
**PSYCHOSOCIAL ASPECTS OF WORK AND HEALTH
IN THE NORTH SEA OIL AND GAS INDUSTRY**

PART V

Offshore work/leave schedules: Data analyses and review

Prepared by the Department of Experimental Psychology,
University of Oxford
for the Health and Safety Executive

**PSYCHOSOCIAL ASPECTS OF WORK AND HEALTH
IN THE NORTH SEA OIL AND GAS INDUSTRY**

PART V

Offshore work/leave schedules: Data analyses and review

Katharine R. Parkes and Melanie J. Clark

*Department of Experimental Psychology
University of Oxford*

March 1997

*A report on work funded by the Health and Safety Executive, Offshore Safety Division
under agreement MaTSU/8550/3037*

FOREWORD

In recent years, offshore work/leave patterns have become a topic of increasing importance in the North Sea oil and gas industry as companies have focused on the dual aims of enhancing safety and reducing costs. In this context, it has been suggested that both purposes could be served if a 3-3 work/leave pattern (i.e. three weeks offshore alternating with three weeks shore leave) were operated on offshore installations in place of the more usual 2-2 pattern (i.e. two weeks offshore alternating with two weeks shore leave).

Although many of those concerned are dismayed at the possibility having to work three consecutive weeks offshore, there is little direct evidence about the effects of longer work/leave cycles on the performance, health and psychological well-being of offshore personnel and their families.

The material presented in this report draws on a variety of published work and on data collected by the present authors to summarise existing research information relevant to the issue of 3-3 working. Reflecting the large gaps in current knowledge, the present report does not seek to make recommendations about optimum work/leave patterns; rather, it is intended to set out what is currently known, and to suggest areas on which future research could usefully focus.

The present work was undertaken within a more extensive programme of research carried out by the University of Oxford; the research consisted of several separate studies sharing a common aim of enhancing understanding of psychosocial factors, and their implications for the health and well-being of personnel, in the context of the North Sea work environment. The earlier studies have already been published by the Health and Safety Executive in a series of four parts with the general title *'Psychosocial aspects of work and health in the North Sea oil and gas industry'*. The present report is published in a less formal style reflecting the more tentative nature of the material reviewed.

SUMMARY

The work described in this report draws on a variety of sources to examine the psychosocial implications of three-week offshore tours as compared with the more usual two-week tour duration. Little of the information currently available about the psychosocial environment offshore, and the mental and physical health of offshore employees, relates to personnel working three-week tours. The present study, intended as a preliminary exploration of responses to three-week offshore schedules, brings together the several different kinds of information. The report includes:

- C A brief review of relevant literature
- C A comparison of different work/leave patterns in terms of the attitudes and preferences of offshore personnel (N=1462).
- C Analysis of questionnaire data evaluating the reactions of offshore personnel (N=113) to plans to change from two-week to three-week tours.
- C A pilot study of mood and sleep patterns among personnel working either a two-week or a three-week tour at the time of data collection.
- C Material from interviews with wives of offshore personnel, focusing on family issues associated with offshore employment, including work/leave cycles.

The findings revealed that personnel working three-week offshore tours were significantly less satisfied with their work/leave pattern than those working two-week tours. However, a small proportion of personnel (mostly on drilling rigs) reported that they preferred the longer work/leave cycle. An anticipated change from existing schedules to those involving three consecutive weeks offshore was perceived very negatively by the personnel concerned. However, data collected in the pilot study provided no clear evidence of adverse effects on mood and sleep of a third week offshore. The wives interviewed expressed unease about three-week work patterns, although this topic was only one of a number of issues of concern to them.

Some general points about the implementation of 3-3 work patterns, and suggestions for a more extensive study of the psychosocial and health implications of such schedules are noted in the conclusions.

INDEX

1.	INTRODUCTION	1
2.	LITERATURE REVIEW	2
2.1	<i>Shift patterns</i>	
2.2	<i>Work/leave schedules</i>	
3.	WORK/LEAVE SCHEDULES: SURVEY DATA	5
3.1	<i>Work/leave patterns reported</i>	
3.2	<i>Satisfaction with work/leave schedules</i>	
3.3	<i>Actual and preferred work/leave schedules</i>	
3.4	<i>Work/leave satisfaction in relation to schedule preferences</i>	
3.5	<i>Comment</i>	
4.	ATTITUDES TO PROPOSED 3-3 WORKING	13
4.1	<i>Shift rotation</i>	
4.2	<i>Work/leave cycles</i>	
4.3	<i>Data analyses and results</i>	
4.4	<i>Comment</i>	
5.	SLEEP, ALERTNESS AND MOOD IN RELATION TO WORK/LEAVE SCHEDULES	17
5.1	<i>Method</i>	
5.2	<i>Data analyses and results</i>	
5.3	<i>Comment</i>	
6.	INTERVIEWS WITH WIVES OF OFFSHORE PERSONNEL	23
6.1	<i>Procedure</i>	
6.2	<i>Work/leave schedules reported</i>	
6.3	<i>Interview material</i>	
6.4	<i>Comment</i>	
7.	DISCUSSION	27
8.	REFERENCES	29

1. INTRODUCTION

The increasing requirement for cost reduction in offshore oil and gas exploration and production has led several North Sea operating companies to consider whether to implement offshore work periods of longer than two weeks. In particular, the possibility of moving from two weeks offshore alternating with two weeks of shore leave (2-2 pattern), which is currently the most usual work/leave cycle, to three weeks of offshore work alternating with three weeks of leave (3-3 pattern) has been widely considered. Indeed, a small proportion of installations already operate a 3-3 pattern for all, or most, personnel; similarly, some groups, e.g. catering personnel, routinely work a 3-3 rota even if it does not apply to others on the same installation.

Arguments in favour of extending the work/leave cycle to 3-3 working include not only the reduction in helicopter costs, but also the fact that reducing the frequency of helicopter travel reduces the associated risks. However, other issues relevant to the implementation of 3-3 working have not been explored in such detail; in particular, there is little or no information about the psychosocial implications of 3-3 schedules, and their effects on the health and job performance of offshore personnel.

Potential sources of stress associated with an extended period offshore include cumulative fatigue and sleep loss, prolonged exposure to confined living conditions and associated lack of privacy, and family concerns resulting from longer absence from home. Stressors such as these may have adverse effects on physical and psychological well-being, not experienced (or experienced only to a lesser degree) by those working 2-2 schedules. However, the reduced travelling and the longer leave period allowed by 3-3 schedules are favourable factors for some offshore personnel.

The present report seeks to bring together several different sources of information which have some bearing on the issue of 3-3 working. The main topics considered are outlined below.

- C Published literature relevant to the issue of working 12-hour shifts for periods of two or more weeks offshore is reviewed.
- C Empirical findings comparing different work/leave cycles in terms of the attitudes and preferences of offshore personnel are reported. Several work/leave patterns, including 3-3 working, are examined.
- C Responses to a questionnaire designed specifically to obtain information about the reactions of a sample of offshore personnel to plans to change from 2-2 to 3-3 working are analysed.
- C A pilot study of patterns of sleep, mood and perceived workload in relation to 2-2 and 3-3 work/leave schedules is reported.
- C Finally, impressions gained from interviews with a small group of wives of offshore employees focusing on family issues associated with offshore employment are outlined.

2. LITERATURE REVIEW

The topic of working hours in general, and day/night shiftwork in particular, has received widespread attention in research publications (e.g. Akerstedt, 1990; Folkard *et al.* 1993; Monk & Folkard, 1992; Tucker *et al.* 1996; Wilkinson, 1992). In this literature, the implications of shiftwork for performance, health and safety have been a major focus of interest. For the purposes of the present report, two topics are particularly relevant, shift duration and work/rest schedules. Research findings of potential significance to offshore work conditions are outlined below.

2.1 SHIFT DURATION

Extended day-work schedules (i.e. work patterns in which longer shifts are worked for fewer days) have been widely implemented in process control operations in onshore industry. In these occupational settings, and in the laboratory, comparisons of 8-hour and 12-hour shifts have been carried out. Results have been equivocal but the balance of evidence suggests that adverse effects on mood and performance occur towards the end of 12-hour shifts, and that these adverse effects may be cumulative over a sequence of 12-hour shifts (e.g. Rosa *et al.* 1985; Rosa & Colligan, 1988). More recently, Laundry and Lees (1991) found that a change from 8-hour to 12-hour shifts was associated with reduced accident rates, but with increased rates of on-the-job injuries.

Furthermore, at least one study (Rosa, 1991) has demonstrated that personnel do not show long-term adaptation to 12-hour shifts; in this study, performance decrements associated with a change from 8-hour to 12-hour shifts were still apparent when examined in a follow-up assessment carried out 3.5 years after the initial study. However, in spite of these disadvantages, the employees concerned welcomed the move to longer shifts because of the increased leisure opportunities afforded by more rest days, and plant management personnel considered the performance of the plant to be unchanged. The favourable response to 12-hour shifts was reflected in the large majority of personnel concerned (80%) who voted to continue the new schedules.

Tucker *et al.* (1996) reported similar findings from a survey of two groups of chemical industry employees, one group working 8-hour shifts and the other working 12-hour shifts. Although the two groups did not differ on most of the outcome measures, the differences that did exist suggested advantages for the longer shift duration, with the important exception of lower reported alertness towards the end of 12-hour shifts (especially night shifts) as compared with 8-hour shifts.

