean (*SD*) (1=Very Little; 5=Very Much)
Mental and perceptual activity required	3.98 (0.92)
Physical activity required	2.82 (0.95)
Time pressure	3.59 (0.89)
Hard work required to accomplish goal of your job	3.75 (0.88)
Frustrations on the job	3.05 (1.10)

A ‘moderate’ degree of demand was indicated for time pressure, hard work required and frustrations on the job. Physical activity was rated as requiring ‘little’ demand, and mental and perceptual activity required was bordering on ‘much’ demand. The number of personnel rating job demand items as requiring ‘much’ or ‘very much’ demand from both sample groups are presented in Table 9.

Table 9

Frequency and Percentage of Personnel Reporting Job Demands as High (‘Much’ or ‘Very Much’) by Sample Group

Job Demands	Current Study (*n*=56)	Brown Study (*n*=40)	Chi-Square
Mental and perceptual activity required	43 (77%)	36 (90%)	1.96
Physical activity required	14 (25%)	9 (23%)	0.0016
Time pressure	30 (53%)	31 (78%)	4.78*
Hard work required to accomplish goal of your job	36 (64%)	35 (88%)	5.38*
Frustrations on the job	17 (30%)	15 (38%)	0.26

* $p<.05$ (without Bonferroni correction)

Seventy-seven percent of personnel reported their job required high levels of mental and perceptual activity compared to 90% of sea-going submariners in Brown’s (1999b) study. However, chi square analysis showed this difference to be nonsignificant. Ratings of physical demands, and frustrations on the job between the two groups were similar and non significant. A large proportion of personnel, significantly more so in Brown's study, recorded time pressure ($x^2=4.78$, $p<.05$, without Bonferroni correction), and hard work required ($x^2=5.38$, $p<.05$, without Bonferroni correction) as high. This is consistent with differences in reporting of the impact of manning levels.

5.4.5 Views on Being a Submariner

Using Brown's (1999b) scale on attitudes towards being a submariner and serving on a COLLINS Class submarine, respondents rated their views from (1) Strongly Disagree to (5) Strongly Agree. The item comparing service on a COLLINS class to an OBERON class was deleted as a number of current personnel may not have served on an OBERON (Table 10).

Table 10

Personnel Views of Being a Submariner

Item	**Mean (*SD*) (*n*=56)** (1=Strongly Disagree; 5=Strongly Agree)	**No. of Personnel Indicating Agreement** ('Agree' or 'Strongly Agree')		**Chi-Square**
		Current Study	**Brown Study**	
Crew works well as team	3.95 (0.84)	47 (83.9%)	N/A	
COLLINS submariners perceived as elite	2.88 (1.11)	17 (30.4%)	N/A	
Little teamwork & cooperation among crew	1.96 (0.85)	5 (8.9%)	N/A	
Closest relationships with people I work with	2.66 (1.03)	14 (25.0%)	N/A	
Negative media attention makes work less satisfying	3.04 (1.20)	23 (41.1%)	25 (63%)	3.60*
Media attention on 'problems' blown out of proportion	3.95 (1.00)	47 (83.9%)	N/A	
Submarine doesn't meet safety requirements	2.73 (1.15)	17 (30.4%)	12A (31%)	0.03
No major safety concerns at sea	3.21 (1.22)	28 (50.0%)	N/A	
Work on submarine is mentally exhausting	3.71 (1.02)	38 (67.8%)	28 (70%)	0.00
Electronic monitoring of performance makes me nervous	2.36 (0.84)	6 (10.7%)	N/A	
Able to remain focussed on job while on duty	3.79 (0.82)	43 (76.8%)	N/A	
Enough support alongside to maintain submarine	2.50 (1.04)	12 (21.4%)	N/A	
Squadron internal communication is effective & fosters teamwork	2.50 (1.00)	10 (17.9%)	8 (21%)	0.00
Last minute changes to work schedules	3.88 (0.95)	41 (73.2%)	33 (84%)	0.67
Separation from extended family making it difficult to do job	2.82 (1.10)	14 (25.0%)	N/A	
Separation from extended family making it difficult to relax	2.79 (1.06)	16 (28.6%)	15 (39%)	0.49
Separation from long term friends making it difficult to relax	2.75 (0.98)	14 (25.0%)	16 (41%)	1.79
Separation from immediate family making it difficult to do job	3.14 (1.12)	21 (37.5%)	N/A	

