1. INTRODUCTION

Oil and gas production play a significant role in the UK economy, and employ a substantial workforce. The magnitude of this role is reflected in recent statistical data which indicate that in 1997-8, the oil and gas industry accounted for 16% of the total industrial investment in the UK, while government receipts from the industry amounted to £3.5 billion. In terms of employment, over 380,000 jobs, approximately one third of which are located in Scotland, depend directly on the industry (Oil and Gas Industry Task Force, 1999). In such a large enterprise, the performance, productivity, and safety of the workforce, and the physical and psychological well-being of the personnel employed, are clearly of major importance.

However, in the past decade, fluctuations in oil prices, coupled with the decline of established oilfields and competition from oil production in other countries, have necessitated widespread restructuring, cost-cutting, and down-sizing in the industry. Consequently, adjusting to organizational change and job insecurity have become increasingly significant concerns for those employed in the industry. These problems have affected both offshore and onshore personnel, but the present study is specifically concerned with the onshore workforce.

Potential sources of stress among onshore oil and gas industry personnel are not of course solely due to restructuring and other organizational changes; other significant work-related demands that impact directly on employees, particularly those working in the plant areas, include managing potentially hazardous production processes and the safety concerns associated with such processes, exposure to adverse physical environment (e.g. noise, poor air quality), mentally demanding work tasks, long work hours, circadian adjustment to round-the-clock shiftwork, and living in, or commuting to, remote locations.

These issues have attracted the attention of specialists from a wide range of disciplines, including epidemiology, occupational medicine, organizational psychology, stress research, safety management, and human factors. Topics investigated range from large-scale studies of mortality and morbidity among production workers in the oil industry as compared with other job groups and/or other industries (e.g. Christie et al. 1991; Divine et al. 1999; Tsai et al. 1997a), to a detailed clinical investigation of acute stress disorder following an explosion in an oil refinery (Creamer & Manning, 1998). However, much of the literature relevant to the present study of psychosocial factors, health and safety in the onshore oil and gas industry, falls within three broad, and to some extent inter-related, fields of research.

- ***Psychosocial stressors, job satisfaction and health.*** This area of research covers a wide range of topics including job characteristics (e.g. workload, autonomy, social support), perceived risk, attitudes to safety, job insecurity, and work-family interaction. Relations between these factors and measures of positive (e.g. job satisfaction, morale, and commitment) and negative outcomes (e.g. psychological distress, minor health complaints, long-term health impairment, accidents and injuries) have been extensively researched (recently, for instance, Bosma et al. 1998; de Jonge et al. 2000; Frese, 1999; Melamed et al. 1995; Peter et al. 1999; Schecter et al. 1997). Although much of the work in this area relates to organizations other than the oil and gas industry, the findings are widely applicable to other settings. Moreover, a number of studies of psychosocial factors and health have been carried out in the oil and gas industry both in the UK and overseas (e.g. Gann et al. 1990; Fischer et al. 1998; Jaffe et al. 1996; Vaernes et al. 1988; Parkes, 1992, 1993, 1994; Parkes & Clark, 1997; Sutherland & Cooper, 1991). The primary focus of most of this research has been on personnel employed on North Sea installations rather than at onshore sites, but the work of Fischer et al. is of particular relevance to the present study as these authors examined work conditions (including shift work), symptoms and health complaints, sleep problems, and lifestyle variables among four occupational groups working in the petrochemical industry.

- ***Shiftwork.*** Oil and gas production, and other petrochemical processes, operate round-the-clock, necessitating day/night shift rotation; consequently, work hours and shift rotation schedules are significant issues in relation to the performance, health and sleep patterns of oil industry personnel. These topics have been widely researched in the oil and gas industry and other continuous process environments (e.g. Fischer et al. 1998; Parkes et al. 1997; Rosa, 1991). Increasingly, shifts of 12-hours duration, rather than 8-hours, have been adopted in such environments; the advantages of this pattern include better sleep quality, alertness and mood, fewer health problems, and higher levels of satisfaction with work hours and time for social activities (e.g. Jaffe et al. 1996; Lowden et al. 1998; Mitchell & Williamson, 2000; Rosa et al. 1989; Rosa, 1991). However, older workers may experience particular problems working 12-hour rotating shifts (Bourdouxhe et al. 1999; Haermae & Ilmarinen, 1999; Parkes, 1994), and there is evidence of increased errors towards the end of the work period (e.g. Mitchell & Williamson, 2000; Rosa et al. 1989).

- ***Health behaviour and health promotion.*** The health status and health promotion needs of oil industry employees have been the subject of a number of research studies, some of them based on data from the health surveillance systems maintained by major oil companies. Assessment and evaluation of dietary habits, obesity, blood pressure, musculo-skeletal problems, smoking, alcohol consumption, and other aspects of lifestyle among oil industry employees, and the impact of health promotion programmes on these factors, are the major focus of such studies (e.g. Lobban, 1997; Maniscalco et al. 1999; Talvi et al. 1998, 1999; Horsley & Mackenzie, 1997). Impaired fitness not only detracts from work performance and general morale, but also has implications for levels of absence and sickness. Thus, health and lifestyle variables, including smoking, blood pressure and cholesterol levels, have been found to act as risk factors for illness absence among oil industry employees (Tsai et al. 1997b); however, other data suggest that organizational factors are also implicated in absence (Ulleberg & Rundmo, 1997).

The present study is not intended to examine in detail any one aspect of work and health among personnel in the onshore oil and gas industry; rather it seeks to present a more general survey of the work environment at a number of UK sites responsible for the onshore processing of oil and gas received from North Sea oil installations. Thus, the information reported includes demographic details of the sample, together with analyses of data relating to perceptions of the physical work environment, job characteristics, safety attitudes, job satisfaction, job insecurity, mental health, psychosomatic complaints, lifestyle variables, and sleep patterns (as related to shiftwork schedules). Furthermore, differences between sites (eight sites participated in the work) and job types (each of the main occupational groups is represented) are examined for all measures, with appropriate controls for individual differences in age and negative response tendencies.

The purpose of the present work is two-fold. First, as noted above, work conditions in the industry have changed markedly in recent years as a result of cost reduction measures and organizational restructuring, including company mergers and changes in ownership; consequently, there is a need for up-to-date information about the well-being of individuals in the industry and the 'organizational health' (for a discussion of this concept, see Adkins, 1999; Quick, 1999) of the companies concerned. Second, the data collected in the present study allow comparison with those obtained in an earlier study of personnel working on offshore installations (Parkes & Clark, 1997). Thus, the data reported here not only contribute to our understanding of the psychosocial environment of UK onshore oil and gas production sites but also potentially allow a large-scale comparison of onshore and offshore oil industry personnel.

1.1 PRESENT STUDY

1.1.1 Outline of aims

In planning the present study, and the analyses described in this report, the main aims were:

- To carry out a survey of work conditions in the onshore oil and gas industry, including physical and psychosocial aspects of the work environment, job characteristics, safety procedures and measures, individual differences (particularly demographic factors), mental and physical health, and job satisfaction, within the framework of established models of occupational stress (e.g. House, 1981; Karasek & Theorell, 1990; Israel et al. 1992).

- To collect data at a range of UK 'upstream' oil and gas processing sites (i.e. plants that receive oil and gas products directly from offshore installations, via pipelines or shipping) varying in size and age, and operated by several different companies.

- To obtain data from as large a sample of personnel as possible, including all the main occupational groups employed in the industry, and both operating company employees and contractors.

- To collect all data on site, rather than use postal survey methods. The main reason for this approach was to encourage a high response rate, but it also had the advantage of allowing the research team to gain first-hand experience of the work environment.

- To offer all participants individual feedback outlining how their personal profile of responses related to the overall findings.

- To set up the study in such a way that it would be potentially possible to follow up the cohort individually at a later stage, thus setting the stage for longitudinal research into work conditions and health among personnel in a rapidly changing industry.

1.1.2 Participating companies, sites, and personnel

Operating companies. Five companies operating oil and/or gas sites within the UK participated in this work. In all, eight different sites were involved.

Sites. A wide range of sites (in terms of characteristics such as gas and/or oil terminal, geographical location and size) participated in the research. The eight sites at which data were collected were located across the UK, and had been in operation for between 6 and 36 years. The numbers of '*personnel employed*' (a measure of size) varied widely across sites, and fluctuated over time depending on current work demands.

Personnel. As far as possible, all personnel at the sites when the researcher visited were invited to take part; both operating company personnel and contractors were included, and all occupational groups. The work patterns of some occupational groups on site were such that it was sometimes difficult for the researcher to meet with them in person; if necessary, therefore, questionnaires and associated explanatory material were left for them, and also for those on annual leave.

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2. RESEARCH METHOD

2.1 PRELIMINARY WORK

2.1.1 Interviews and design of questionnaire

Prior to the main data collection phase, a total of 71 employees (including personnel from all the major occupational groups) working at each of the sites were interviewed. This initial phase of data collection provided background information which served to guide the range of material covered in the main questionnaire, the wording of specific items and inventories, and the scaling of quantitative responses.

To facilitate future comparisons between the onshore and offshore environments, the final questionnaire duplicated as close as possible that which was used in the previous offshore research (Parkes & Clark, 1997). The questionnaire drew on material from previous work by the present senior author (Parkes, 1993); it also included modified versions of other relevant inventories (e.g. Rundmo, 1992), and items developed specifically for the present study.

2.2 MAIN SURVEY

2.2.1 Data collection

The survey data were collected over a nine-month period in 1999. All data were collected on site, so as to maximise the response rate and enhance reliability. Visits to sites normally lasted two to four days, to allow time for completed questionnaires to be returned directly to the researcher. In general, two visits were made to each site, timed to allow individuals from all shift teams to participate, although inevitably some personnel were not present during either visit, while others were there on both occasions.

2.2.2 Procedure

On arrival at the site, the first stage of the work was to explain the nature and aims of the study to those present, initially by briefing senior management personnel and subsequently by meeting informally with employee groups at the workplace, during breaks, or by means of a short presentation during regular safety meetings. These meetings provided opportunities for those concerned to ask questions about the work, and allowed the researcher to make arrangements for the distribution and return of the questionnaires.

Questionnaires and associated materials were given to as many as possible of those present. At the largest sites, it was not always possible to contact everyone, but at most of the sites concerned, the majority of personnel present at the time of the visit were invited to participate. Participation was voluntary; however, it was rare for those contacted to decline to accept the survey materials. Questionnaires were left for distribution to those whose work meant they were seldom available at the site, and for those on annual leave.

Each set of survey material contained the following items, together with a large envelope in which to return the completed questionnaire:

- ***Introductory letter***. This letter outlined the nature of the work, and the source of funding; in addition, it guaranteed the confidentiality of all individual data, and adherence to the provisions of the Data Protection Act. The letter also included the names of the researchers and the address at which they could be contacted.

- ***Questionnaire, and brief instruction sheet.***

- ***Individual research number***. When the questionnaires were distributed, the particular research number on the set of materials given to a participant was recorded on a separate confidential list, together with the name of the individual to whom it had been given.

- '***Feedback slip***'. This slip asked participants to indicate whether they would like individual feedback about their profile of responses in relation to the overall results; it included space for the research number, and the name and address to which the feedback should be sent, if requested. A small envelope was also provided so that this slip could be returned separately from the questionnaire. Those who did not want to receive feedback simply checked the '*no*' response option and were not asked for other details.