Whilst these findings, and those of numerous other studies that have examined shift duration as a factor in job performance and health, have implications for the design of onshore work patterns, their relevance to offshore work schedules is difficult to assess. Indeed, it can be argued that findings relating to onshore shiftwork are of very limited value in understanding the effects of offshore shift patterns and work/leave schedules.

In onshore work settings, 12-hour day shifts are usually scheduled in a '*compressed work week*' of four consecutive shifts, followed by a four-day rest period. In contrast, offshore work schedules are such that 12-hour shifts are worked for consecutive periods of 14 days or, in the case of 3-3 working, for periods of 21 days. The lack of flexibility in offshore shift scheduling arises from the fact that accommodation limitations allow only two crews on board at any one time, that travel distances preclude the use of fast rotation systems, and that offshore drilling and production processes operate round-the-clock. The implications of these constraints for the design of offshore shift patterns are discussed by Parkes (1993) and Parkes *et al.* (1996).

Under offshore conditions, it is not possible to design shift systems that follow current recommendations for minimising the adverse effects of extended work hours, particularly if day/night shiftwork is involved. Thus, daywork schedules in operation offshore give rise to concern in the light of Knauth's (1996) recommendations that '*Extended workdays (9-12 hours) should only be contemplated when the nature of work and the workload are suitable for extended working hours, and the shift system is designed to minimize the accumulation of fatigue, and toxic exposure is limited*', and that '*An early start for the morning shift should be avoided*' (p.39). Furthermore, the most usual system of day/night rotation offshore (in which a mid-cycle shift change takes place at the end of the first week) violates all five recommendations put forward by Knauth for the design of better shift systems.

2.2 WORK/LEAVE SCHEDULES

In view of the unfavourable shift systems which necessarily operate offshore, the related question of work/leave schedules, particularly the duration of offshore tours, is a matter of considerable importance. Whilst the cost advantages of changing from 2-2 to 3-3 schedules, and the reduced risk associated with less frequent helicopter flights, can be quantitatively estimated, more general effects on the health and safety of offshore employees of three weeks of continuous offshore work are less readily evaluated.

In spite of the diversity of current offshore work patterns, almost all the existing literature on health and psychosocial factors among North Sea personnel relates to individuals working 2-2 schedules. There appears to be no published research which compares the different offshore work/leave patterns in use in the UK sector in terms of the health and performance of personnel. Indeed, a study by Soviet scientists (Aleksperov *et al.* 1988) which examined the physiological effects of different work/leave patterns on drilling rigs in the Caspian Sea, is virtually the only published literature specifically addressing the issue of offshore work/leave cycles. The findings led the authors to recommend that, of the two schedules studied, the one-week work/rest cycle should be adopted rather than the two-week cycle. However, this study provided no information about three-week offshore schedules.

Other published studies, although not specifically concerned with offshore work/leave schedules, do throw some light on the question of 3-3 working. In particular, Proctor

et al. (1996) examined the effects of overtime work on cognitive performance among automotive workers. Overtime was defined as the number of hours worked greater than the standard eight hours a day, or greater than five days a week, in the seven days immediately prior to the test day; this information was obtained from company records. A wide range of possible confounding variables (including the number of hours worked immediately prior to the test) was taken into account before examining the effects of overtime on cognitive performance.

Overtime hours were found to be predictors of impaired performance on several tests of attention and visual-motor skills. Using regression methods, the authors demonstrated that 20 hours overtime (i.e. a total of 60 hours work in seven days) gave rise to substantial decrements in performance; changes in performance relative to the no-overtime level were in the range 9 - 46% for the various different tasks examined. Five measures of negative mood (tension, depression, anger, fatigue, and confusion) were also examined; each was significantly predicted by both overtime hours and the number of consecutive days worked, longer hours being associated with more negative mood.

The findings of Proctor *et al.* should be considered in the context of the standard 84-hour week (7 x 12-hour shifts) worked by offshore employees; furthermore, a recent survey by the present authors (Parkes & Clark, 1996) suggests that nearly 40% of offshore personnel work more hours than the standard week, with 13.8% (mostly management personnel) reporting in excess of 100 hours work in seven days. In the light of the data presented by Proctor *et al.*, these long work hours must raise serious questions about cumulative fatigue, performance decrement, and impaired well-being among offshore personnel, especially if 3-3 schedules are worked.

However, the concerns of offshore personnel about possible changes from 2-2 working to 3-3 working, are not restricted to its potential implications for job performance and safety. The lifestyle of offshore personnel and their families is significantly disrupted by psychosocial stressors associated with '*intermittent husband syndrome*' (Taylor *et al.* 1985; Shrimpton & Storey, 1993; Solheim, 1988), and many offshore personnel fear that extending offshore tours from two weeks to three weeks would be likely to intensify these problems.

In the absence of any existing empirical evidence which directly addresses questions of health, safety, and performance in relation to 3-3 offshore work patterns, it can be argued that systematic research should be undertaken to investigate the possible effects of such schedules on offshore personnel and their families. The aim of the present study is more modest; it seeks only to examine existing data relating to offshore work/leave schedules obtained by the present authors in the context of a wider research programme. These data are derived from a variety of sources, including survey work and other forms of self-report; they serve primarily to highlight the attitudes, preferences and concerns of offshore personnel as they relate to work/leave schedules in general, and 3-3 working in particular.

3. WORK/LEAVE SCHEDULES: SURVEY DATA

The main survey data set (see Parkes & Clark, 1997) provided information about the range of work/leave schedules in operation on the installations involved, and the numbers of personnel working each schedule. In addition, as patterns of offshore work and shore leave are a topic of considerable importance to offshore personnel and their families, it would be expected that levels of satisfaction with work/leave patterns would differ according to the actual schedule worked. The survey data also allowed this issue to be examined.

3.1 WORK/LEAVE PATTERNS REPORTED

3.1.1 Work/leave patterns on platforms and drilling rigs

The great majority of personnel in the survey sample reported that they worked two-week offshore tours, but this category encompassed a variety of work/leave schedules depending on the duration and pattern of shore leave. In addition, some personnel worked three weeks offshore tours alternating with three weeks of shore leave. Table 3.1 shows the actual work/leave schedules reported by the survey participants, and the numbers of personnel reporting each pattern on platforms and on drilling rigs.

Table 3.1
Work/leave schedules on platforms and rigs: Personnel numbers

SCHEDULE	CODE	Platforms n = 1017	Rigs n = 377
Two weeks offshore / two weeks leave	2 - 2	677	274
Two weeks offshore / two weeks leave, plus holidays	2 -2 (+)	47	--
Two weeks offshore / three weeks leave	2 - 3	63	4
Six weeks of 2 -2 working / six weeks of leave	'Equal 6's'	139	--
Three weeks offshore / three weeks leave	3 - 3	91	99
<i>Some personnel (n=68) were excluded from these analyses as their work/leave patterns could not be identified.</i>			

As shown in Table 3.1, the regular 2-2 cycle was the most frequently reported; 68.2% of the sample for whom a work/leave cycle could be identified reported this work pattern. Other work/leave schedules based on two-week offshore tours but allowing either longer leave periods or holidays, accounted for a further 18.2% of personnel. The 3-3 pattern was reported by 13.6% of the sample overall, but by a higher proportion of personnel on drilling rigs (26%) than on production platforms (9%).

3.1.2 Work/leave patterns in relation to job type

There were significant differences between different job types in the proportions of personnel working each of the schedules identified in Table 3.1 ($\chi^2 = 361.2$, $df = 28$, $p < .001$). Table 3.2. shows the percentage of personnel in each job type who reported each of the work/leave schedules identified. Clear differences between job types are apparent; for instance, more than 80% of personnel in the construction and drilling job types reported a regular 2 -2 schedule, whereas only 40% of production operators and 48% of those in the management category reported this schedule.

Table 3.2
Work/leave schedules: Breakdown by job type

JOB TYPE	WORK / LEAVE CYCLE				
	2 - 2	2 - 2 (+)	2 - 3	<i>Equal 6's</i>	3 - 3
	%	%	%	%	%
Maintenance	76.9	3.0	5.9	6.5	7.8
Technical	67.7	4.0	4.0	3.0	21.2
Catering	76.8	--	--	--	23.2
Production	40.0	6.8	7.7	36.8	8.6
Management	48.0	7.2	11.8	15.1	17.8
Admin/other	67.7	3.2	5.4	3.2	20.4
Construction	85.7	0.8	--	0.8	12.6
Drilling	81.9	0.9	0.4	1.8	15.0
TOTAL	68.2	3.4	4.8	10.0	13.6

The catering job category had the highest proportion of personnel working the 3 - 3 schedule, nearly one quarter reporting this pattern. It is also noteworthy that all the catering personnel reported 'equal time' work/leave schedules (i.e. same number of days offshore and on leave during the year); in contrast, for other job types, at least a small proportion of personnel reported more generous schedules (i.e. those allowing a greater number of leave days than offshore days over a one-year period). In general, the data in Table 3.2 suggests that catering, construction and drilling are the job types with the least favourable schedules in terms of the number of offshore days per year.

3.2 SATISFACTION WITH WORK/LEAVE SCHEDULES

3.2.1 Data analysis

In the main survey questionnaire, 20 items assessed aspects of job satisfaction. Responses to each item ranged from -2 (*extremely dissatisfied*) to +2 (*extremely satisfied*). One item in this set specifically asked about satisfaction with work/leave patterns; analysis of responses to this item in relation to other aspects of the survey data forms the basis of the results reported here. The factors used to predict satisfaction level were the actual schedule worked, type of installation (platforms vs. rigs), employer (operating company vs. contractor personnel), job type, and age.