* $p<.05$ (without Bonferroni correction)
N/A – data not available

Key findings from the current study included: Respondents overwhelmingly agreed that their crew worked well as a team (84%). However, the majority of personnel reported that their closest relationships were not with the people they worked with. The media attention regarding ‘problems’ with the COLLINS class was believed to be blown out of proportion (84%), and nearly half the personnel indicated that it was making work less satisfying. Only 17 of the 56 personnel surveyed believed that submariners were perceived as the elite of the Navy. With recruitment and retention being significant issues, separate correlations were computed for this item to increase insight.

Spearman’s rho correlations indicated a significant negative relationship with job frustration (-.48, $p<.01$), indicating that greater frustrations experienced on the job were associated with the view that submariners are not perceived as the elite of the Navy. A significant relationship was also found with the coping resource of Recreation (.35, $p<.01$). Personnel who spent more time in recreational activity had a better view of the Service. Length of time spent in their current posting was not found to be significantly associated with this view. Correlations were also computed with the DASS to determine if this view was related to psychological symptomatology. Significant relationships were found with each of the scales. Those subjects who held a poorer view of how submariners are perceived were also likely to have high scores for Depression (-.50, $p<.01$), Anxiety (-.43, $p<.01$), and Stress (-.46, $p<.01$). A moderate relationship with job satisfaction was also identified (.44, $p<.01$), indicating that job satisfaction was higher when subjects believed that submariners were perceived as the elite of the Navy. Ratings of job performance were not associated with this view.

Working on a COLLINS class submarine was identified as mentally exhausting ('agreed' or 'strongly agreed') by 68% of personnel, and 9% indicated difficulties remaining focused while on duty. Half the personnel (52%) disagreed that there was enough support alongside to maintain the submarines, and did not believe that the internal squadron communication was effective and fostered teamwork (50%). Finally, 73% of personnel indicated that they often only found out at the last moment about changes to the work schedule, and nearly half of the respondents agreed that separation from their immediate family made it difficult to do their job. Of the findings Brown reported, chi square analyses were computed. For these particular items, submariner attitudes remained largely unchanged since Brown's study.

5.5 Dependent Variables

5.5.1 Personal Strain Questionnaire (PSQ)

The PSQ formed part of the baseline measures. It was first administered on the boat's return from sea, and a second time after a two-week period alongside. Responses at each stage were retrospective over the past two weeks. Findings for maladaptive strain on the PSQ subscales within the present study and in Brown's sample (1999b) are presented in Table 11.

Table 11

Number of Respondents Reporting At or Above 60T for the PSQ Subscales at the Baseline Alongside Measure Compared with Brown's Findings

Subscale	Baseline Alongside No. (%)	Brown Study No. (%)	Chi-Square
Vocational Strain	14 (26.6)	13 (33.0)	0.17
Psychological Strain	12 (22.8)	13 (33.0)	0.68
Interpersonal Strain	10 (19.0)	8 (20.0)	0.01
Physical Strain	10 (19.0)	16 (40.0)	4.06*

* $p<.05$ (without Bonferroni correction)

Comparisons with Brown's study and Baseline Alongside results, using chi square analysis revealed that significantly more respondents in Brown's study reported maladaptive levels of physical strain, (x^2=4.06, *p*=.05, without Bonferroni correction). No other significant differences were found in strain reporting between this study and Brown's.