- ***Prepaid mail label.*** An address label with prepaid mail to facilitate the confidential and speedy return of any questionnaires returned by mail.

The questionnaire took approximately 30 to 45 minutes to complete, although there were wide variations between individuals in the time required. Questionnaires were returned in the sealed envelopes, either directly to the researcher, left with a nominated supervisor for mailing, or mailed individually using the prepaid mail sticker.

2.3 QUESTIONNAIRE CONTENT

The questionnaire developed from the preliminary work was used at all sites in the survey, with occasional minor revisions of wording to accommodate specific features of particular sites. The main topics covered in the present report are outlined below:

- ***Demographic information***. Age, marital status, place of residence, education, current job details (e.g. job title, employer, area of work), and total number of years of employment at the present site.

- ***Job characteristics.*** Specific features of jobs (including workload, autonomy, variety, and clarity) were assessed by means of a set of 22 items. Further information requested included shift patterns, working hours, and overtime hours, if any.

- ***Physical working environment***. An eight-item questionnaire assessed exposure to physical environment stressors, e.g. noise, vibration, poor air quality.

- ***Shift patterns, and satisfaction with shift schedules.*** The questionnaire included items concerned with work hours, in particular, whether days only, nights only, or day/night rotating shift schedules were worked. In addition, for shift-workers, items asking details of shift rotation patterns, reasons for working day/night shifts, and measures assessing satisfaction with shift-work schedules were also included.

- ***Safety issues.*** Satisfaction with safety and emergency response measures was assessed using items from the checklist developed by Rundmo (1992) for offshore installations, but modified as appropriate to the onshore environment.

- ***Work satisfaction***. Two aspects of work-related satisfaction were assessed. The '*job satisfaction*' scale focused on satisfaction with the job itself, the content of the work carried out, and the skill, variety and responsibility involved. The *'job prospects'* scale assessed more general aspects of work satisfaction, including job security, promotion opportunities, and future prospects.

- ***Health.*** Published scales were used for the assessment of minor physical/psychosomatic health problems (Vaernes et al. 1988) and for the assessment of mental health (Goldberg, 1978). Other health-related information recorded included smoking behaviour and alcohol consumption, and details of height and weight, from which the body mass index (BMI) was calculated.

- ***Sleep patterns.*** Information about sleep hours and quality of sleep in relation to day-shift and night-shift work (if applicable), and during periods of leave was obtained.

- ***Negative affectivity.*** Several personality measures were included in the questionnaire, but only one plays a major role in the present report. Neuroticism, a measure of 'negative affectivity', and vulnerability to psychological distress, was assessed in the present study by the Eysenck Personality Questionnaire (Eysenck et al. 1985).

2.4 RESPONSE RATES

At the eight sites in the study, response rates ranged from 53.1% - 84.5% of questionnaires distributed, with a mean of 68.7 (± 12.9) %. The rate of return tended to be inversely proportional to the number of personnel employed at the site. At the larger sites it was difficult to contact all potential participants directly; consequently, it was sometimes necessary for supervisors to brief other personnel, and to distribute the questionnaires, which were subsequently collected by the researcher or returned by mail. This indirect approach inevitably tended to reduce response rates. Overall, the level of response (although lower than in the offshore study) was considerably higher than in most survey studies of this kind, particularly in view of the size of the sample, the wide range of occupational groups included, and the detailed nature of the questionnaire.

2.5 DATA CODING AND PROCESSING

The questionnaire data were coded according to a pre-determined schedule: nominal categories (e.g. job type) were given discrete numerical codes for identification; ordinal and interval level measures were entered quantitatively. Individual participants were identified by research numbers, and sites were also coded into numerical form. The pre-coded data were entered into the SPSS-PC program. Prior to analysis, the data set was examined to check that each variable was in the expected range; occasional missing data and out-of-range values were identified, and corrected if necessary, and any recoding required for analysis purposes was carried out.

2.5.1 Coding of categorical variables

Sites and company groups. The eight different sites involved in the study were identified by discrete codes in the data set. In general, 'sites' (rather than companies) were treated as the main factor in the analyses; however, the company groups were also coded in the data set, and used in some comparisons. Companies A and B had more than one site involved in the study, the former having two sites (designated A1 and A2) and the latter three sites (designated B1, B2, and B3). Group C consisted of three sites (C1, C2, and C3) operated by other companies.

Employer. The distinction between operating company employees and contractor personnel was represented in the 'employer' coding. At the sites, *'operating company personnel*' (i.e. those directly employed by the operating company) were distinguished from those employed by contractors, services companies and agencies, the later being designated '*contractors*'. Thus, the basis of this classification was the distinction between those employed by the company operating the site, and those with other employers.

Job type. The questionnaire asked respondents to indicate their job title and also the main area of work in which they were involved from a list of eight categories (maintenance, technical, production, management/supervisory, administration, construction, catering and office/clerical/ reception). In addition, an open-ended 'other' category was included for those whose jobs did not fit into any of the areas listed. Subsequent examination of data indicated that the sample included too few males employed in catering or in the office/clerical/reception job category to allow reliable analyses; data from personnel in these job types was therefore excluded from analysis. Conversely, the relatively high number of security personnel in the sample justified creating a separate job category for this group. The seven job types identified in the analyses reported here were therefore *maintenance, technical, production, management/supervisory, administration, construction,* and *security*.

Job level. Job level was designated by four ordered codes, derived from job titles. The codes used were: *senior management* (1); *supervisor* (2); *lead technician* (3); and *technician/operator* (4). The most senior level, coded (1), included only the site Managers, and a few senior colleagues. An additional job level code, designated '*professional*' in this report, was included for individuals (*mostly specialist and technical personnel*) who did not fit clearly into the hierarchical structure. Whereas job types were coded according to the nature and area of the work carried out, job levels 1 - 4 were determined solely by seniority.

Additional duties. The survey questionnaire asked respondents to indicate whether they undertook any specific duties additional to their main jobs. The additional duties specified were: f*irst-aider*, *safety representative*, *fire team*, *emergency response team*, and '*other*'.

Shift patterns. The analyses reported here distinguished between personnel working day/night rotating shifts and those who worked days only. A few participants (n=25) whose work pattern did not fall clearly into either category were coded in an 'other' category, but the main analyses of shiftwork variables were restricted to comparing *day workers* with *day/night shift workers*.

2.6 DATA ANALYSIS

In reporting findings from the large data set available, it was necessary to focus on a limited number of analyses from the vast range of possibilities. The work reported here is primarily concerned with assessing the extent to which *objective* factors such as site, job types, and work/shift patterns, predict *subjective* outcomes, such as perceived job characteristics, safety perceptions, and health measures, rather than examining relations between subjective measures.

The factors chosen as the basis for the initial analyses were job type and site, with control for age and negative response biases (see below). Within this framework, differences between the eight sites, and between sites within company groups, were also examined where appropriate. In addition, specific points of interest were followed up in relation to particular outcomes. Several more technical aspects of the analysis are outlined below.

Multivariate analyses. As the predictor variables of interest were not independent of each other (see Section 3.2), it was necessary to use multivariate methods of analysis which allow the effects of more than one variable to be evaluated simultaneously. Although univariate methods are also reported where appropriate, multivariate analyses provide more clearly interpretable results.

Main effects, interactions, and curvilinear effects. Two predictor variables may either act separately (each showing an overall effect in relation to the outcome, independently of the other), or they may combine interactively, in which case the effect of one variable depends on the level of the other. For instance, site and job type may both relate independently to, say, perceived workload; alternatively, the two factors may interact, the effect of job type varying across sites and, conversely, the effect of sites varying across job types. In most cases, continuous quantitative variables (e.g. neuroticism) were linear in effect (i.e. the outcome variable was directly related to the predictor) but, in a few instances, curvilinear trends were also observed and are reported.

In the present work, the main emphasis is on overall main effects, which usually accounted for the largest proportion of the variance in outcome. However, in the onshore data set, when the interaction between site and job type was found to be highly significant, interaction effects are reported. The analyses described in Chapter 11, which compare onshore and offshore personnel on measures of work environment, job characteristics and well-being, are more complicated in that significant interactions between the factor representing onshore/offshore location and other predictor variables (particularly company and job type) were frequently found. These interactions imply that the magnitude and/or direction of differences between the two locations are not universal but depend on which company and/or job type is being considered.

All regression tables in this report present data from simultaneous analyses; thus, all factors (including interactions, where appropriate) are fully corrected for all other factors in the model. It should be noted that, if the model includes interaction terms, this procedure changes the results for the component terms of the interaction from overall main effects to 'first-order' effects. In these cases, it is the interaction that should be interpreted, not the first-order term.

Data distributions. Some measures described in this report had markedly 'skewed' distributions, that is, most scores were bunched together within a small range, but there was a tail of extreme scores at one end. For distributions of this nature (e.g. reported working hours per week, health problems scores), the overall mean is not a useful measure as it tends to be distorted by the extreme values. In these cases, the percentages of the sample falling within certain ranges of scores are reported, and statistical analyses appropriate to this format are used.

Significance levels. The sample size in the present study was such that very high levels of significance were obtained in many of the analyses. The convention adopted in this report is that probability levels less than .001 (i.e. the probability of the observed result being obtained by chance is less than 1 in 1000) are reported as $p<.001$, irrespective of the actual level of significance achieved which was often much higher (i.e. a smaller probability value reflecting a more highly significant result). Probability levels that were statistically significant ($p<.05$) but did not reach the $p<.001$ level are quoted precisely.

Control for response biases. A general tendency to perceive both self and environment in a negative light is reflected in a wide range of self-reported information, including job perceptions and health measures. In analysing survey data, individual differences in this tendency, labelled '*negative affectivity*', must be taken into account for two reasons. First, negative affectivity acts to inflate observed correlations between stressors and outcomes (e.g. Brief et al. 1988). Second, between-group differences in negative affectivity may distort comparisons across groups; for instance, differences between job types in, say, perceived workload, may be partially attributable to differences in the overall levels of negative affectivity in different job groups. The measure used to control for this form of response bias was *neuroticism* (Eysenck et al. 1985); it was routinely included as a covariate in all multivariate analyses.

Control for age effects. A second covariate, age, was also routinely included in the analysis models, both as a predictor variable of interest in its own right, and to take into account possible confounding due to age differences between sub-groups within the overall sample.

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3. DESCRIPTION OF THE SAMPLE

A total of 1023 personnel employed at eight different sites (see Section 1.1.2) returned completed questionnaires. The data set that forms the basis of the analysis presented here differs in three ways from this original sample.

- The main analyses were restricted to data from male personnel. Women who participated in the study formed only a small proportion of respondents (7.9%), corresponding to their relatively low representation in the oil and gas industry workforce. Furthermore, they were employed in a limited range of occupational groups. Thus, including data from women in the main analyses would have complicated the interpretation of the statistical findings. Excluding female participants left a sample size of 940 personnel.

- As sites and job types were main factors in the analysis model, it was important not to confuse the results by including personnel for whom these factors were of little significance. Accordingly, those with less than two months' experience of working at the site (together with six personnel for whom the relevant data were missing) were excluded from the sample. This screening reduced the male sample by 19 personnel to 921.

- The two job categories in which the numbers of male personnel returning questionnaires were low (catering and office/clerical/reception) were excluded, leaving a sample size of 909 personnel. The main analysis of onshore data presented in this report is restricted to this sample.