In addition, to ensure that the analyses were free of possible confounding by other aspects of job satisfaction and personality, two covariates were included in the analyses. The covariates used were scores on a measure of neuroticism (a personality measure reflecting a general tendency to report negatively about self and environment) and scores on a scale assessing general job satisfaction (see Parkes & Clark, 1996). These measures were taken into account prior to examining the effects of the predictor variables on satisfaction with work/leave schedules.

3.2.2 Satisfaction with 2-2 and 3-3 work patterns

The initial analyses focused on direct comparison of levels of satisfaction with regular 2-2 and 3-3 'equal time' schedules, disregarding other work patterns which were reported less frequently. The results showed a highly significant overall difference in satisfaction between 2-2 and 3-3 work patterns, $F(1,1128) = 133.0, p < .001$. However, a significant interaction between work/leave pattern and installation type (i.e. platforms vs. drilling rigs) was also found, $F(1,1127) = 28.0, p < .001$. Employer was not a significant factor and was dropped from subsequent analyses.

The significant interaction term indicated that the effect of work/leave pattern on satisfaction was different on platforms and rigs. Accordingly, further analyses were carried out for platforms and rigs separately; in these analyses, job type was also included as predictive factor, together with age, and the two covariates (neuroticism and general job satisfaction) as previously.

The results of these analyses are illustrated in Figure 3.1. On both platforms and drilling rigs, satisfaction with the 2-2 schedule was significantly higher than that with the 3-3 schedule. On average, those working 2-2 schedules reported positive satisfaction scores, while those working the 3-3 schedule report negative satisfaction scores. However, the difference in satisfaction between 2-2 and 3-3 working was much greater on platforms, $F(1,750) = 156.9, p < .001$, than on rigs, $F(1,361) = 15.2, p < .001$. The most conspicuous feature of the results was the low level of satisfaction with 3-3 schedules reported by personnel on production platforms.

The data shown in Figure 3.1 take into account the effects of job types and age. Among those working 2-2 schedules, job type was a significant factor predicting satisfaction with work/leave schedules (catering, administration, and construction

personnel reported higher levels of satisfaction with the 2-2 pattern than those in other types of jobs). In contrast, among those working the 3-3 pattern, age was a significant factor (older personnel being more satisfied with this pattern than their younger counterparts). Both neuroticism and general job satisfaction were significant covariates, higher neuroticism and lower general satisfaction predicting lower satisfaction with work/leave schedules, irrespective of whether the 2-2 or 3-3 pattern was worked.

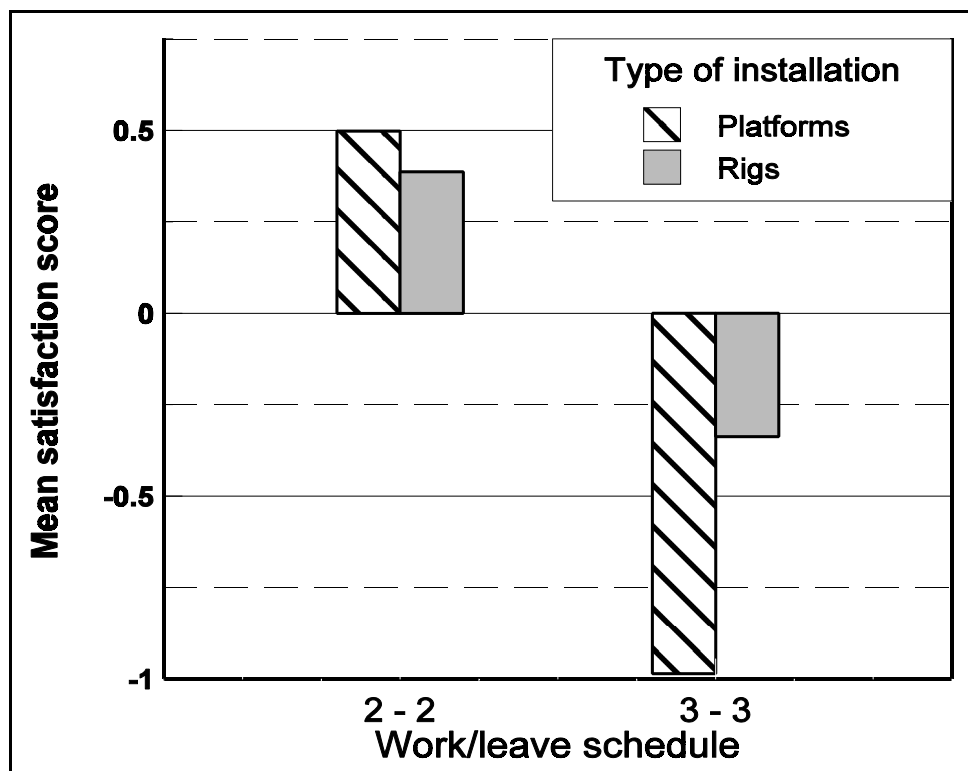


Figure 3.1
Satisfaction with 2-2 and 3-3 work/leave schedules
on drilling rigs and production platforms

3.2.3 Satisfaction compared across all work/leave schedules

The analyses reported above only included data from personnel working 'equal time' schedules; however, as noted in Section 3.1.1, almost one in five of the personnel who took part in the survey had work/leave schedules with a more generous leave allowance. A further analysis was carried out to examine levels of satisfaction with these schedules in comparison with the 2-2 and 3-3 patterns. In these analyses, the effects of work/leave schedule on satisfaction were examined taking into account job type, employer, type of installation, age, and the two covariates. Actual work/leave cycle was found to be the strongest predictor of satisfaction, $F(4,1371) = 43.3, p < .001$. The levels of satisfaction reported for each of the work/leave cycles included are shown in Figure 3.2. The 2-3 pattern, in which two weeks offshore alternate with three weeks shore leave had the highest satisfaction level although this score was not significantly

different from that for the 'equal time' 2-2 schedule.

The work/leave patterns showing the lowest satisfaction levels were 3-3 and the 'equal 6's' pattern; scores for these schedules did not differ significantly, but they were both significantly lower than those for the 2-2 and 2-3 patterns. The relatively low score for the 'equal 6's' pattern contrasts markedly with the high score for the 2-3 pattern, in spite of the fact that both these schedules involve the same number of days offshore per year.

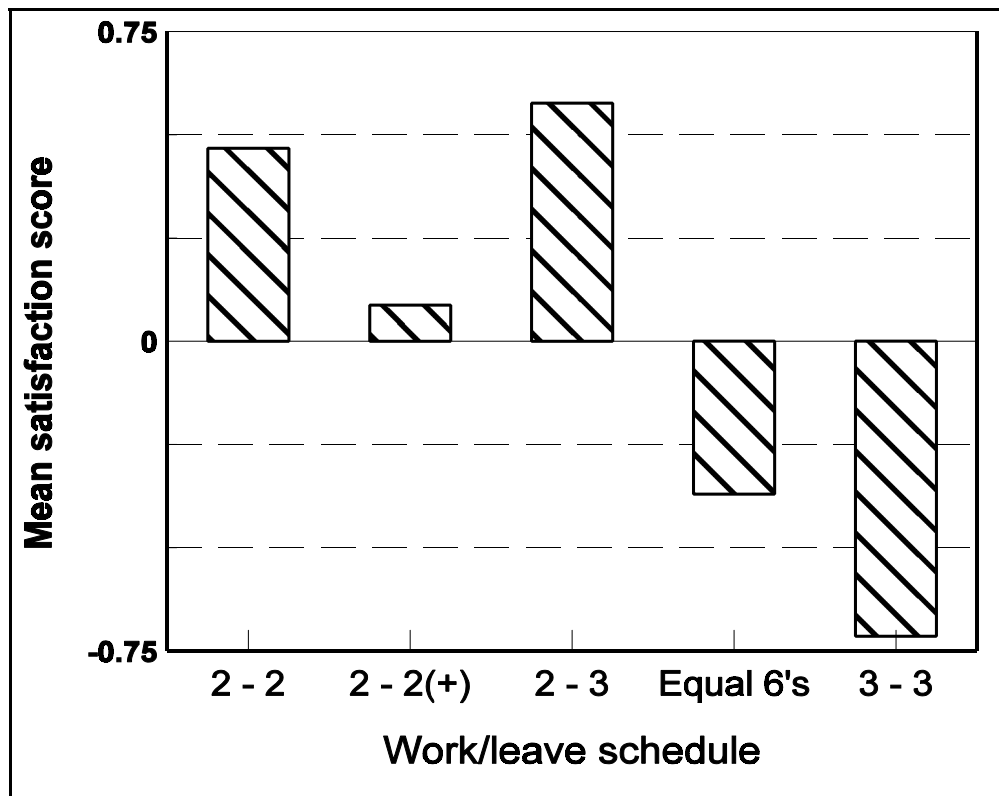


Figure 3.2
Satisfaction with work/leave schedules

3.3 ACTUAL AND PREFERRED WORK/LEAVESCHEDULES

Participants in the survey were asked to indicate their preferred work/leave schedule, and these schedule preferences were examined in relation to the actual schedule reported. These analyses were restricted to those who worked an 'equal time' schedule, either 2-2 or 3-3. The analyses were further restricted by eliminating all participants who failed to note the instruction "assuming the same number of days offshore per year as you presently work". Thus, for instance, personnel who responded that their preferred pattern was 2-3 when they were currently working an equal time schedule (or, more notably, the one who responded "1 week on, 51 weeks off") were not included in these analyses.