5.5.2 Occupational Roles Questionnaire (ORQ)

For the ORQ scale, T scores at or above 60 (i.e. 60T) reflect mild levels of maladaptive stress and strain, with T scores at or above 70 indicating the strong probability of maladaptive stress, debilitating strain or both. Findings are included in Table 12.

Table 12

Descriptive Findings on the ORQ and Clinical Findings by Sample Group

ORQ Subscale	Current Study Mean (*SD*) (*n*=56)	Current Study Above 60T No. (%)	Brown Study Above 60T (*n*=40) No. (%)	Chi-Square
Role overload (RO)	28.07 (7.3)	18 (32.4%)	20 (51%)	2.41
Role insufficiency (RI)	27.71 (6.5)	17 (30.4%)	14 (36%)	0.06
Role ambiguity (RA)	24.07 (6.2)	13 (23.3%)	8 (21%)	0.02
Role boundary (RB)	23.25 (5.5)	10 (17.9%)	8 (21%)	0.00
Responsibility (R)	26.98 (8.3)	12 (21.3%)	11(28%)	0.14
Physical environment (PE)	24.80 (7.2)	5 (9.0%)	2 (5%)	0.11

Note. None of the chi square tests were statistically significant

The means for the entire sample of participants fell within the normal range for each of the subscales. When scores above 60T were examined, it can be seen that a number of personnel experienced difficulties at maladaptive levels. In particular, the Role Overload and Role Insufficiency scales had over 30% of personnel reporting maladaptive strain.

Role overload measures the imbalance of job demands and resources and the individual's ability to accomplish workloads. Individuals scoring high on this scale may report an increasing and unreasonable workload, and a lack of resources to support them. They may also describe feeling incompetent, not well trained, working under tight deadlines and/or needing more assistance (Osipow, 1998). In this study, personnel high on this scale reported experiencing high demand with respect to time pressure. Despite this, they perceived their job performance to be 'good'.

Role insufficiency is a mismatch between skills-experience and job requirements. This finding is consistent with some of the reported dissatisfactions with the job (i.e. training in billet, too much prior knowledge assumed, insufficient technical documentation held onboard). High scorers on this variable may also report lack of career progression, lack of recognition, and possibly boredom (Osipow, 1998). In this study, personnel recording maladaptive strain on the Role Insufficiency scale reported being 'dissatisfied' with their job, and viewed their job performance as 'average'. Of this subgroup, 25% identified boredom or repetitiveness in their programs or tasks as key factors contributing to their dissatisfaction. The Physical Environment scale measures exposure to environmental toxins or extreme physical conditions. This measure had the least number of personnel reporting maladaptive strain (n=5) compared to the other subscales.

In comparing sample groups, chi square analysis did not reveal any significant differences in maladaptive strain reporting between the current group and Brown's group on any of the ORQ subscales.

5.5.3 Personal Resources Questionnaire (PRQ)

The PRQ measures an individual's use of a range of coping resources, in the areas of Recreation (RE), Self-Care (SC), Social Support (SS), and Rational/Cognitive Coping (RC). Higher scores indicate better developed coping skills. Scores within 30T to 39T reflect mild deficits in coping skills, and scores below 30T indicate a significant lack of coping resources. Findings are included in Table 13.

Table 13

Descriptive and Clinical Findings for the Subscales of the PRQ

Subscale	**Mean (*SD*) (*n*=56)**	**Current Study < 39T No. (%)**	**Brown Study <39T (*n*=40) No. (%)**	**Chi-Square**
Recreation (RE)	23.93 (5.95)	13 (23.3%)	11 (27.5%)	0.06
Self Care (SC)	20.77 (5.58)	20 (35.7%)	14 (35.0%)	0.02
Social Support (SS)	36.12 (9.53)	19 (34.1%)	8 (20.0%)	1.60
Rational Coping (RC)	31.52 (6.43)	21 (37.6%)	7 (17.5%)	3.48*

* $p<.05$ (without Bonferroni correction)

Means for each of the coping resources fell within the normal range, indicating that on average submariners demonstrated effective coping skills. When examining the scores to determine the number of personnel with at least mild deficits in coping (<39T), 23% - 37% of personnel recorded deficits across the subscales. In particular rational coping, self-care and social support were less well employed.