3.1 DEMOGRAPHIC AND BACKGROUND CHARACTERISTICS

Broad demographic categories, and other background factors that characterise the sample, are shown in Table 3.1. Considering, first, the demographic information, the table presents a breakdown of age, years of work at current site, marital and family status, and educational level. The overall average age was 43.3 years (±10.2 years) with a range of 18-64 years. As shown in Table 3.1, the 30-59 years age range accounted for 85% of the sample, the largest group being the 40-49 years range with a total of 35%. The majority (52%) of personnel in the sample had been employed at the current site for ten years or longer.

As also shown in Table 3.1, 81% of those taking part were married or living with a partner, and 52% had children under 18 years living at home. Other background information in Table 3.1 shows that the majority of personnel (61%) reported a clear preference for onshore (as opposed to offshore) work. In spite of increasing concern about job security, the great majority of the sample reported that they expected to be, or probably would be, in the same job in a year's time.

3.2 SAMPLE COMPOSITION

Table 3.2 shows the proportions of the overall sample falling in sub-groups defined by the sites, companies, employer, job type, job level, and work/shift pattern. The majority of personnel (59.6%) were employed by the companies in Group C, the single company group, rather than by either of the company groups (Companies A and B) with more than one site in the study. The largest job groups were maintenance (25.7% of the sample) and production (32.9%). Over half the sample were at the job level of technician/operator (56.8%); were employed by the operating company (56.8%) rather than a contractor; and worked days (59%) rather than day/night shifts.

Table 3.1
Demographic and background characteristics

Variable	Levels	% of sample
Age range (years)	18 - 19	1.2
	20 - 29	9.4
	30 - 39	23.0
	40 - 49	35.2
	50 - 59	27.3
	60+	4.0
Years of work at site	< 5	30.4
	5 - 9	17.7
	10 - 14	18.2
	15 - 19	17.1
	20 - 24	14.2
	25+	2.5
Marital status	Married / living with partner	80.6
	Separated / divorced / widowed	6.1
	Single	13.4
Family status	Dependent child/children	52.5
	No dependent child	47.5
Educational level	No formal qualifications	12.7
	GCSE/O-/A-level or equivalent	20.3
	Technical qualifications	52.2
	Degree level qualifications	14.7
Expectation of being in same job in a year's time	No	7.6
	Probably not	8.6
	Probably yes	32.3
	Yes	51.5
Preference for working on or offshore	Definitely prefer offshore	1.7
	Tend to prefer offshore	2.1
	No preference	18.1
	Tend to prefer onshore	17.3
	Definitely prefer onshore	60.8

Table 3.2
Sample composition

Factor	Total sample	
	N	%
Sites		
A1	52	5.7
A2	50	5.5
B1	83	9.1
B2	112	12.3
B3	70	7.7
C1	114	12.5
C2	216	23.8
C3	212	23.3
Operating companies		
Company A	102	11.2
Company B	265	29.1
Group C	542	59.6
Employer		
Operating company	516	56.8
Contractor/services	389	42.8
Missing	4	.4
Job type		
Maintenance	234	25.7
Technical	95	10.5
Production	299	32.9
Management	152	16.7
Admin/other	32	3.5
Construction	40	4.4
Security	57	6.3
Job level		
Senior management	20	2.2
Supervisor	81	8.9
Lead technician	228	25.1
Technician/operator	516	56.8
Professional	64	7.0
Work/shift pattern		
Days only	531	58.5
Day night shiftwork	352	38.7
Other	25	2.8
Missing	1	
TOTAL	909	100

There were a number of significant differences associated with employment patterns at different sites. For instance, the numbers of personnel employed in day work and day/night shiftwork differed significantly between sites, (χ^2= 34.8, df=7, p<.001); Site A1 employed the highest proportion of shiftworkers (57.7%), whereas Site B2 employed the smallest proportion (26.9%). Two other examples of employment patterns merit particular attention.

Job types. As shown in Figure 3.1, there were significant differences between job types in the relative proportions of personnel employed by operating companies and contractors (χ^2 = 349.3, df=6, p<.001). All security personnel were contractors, as were the majority of maintenance and construction personnel. Conversely, production personnel and management were mainly employed by the operating company.

Age. There were significant differences in the age profiles of groups classified on the basis of employer (χ^2 = 68.5, df=8, p<.001). This pattern is illustrated in Figure 3.2, in which the sizes of shaded areas represent the relative numbers of personnel in each group, while the profiles show the age distribution of each group. A conspicuous feature of the diagram is that the relative proportion of personnel employed by operating companies is highest in the age range 30 -60 years. In the youngest and oldest age groups the majority of personnel were contractors.

There were also significant differences in age associated with factors shown in Table 3.2. For instance, the mean age of personnel differed significantly across sites, F(7,904)=6.41, p<.001; on average, personnel working at Site C3 were older (46.6 years) than those at other sites (43.3 years). Age also varied significantly across job types, F(6,904)= 7.42, p<.001, management and security personnel being older, and technical personnel younger, than other groups.

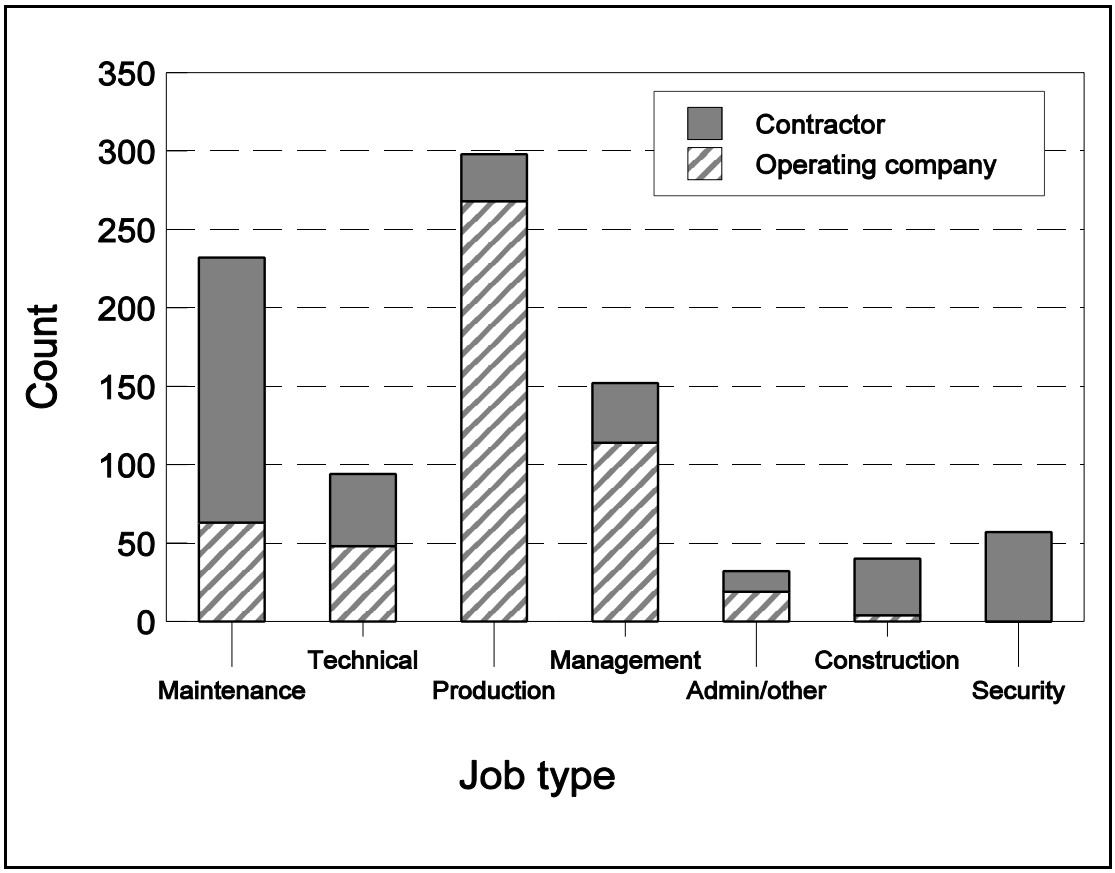

Figure 3.1
Sample characteristics: Job type by employer

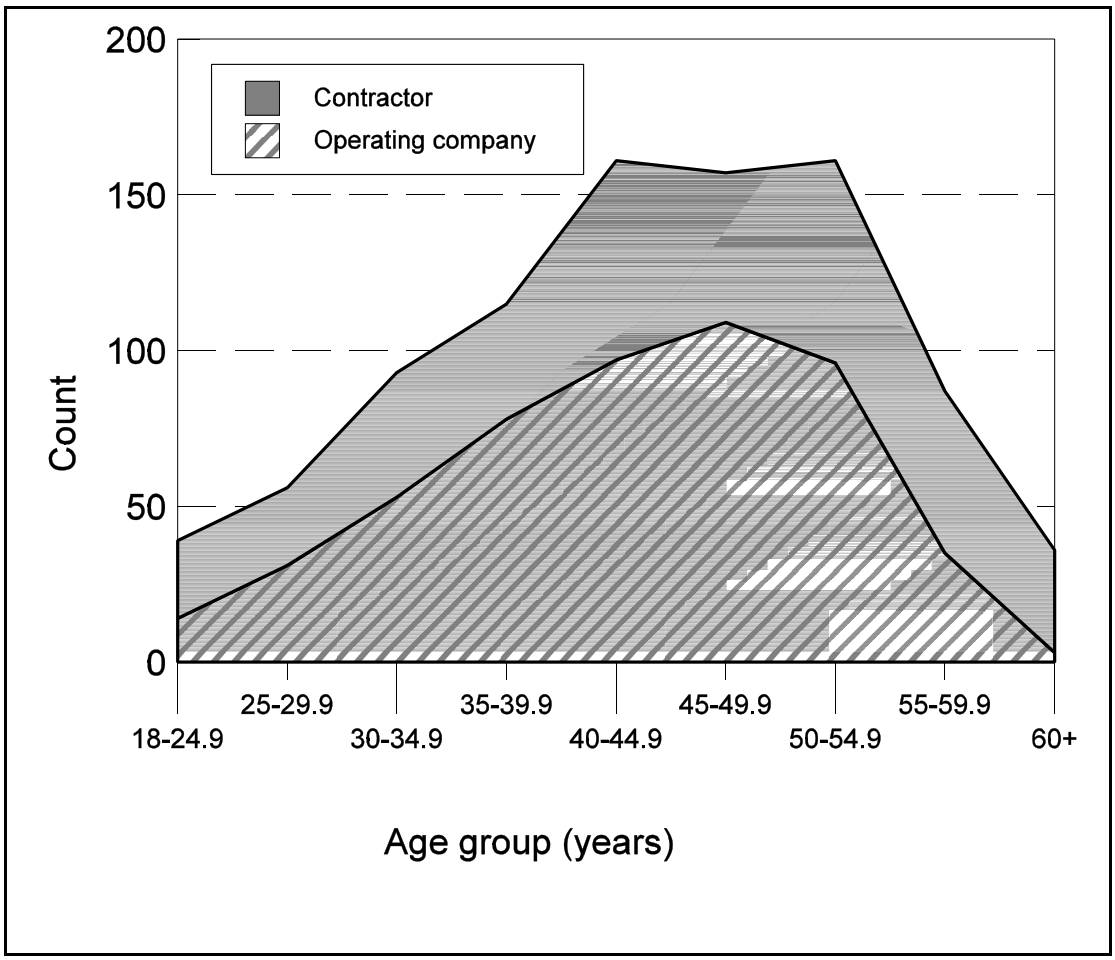

Figure 3.2
Sample characteristics: Age group by employer

3.3 PERSONALITY

Although personality variables are not considered in detail in this report, two dimensions assessed in the present study are relevant to the description of sample characteristics in that they throw light on the general adaptability and emotional stability of the personnel involved in the study. The overall mean score on the *extraversion-introversion* scale was 7.5 (± 3.5), and the mean score on the *neuroticism scale* was 3.8 (± 2.9).