After this data screening, approximately half the original participants were left in the sample. In this data set, work schedule preferences were examined in relation to actual

schedule worked. These analyses were carried out for the group as a whole (N=741), and for platforms (n=474) and drilling rigs (n=267) separately. The cross-tabulated data are shown in Table 3.3.

Table 3.3
Actual and preferred work/leave schedules for personnel working
'equal time' 2-2 or 3-3 schedules

Actual schedule	All personnel N = 741		Platforms n=474		Drilling rigs n=267	
	Preferred schedule		Preferred schedule		Preferred schedule	
	2 - 2	3 - 3	2 - 2	3 - 3	2 - 2	3 - 3
2 - 2	537 90.1%	59 9.9%	385 94.6%	22 5.4%	152 80.4%	37 19.6%
3 - 3	96 66.2%	49 33.8%	56 83.6%	11 16.4%	40 51.3%	38 48.7%

The percentage values shown represent the breakdown of each group by preferred schedule (2-2 vs. 3-3)

It is clear from the data in Table 3.3 that, in the sample as a whole, the great majority (90.1%) of those working 'equal time' 2-2 schedules reported a preference for this schedule as compared with a 3-3 pattern. However, among those already working 3-3, preferences were less polarised; approximately one third (33.8%) of this group reported a preference for the 3-3 schedule, while two-thirds (66.2%) preferred the 2-2 pattern. This difference in proportions was significant ($\chi^2 = 53.5$, $df = 1$, $p < .001$).

However, it is also clear from Table 3.3 that the pattern of findings on production platforms is different from that on drilling rigs. In particular, nearly half (48.7%) of those working 3-3 schedules on drilling rigs reported that this was their preferred work/leave pattern, whereas only 16.4% of those currently working 3-3 on platforms reported this preference. Similarly, of the personnel currently working 2-2 schedules, nearly one in five (19.6%) of those on drilling rigs reported a preference for 3-3 in contrast to only 5.4% of those working on platforms. Whilst the numbers involved (particularly of those working 3-3 schedules on platforms) are small, the data do serve to throw some further light on the views of offshore personnel about different work/leave schedules.

3.4 WORK/LEAVE SATISFACTION IN RELATION TO SCHEDULE PREFERENCES

The analyses reported in Sections 3.2 and 3.3 raised the further question of whether personnel working their preferred work/leave schedule reported higher scores on the measure of ‘satisfaction with work/leave schedules’ than those for whom there was a discrepancy between the preferred schedule and the actual schedule worked. Using the sample that formed the basis of the analyses in Section 3.3 (i.e. those working equal time schedules, either 2-2 or 3-3), two groups were identified; those whose actual work/leave schedule was the same as their preferred schedule (the *congruent* group), and those whose preferred schedule was different from their actual schedule (the *incongruent* group). Each group was further divided on the basis of the actual schedule worked, either 2-2 or 3-3, giving four groups in all.

Using the analysis model described in Section 3.2, differences between the four groups in work/leave schedule satisfaction were examined. In the initial analysis a significant interaction with type of installation indicated that the pattern of results was different on drilling rigs and production platforms. Accordingly, separate analyses were carried out for each type of installation. The levels of satisfaction determined from these analyses for congruent and incongruent groups working either 2-2 or 3-3 schedules are shown in Figure 3.3 for platforms and drilling rigs.

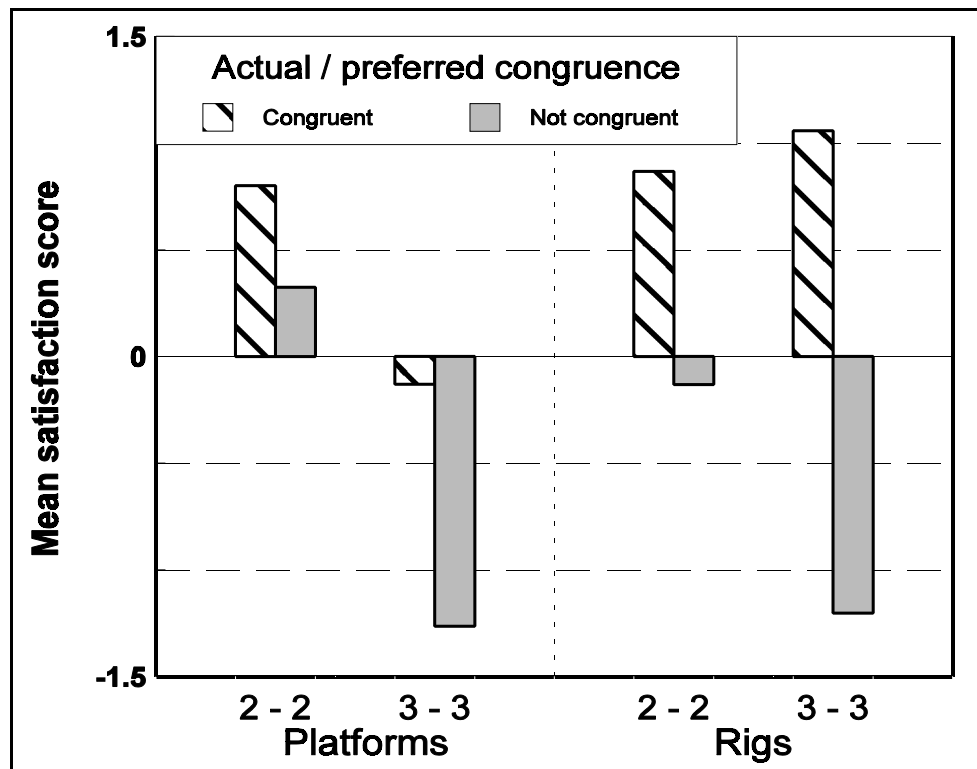


Figure 3.3
Satisfaction with work/leave schedules for ‘congruent’ and ‘incongruent’ groups on drilling rigs and production platforms

Drilling rigs. For personnel on drilling rigs, the results demonstrate clearly that individuals working their preferred schedule, irrespective of whether it is 2-2 or 3-3, report higher satisfaction than those not working their preferred schedule. However, the magnitude of this effect differs significantly for the 2-2 and 3-3 schedules, $F(1,253) = 17.0, p < .001$. Personnel working 3-3 who would prefer to work 2-2 report much lower satisfaction with the schedule than those working 2-2 who would prefer to work 3-3. Put differently, the difference in satisfaction between working a preferred or non-preferred schedule is significantly greater for the 3-3 schedule than for the 2-2 schedule.

Production platforms. For personnel on production platforms, the most marked feature of the results was the significant difference between satisfaction with 2-2 schedules as compared with 3-3 schedules, $F(1,463) = 38.8, p < .001$. The 2-2 schedule had positive satisfaction scores for both the congruent and incongruent groups, whereas the 3-3 schedule had negative scores for both groups.

Although there was also a significant overall difference between congruent and incongruent groups, $F(1,463) = 11.5, p = .001$, the results were less clearly interpretable than those for drilling rigs. In particular, the congruent 3-3 group failed to show the relatively high satisfaction levels characteristic of congruent groups, while incongruent 2-2 group failed to show the low satisfaction characteristic of incongruent groups. One explanation could be that, in responding to the item asking about satisfaction with work/leave cycles, these two personnel groups tended to reflect the prevailing views on the installation rather than their own personnel views. The small numbers of personnel in the groups concerned (see Table 3.3) may also be relevant.

3.5 COMMENT

One of the main findings to emerge from the analyses presented above was the difference between platforms and drilling rigs in the proportion of personnel working a 3-3 schedule (9% and 26% respectively), and in levels of satisfaction with this schedule. Thus, personnel on platforms working 3-3 schedules showed particularly low satisfaction and only 16.4% of this group reported that 3-3 was their preferred work pattern. In contrast, among drilling rig personnel, nearly half those working 3-3 reported that this schedule was their preference.

One reason for this difference is that 3-3 working tends to be introduced as a cost-cutting measure on older and less productive platforms, whereas on drilling rigs it is more widely adopted as a general practice. Older platforms (one of which accounted for most of the production platform personnel working 3-3 in the present study) tend to provide less favourable physical facilities in which to live and work than newer installations. Furthermore, personnel on such platforms are more likely to be demoralised and threatened by job insecurity. Thus, in these respects, older platforms may be the least favourable environments in which to impose 3-3 working, and a more encouraging response might result from introducing this work pattern on new platforms from the start of operations.

4. ATTITUDES TO PROPOSED 3-3 WORKING

On one of the production installations involved in the main offshore survey, notification of a proposed change from work/leave cycles based on two weeks offshore duty (i.e. 2-2 and 2-3 patterns) to a 3-3 cycle had been given to all personnel as part of a number of planned cost reduction measures. This situation provided an opportunity to assess the attitudes of the workforce to 3-3 working prior to the proposed change taking place.

4.1 ASSESSMENT

A 12-item questionnaire was devised to cover not only the main concerns that personnel had about 3-3 working but also the potentially more positive features of extended work /leave schedules. The list of items is shown in Table 4.1.

Table 4.1
Items used to assess attitudes to 3-3 working

11.	<i>I am not convinced that it is necessary to move to 3:3 working to maintain profitability on this installation</i>
3.	<i>Working three weeks offshore is too long to be away from home</i>
6.	<i>I am concerned about my ability to perform work tasks efficiently after 3 weeks offshore</i>
10.	<i>Working 3-3 will make it much harder to adjust to family life</i>
4.	<i>Working 3-3 will adversely affect the safety of the installation</i>
8.	<i>After working 3 weeks offshore I will be too tired to enjoy my time onshore</i>
9.	3-3 working will make it easier to take a full two-week holiday away from home
5.	When working 3-3, I will be better able to relax with my family each time I return onshore
12.	Overall, I am sure I will adapt well to working a 3-3 cycle
7.	Moving to a 3-3 schedule will benefit platform efficiency
1.	I am confident the change to 3-3 working will go smoothly
2.	I am looking forward to working 3-3

The instructions asked participants to indicate the extent to which they agreed/ disagreed with each statement by circling a number from -2 (strongly disagree) to +2 (strongly agree). The items are listed above in order of mean agreement scores, with the item with the highest agreement score at the top, negatively worded items being shown in italics. The item numbers correspond to those in Figure 4.1.