Deficits in the use of recreation (28% of personnel) and self-care (35% of personnel) were identified in Brown's study (1999b), with rational coping being the more commonly employed technique. More personnel from the current sample group had mild deficits in their use of rational coping than Brown's group.

5.5.4 Job Satisfaction

Respondents rated their job satisfaction on a 5-point scale from (1) Very Dissatisfied to (5) Very Satisfied. Findings showed that 19 respondents (34%) indicated they were either 'very dissatisfied' or 'dissatisfied', compared to 26 respondents (46.4%) who reported being 'very satisfied' or 'satisfied'. The remaining 11 respondents (19.6%) were ambivalent regarding their job satisfaction. A comparison of job satisfaction ratings is presented (Table 14).

Table 14

Job Satisfaction Ratings for Personnel in the Current Study and HMAS Farncomb Personnel in Brown's (1999b) Study

Item	Current Study No. (%)	Brown Study No. (%)
Very Dissatisfied or Dissatisfied	19 (34.0%)	19 (47.5%)
Neither Satisfied nor Dissatisfied	11 (19.6%)	10 (25.0%)
Satisfied or Very Satisfied	26 (46.4%)	11 (27.5%)

Overall, job satisfaction was rated more strongly in the current sample group than in Brown's study (1999b). However, chi square analysis showed this difference to be nonsignificant ($x^2=3.54$, $p>.05$).

Subjects who reported dissatisfaction with their job were asked to nominate the strongest factor affecting this. Their options included a) short notice unpredictable programs, b) boring or repetitive programs, c) long working hours, d) difficult working conditions, e) repetitive or boring tasks, f) equipment difficulties, or g) other. The most reported area of dissatisfaction was short notice unpredictable programs with 29% of responses. Long work hours, and boring or repetitive programs were also identified as contributing factors to their dissatisfaction. Fifteen

percent of respondents indicated ‘other’ contributing factors and these were: difficulties completing training due to being in billet, and subsequent impact on relaxation and sleep time; too much prior knowledge being assumed and difficulties obtaining information; non-team environment; lack of professional behaviour in the higher ranks; change in direction of workload and requirements; constant not knowing; poor support from external agencies; insufficient stores; and insufficient technical documentation onboard.

Farncomb personnel from Brown’s study indicated similar dissatisfactions to the current sample group, with a combination of changes to programs and long working hours cited most often. The ‘other’ option was frequently nominated. However, Brown did not state what specific factors were identified as contributing to their dissatisfaction.

5.5.5 Overall Job Performance

Overall how successful personnel felt they were at accomplishing the goal of their job was rated on a 5-point scale from (1) Very Poor to (5) Very Good. Seventy-three percent of personnel rated their performance as ‘good’ or ‘very good’. No respondents perceived their performance to be ‘very poor’, and one person identified their performance as ‘poor’. The remaining 25% saw their performance as average. In comparison, job performance was rated as ‘good’ by 68% of personnel in Brown’s study. A chi square analysis of this difference found it to be non significant ($x^2=0.14$, $p>.05$).

5.5.6 Health and General Wellbeing

Respondents were asked to rate their current health as either (1) Poor, (2) Average, (3) Good, or (4) Excellent. The majority of personnel in this study rated their health as 'good' (55.4%). Seven personnel recorded their health as 'poor' (12.5%), and only four respondents (7.1%) rated their health as 'excellent'. Personnel also recorded their experience over the past week of a number of health complaints as (1) None, (2) A Little, (3) Often or (4) Very Often. In general, reporting of health complaints was low with general aches and pains, trouble sleeping, and being overly tired the only items with a mean rating of 2 ('a little') or more (Table 15).