Relative to normative data (Eysenck et al. 1985), the extraversion scores were significantly high and the neuroticism scores significantly low. This combination of low neuroticism and high extraversion (reflecting a tendency to be sociable, active, emotionally resilient, and adaptable) is associated with better-than-average mental health, and good coping skills.

Thus, the present data suggest that selection processes involved in seeking, obtaining, and remaining in, employment in the oil and gas industry give rise to a workforce that, on average, shows personality characteristics likely to promote favourable adaptation to the work environment. However, it should be noted that on both scales the full range of scores (0-12 in each case) was observed, indicating considerable individual variation around the overall mean values.

SUMMARY

3.4 DESCRIPTION OF SAMPLE

- The survey data analysed were obtained from 909 male personnel at eight oil and/or gas sites. Data from the relatively small sample of female personnel (n=81) were not included in the main analyses.

- The sample covered the operating company personnel (56.8%) and contractors (42.8%). The full range of job types (coded in seven categories) and job levels were represented.

- The age range was 18-64 years; 85% of the sample were in the 30-59 years age group.

- Over half the total sample reported at least 10 years of work at their current site.

- In the sample as a whole, scores on personality measures indicated relatively high extraversion and low neuroticism, characteristics typically associated with adaptability, emotional resilience, and above-average mental health.

4. PHYSICAL ENVIRONMENT

4.1 MEASURES

Eight items were used to assess the physical work environment; participants were asked to indicate to what extent their work exposed them to adverse physical conditions. Responses were scored on a five-point (0 - 4) scale, ranging from *'not at all*' to '*to a high extent*'. Six of these items formed a single scale, the *'general environmental stressors'* scale, for which a mean item score was calculated. The scale consisted of items concerned with poor workplace design, noise, vibration, cold, poor ventilation, and exposure to chemical hazards. The remaining two items (heavy physical workload and working at heights) did not fall clearly on this factor, and were disregarded in the present analyses.

4.2 PREDICTORS OF PHYSICAL ENVIRONMENT STRESSORS

The extent to which the two main factors, *sites* and *job types* predicted scores on the measure of physical environment stressors was evaluated, with *age* and *neuroticism* included as covariates (see Section 2.6 for details of the analysis model). The results are summarised in Table 4.1.

Table 4.1
Scores on the physical environment stressors scale in relation to sites and job types

	Main effects		*Covariates*	
Measure	Site	Job type	Age	Neuroticism
Physical environment stressors	F=19.41 df=7,881 p<.001	F=37.14 df=6,881 p<.001	ns	F=31.51 df=1,881 p<.001 [+]
Overall model: $F(15,881) = 26.62$, $p<.001$; $R = .558$, $R^2 = .312$				
Note: *The signs in brackets indicate the directions of the covariate effects*				

4.2.1 Sites

After job type, age, and neuroticism had been taken into account, sites differed significantly in the extent to which personnel reported exposure to *physical environment stressors*. In particular, Site C2 was higher (ie. less favourable) on this measure than all the other sites. The combined means of Company A sites did not differ significantly from those of Company B.

Within company groups, the two sites of Company A did not differ significantly; however, in Company B, Site B3 was significantly lower (ie. more favourable) on this measure than Sites B1 and B2, $F(2,260) = 9.13$, $p<.001$. Figure 4.1 shows mean scores (adjusted for job type, neuroticism, and age) for each site. These results should be interpreted in relation to the overall

range of possible scores (0-4); all mean scores were in the lower or middle part of the range. Thus, at the sites concerned, overall perceived exposure to adverse physical conditions did not appear to be unduly high.

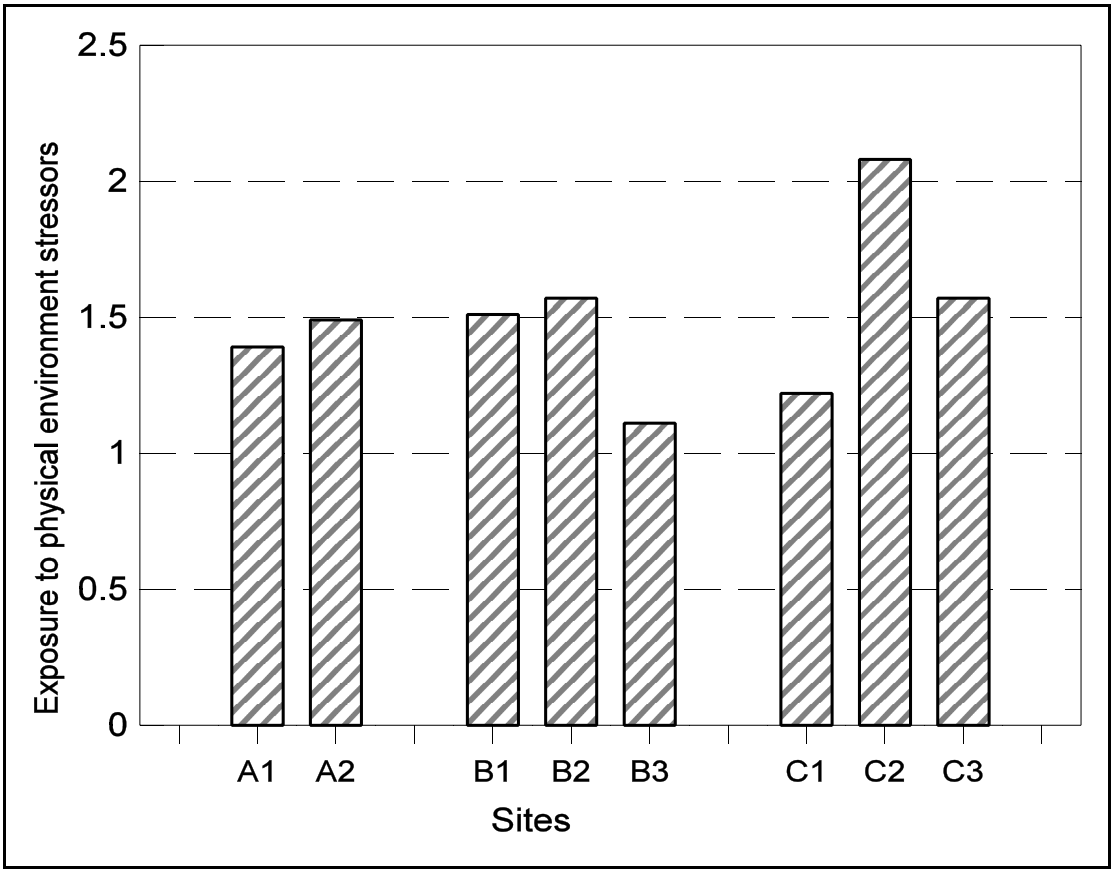

Figure 4.1
Exposure to general physical environment stressors by site

4.2.2 Job types

As shown in Table 4.1, personnel in different job groups reported significantly different levels of exposure to physical environment stressors. Scores for each job type on this measure (adjusted for site differences, age and neuroticism) are shown in Figure 4.2. The scores could be divided into two groups, roughly corresponding to the job groups that spent most of their time in the accommodation and office areas (management and administration/other) and those in other jobs whose work was mainly on site (production, maintenance, and construction areas) who therefore experienced higher levels of environmental stressors. Technical personnel were distributed across both areas (drawing offices and on site), and this was reflected in the mean score on this measure.

4.2.3 Covariate effects

Age was not a significant predictor of physical environment stressors; however higher neuroticism was significantly related to higher scores on the perception of exposure to physical environment stressors. Thus, irrespective of job type or site, those high in neuroticism reported higher exposure to adverse environmental conditions.

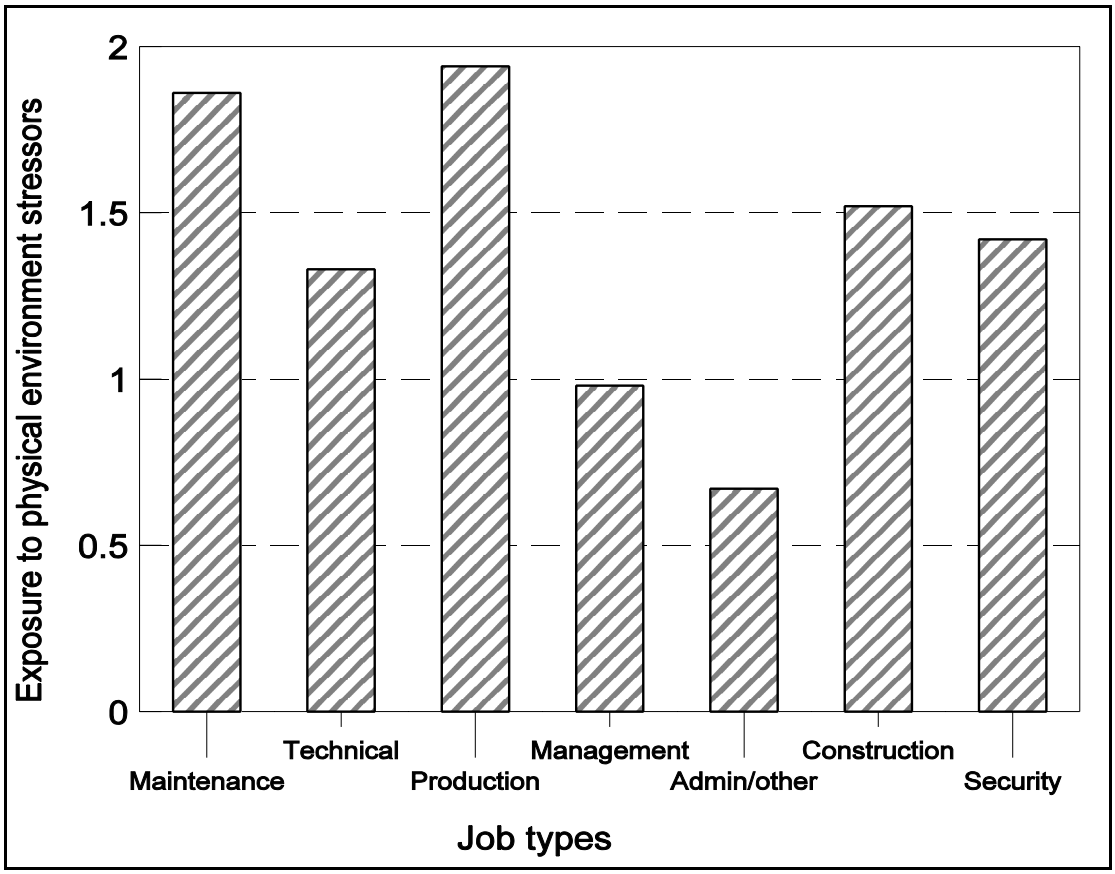

Figure 4.2
Exposure to general physical environment stressors by job types

SUMMARY

4.3 PHYSICAL ENVIRONMENT

- General aspects of exposure to adverse physical environment were assessed (e.g. noise, poor air quality).
- In the sample as a whole, the scores did not suggest an unduly adverse physical environment, although there was a significant difference between all sites and within one of the two company groups.
- Job types were significant predictors of perceived exposure to physical stressors. Highest overall exposure was reported by maintenance and production personnel, while those in management or office-based jobs reported lowest exposure.
- Higher neuroticism was significantly related to higher scores on this measure.