4.2 SAMPLE

A total of 113 individuals responded to the questionnaire; 43.4% of this sample were working a 2-2 schedule at the time the questionnaire was completed, while 42.9% were working the 2-3 pattern, with three weeks of shore leave following each two-week offshore tour. A variety of different work/leave cycles accounted for the remaining 13.7% of the sample, but only one individual reported that he was already working a 3-3 schedule. All the main job types were represented, and slightly less than half the participants were employed by the operating company.

4.3 MEAN ITEM SCORES

The initial analyses examined the mean scores on each item; these scores are shown in Figure 4.1, arranged in order of agreement/disagreement. Each of the six items worded in such a way that agreement with the item represented an unfavourable view of 3-3 working had a positive mean score. Conversely, all but one of the six items worded so that agreement represented a favourable view of 3-3 working had negative mean scores. The only positively-worded item to receive a positive agreement score was the one endorsing the advantages of being able to take a full two-week holiday when working a 3-3 schedule. Overall, however, these results clearly represent strongly negative attitudes to 3-3 working.

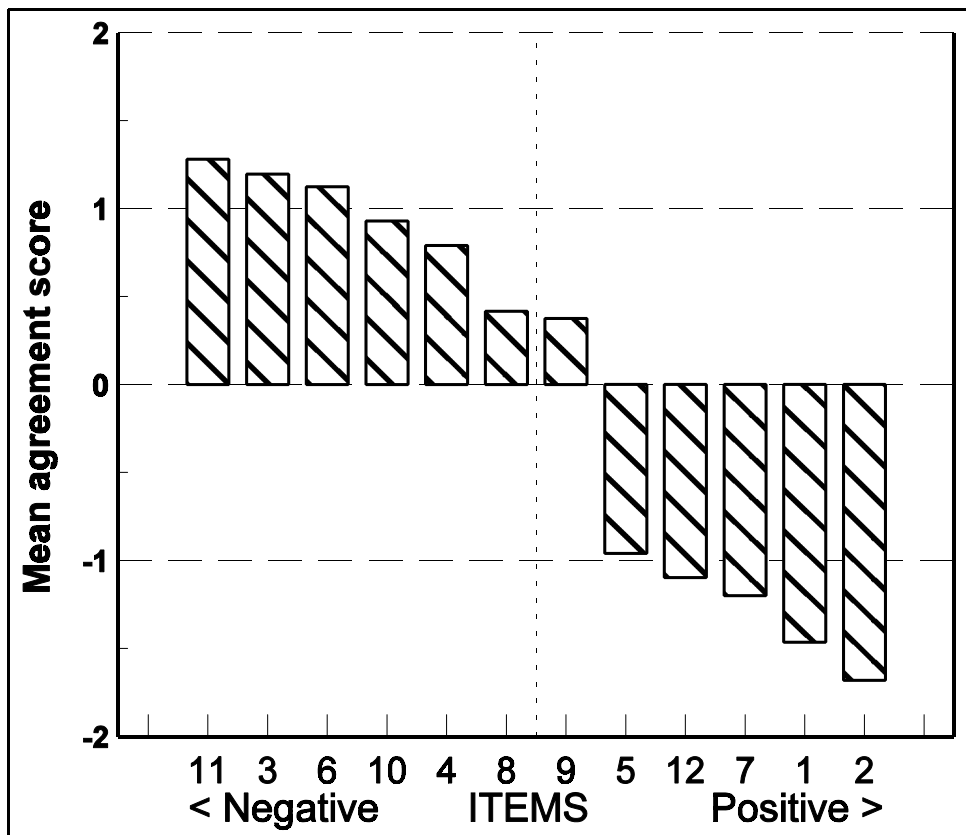


Figure 4.1
Attitudes to 3-3 working: Mean agreement scores for each item

4.4 POSITIVE AND NEGATIVE SUBSCALE SCORES

Factor analysis demonstrated that two separate subscales could be identified in the set of 12 items; the first scale included all the items worded in such a way that agreement represented a negative view of 3-3 working, while the remaining positively-worded items formed the second subscale. The mean item scores on these scales were $0.95 \pm .88$ (negative items) and $-1.01 \pm .76$ (positive items), representing general agreement with negative items and disagreement with positive items.

4.5 PREDICTORS OF SUBSCALE SCORES

Further analyses were carried out to examine predictors of attitudes to 3-3 working as represented by the positive and negative subscale scores. The work factors examined in these analyses were job type, employer (i.e. operating company vs. contractor), and present work/leave schedule (2-2 vs. 2-3). To facilitate interpretation of the effects of current work/leave schedules, the small number of individuals in the sample who did not work either the 2-2 or the 2-3 pattern were excluded from these analyses. Initial analyses showed that employer was not significant for either subscale, and this variable was therefore dropped from the model.

In addition to the work-related predictors, several individual difference variables of potential relevance to attitudes to 3-3 working were included in the analyses: age, neuroticism/extraversion (personality measures relevant to adaptation and mental health), reported sleep problems, and the presence or absence of children under 18 years of age living at home. The main findings from these analyses are outlined below.

Positive subscale. Two factors predicted the extent to which participants agreed with positively-worded items. The first of these significant factors was the presence of at least one child living at home, $F(1,83) = 5.10, p < .03$; for those with no children at home, the mean score (adjusted for other variables in the model) was -0.94 , whereas, for those with at least one child at home, the mean score was -1.23 . As indicated by the negative mean scores, overall attitudes towards 3-3 working were unfavourable, but they were significantly more negative for those with children living at home than for those without children. This result could not be explained by other related factors; in particular, differences in age and in neuroticism were taken into account in the analysis.

The second significant factor in the analysis of the positive subscale scores was current work/leave pattern. Those working the more generous (in terms of time onshore) 2-3 schedule had more unfavourable attitudes to 3-3 working than those working the 'equal time' 2-2 schedule, $F(1,79) = 4.12, p < .05$. The adjusted mean scores were -1.34 for the 2-3 schedule, and -0.87 for the 2-2 schedule.

Negative subscale. Responses to the negative subscale were less strongly predicted by the model than responses to the positive subscale. The two significant predictors of agreement with the negative subscale were current work/leave pattern and extraversion. Personnel currently working the 2-3 pattern agreed more strongly with the negatively-worded items than those working the 2-2 pattern, the adjusted mean scores being $+1.30$ and $+0.74$ respectively. Thus, as above, individuals working the more generous 2-3 pattern had more negative attitudes to 3-3 working than those whose

current schedule was 2-2.

The results for extraversion showed that those with higher scores on this measure (characterised by a sociable, lively, and active lifestyle) agreed more strongly with the negative items than those with less extravert personalities $F(1,79) = 4.26, p < .02$. In addition to these two significant predictors, there was a weak positive relationship ($p = .08$) between reported sleep problems and negative attitudes to 3-3 working.

4.5 COMMENT

At the time these data were collected personnel in the sample were facing the prospect of a change to 3-3 working within a few months. The findings reported above leave little doubt that they viewed the proposed change in a very negative light. In general, the personnel in the sample agreed strongly with items representing negative attitudes to 3-3 working, and disagreed with the items representing more positive aspects of 3-3 schedules. Even the potential advantage of being able to take a full two-week holiday within a three-week shore break (which is not possible within a 2-2 work pattern) did little to mitigate negative attitudes to 3-3 working.

Further analyses indicated that personnel working the 2-3 schedule (mostly operating company employees) viewed the prospect of changing to 3-3 significantly more negatively than those currently working the 2-2 pattern. For the 2-3 group, the proposed change would involve not only longer periods offshore but a move to 'equal time' working in place of the more generous leave schedule allowed by the 2-3 pattern. The potential financial advantages did little to reconcile this group to the prospect of 'equal time' 3-3 working.

In addition, several individual difference variables also predicted attitudes to 3-3 working. Other things being equal, individuals who experienced sleep problems while offshore, those with a more out-going sociable personality, and, importantly, those with children living at home, had less favourable attitudes to 3-3 working than those who did not show these characteristics.

In the context of these results, it is of interest to note that, independently of the present study, the managers concerned subsequently decided not to go ahead with the introduction of 3-3 working as originally planned. In the light of the negative response of platform personnel, and the potential effect on morale if the decision was implemented, a revised plan was introduced. This revised plan involved a mixed work/leave cycle alternating 2-2 working with 3-3 working; it was implemented some months after the present data collection was completed.

5. SLEEP, ALERTNESS, AND MOOD IN RELATION TO WORK/LEAVE SCHEDULES

A pilot study was carried out to examine whether exposure to the offshore environment for three, as compared with two, consecutive weeks had significant effects on measures of sleep and mood. The study was carried out on an installation which operated a mixed work/leave schedule in which two-week offshore tours alternated with three-week tours. Thus, while general environmental factors were kept constant by collecting all data on the same platform during a single week, tours of different durations (two weeks *vs.* three weeks) and weeks within these tours, could be directly compared in terms of the sleep and mood patterns of the personnel concerned.