Table 15

Ratings of Health Complaints

Item	**Mean (*SD*) (*n*=56) (1=None; 4=Very Often)**	**No. of Personnel Frequently Experiencing Symptoms (Often / Very Often)**
Common cold or flu	1.75 (0.81)	11 (19.7%)
Dizziness	1.14 (0.35)	0
General aches & pains	2.00 (0.85)	14 (25.0%)
Hands sweat & feel damp & clammy	1.34 (0.79)	5 (9.0%)
Headaches	1.95 (0.86)	13 (23.3%)
Muscles twitch & tremble	1.43 (0.73)	6 (10.7%)
Rapid heart beat	1.23 (0.54)	3 (5.4%)
Shortness of breath	1.30 (0.54)	2 (3.6%)
Skin rashes	1.36 (0.72)	4 (7.2%)
Upset stomach	1.52 (0.81)	5 (9.0%)
Trouble sleeping	2.09 (1.13)	20 (35.7%)
Depressed mood	1.68 (0.79)	9 (16.1%)
Difficulty concentrating	1.75 (0.79)	10 (17.9%)
Crying easily	1.14 (0.48)	1 (1.8%)
Lack of appetite/loss of weight	1.21 (0.45)	1 (1.8%)
Taking medication to sleep or calm down	1.09 (0.44)	1 (1.8%)
Overly tired / lack of energy	2.09 (1.08)	19 (33.9%)
Loss of interest in activities	1.66 (0.81)	10 (17.9%)
Feeling life is pointless, meaningless	1.25 (0.51)	2 (3.6%)

The most often reported symptoms for sea-going submariners in Brown's study were flu, general aches, headaches, trouble sleeping, and tired/lacking energy.

Similar findings were obtained in this study when examined by frequency of personnel rating the complaint as ‘often’ or ‘very often’. The items trouble sleeping (35.7%) and overly tired/lack of energy (33.9%) had the most number of personnel reporting these symptoms as ‘often’ or ‘very often’. High work demands and physical effort have been identified as risk indicators for disturbed sleep, and it was suggested that the inability to stop worrying about work in free time may also affect sleep. Social support was reported to be a protective factor (Akerstedt et al., 2002). Other commonly reported symptoms included cold or flu, general aches and pains, headaches, depressed mood, difficulty concentrating and loss of interest in activities and people.

Table 16

Health Ratings by Sample Group

Rating	Current Study	Brown’s Study
Excellent	4.0 (7.1%)	7.0 (17.5%)
Good	31 (55.4%)	17 (42.5%)
Average	14 (25.0%)	15 (37.5%)
Poor	7.0 (12.5%)	1.0 (2.5%)

A greater number of personnel in this study reported ‘poor’ health, and only 7.1% rated it as excellent compared with 17.5% in Brown’s study (Table 16). However, this difference in reporting of poor health was not significant (x^2=5.74, p>.05).

Given the importance of remaining medically fit to serve at sea and the potential impact on manning, further analyses of health ratings were conducted. Sickbay attendance was measured with respondents asked to record how many times they attended the sickbay in the past month. Around 11% of personnel reported three or more visits, with the majority of personnel having one or no visits (82%). Subjects complaining of poor health (n=21) attended the sickbay a total of 27 times compared to 17 occasions for subjects reporting good health (n=35). A Mann-Whitney U did

not indicate any significant differences between these two groups (z=-1.34, *p*=.178). Spearman's rho test for correlation did not find a significant relationship between mean health ratings and sickbay attendance. Personnel with poor health ratings recorded more frustrations on the job (-.36, *p*<.01), spent less time in recreational activities (.43, *p*<.01), and using self-care (.43, *p*<.01), and used rational coping techniques less (.34, *p*<.05).