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5. JOB CHARACTERISTICS

5.1 MEASURES

The job characteristics scale consisted of 22 statements describing particular features of jobs. Participants were asked to indicate to what extent they agreed with each of the statements as applied to their jobs, using a five-point response scale, ranging from 0 (*do not agree at all*) to 4 (*agree strongly*). Using standard factor-analysis methods, four sub-scales were derived from the data, and mean item scores for each sub-scale were calculated for each participant. One item which did not clearly belong on any of the sub-scales was discarded. Details of the sub-scales and content areas are shown in Table 5.1; these sub-scales were the same as those used in the offshore study, thus allowing direct comparison across the onshore and offshore samples (see Chapter 11).

Table 5.1
Job characteristics measures

Scale	Content area	Mean item score ± s.d.
Workload *5 items*	*Time pressures, quantity of work, difficult to get work done in time, have to work very hard*	2.46 ± 0.85
Task variety and skill *6 items*	*Varied activities, opportunities to learn new skills, interesting work. Repetitive tasks (reverse-scored)*	2.29 ± 0.72
Autonomy *4 items*	*Can decide own workpace, work in own way, work independently, take short breaks*	2.66 ± 0.81
Clarity *6 items*	*Given clear instructions, details of tasks are planned by others, know what to expect from others*	2.35 ± 0.67

5.1.1 Initial multivariate analysis

A multivariate analysis of variance (MANOVA) was carried out to determine whether site, job type, age, and neuroticism were significant predictors of the overall set of job characteristics variables. The results showed that each main factor was highly significant ($p<.001$ in each case), thus justifying the use of this model in separate analyses of the four job characteristics, as reported in the following sections.

5.2 WORKLOAD

5.2.1 Sites and job types

The main results of the analysis of workload scores in relation to sites and job types are shown in Table 5.2. Sites, job types and neuroticism each showed highly significant effects, but age was not a significant predictor.

Table 5.2
Analysis of workload in relation to sites and job types

	Main effects		*Covariates*	
Measure	Sites	Job type	Age	Neuroticism
Workload	F=6.73 df=7,878 p<.001	F=20.04 df=6,878 p<.001	ns	F=5.57 df=1,878 p=.018 [+]
Overall model: $F(15,878) = 13.73$, $p<.001$; $R = .436$, $R^2 = .190$				
Note. *The signs in brackets indicate the direction of the covariate effects*				

Sites. There were highly significant differences in mean workload scores across the eight sites in this study. Mean scores for each site are shown in Figure 5.1. Further analyses were carried out to examine differences between sites within each of the company groups.

The results showed no significant differences in workload levels within the Company Groups A and B (ie. between sites operated by the same company); furthermore, there were no significant differences between the combined means of these two company groups. However, the three single sites in Group C, did show significant differences (p<.001). Site C3 was significantly lower on this measure than sites C1 and C2. Thus, overall workload levels were similar at sites within and between company groups A and B; however the three single sites forming Group C were more diverse, with the two highest scores and the lowest score on this measure.

Job types. As shown in Figure 5.2, there were highly significant differences across job types in mean workload scores. Two job types, administration and management had conspicuously high scores relative to other types of jobs. Security personnel tended to report the lowest workload levels.

Covariates. Neuroticism was a significant factor in the analysis of workload (p=.018); higher neuroticism predicted higher workload ratings. Age was not significant.

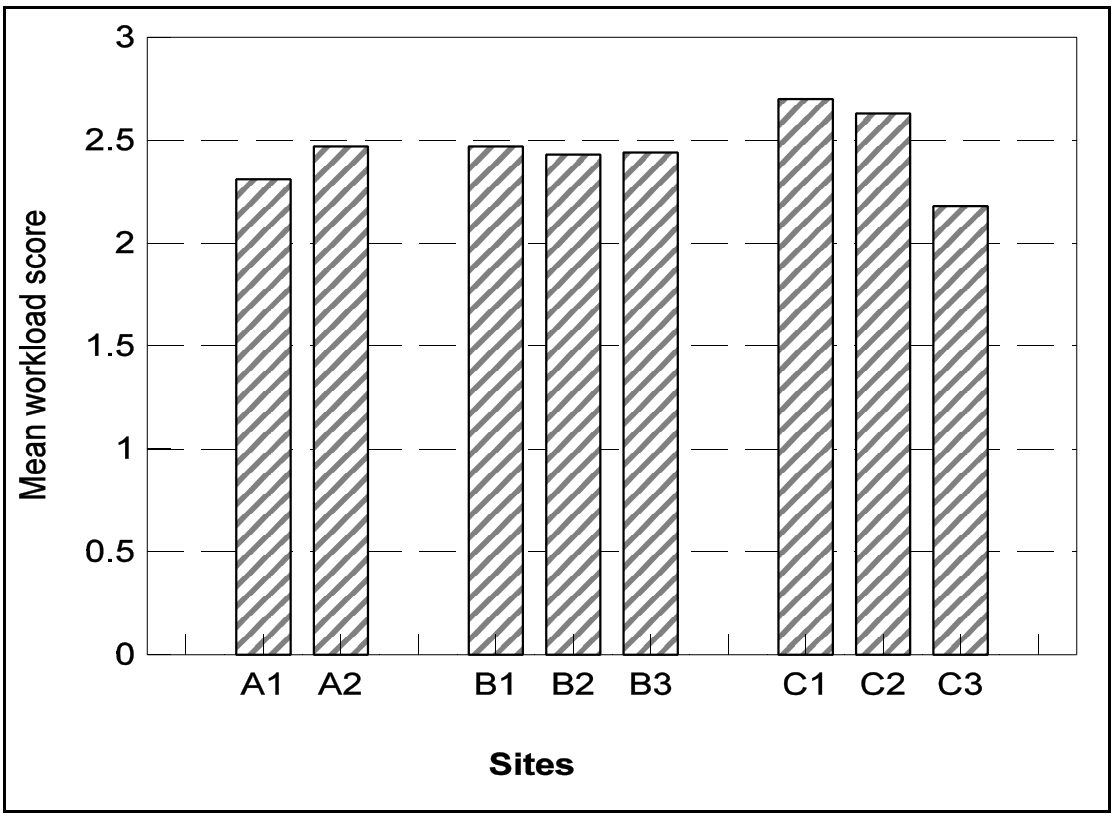

Figure 5.1
Workload levels across sites

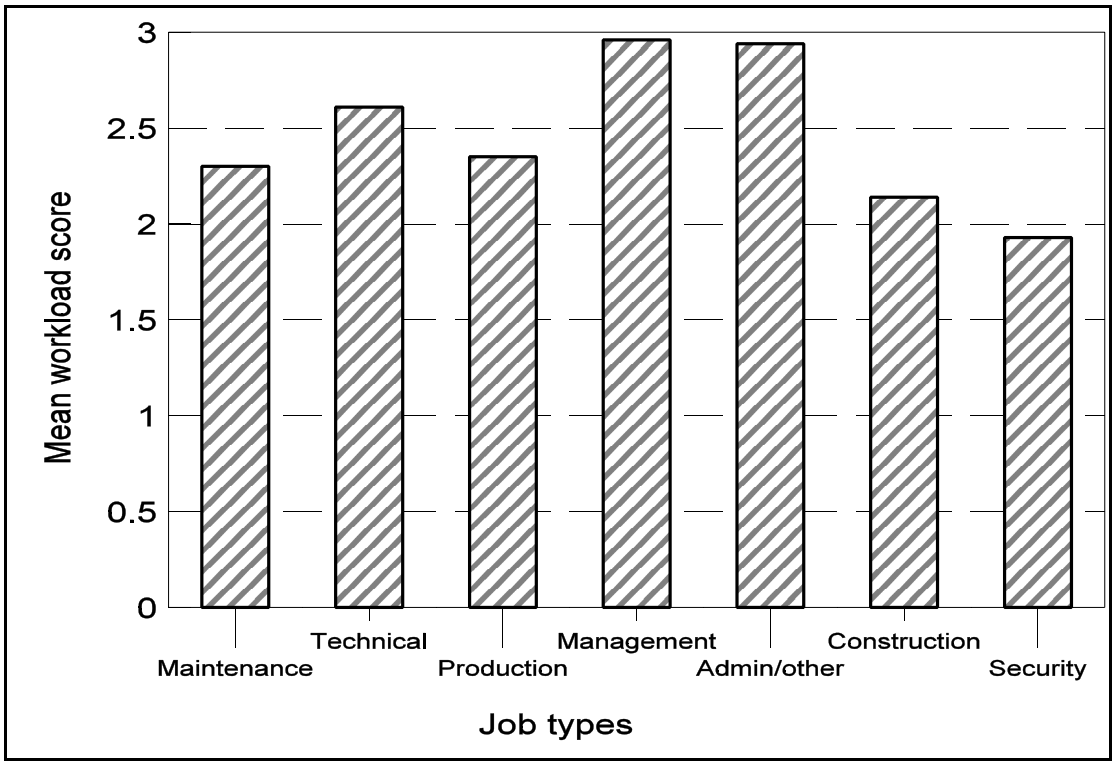

Figure 5.2
Workload levels across job types

5.2.2 Further analysis of workload

Additional analyses were carried out to determine the extent to which the variation in workload was predicted by job level, operating company vs. contractor personnel, number of years of employment at the site, and work responsibilities additional to an individual's main job. The significance of these factors was evaluated over and above site, job type, age and neuroticism, using the extended analysis model in which the independent contribution of each factor was evaluated, taking into account all other factors in the model.

The results of the analysis are summarised in Table 5.3. Job level and employer (operating company vs. contractor personnel) were the most highly significant predictors in this model. Years of work at present site, and two of the five additional responsibilities (first aid and emergency response team), also contributed to differences in perceived workload.

Table 5.3
Multiple predictors of workload

Predictor variables*	df	F	p
Job level	4	19.30	<.001
Operating company *vs*. contractor personnel	1	11.03	<.001
Years of work at present site	1	4.52	<.05
Additional responsibilities:			
First aid	1	4.04	p<.05
Safety representative	1	<1	ns
Fire team	1	<1	ns
Emergency response team	1	5.74	p<.05
Other role	1	<1	ns
Overall model: $F(26,863) = 14.42$, $p < .001$ Multiple correlation, $R = .550$, $R^2 = .303$			
***** *Site, job type, age, and neuroticism were also included in the model. All factors were corrected for the effects of these variables, and for all factors shown.*			

Examination of the data showed that the middle job levels and those classified as professional (ie outside the hierarchical structure) were associated with higher perceived workload than other job levels. In addition, operating company personnel tended to report higher workload than contractors. There were two additional work responsibilities associated with higher perceived workload, first aider and emergency response team member, but these effects although significant were not very large. In addition to these findings, those who had worked at the site for a longer period of time tended to report higher levels of workload than those with shorter experience at the site. These results are illustrated in Figures 5.3a and 5.3b.