5.1 METHOD

5.1.1 Experimental design

The experiment was based on a mixed-model design in which the main factors ‘*two vs. three week tour duration*’ and ‘*week into tour*’ were tested between groups (i.e. each condition was tested on a separate group of personnel). Two further factors, ‘*shifts within weeks*’ and ‘*time within shifts*’ were tested within subjects, data being collected from each participant on three occasions during each of four shifts. Details of the design are shown in Table 5.1.

Table 5.1
Experimental design comparing two-week and three-week tours

DURATION OF TOUR	WEEK INTO TOUR											
	<i>Week 1</i>				<i>Week 2</i>				<i>Week 3</i>			
	S1	S2	S3	S4	S1	S2	S3	S4	S1	S2	S3	S4
Two weeks	<i>Group 2.1</i> n = 9				<i>Group 2.2</i> n = 9							
Three weeks	<i>Group 3.1</i> n = 7				<i>Group 3.2</i> n = 16				<i>Group 3.3</i> n = 14			
<p><i>S1, S2, S3, and S4 represent the four test shifts in each week; during each test shift data were collected at the start, middle and end of shift</i></p> <p><i>Total sample size = 55</i></p>												

5.1.2 Participants

A wide range of personnel on the installation took part in the study. Ages varied between 29 and 60 years, with a mean value of 41.4 years, and all the main job groups were represented. Only those working day shifts were included in the sample to avoid the particular problems associated with adaptation to night work. Participation was voluntary, and the main consideration in recruiting study participants was to ensure that the five cells in Table 5.1 were adequately represented.

The sample size was limited by time and resources, and it was not possible (nor was it necessary) to ensure equal numbers in each cell of the experimental design. However, the group in each cell could be regarded as a random sample of personnel, determined only by whether a two-week or a three-week tour was being worked during the data collection period, and whether they were in their first, second, or third week offshore. This information was obtained from the personnel-on-board (POB) list. The work was described to participants as a study of sleep and mood patterns in the offshore environment.

5.1.3 Data collection

Data were collected by means of two booklets given to each participant at the start of the study. Each booklet covered two test shifts. The initial page provided space for recording ID number, age, and job title. Subsequent pages, one for each assessment occasion, presented rating scales for assessing mood, sleep duration and quality (start of shift only), and workload (mid-shift and end-of-shift only). The mood scales used are shown in Table 5.2; they provided measures of alertness and positive mood (see Parkes, 1993 for further details). Three further items were used to assess irritability and impatience.

Participants were asked to fill in one page within two hours of the start of the shift, the next page no more than a hour after the mid-shift meal break, and the final page during the last two hours of the shift. This procedure was repeated over four shifts, either on consecutive days, or with a one-day break after two test shifts.

5.1.4 Data analysis

The data were analysed using a mixed-model analysis of variance in which '*duration of tour*' and '*week into tour*' were tested across groups, and '*shifts*' and '*time-within-shifts*' were tested within individuals. Within this framework, it was necessary to devise a suitable form of analysis to overcome the problem of the unbalanced design, resulting from two weeks of assessment for the 2-2 condition and three weeks for the 3-3 condition. Two different approaches were adopted. Initially, the individual cells were treated as a single factor with five categories; this analysis provided information about the effects of '*duration of tour*' and '*week into tour*' in a combined form.

Subsequent analyses compared the first and last weeks offshore for two-week and three-week tours, dropping the data from Group 3.2 (i.e. the second week of the three-week tour) to produce a balanced design in which '*duration of tour*' and '*week into tour*' were treated as separate factors. Both analyses included the within-subjects factors '*shifts*' and '*time-within-shifts*'. Further analyses, some of which assessed change in mood over the course of a shift, were also carried out.

Table 5.2
Scales used in the assessment of alertness and positive mood

¹ ENERGETIC _____	TIRED
² CALM _____	TENSE
WEARY _____	VIGOROUS ¹
² CONTENTED _____	DISCONTENTED
UPTIGHT _____	AT EASE ²
DEJECTED _____	CHEERFUL ²
¹ LIVELY _____	FATIGUED
JITTERY _____	RELAXED ²
² HAPPY _____	MISERABLE
DROWSY _____	ALERT ¹
DEPRESSED _____	ELATED ²
² TRANQUIL _____	BOTHERED
<p>¹ <i>Indicates the high-scoring end of the four scales which were summed to form the alertness dimension.</i></p> <p>² <i>Indicates the high-scoring end of the eight scales which were summed to form the positive mood dimension.</i></p> <p><i>Scores on each dimension were scaled to run from -20 to +20</i></p>	

5.2 RESULTS

5.2.1 Overview

A total of six measures were derived from the data collected: subjective alertness, positive mood, irritation, workload, sleep duration and sleep quality. However, only two of these measures, alertness and workload, showed any results relevant to the issue of work/leave schedules. The other four measures, analysed by the methods described in Section 5.1.4, together with a number of more detailed approaches, failed to show any significant findings of interest in the present context. However, there was no evidence to suggest that the data were unreliable, and in the light of the non-significant findings, these four measures are not considered further.

5.2.2 Alertness

In the initial analysis of alertness scores, using a single factor to represent the five groups identified in Figure 5.1, the '*time of shift*' factor was highly significant, $F(3,150) = 10.9, p < .001$, and the '*shifts within weeks*' factor was also significant, $F(3,150) = 2.7, p < .05$. The profiles of alertness are shown in Figures 5.3 for two-week tour duration, and in Figure 5.4 for the three-week tour duration. Overall, differences between the groups representing the five tour/week conditions were non-significant (although a weak trend was apparent, $.15 > p < .20$), and groups did not interact significantly with other factors in the model.

In the data shown in Figure 5.3 for 2-2 working, there was no significant effect of week (first week vs. second week), and little effect of time-of-shift. In contrast, among the three groups representing the three-week tour duration, alertness levels were significantly higher in the middle of the shift than at the start or end of the shift. As shown in Figure 5.3, the alertness profile was slightly lower for personnel in their third week than for those in their first or second weeks; however, the overall trend across the three groups representing the three weeks of the tour, was non-significant.

These results were further examined in a two-factor analysis of first vs. last week and two-week vs. three-week tours. Shift and time-of-shift were also included in this analysis. This method provided a more rigorous way of assessing the effects of week and tour duration, but the results showed no significant interaction between these two factors which would have indicated that differences in alertness between the first week and the final week was influenced by tour duration.

5.2.3 Workload

Workload patterns varied significantly across the three assessments in each shift ($p < .02$), but these effects were different for different shifts ($p = .05$). Examination of the workload profiles across Weeks 1 and 2 (two-week tour) and Weeks 1-3 (three-week tour) indicated that workload levels fluctuated unpredictably across shifts, but generally tended to be higher in the afternoon. There were no results suggesting consistent differences in perceived workload associated with 2-2 vs. 3-3 working, or with first week vs. last week offshore.