5.6 Discussion

Brown (1999b) conducted a study examining work stress and coping abilities in Royal Australian Navy submariners. Data was collected for a number of work outcomes and internal symptomatology. From this earlier study, Brown (1999b) made a number of recommendations aimed at addressing identified stressors, to reduce stress and strain, and improve work outcomes. A number of comparisons and analyses were conducted between Brown's study and the present study. The discussion section will firstly make comment on methodological issues to consider when examining the findings. As these issues apply to most of the following studies, they will be addressed in more detail in the General Discussion. Key findings for work conditions, training, job demands, work views, strain, coping resources, job satisfaction, job performance, and health will be discussed.

5.6.1 Methodological Issues

5.6.1a Response Rate

The initial overall response rate was 32.8%. This is low but consistent with recent military survey response rates, which have declined considerably over the years (Baruch, 1999; Edwards et al., 1996; Rogelberg et al., 2000). Within the

submariner population it appeared that attitudes towards research participation were poor in some personnel due to lack of feedback or outcomes from previous studies, and too many surveys being conducted. Care should be taken in generalising the findings beyond the research sample.

5.6.1b Self-Report

The baseline measures asked subjects to respond retrospectively, which can be affected by memory decay. Self-reports can also be influenced by social desirability and evaluation apprehension, resulting in subjects not being willing to respond entirely accurately (Whitley, 1996). It is also possible that subjects' responses could be influenced by external motivators (e.g. increased pay if job seen to be more stressful).

5.6.1c Type I Errors

As previously indicated, multiple comparisons were made throughout the study, which increases the likelihood of findings being significant by chance. Those outcomes reported as significant at the more stringent criterion are robust findings (Shaffer, 1995). Those outcomes significant at the standard criterion were still considered important to report, as they identify interesting trends in the data and may be important if confirmed in future research.

5.6.2 Work Conditions

The present study investigated the current state of the Royal Australian Navy Submarine Service, and utilised many of the same measures as those in Brown's study to allow for meaningful comparisons. The key findings of the present study

showed attitudes towards manpower and working hours has remained largely unfavourable, with submariners reporting insufficient personnel, unhappiness with working hours, difficulties planning family and leisure activities, and lack of respite from workload despite working alongside. However, these views were held less strongly in comparison to personnel from Brown's study, with notably less disagreement regarding manpower in terms of job outcomes, shore time for recovery, and planning difficulties due to frequent work schedule changes.

Increased contractor support may have helped to alleviate this problem in comparison to the state of the Service when Brown's study was conducted. The introduction of the Enhanced Selection Process, designed to entice more personnel to Submarine Service, and for the organisation to better select appropriate candidates may have also aided with manning issues. However, ratings are still not favourable, and current indicators are that there are several critical categories (i.e. categories with manpower shortage), which indicates this issue requires further attention.

5.6.3 Training

On average current serving personnel believed they were adequately trained to perform their job. Approximately 20% of respondents felt they were poorly prepared to undertake their job requirements, and this was similar to the number of respondents reporting difficulties in Brown's study. Given critical manpower shortages, safety, and the range of potential stressors of this unique work environment, having all personnel feel at least adequately prepared/trained would seem essential. Current indicators were that training in billet, unrealistic assumptions

of prior knowledge, and insufficient technical documentation being held onboard may be important in terms of job skills mismatch, job dissatisfaction, and view of job performance. Training in billet can make it difficult for 'trainee' submariners to get their taskbooks completed, which is essential for qualification as a submariner. Equally, if too much prior knowledge is assumed, then submariners may be required to work above their rank and experience – creating a job skills mismatch. This may also result in submariners feeling unsupported in their work environment. Finally, having insufficient technical documentation onboard does not provide submariners with necessary resources to do their job properly.