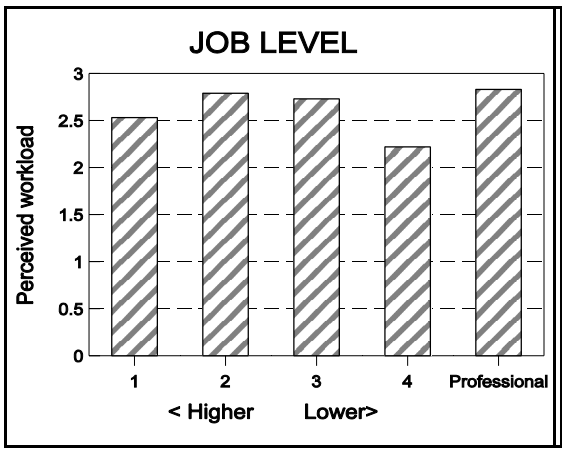

Figure 5.3a
Job level as a predictor of workload

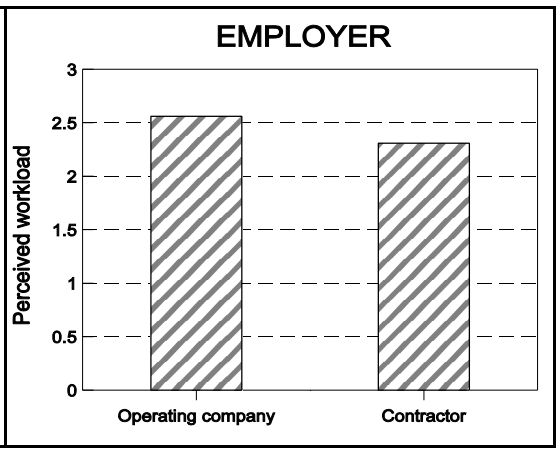

Figure 5.3b
Employer as a predictor of workload

5.2.3 Reported number of work hours per week

In addition to the scale measuring perceived workload, a separate item in the survey questionnaire asked day workers to indicate how many hours overtime they normally worked per week. Assessment of overtime hours was not attempted for personnel working day/night rotating shifts as shift schedules varied considerably both within and between sites; in addition, at some sites shift-workers worked overtime to cover for those on annual or sick leave, whereas at other sites these duties were incorporated in the shift pattern.

A significant proportion (almost 40%) of the day-work group reported that they worked overtime hours in addition to their normal week (see Table 5.4). This information was not included as a predictor variable in the analysis of perceived workload as long work hours may be more appropriately regarded as an outcome of high perceived workload, rather than as an antecedent factor. Irrespective of the direction of the effect, the correlation between perceived workload and reported work hours was positive and highly significant (tau =.266, $p<.001$, n=486), consistent with the view that higher perceived workload is associated with longer work hours.

Which groups report overtime hours? Logistic regression analysis was used to examine the extent to which sites, job types, and job level jointly predicted whether or not overtime hours were reported. In this analysis, the security job type was excluded as, with one exception, this group was entirely made up of shift-workers.

Both site and job level were found to be highly significant predictors ($p<.001$ in each case) of whether or not overtime hours were reported, but job type did not contribute over and above these factors. Further analysis showed that employer (operating company vs. contractor/agency employee) was not a significant factor. Age was also non-significant in this analysis, and neuroticism, although significant, did not play a major role.

Sites. Overtime hours were significantly less likely to be reported by personnel working at sites B2 and B3, and C2 and C3 than by personnel at site A1 (arbitrarily chosen as the 'reference site' in this analysis). The other sites did not differ from site A1 in the proportion of personnel reporting overtime hours. A further analysis using 'company groups' rather than 'sites' as the predictor variable showed that, overall, personnel in Company Group C and in Company B were less likely to report overtime than those in the Company A, although for Company B the difference from Company A was only marginally significant.

Table 5.4
Reported overtime hours per week for day workers

	Percentages of day workers reporting overtime (classified by overtime hours per week)					
	None	**< 5**	**5 - 9**	**10-14**	**15-19**	**20+**
	%	%	%	%	%	%
Site						
A1	40.0	35.0	15.0	10.0	0	0
A2	53.6	10.7	21.4	10.7	0	3.6
B1	39.6	18.8	27.1	6.3	6.3	2.1
B2	62.5	1.4	19.4	5.6	5.6	5.6
B3	73.2	2.4	17.1	7.3	0	0
C1	40.0	12.0	24.0	13.3	6.7	4.0
C2	61.5	9.4	16.7	6.3	3.1	3.1
C3	79.8	7.9	6.1	3.5	0.9	1.8
Job type						
Maintenance	68.7	11.2	13.1	3.3	1.9	1.9
Technical	63.5	8.1	16.2	6.8	2.7	2.7
Production	65.4	3.8	11.5	11.5	3.8	3.8
Management	44.1	9.3	23.7	11.9	6.8	4.2
Admin/other	64.3	10.7	14.3	7.1	3.6	0
Construction	47.1	8.8	26.5	11.8	0	5.9
Job level						
Senior manager	26.3	5.3	31.6	10.5	15.8	10.
Supervisor	43.3	11.7	28.3	11.7	1.7	5
Lead technician	54.6	10.1	18.5	11.8	1.7	3.3
Technician	71.1	8.3	12.8	3.3	2.5	3.4
[Professional]	53.7	14.8	14.8	7.4	7.4	2.1
						1.9
TOTAL **N = 495**	***60.2***	***9.6***	***16.9***	***7.1***	***3.3***	***2.9***

Notes. *Data were missing for 36 (6.8%) of the 531 day workers.*

The percentages shown in each category are the observed values; they are not adjusted for inter-relationships between the factors.

Job level. Senior management personnel, the highest job level in the present study, were more likely to report overtime hours than all other personnel; this difference was significant in comparison with all job levels except the second highest level 'supervisors', who did not differ significantly from senior managers in this respect.

How many overtime hours? The analysis of work hours was extended to examine the overtime hours worked by different groups of day workers. Table 5.4 shows the proportions of personnel reporting a standard week, or one of five levels of overtime (up to 4.9 hours, 5.0 to 9.9 hours, 10.0 to 14.9 hours, 15.0 to 19.9 hours, and 20 hours or above), the data being shown separately for sites, job types, and job levels.

Chi-square tests showed that the proportions in each overtime category were significantly different across each of these factors ($p<.001$ for sites and job levels, and $p<.05$ for job types). As shown in Table 5.4, the substantial proportion (~25%) of senior managers who reported more than 15 hours overtime per week is particularly marked. Also notable is the fact that almost 13% of the entire sample reported working more than 10 overtime hours per week. However, there were also overall differences between sites; in particular, no one at sites A1 and B3 reported 15 hours or more overtime per week, whereas 10-12% of those at sites B2 and C1 did so.

5.3 AUTONOMY

Analysis of the other three job characteristics measures (autonomy, task variety and skill, and clarity) followed a pattern similar to that used in the analysis of workload. The measure of autonomy assessed the extent to which the job allowed an individual to work independently, and to carry out tasks in his/her own way; higher scores represented greater autonomy, and thus a more favourable situation. The results of the initial analysis are summarised in Table 5.5. As previously, the main predictor factors examined were sites and job types, and individual differences in age and neuroticism were treated as covariates.

Table 5.5
Analysis of autonomy in relation to sites and job types

	Main effects		*Covariates*	
Measure	Sites	Job type	Age	Neuroticism
Autonomy	F = 3.51 df = 7,879 p < .001	F = 3.97 df = 6,879 p < .001	F = 6.37 df = 1,879 p < .02 [+]	F = 7.80 df = 1,879 p <.005 [−]
Overall model: $F(15,879) = 4.31$, $p<.001$; $R=.262$, $R^2 = .068$				
The direction of the covariate effects are shown by the signs in the brackets				