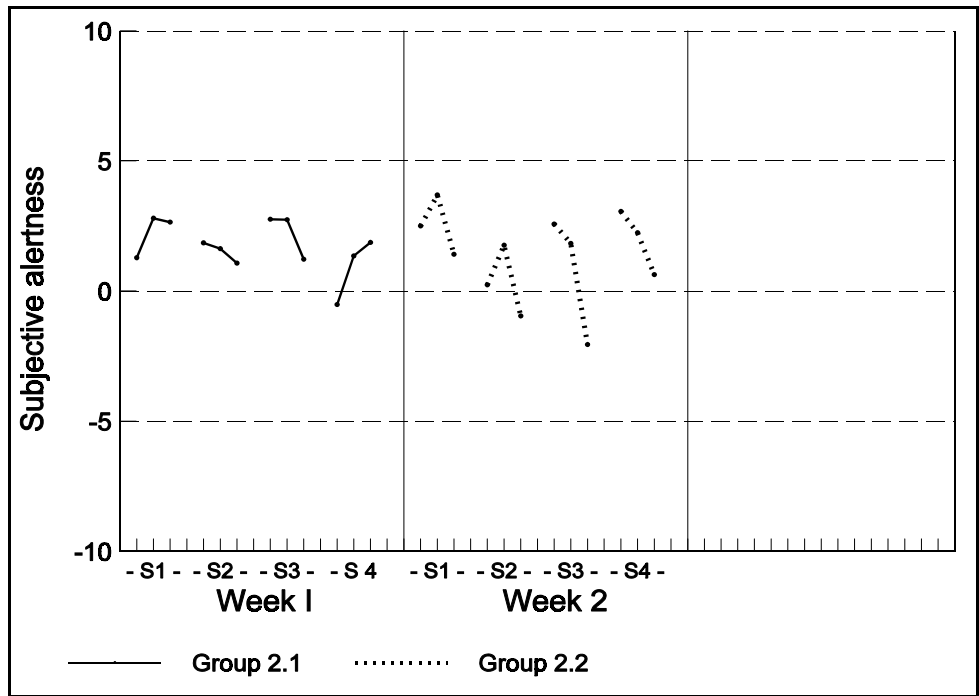


Figure 5.3
Alertness: First and second weeks of 2-2 schedule

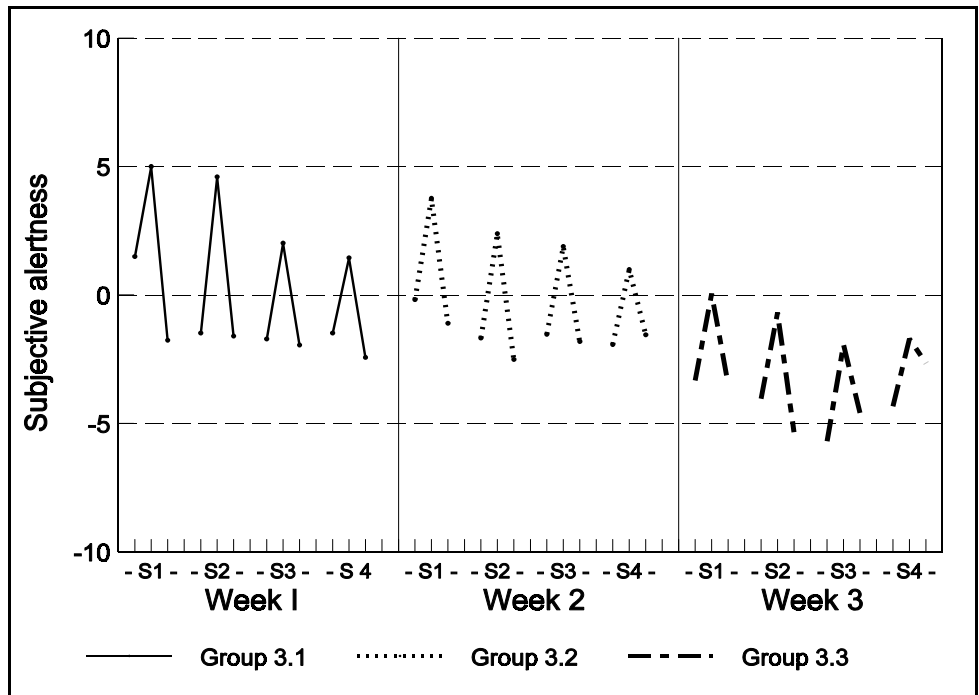


Figure 5.4
Alertness: First, second, and third weeks of 3-3 schedule

Note. In these diagrams, three points are plotted for each shift, representing the three times (start, middle, and end of shift) at which assessments were made.

5.3 COMMENT

The pilot study reported above was intended to compare three-week and two-week offshore tours in terms of sleep and/or mood patterns over a sequence of four day shifts. It is clear from the results described above that there were no significant findings that clearly demonstrated effects of a third week offshore. However, it is important that the largely non-significant results of this small-scale study are seen in context. Two points are particularly relevant.

- C The fact that effects on sleep and short-term mood were not observed in the present study should not be taken to indicate that three-week tours have no implications for health and safety offshore. In the study by Alekperov *et al.* (1988), physiological measures distinguished between one-week and two-week tour durations, and it is possible that such measures would provide a valuable method of assessing the effects of 3-3 schedules. In addition, assessment of longer-term mental and physical health outcomes associated with 3-3 working, and of the responses of the wives and families of offshore personnel, would be necessary in any detailed investigation of the effects of three-week tours.

- C The experimental design used in the present study was limited by constraints on time and resources which precluded testing the same individuals repeatedly through successive weeks of the offshore work cycle. Consequently, statistical tests evaluating the effects of two *vs.* three week tours had to be carried out between different groups of personnel assessed in particular weeks of either a two-week or a three-week tour, rather than between assessments carried out over two or three successive weeks on the same individuals.

This ‘between-groups’ approach necessarily adopted in the present study is statistically less powerful than a repeated-measures ‘within-subjects’ method, such as that used by the present authors in evaluating offshore shift rotation patterns (Parkes & Clark, 1996).

Both these points are important in interpreting the findings reported here. Although the methods used in the present study would have detected any marked effects on short-term mood and/or sleep patterns attributable to a third week offshore, more subtle or longer-term outcomes remain to be investigated. Certainly, the issue remains open.

6. INTERVIEWS WITH WIVES OF OFFSHORE PERSONNEL

The duration of offshore tours, and work/leave schedules more generally, are topics of importance not only to offshore personnel themselves but also to their wives and children. As part of the present work, therefore, interviews were arranged with the wives of a small sample of men working on offshore installations (predominantly production platforms); these interviews were intended to explore the attitudes and perceptions of women whose husbands worked offshore, particularly those concerned with work/leave schedules but also in relation to other family issues. Whilst these interviews do not constitute a major aspect of the present report, the information obtained provided a perspective on the issue of work/leave schedules complementary to that obtained from offshore personnel themselves.

6.1 PROCEDURE

Individual interviews were carried out with a total of 19 wives of offshore personnel, by means of a semi-structured interview administered either face-to-face in Aberdeen (n=9) or by telephone (n=10). The wives were contacted either through the OWLS (Offshore Womens' Link Service) organization, or from home address information obtained in connection with the survey of offshore personnel (Parkes & Clark, 1996). Participation in the interviews was on an entirely voluntary basis; travel expenses were paid to those participating in interviews in Aberdeen.

The interview schedule was semi-structured and took approximately 25 minutes to administer, although there was considerable variation about this average duration. The protocol covered a number of issues relating to the husband's offshore employment, including work/leave patterns. Family and domestic issues associated with offshore employment, particularly those associated with the husband's intermittent absence from home, were also covered. The main focus was on how the interviewee perceived the advantages and disadvantages of the offshore lifestyle from her own viewpoint, and the implications for family activities. With one exception, none of the wives interviewed had ever visited an offshore installation.

6.2 WORK/LEAVE SCHEDULES REPORTED

Asked about the work/leave pattern currently worked by their husbands the women in the sample reported a variety of different patterns. Details are shown in Table 6.1. It can be seen that almost all the main work/leave schedules in operation on the installations involved in the survey of offshore personnel (see Table 3.1) were reported by the wives interviewed. Of the 19 wives involved, 14 reported a work/leave schedule based on two-week offshore tours (although in two cases the husband had worked a 3-3 schedule for some period during the previous 12 months). Five of the wives had current experience of 3-3 schedules, in some cases in the form of a mixed 2-2 / 3-3 system.

Table 6.1
Schedules worked by the spouses of the wives interviewed

WORK / LEAVE SCHEDULE	Number of wives reporting the schedule
Two weeks offshore / two weeks leave	6*
Two weeks offshore / two weeks leave, plus holidays	4
Two weeks offshore / three weeks leave	4
Mixed 2-2 / 3-3 schedule	3
Three weeks offshore / three weeks leave	2
<p>* This group included two women whose husbands had worked a 3-3 schedule in the previous 12 months</p>	

6.3 INTERVIEW MATERIAL

Three main topics covered in the interviews were of direct relevance to the question of work/leave cycles. The findings relating to these issues are outlined below.

6.3.1 Work/leave schedule preferences

In the sample of wives interviewed, there was a clear preference for work cycles based on two-week offshore tours, in the context of an ‘equal time’ schedule (i.e. same number of days offshore and onshore over the year) or, preferably, more generous schedule such as 2-3 (i.e. 2 weeks offshore alternating with 3 weeks shore leave).

Experience of three-week offshore tours had not resulted in more positive attitudes towards 3-3 schedules. Six of those interviewed expressed extremely negative views about 3-3 working. A typical comment was “. . . the 2-2 system is OK, you can survive that (but) three weeks is never ending”. Similarly, another interviewee commented that “Three weeks is a long time to be out of the whole environment - it makes it very difficult to come back to reality.” Furthermore, two wives who had experienced the 3-3 schedule, but whose husbands had reverted to the 2-2 pattern at the time of the interview, both expressed concern that they would be unable to cope with a reversal to 3-3 working.

6.3.2 Work/leave schedules and the disruption of family life

More general comments about work/leave schedules were primarily concerned with disruption of the family routine and leisure activities. The initial period of shore leave tended to give rise to particular problems of adjustment, especially if the husband had been on night shifts immediately before going on shore leave. In one instance, a wife whose husband worked three weeks of day/night shiftwork, scheduled as one week of night shifts, one week of days shifts, and a final week of night shifts, reported that her husband had “. . . *extreme difficulty in readjusting which took at least one week to come out of* . . . “. Others spoke of their husbands “*needing time to unwind*” or “*needing to be left alone for one or two days*”.

The last few days before the husband returned offshore also seemed to be problematic for wives. In anticipation of the husband’s departure, wives tended to psychologically detach themselves several days before the end of the leave period. This process was reflected by the comment of one of the interviewees that “*You try to switch off in the last week when he’s home to the fact that he’s leaving - you find yourself trying to cram everything in*”.

Mood disturbance was also common in the final few days of a leave period. Thus, several of the wives interviewed reported that their husbands became “*grumpy*” or “*tense*” just prior to returning offshore, and complained of long silences and “*oversensitivity*”. In these circumstances, one wife reported consciously trying “*to avoid saying upsetting things just before he goes offshore*”.

Thus, a picture emerged of a repeatedly fractured home life, requiring frequent adjustments to the separations and home-comings intrinsic to the offshore lifestyle. Shrimpton and Storey (1993) reflected the same problems in noting that “*family-related tensions peak, for both workers and their spouses, around the partings and reunions*”. Other authors have also commented on the emotional demands inherent in the offshore lifestyle, noting also the more general problems of ‘*intermittent husband syndrome*’ for the families of offshore personnel (e.g. Taylor *et al.* 1985; Morrice *et al.* 1985).

However, psychological and emotional issues were not the only ones raised by the wives interviewed in the present study. More practical problems were also of concern, including travel times between the heliport and home (although the wives recognised that place of residence was a matter of personal choice), and inconvenient crew change times. Both these problems were considered to adversely affect the time required for readjustment.