5.6.4 Job Demands

Demands of the submarine environment were greatest in the areas of mental and perceptual activity, hard work required, time pressure, and job frustrations. Research has found a strong association between working under these types of job demands and global stress (Grunfeld et al., 2000). High levels of emotional exhaustion and low levels of personal accomplishment have also been linked to work overload, time pressure, role conflict and job frustration**,** and are known to be directly related to burnout (Cordes & Dougherty, 1993; Felton, 1998; Grunfeld et al., 2000; Leiter et al., 1998; Lloyd et al., 1994). Interestingly, a significantly greater proportion of Brown's respondents than those in the current study recorded high levels of demand in the areas of time pressure, and hard work. These differences could be due to increased contractor support, more years of experience in operating the equipment, the maturity (age) of the equipment and subsequent improved knowledge of its use, and changes in training attitude. The latter has resulted in personnel being more familiar with the boat's capabilities and, having completed a full set of work-ups,

being more familiar with and knowledgeable about the routines. Physical activity was rated low in demand. Given the physical limitations of the environment, this finding could be expected.

5.6.5 Work Views

Brown identified the negative media attention given to the submarines as a contributing factor to the stress experienced by the submariners. The COLLINS class had only recently been introduced at the time of this previous study and was encountering certain difficulties, which were highly publicised (Woolner, 2001). These difficulties have since been addressed and with further operational success, there has been less negative media attention in recent years. Current submariners overwhelmingly agreed that the media attention on 'problems' was blown out of proportion, and significantly fewer respondents reported an impact from negative media attention on job satisfaction than in Brown's cohort. Despite this shift in submariners' perceptions of the public's view, approximately only one quarter of submariners believed they were perceived as the elite of the Navy.

Submarine Service is a specialist role that has a difficult and competitive selection process (Defence Instructions – Navy Personnel, 2003). It implicitly functions on commitment, loyalty and strong camaraderie. However, if fewer personnel perceive this Service to be elite, then motivation and commitment may wane, possibly resulting in withdrawal/intention to quit. Further examination of this issue indicated that poorer views of public perception were associated with psychological symptoms and decreased job satisfaction. Greater frustrations on the job and less time spent in recreational activity were also associated with poorer perceptions of the Service.

Interestingly, perceptions of the Service were not reflected in perceptions of one's own performance, nor were they linked to length of posting. A notable change in 1999 was the closure of submarine activity at HMAS Platypus and the subsequent move to HMAS Stirling. At HMAS Platypus, Submarine Service was more secluded and had an independent identity whereas personnel at HMAS Stirling are more integrated within the wider Navy. This may have resulted in a loss and/or change of their 'independent' identity. In addition, submariners are not always recognised for their achievements due to the nature of their work, and therefore may not be perceived as the elite of the Navy due to a lack of understanding of the Service.

5.6.6 Strain

Brown reported findings of maladaptive personal strain, notably vocational, psychological, and physical strain. Similar proportions of personnel in the current group recorded maladaptive levels of personal strain, except in the area of physical strain where fewer numbers reported maladaptive strain. This may be due to adjustment difficulties associated with the changes they were encountering with the introduction of the new boats. Overall there were no marked changes in occupational strain being experienced at maladaptive levels by the submariners in the present study or previously in Brown's study. The lack of significant change in this area is concerning given that earlier research had reported a negative impact on psychological health, job satisfaction, organisational loyalty and intention to quit (Boswell et al., 2004; Cavanaugh et al., 2000; Hobson et al., 2000). This suggests that more emphasis needs to be placed on addressing organisational issues to facilitate a decrease in occupational strain and reduce the likelihood of associated negative work outcomes.

