Lifestyle behaviours and perceived wellbeing in different fire service roles

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Abstract

Background: Aspects of the work environment influence employee wellbeing. However, it is unclear how employee lifestyle behaviours, health characteristics and wellbeing may differ within a broader occupational sector.

Aims: To investigate the health characteristics, lifestyle behaviours and wellbeing of three Fire and Rescue Service (FRS) occupational groups that differ in shift work and occupational demands: operational firefighters (FF), emergency control (EC), and administrative support (AS) workers.

Methods: Data were obtained via an online survey using previously validated questionnaires to assess health characteristics, lifestyle behaviours, and perceived wellbeing. Differences between groups were explored, controlling for confounding variables, using Analysis of Covariance (ANCOVA) methods. Effects sizes are reported where appropriate to demonstrate clinical significance.

Results: Four thousand five hundred and sixty-four FRS personnel volunteered, with 3333 (73%) completing the survey out of a total workforce of 60,000 (8%). FF reported the lowest prevalence of chronic medical conditions (10%), compared to AS (21%) and EC (19%) workers. Total physical activity (PA) was 66% higher among FF compared to EC and AS workers. Components of sleep and self-rated health were independent predictors of wellbeing irrespective of FRS role.

Conclusions: FF reported the highest levels of physical activity and highest perceptions of wellbeing, and the lowest prevalence of obesity and chronic medical conditions, compared to other FRS occupational groups. These findings may be used to inform FRS workplace intervention strategies.

Key words: occupation; shift-work; wellbeing; health; lifestyle; physical activity; sleep

Introduction

Compared to non-shift workers, shift workers are reported to be at an increased risk of chronic disease (1). Approximately one-third of the UK working population are shift workers, defined as working shift patterns outside the hours of 7am to 7pm. Compared to non-shift workers, they are, on average, more likely to smoke, consume less fruit and vegetables, and have a higher body mass index (BMI) (1). Whether an increased risk of chronic disease among shift workers is due to shift working patterns, or to the prevalence of unhealthy lifestyle behaviours, remains unclear.

While shift work does not appear to pose acute health risks, prolonged periods of shift working have adverse effects on perceived wellbeing (2) and sleep quality (3). Furthermore, short sleep duration has been shown to increase sympathetic nervous system activity and blood pressure (4), and is perhaps exacerbated in the presence of sleep disruption (3). Sleep disruption in shift workers may, in part, be explained by circadian rhythm misalignment resulting from alterations in day-night signalling processes, which can lead to a decrease in resting metabolic rate and altered blood glucose concentrations (5). A decrease in energy expenditure and fatigue-induced reductions in physical activity (PA) may contribute to the prevalence of being overweight and obese in shift workers.

Alterations to lifestyle behaviours such as PA and dietary intake among shift-workers may have further consequences for psychological wellbeing (2) and perhaps reduce the reported benefits of positive wellbeing (6). In physically demanding occupations such as firefighting, transient increases in cardiac risk occur during emergency response activity and are often coupled with undiagnosed cardiovascular disease (CVD) and unfavourable lifestyle behaviours (7). However, among firefighting populations, the use of physical entry standards and health screening may help maintain a healthy worker effect (8), causing population bias that buffers against the negative effects of shift working and encourages applications from individuals with physical and psychological characteristics more suited to the challenges of emergency response.

Occupations within the UK Fire Rescue Service (FRS) encompass contrasting job roles that present an opportunity to investigate the potential health effects of differing occupational stressors. Occupational roles within the UK FRS can broadly be categorised as operational firefighting (FF), emergency control (EC), and administrative support (AS). The FF role includes emergency response activity as defined by responding to, and attending, emergency incidents. This work also requires the maintenance of physical fitness commensurate to a cardiorespiratory standard of ≥ 42 ml kg^{-1} min^{-1} (9). EC roles include emergency call handling and are predominantly office-based; while AS roles are administrative and office-based. Both the FF and EC roles involve shift working, whereas the AS role involves typical work in daytime hours. To date, the health characteristics, lifestyle behaviours, and wellbeing of employees performing these distinct occupational roles within the UK FRS have not been formally examined within extant empirical literature.

The aim of this study was to quantify the health characteristics, health-related lifestyle behaviours, and associated measures of perceived health and wellbeing among UK FRS employees across these three occupational groups. We hypothesised that FF would report more frequent healthy lifestyle behaviours and greater feelings of health and wellbeing compared with other FRS job roles that are office based (AS roles) or office based with night shift working (EC roles). We further hypothesised that reported differences in perceived wellbeing would differ according to lifestyle characteristics within each FRS role.