6.3.3 Communications

Almost all the wives interviewed reported that their husbands phoned home on a regular, if not daily, basis, although the timing of call was sometimes constrained by day/night shift working. None of the wives in the sample regularly initiated telephone contact with their husbands offshore, although they were aware that they could do so in an emergency, and on one or two occasions had done so successfully.

Although the wives were generally satisfied with telephone communications with offshore installations, the issue of ‘one-sided communication’ was frequently noted to be a problem. Thus, on occasions, wives felt that important decisions were being delayed or impeded by having to wait for the husband to return home or telephone. One wife typified several in noting “. . . *you can’t make decisions without being able to contact him - you can find yourself waiting for a call but it’s the one time you’re out that he phones - it’s very distressing.*”

In these circumstances, decisions have either to be made by the wife alone, or they must necessarily be delayed until the husband’s shore leave, or until he makes contact by telephone. Either way, if the wife does not feel able or willing to make a decision alone, she has little control over when the matter can be resolved.

6.4 COMMENT

Much of the interview material outlined above is consistent with what has already been published about offshore wives’ experience of ‘intermittent husband syndrome’, and other aspects of the offshore lifestyle. However, in the present context, the main issue was the question of 3-3 working, and it was clear that this work pattern had already caused problems for one or two wives, and was an issue of potential concern for most of the others in the sample. Whilst it would be unwise to place too much emphasis on the views of this very small group of wives, the findings do suggest that the implications for the families of offshore personnel of an extension of the offshore work cycle should form part of any more extensive study of 3-3 work patterns.

7. DISCUSSION

In reviewing the material relating to 3-3 work/leave patterns, it should be emphasised that the present study represents only a preliminary examination of the limited amount of data currently available. On the basis of the material presented, the report neither advocates nor discourages the introduction of 3-3 working; indeed, reviewing the available information serves primarily to highlight how little is currently known about the health and safety aspects of work patterns involving three-week offshore tours.

However, the data presented do demonstrate that negative views about 3-3 working are widely held by offshore personnel. These views, which were shared by the small sample of wives interviewed in the present study, should not be ignored; work conditions that give rise to low morale and dissatisfaction potentially impair the productivity, safety and health of the personnel concerned. Several more detailed points arising from the material presented merit consideration.

- C There was a marked difference between production platforms and drilling rigs in the extent to which 2-2 work/leave pattern was preferred to the 3-3 pattern. Whereas this preference was very strong among platform personnel, those on drilling rigs were more evenly balanced in their views. In part, this difference may derive from the higher proportion of drilling rig personnel with a seafaring background, for whom three weeks away from home compares favourably with the much longer periods spent at sea in naval service and other seafaring occupations. However, there are additional reasons which may also explain the greater acceptance of 3-3 working among drilling rig personnel. In general, drilling rigs are organized in a less tightly structured manner than production platforms, perceived workload levels are lower than on platforms (Parkes & Clark, 1996), and at least some personnel are able to choose, in consultation with their 'back-to-back', whether to work a 2-2 or 3-3 pattern. This greater flexibility of work patterns, and element of control over work schedules is (as has been found for control over other aspects of the work environment), an important factor in mitigating stress and enhancing job satisfaction (e.g. Karasek & Theorell, 1990).

- C As noted in Section 3.5, the introduction of 3-3 working on production platforms currently tends to be associated with cost-reduction measures on older, less profitable installations. Adaptation to a major change in work conditions inevitably takes time under any circumstances but, in view of the difficulties already faced by personnel on older platforms, these are probably the least appropriate installations on which to introduce 3-3 working. It seems likely that three-week offshore tours would be seen as more tolerable on new, productive platforms characterised by high morale, high productivity, favourable physical environment, and no previous tradition of two-week tours. However, the reality is that older platforms are most concerned about reducing costs, and it is on these platforms that 3-3 working will be seriously considered.

Thus, the issue of three-week offshore tours is not going to disappear, however unpopular this work pattern may appear to be among some offshore personnel. The question therefore arises as to what kinds of information would be required to establish

whether 3-3 working (or other work patterns involving a three-week offshore work cycle) is acceptable in terms of the health and safety of offshore personnel, and more general well-being of the offshore community.

Several different kinds of research data that would contribute to the better understanding of the effects of 3-3 working can be suggested. In particular, information from physiological measures (e.g. cortisol excretion, blood pressure monitoring); medical records (e.g. sickbay visits, medical evacuations, sickness absence); accident/incident rates; psychological assessments (psychosocial factors, mental health and morale, job satisfaction, cognitive performance); health behaviours (e.g. smoking rates, alcohol use); longer-term patterns of job turnover and recruitment; and rates of divorce and separation in offshore families, would all throw light on the underlying question.

Furthermore, given the many interacting influences on the health and performance of offshore personnel, and the individual variation in work cycle preferences, it should not be assumed that, if significant effects are observed, they will all necessarily favour 2-2 as compared with 3-3 working. In view of the limited information currently available, it is important to approach further study of the issue of 3-3 working with an open mind, and a rigorous research approach.

8. REFERENCES

- AKERSTEDT, T. (1990). Psychological and psychophysiological effects of shift work. *Scandinavian Journal of Work, Environment and Health*, **16** (Suppl. 1), 67-73.
- ALEKPEROV, I. I., MELKUMYAN, A. N. and ZAMCHALOV, A. I. (1988). Some peculiarities of the physiological validity of shift work schedules for the crews of floating oil drilling platforms. *Journal of Hygiene, Epidemiology, Microbiology and Immunology*, **32**, 385-396.
- FOLKARD, S., DIRKX, J., HÄRMÄ, M., KNAUTH, P., KOLLER, M., SMITH, P.A., and WEDDERBURN, A. (1993). Night and shiftwork. Special Issue, *Ergonomics*, **36** (1-3).
- KARASEK, R. A. & THEORELL, T. (1990). *Healthy work: Stress, productivity, and the reconstruction of working life*. New York: Basic Books.
- KNAUTH, P. (1996). Designing better shift systems. *Applied Ergonomics*, **27**, 39-44.
- LAUNDRY, B. R. and LEES, R. E. (1991). Industrial accident experience of one company on 8- and 12-hour shift systems. *Journal of Occupational Medicine*, **33**, 903-906.
- MONK, T. H. and FOLKARD, S. (1992). *Making shift work tolerable*. London: Taylor and Francis.
- MONK, T. H. and TEPAS, D. I. (1985). Shift work. In: C. L. Cooper and M. J. Smith (Eds.), *Job Stress and Blue Collar Work*. Chichester: Wiley.
- MORRICE, J. W. K., TAYLOR, R. C., CLARK, D., and MCCANN, K. (1985). Oil wives and intermittent husbands. *British Journal of Psychiatry*, **147**, 479-483.
- PARKES, K. R. (1993). *Human Factors, Shift Work, and Alertness in the Offshore Oil Industry. Part I. A survey of onshore and offshore control-room operators. Part II. Alertness, sleep, and cognitive performance*. Report OTH 92-389. London: HMSO.
- PARKES, K. R., CLARK, M. J. and PAYNE-COOK, E. (1997). *Psychosocial aspects of work and health in the North Sea oil and gas industry. Part III. Sleep, mood, and performance in relation to offshore shift rotation schedules*. OTH 96 530. Sudbury: HSE Books.
- PARKES, K. R., and CLARK, M. J. (1997). *Psychosocial aspects of work and health in the North Sea oil and gas industry. Part IV. The offshore environment in the mid-1990's: A survey of psychosocial factors*. OTH 96 530. Sudbury: HSE Books.

- PROCTOR, S. P., WHITE, R. F., ROBINS, T. G., ECHEVERRIA, D., and ROCSKAY, A. Z. (1996). Effect of overtime work on cognitive function in automotive workers. *Scandinavian Journal of Work, Environment and Health*, **22**, 124-132.
- ROSA, R. (1991). Performance, alertness, and sleep after 3.5 years of 12 h shifts: A follow-up study. *Work and Stress*, **5**, 107-116.
- ROSA, R. R., WHEELER, D. D., WARM, J. S., & COLLIGAN, M. J. (1985). Extended workdays: Effects on performance and ratings of fatigue and alertness. *Behavior Research Methods, Instruments, and Computers*, **17**, 6-15.
- ROSA, R. R. and COLLIGAN, M. J. (1988). Long workdays versus restdays: Assessing fatigue and alertness with a portable performance battery. *Human Factors*, **30**, 305-317.
- SHRIMPTON, M. and STOREY, K. (1993). Work-related stress in the Newfoundland offshore oil industry: Implications for health and safety. In: Storey, K. and Shrimpton, M. (Eds.), *Social, Psychosocial and Cultural Aspects of Health and Safety in the Offshore Oil Industry* (pp.1-20). St. John's: Memorial University of Newfoundland, Institute of Social and Economic Research.
- SOLHEIM, J. (1988). Coming home to work: Men, women and marriage in the Norwegian offshore oil industry. In: J. Lewis, M. Porter, and Shrimpton, M. (Eds.), *Women, Work and Family in the British, Canadian and Norwegian Offshore Oilfields*. London: Macmillan Press.
- TAYLOR, R. C., MORRICE, K., CLARK, D. and MCCANN, K. (1985). The psychosocial consequences of intermittent husband absence: An epidemiological study. *Social Science and Medicine*, **20**, 877-885.
- TUCKER, P., BARTON, J., and FOLKARD, S. (1996). Comparison of eight and 12 hour shifts: impacts on health, wellbeing, and alertness during the shift. *Occupational and Environmental Medicine*, **53**, 767-772.
- WILKINSON, R. T. (1992). How fast should the night shift rotate? *Ergonomics*, **35**, 1425-1446.