5.6.7 Coping Resources

In acknowledgment of the range of potential stressors associated with Submarine Service, submariner applicants are also assessed in terms of their coping capacity. Current findings were that submariners generally utilised effective coping skills to manage these stressors. However, a proportion of personnel reported coping difficulties. It was discovered that the submariners were not adequately utilising rational coping as a technique, and this deficit was markedly more problematic in current submariners than in Brown's group. This technique would seem to be the most viable for use within the sea-going environment, given limited access to the other coping strategies. It is also an essential element of cognitive-behaviour therapy. Given its importance and the reported deficit in this sample group, rational coping was investigated in more detail. Associations between rational coping, and the strain variables and work outcomes were examined in Chapter 6 (pp.99 & 106), and its impact within the intervention was also investigated in Chapter 8 (pp.128). As Brown (1999b) suggested, submariners need to be provided with a broad range of coping techniques to overcome individual differences, restrictions due to military culture, and to be viable for use both at sea and/or alongside.

5.6.8 Job Satisfaction

Reports of job satisfaction did not significantly differ between studies. Areas of dissatisfaction with their job were also similar, with short notice changes to programs and long working hours being stand-out problems. This would suggest that submariners are seeking more predictability and stability. An important and encouraging finding was that perceptions of job performance were generally high, and this was consistent with Brown's findings. Health was also generally rated high.

General aches and pains, sleeping difficulties, and feeling overly tired were the more commonly cited health complaints.

5.6.9 Job Performance

Those personnel who reported greater work overload also reported experiencing greater time pressure, but maintained a positive perception of their job performance. This seems reflective of the type of personnel selected for Submarine Service, who are chosen for their work performance, work ethic, motivation, and capacity to deal with additional responsibility and pressure. Greater role insufficiency was associated with poorer views of job performance, which is consistent with a job-skills mismatch. The stressors of boredom and repetitiveness were identified as key factors. Training and preparation, activity development, and goal setting would seem important here.

5.6.10 Health & General Wellbeing

Submariners need to be medically fit to serve at sea. With manpower shortages already an issue, the organisation cannot afford to 'lose' seagoing personnel due to poor health. As such, it was considered important to identify key relationships between health and coping strategies, and if certain demographic groups were more prone to ill health, to be able to specifically target these groups for assistance. These investigations were conducted in Chapter 6 (pp.104 & 106). Interestingly, despite complaints of poor health these personnel did not present to the sickbay more often than 'healthy' personnel according to self-reported attendance. This may be due to the 'macho' culture of the Service, the tendency for this type of personnel to be more self-reliant, and possibly the concern of being landed from the boat and potential

scrutiny by the rest of the crew. Earlier research also found that submariners underreported health complaints and attributed this to the high social value placed on mental capacity and physical strength (Sandal et al., 1999). Those with poorer health had more job frustrations, and utilised the identified coping resources less often. Focus on improving coping strategies, social support, ability to leave worries at work, and providing better psychological health education may facilitate an improvement in health and help-seeking behaviours.

5.6.11 Summary

The most significant and notable changes since Brown's (1999b) study were in the areas of the impact of manning, hard work required, and the impact of the media. Certainly the organisation and its personnel have worked particularly hard to improve public perception of 'problems' with the COLLINS class submarines, and this seems to have lessened the impact on current serving submariners in terms of stress and job dissatisfaction. The Navy's decision to utilise contractors to conduct work on the boats alongside also seems to have facilitated changes in the impact on job outcomes, recovery time, time pressure, and working hours. However, as stated these issues still require further attention to improve to satisfactory levels.

Clearly, further work needs to be done to improve submariner conditions. Importantly, it would seem that submariners' hardiness and resilience are key factors in their capacity to manage work stressors. This is consistent with research indicating increasing resilience to ongoing stressors is a common and effective short-term response. However, it is generally difficult to sustain this in the longer-term and is likely to lead to burnout (Beehr, 1995; Boswell et al., 2004; Cordes & Dougherty,

1993; Lee & Ashforth, 1993; McGuigan, 1999). As previous intervention research has indicated, the organisation cannot afford to rely on individual factors alone to maintain a fully operational and effective Service, as evidenced by ongoing recruitment and retention difficulties. Further organisational change needs to take place to avoid burnout, reduce stress and strain, and improve work outcomes.