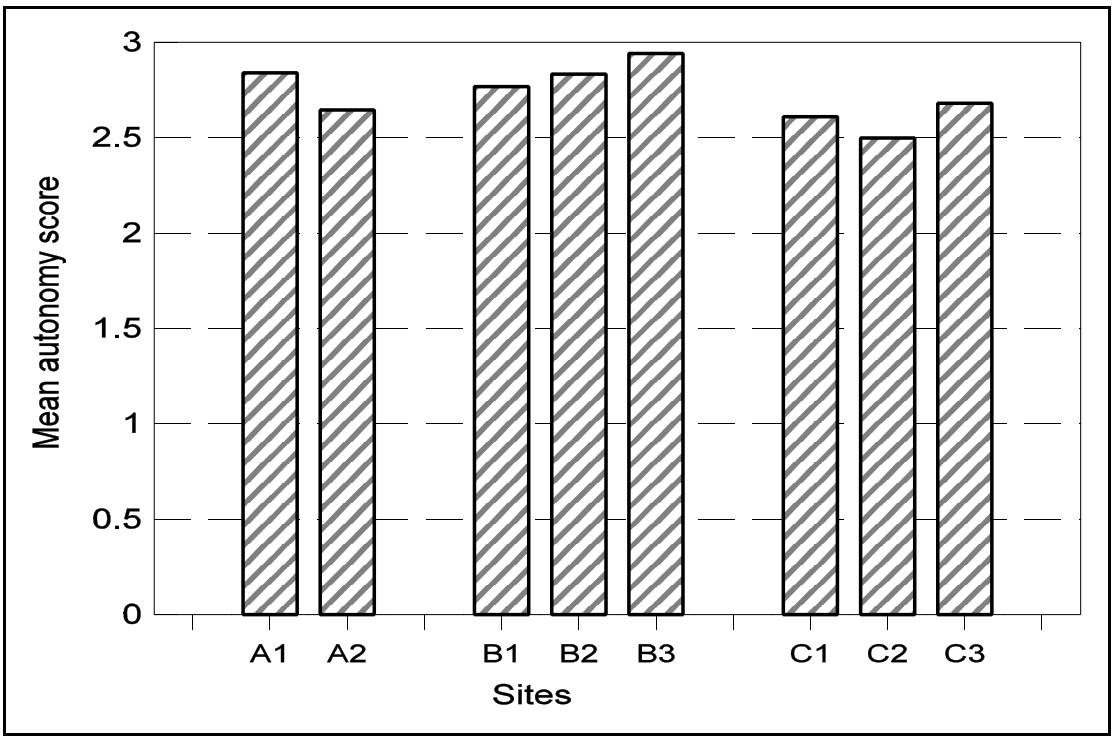

Figure 5.4
Perceived autonomy scores across sites

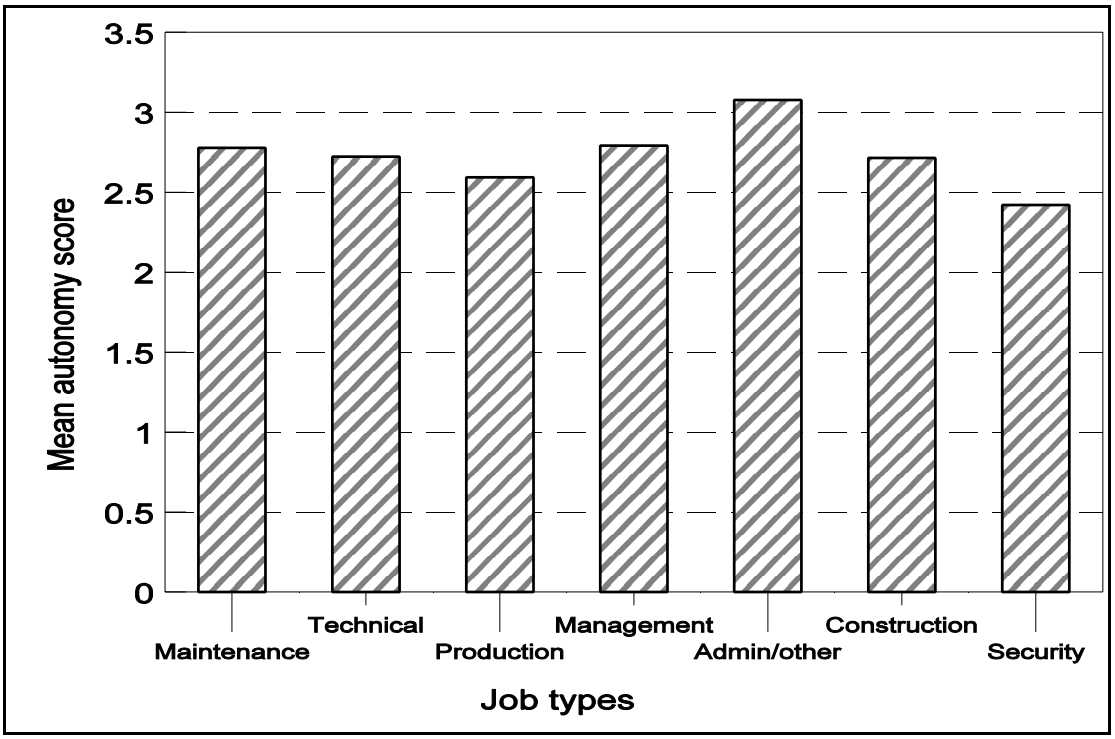

Figure 5.5
Perceived autonomy scores in relation to job types

5.3.1 Sites

Figure 5.4 shows the mean autonomy scores for each site, corrected for job type, age and neuroticism. There were significant differences between the eight sites on this measure, but the overall means for Companies A and B did not differ significantly. Furthermore, the two separate sites operated by Company A did not differ significantly from each other, nor did the three sites operated by Company B. However, differences within Group C (the three single company sites) were significant. The mean score for Site C3 was significantly higher (more favourable) than that for Site C2 (t=2.80, df=420, p=.005), Site C1 occupying an intermediate position.

5.3.2 Job types

Perceived autonomy levels were significantly different across different types of jobs (see Table 5.5). The mean scores, corrected for the other factors in the analysis, are shown in Figure 5.5. Security personnel reported relatively low scores on this measure, while the administration group showed the highest scores.

5.3.3 Covariate effects

Both age and neuroticism were significant covariates in the analysis of autonomy. Age was positively related, and neuroticism negatively related, to greater perceived autonomy. These effects were independent of the overall effects of site and job type differences.

5.4 TASK SKILL / VARIETY

The results of the analysis of scores on the job characteristics measure of skill/variety are shown in Table 5.6. Site, job type, age and neuroticism were each significant predictors of this mean item scores on this measure. The data for sites and job types are shown in Figures 5.6 - 5.7.

Table 5.6
Analysis of scores on task skill / variety scale in relation to sites and job types

	Main effects		*Covariates*	
Measure	Sites	Job type	Age	Neuroticism
Variety/ skill	F=6.20 df=7,871 p<.001	F=30.82 df=6,871 p<.001	F=6.10 df=1,871 p=.014 [+]	F=30.92 df=1,871 p<.001 [−]
Overall model: F(15,871) = 17.59, p<.001; R=.482, R^2=.232				
The direction of the covariate effects are shown by the signs in the brackets				

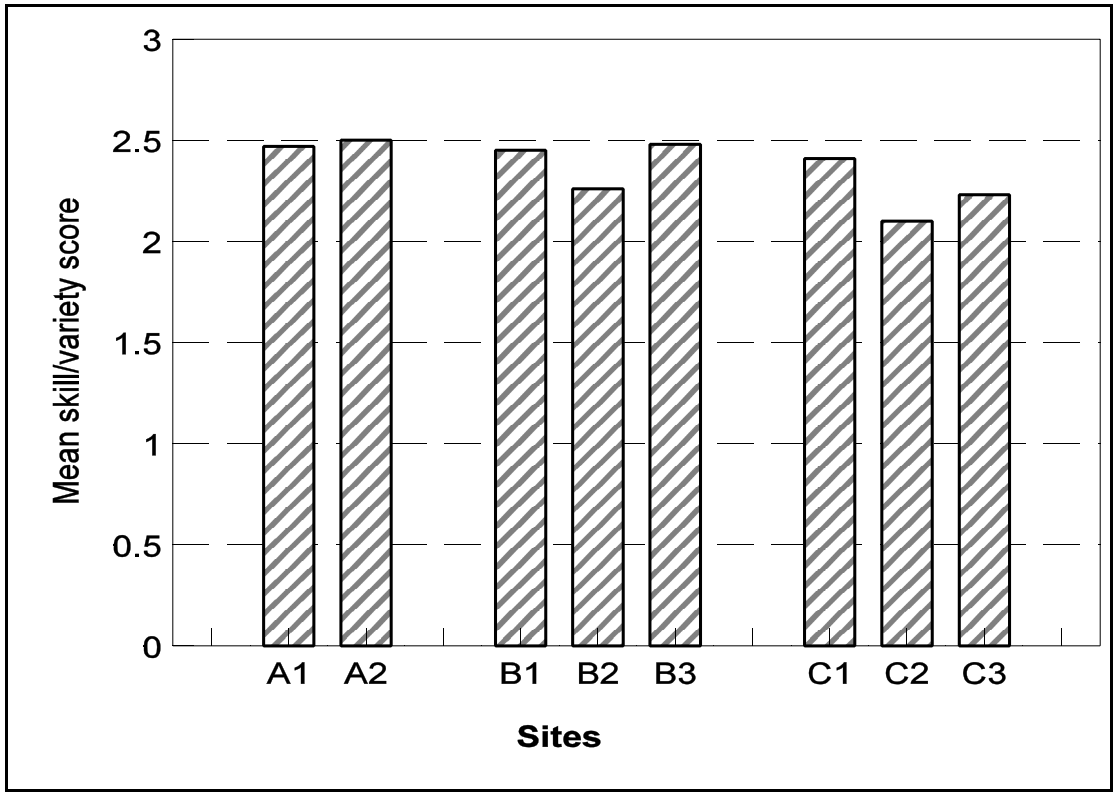

Figure 5.6
Mean skill/variety scores in relation to sites

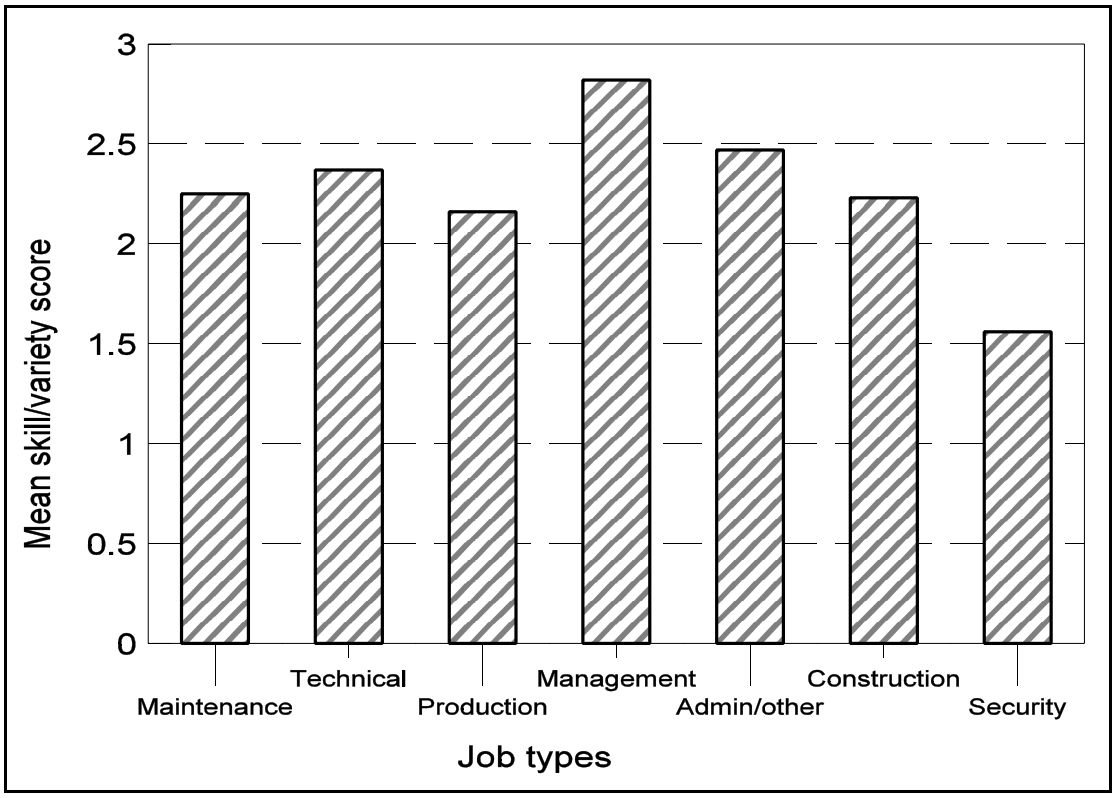

Figure 5.7
Mean skill/variety scores in relation to job type

5.4.1 Sites and job types

Overall mean item scores for skill/variety for each of the eight sites are shown in Figure 5.6. There was no significant difference between the combined means of Company Group A and Company Group B, or within Company A (between sites A1 and A2); however there was a significant difference between Company B sites (with Site B2 being the lowest in the group on this measure). There was also a significant difference between Group C sites; Site C2 reported the lowest score overall.

Mean item scores on the task skill/variety scale are shown in Figure 5.7 for each job type (adjusted for site, age and neuroticism). Multiple comparison tests indicated that management personnel had significantly higher scores than all other groups, except administrators, on this measure, while security personnel reported significantly lower scores than all other groups.

5.4.2 Covariate effects

Higher age and lower neuroticism were both significantly related to higher scores on the skill/variety measure. Thus, irrespective of job type or site, older and less neurotic personnel reported more variety and skill in their work than those who were younger or more neurotic.

5.5 JOB CLARITY

Scores on the job clarity scale (which refers to the extent to which tasks are clearly structured and defined) were analysed in relation to site, job types, and the two covariates. As shown in Table 5.7, there were no overall significant differences between job types in clarity, but there was a significant difference in mean scores across sites. Neuroticism was negatively related to reported job clarity, but age was non-significant.

Table 5.7
Analysis of job clarity in relation to sites and job types

	Main effects		*Covariates*	
Measure	Sites	Job type	Age	Neuroticism
Clarity	F=5.83 df=7,878 p<.001	ns	ns	F=21.50 df=1,878 p<.001
Overall model: F(15,878) =5.35, p<.001; R = .289, R^2 = .084				
Neuroticism was negatively related to job clarity				

5.5.1 Sites

There was no significant difference in overall job clarity between the two sites in Company A. Within Company B, Site B2 personnel reported significantly higher clarity than the other two sites operated by this company, and Site C3 was significantly higher than the two other single sites in Group C. There was no significant difference between the combined means of Company A and Company B. However, these overall differences should be seen in the light of the interaction effects reported in Section 5.5.3 below.

5.5.2 Covariate effects

Neuroticism was significantly related to job clarity scores, higher neuroticism being associated with lower ratings of clarity, but age was not a significant factor in this analysis.