Methods

Target participants for this study were all UK FRS employees. Participants were recruited as volunteers through internal FRS communications. All participants gave informed consent after reading a written description of the study. This study received ethical approval from the University of Bath Research Ethics Approval Committee for Health (REACH, University of Bath).

A health and lifestyle survey was compiled and hosted on an online survey platform. This survey was made accessible via the UK FRS internal intranet system for a period of six months (January through July 2013). All FRS employees were invited to complete the survey in an attempt to capture data from a representative cross-section of UK FRS employees and occupational groups. Paper copies were also made available where online access was not possible.

The survey was composed of a number of reliable and previously validated questionnaires that were designed to collect self-reported information on lifestyle behaviours associated with increased CVD risk (i.e. physical activity, nutrition, smoking status, alcohol consumption), and health characteristics [i.e. waist circumference (WC), body mass index (BMI), waist to height ratio (WtHr)]. Other descriptive information (including age, sex, height, body mass, length of employment, medical history) and perceptions of health and wellbeing (depression, anxiety, stress, mood, self-rated health, sleep behaviour) were also collected. The questionnaires (detailed below) were specifically selected based on their well-established use in occupational settings (10) where they have demonstrated good reliability and validity. Where shortened versions of questionnaire protocols were available, they were used to manage the overall length of the survey and participant burden without markedly affecting validity and reliability.

Physical activity habits were assessed using the International Physical Activity Questionnaire (IPAQ)(11). Dietary intake was assessed using the Rapid Eating Assessment for Patients (REAP) (12). Smoking behaviour was assessed using the Cigarette Dependence Scale (CDS) (13). Alcohol intake was assessed using the widely used Alcohol Use Identification Test (AUDIT-C) (14). Sleep quality was assessed using the Pittsburgh Sleep Quality Index (PSQI) (15) and sleepiness using the Epworth Sleepiness Scale (ESS) (16).

Psychological wellbeing was assessed using the Depression, Anxiety, Stress Scale (DASS)(17), the Positive and Negative Affect Scale (PANAS)(18), and the Satisfaction with Life Scale (SWLS)(19).

All statistical analyses were completed using SPSS Version 20 (IBM, New York, USA). Descriptive statistics (mean, standard deviation) were calculated for each occupational role and sex. Standardised z-scores larger than 3.29 ($p < 0.001$) were used to identify participants as univariate outliers who were then excluded from further analyses. Log transformation was performed prior to statistical analysis for all data displaying excessive skewness ($\leq$-1 or $\geq$1) or kurtosis ($\leq$-1 or $\geq$1). All data were back-transformed prior to presentation. Group differences were tested with analysis of covariance (ANCOVA), adjusting for previously identified confounding variables (7). Post hoc Bonferroni methods were used to identify significant differences between subgroups following significant overall F-test results. The Welch statistic was used to test for equality of means. Chi-square analysis was conducted to test for significant differences between nominal values and Cramer's V reported for clinical meaningfulness, where a value of 0.1 is considered small, 0.3 moderate, and 0.5 or above, large (20). DASS scores were summed to form a composite score and, with SWLS scores, used as separate dependent outcome measures of psychological distress and positive psychological wellbeing in multiple linear regression models against lifestyle predictor variables. Multiple linear regression analyses were conducted using the stepwise method, such that only statistically significant correlations were included and combination of variables, which explained the highest variance. Effect sizes were calculated to provide an assessment of the clinical meaningfulness of any group differences between continuous variables. In this regard, an effect size of 0.2 is considered small, 0.5 moderate, and 0.8 or above large (20). Statistical significance was set *a priori* at $p < 0.05$ and data are presented as mean (±SD) unless stated otherwise.

Results

A sample of UK FRS personnel (4564) responded to this survey, of which 3333 survey forms (73%) were completed, from a workforce of 61,720 (7% uptake). Responses by FRS role using the workforce base were FF; 2236 (4% uptake), EC; 184 (11%) and AS; 913 (10%). Descriptive data, broken down by sex, are presented in Table 1. The proportion of respondents from each FRS role, who were engaged in shift working involving ≥1 night shift per week was: 89% (FF); 86% (EC) and; 26% (AS).

After adjustment for age, sex, BMI, total weekly physical activity and alcohol consumption, hypertension ($X^2(2) = 27.67$, Cramer's V = 0.10; P<0.05), and diabetes ($X^2(2) = 14.30$, Cramer's V = 0.10; P<0.05) were lowest among FF. Although the prevalence of diabetes and hypertension increased progressively across BMI classifications, compared to AS and EC, a less steep gradient was seen in FF.

Furthermore, FF had the lowest prevalence of obesity ($X^2(2) = 6.67$, Cramer's V = 0.05; $P<0.05$).