5.5.3 Interaction between sites and job types

In the analysis of job clarity (unlike the other job characteristics measures), there was a significant interaction between sites and job types in predicting mean scores. This finding implies that the magnitude and/or direction of differences between sites depends on which type of job is being considered; conversely, the magnitude and/or direction of differences between job types depends on the particular site involved. This interaction was also significant ($p<.001$)when company groups were analysed rather than individual sites; the pattern of results is illustrated in Figure 5.8.

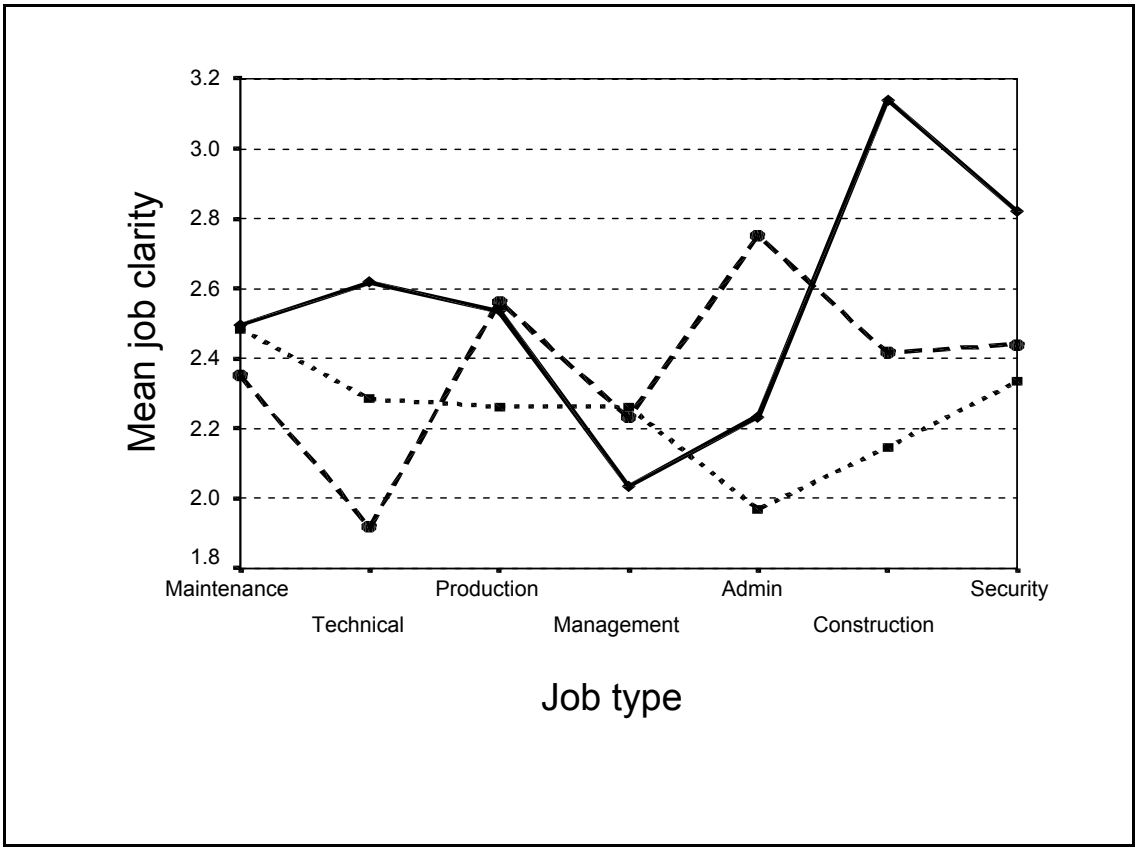

Figure 5.8
Profiles of mean job clarity scores across job types for each company group

5.6 JOB CHARACTERISTICS: OVERALL PROFILES

To summarise the main information presented in this section, overall profiles were plotted to facilitate direct comparison of job characteristics across sites (Figure 5.9), and across job types (Figure 5.10). In these diagrams, as in the earlier analyses, the data plotted are the adjusted mean scores taking into account other factors in the model.

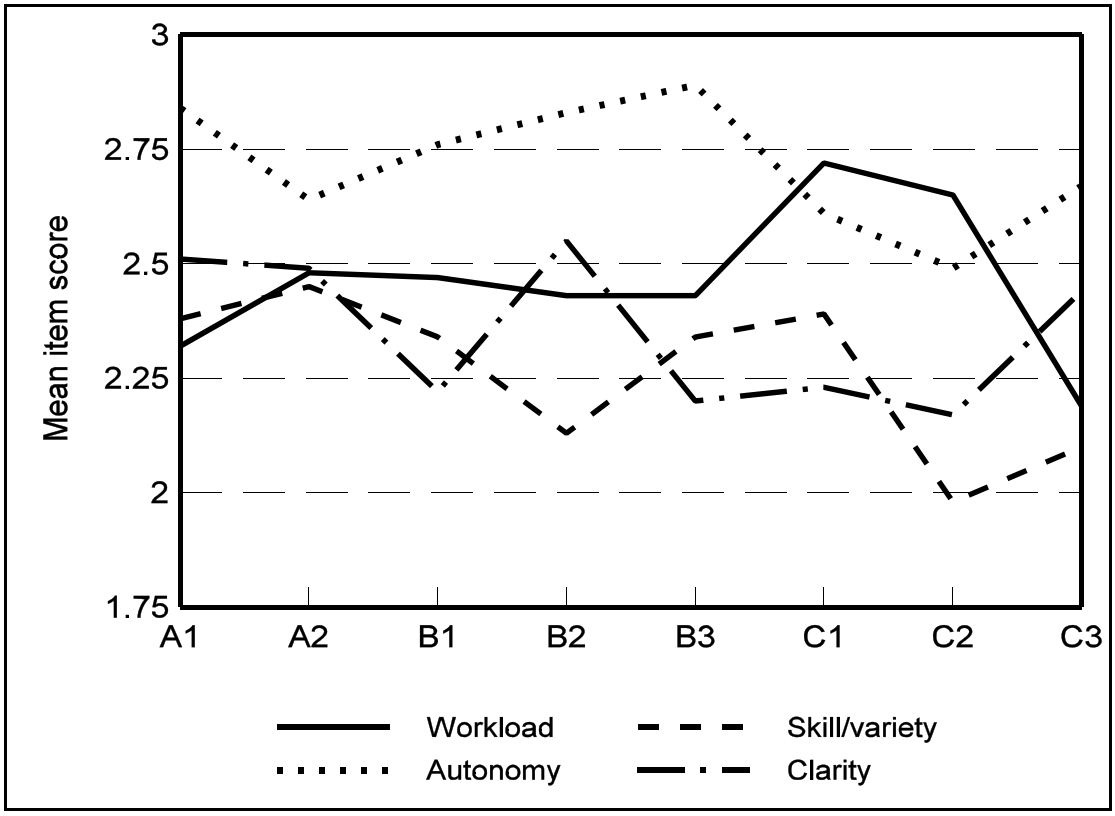

Figure 5.9
Job characteristics profiles across sites

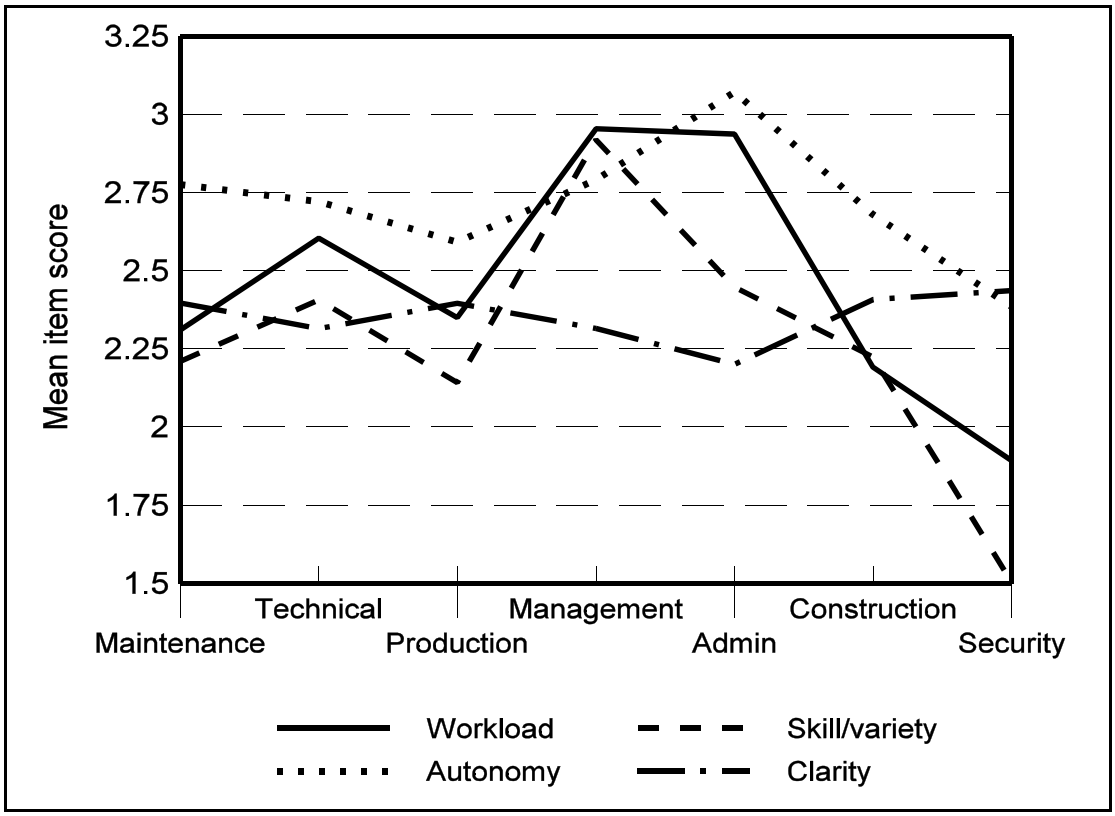

Figure 5.10
Job characteristics profiles across job types

In Figures 5.9 and 5.10, it is clear that the four job characteristics (workload, skill/variety, autonomy, and clarity) do not vary consistently in overall levels; rather, the patterns represent significant interactions between job characteristics and groups, whether sites or job types. For example, Site C2 reported high workload and low autonomy scores relative to most other sites, while Sites A1 and C3 show low workload and high clarity.

The pattern across job types also highlights important differences in the job characteristics profiles. For instance, security personnel report levels of workload and job skill/variety sharply lower than those of other job groups, but also relatively high level of clarity. In contrast, management personnel have high levels of workload and skill/variety, but lower job clarity. Administration personnel have high workload and autonomy, and low clarity.

SUMMARY

5.7 JOB CHARACTERISTICS

- Four job characteristics were measured: perceived workload, autonomy, skill/variety, and clarity. Site and job type were significant, independent predictors of each of these measures, with one exception; overall, job clarity was predicted by job type but scores on this measure depended jointly on site and job type.
- Age and/or neuroticism were significant predictors of most of the job characteristics measures.
- The pattern of job characteristics scores across sites and across job types was different for each measure.
- Workload was also predicted by job level, employer (operating company vs. contractor), duration of employment at the site, and two additional work responsibilities (first aider and emergency response team).
- Overall, 39.8% of the sample of 494 day workers reported working overtime hours above their contracted hours per week. Senior management personnel were the most likely to report working overtime hours; in particular, almost 25% of these personnel reported 15 hours or more overtime per week.