After adjustment for age, total weekly physical activity, smoking, alcohol, daily sitting time and sleep components, female FF had a significantly lower WtHr ($F=3.32$; $P<0.05$) compared to women in EC and AS, as was hypertension prevalence ($F=6.15$; $P<0.01$) in women FF.

[INSERT TABLE 1 HERE]

Lifestyle behaviours according to FRS occupational group are presented in Table 2. After adjusting for age, sex, BMI, smoking and alcohol, FF reported a higher total PA ($p < 0.05$; g = 0.54 & 0.51 for EC and AS respectively) and less time spent sitting ($p < 0.05$; g = 1.16 & 0.77 for EC and AS respectively). More specifically, compared to EC, FF participated in almost twice the amount of vigorous PA ($p < 0.05$; g = 0.47) and rated their health more highly ($p < 0.05$; g = 0.33). However, FF had the highest alcohol use score of all groups ($p < 0.05$; g = 0.36 & 0.33 for EC and AS respectively) and the most prevalent at-risk drinking behaviour (with scores ≥ 5 in 52%, 37%, and 39% for FF, EC, and AS respectively), $X^2(2) = 57.82$, Cramer's V = 0.13 ($p < 0.05$). Habitual smoking was more than twice as prevalent among EC (15%) compared to FF (7%) and AS (7%), respectively, $X^2(2) = 18.78$, Cramer's V = 0.10, ($p < 0.01$). FF reported higher total dietary fat intake than AS employees, and higher saturated fat intake than both EC and AS ($p < 0.05$). Despite the different shift requirements, total sleep duration did not differ significantly between groups. However compared to EC and AS, FF reported greater sleep quality ($p < 0.05$; g = 0.21 & 0.14 for EC and AS respectively), yet higher daytime sleepiness.

[INSERT TABLE 2 HERE]

Psychosocial constructs and wellbeing according to FRS role are presented in Table 3. Internal reliability of the DASS-21 scales was calculated and found to have a very high level of reliability (Cronbach's α = .92, .82, .90; for the depression, anxiety, and stress scales). Similarly, the internal reliability of the SWLS and PANAS were very high (Cronbach's α = .88, .88; positive, negative affect and .91; SWLS). After adjusting for age, sex, BMI, total weekly physical activity, alcohol and smoking, psychological distress scores were not statistically significant between the three groups. Compared with EC, reported life satisfaction was significantly higher in FF, however the effect size was small ($p < 0.05$; $g = 0.21$).

[INSERT TABLE 3 HERE]

Various components of sleep and self-rated health correlated with reported markers of psychological wellbeing (satisfaction with life; positive mood) and psychological distress (depression, anxiety, stress; negative mood). Higher levels of disturbed sleep, characterised by poor sleep quality and shorter sleep duration, were associated with higher levels of reported depression, anxiety, stress and negative mood. Conversely, these sleep disturbance characteristics were associated with lower satisfaction with life and positive mood score. Independent correlations were irrespective of FRS role (Supplementary Table 1). Multiple linear regression analyses identified sleep duration, disturbance and quality, sleepiness, and self-rated health as independent predictors of psychological distress (DASS composite score) and psychological wellbeing (SWLS score). These multivariate models are fully described in Table 4.

[INSERT TABLE 4 HERE]

Discussion

The findings of this study demonstrate components of sleep and self-rated health to be independent predictors of perceived psychological wellbeing among a representative population of UK FRS employees engaged in differing job roles. FF reported the highest levels of physical activity and perceptions of wellbeing, but also the lowest prevalence of obesity and chronic medical conditions, compared to other FRS occupational groups. These findings may be used to inform FRS workplace intervention strategies.

To our knowledge, the sample represents the largest of its type to describe lifestyle behaviours and health characteristics, including psychological wellbeing and sleep characteristics, of UK FRS employees, and is the first to compare operational and non-operational FRS roles. The relative representation of each occupational role within the present study sample [67% FF: 6% EC: 27% AS] was comparable to that found in the general UK FRS population [82% FF: 3% EC: 15% AS]. The sample size of female firefighters was large in comparison with previous studies.

Despite these strengths our study had a number of limitations. Participation in the study was voluntary and therefore healthier individuals may be over-represented, contributing to sample bias. The response rate of 8% was low, challenging the representativeness of the sample and its applicability to the wider UK FRS population. Moreover, the use of a single-source survey in our study may have led to common-instrument bias such that reporting of wellbeing in the study may have influenced reporting of related behaviours including self-rated health, alcohol use, smoking, physical activity level. Additionally the sample size of female firefighters and particularly male emergency control workers was small and may have reduced the statistical power. Finally, the reported presence of weekly night shifts among administrative employees may have confounded group differences in health variables. Despite these potential limitations, this study reports findings from one of the largest surveys of health characteristics and modifiable lifestyle behaviours among occupational groups, which are diverse in their physical demands and shift-working regimes. Data have been derived using established and validated instruments, in one of the largest surveys of health characteristics to date, highlighting independent determinants of perceived employee wellbeing.

The lower obesity prevalence among FF in the present study is perhaps an indication of the incompatibility of excess body mass with firefighting duties. However WC was highest among FF ($p < 0.05$; $g = 0.33$ & 0.23 for AS and EC respectively), which is of some concern given the increased risk and prevalence of cardiac fatalities associated with operational firefighting duties (21). The findings of the current study support current concerns of an upward trend in obesity prevalence among UK operational FF, which were reported as 11% in 2008 and 13% in 2011 (22), compared with 15% in the present study.

In the present study, FF reported the highest level of physical activity engagement (5002 (±4546) $MET.min^{-1}.week^{-1}$) and lowest daily sitting time, in the presence of lower prevalence of obesity and hypertension, when compared with other occupational groups. This is in agreement with previous research among a US firefighter population where the use of a wellness program was associated with higher reported physical activity and a lower prevalence of obesity and hypertension (23) Indeed, the mean reported physical activity levels in FF were five-fold higher than the current recommended minimum weekly physical activity level for health maintenance (24). Given the physical demands of firefighting it is encouraging that firefighters are achieving substantially higher physical activity levels, perhaps more appropriate for maintaining the levels of cardiorespiratory fitness (9), muscular strength and endurance (25) necessary to fight fires safely and effectively.

The association between physical activity and psychological wellbeing may be related to favourable stimulatory effects on the hippocampus, an area of the brain sensitive to the effects of ageing and cognitive impairment and important for learning, memory and motivation (26). It may also act by improving sleep quality, through thermoregulatory processes affecting melatonin release (26). Despite differing shift-patterns, total sleep hours were unexpectedly similar between groups in the present study perhaps due to a higher-than-expected prevalence of reported night shift working among the AS group. Interestingly, EC reported the highest level of sleep disturbance and lowest sleep quality of all roles perhaps reflecting differences in night-shift duties compared to other FRS roles. The substantial habitual physical activity among FF and possible beneficial impact on sleep quality may partly explain the greater perceived psychological wellbeing and satisfaction with life compared with other FRS roles. In addition, this suggests habitual physical activity may counteract some of the negative effects of shift work on wellbeing and that important differences in sleep behaviour may be independent of sleep duration. The acute moderating effect of physical fitness on stress reactivity has been demonstrated previously in a firefighter cohort (27). However irrespective of role, components of sleep and self-rated health were independently associated with psychological wellbeing. In previous studies single item global self-rated health measurement has shown consistent association with overall mortality and psychological wellbeing even after adjustment for comorbid illness (28).

In the present study, differences in nutritional behaviour were not judged to be clinically meaningful. However, in agreement with findings among US firefighter populations (29), compared to EC (38%) and AS (39%), a higher proportion of FF (52%) reported ‘at-risk’ alcohol consumption. Alcohol consumption has been observed previously as a coping strategy for the psychological demands of emergency response work (29). Indeed, there are consistent findings and agreement that firefighters may present as an ‘at-risk’ group for alcohol consumption (30).

In summary, participants in this study that were engaged in more physically arduous FRS roles (i.e. operational firefighters), reported higher levels of physical activity, higher life satisfaction and lower prevalence of medical conditions associated with cardiovascular health. Conversely, night-shift workers not involved in physically arduous emergency response activities (i.e. emergency control), reported the lowest weekly physical activity amount, highest daily sitting time, lowest life satisfaction and self-rated health. However, irrespective of FRS role, components of sleep and self-rated health were independent predictors of perceived psychological wellbeing and psychological distress. Although physical activity and sedentary behaviour differences between employees engaged in differing FRS roles may have acted as a buffer against the adverse consequences of shift working, sleep behaviours and self-rated health were independent predictors of perceived wellbeing.

Key points:

- Compared with more sedentary FRS roles, firefighters reported higher levels of physical activity, greater life satisfaction and a lower prevalence of chronic health conditions.
- Sleep characteristics did not differ significantly between FRS occupations, however sleep and self-rated health were independent predictors of wellbeing irrespective of FRS role.

- Within specific occupational groups, the prevalence of chronic disease and hypertension increased with each stratified BMI classification.

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Abbreviations: UK FRS: United Kingdom Fire and Rescue Service; FF: Operational firefighter employee; EC: Emergency control employee; AS: Administrative support employee; WC: Waist circumference; BMI: Body mass index; PA: Physical activity; SRH: Self rated health; SWL: Satisfaction with life; CVD: Cardiovascular disease; IPAQ: International physical activity questionnaire; REAP: Rapid eating assessment for patients; CDS: Cigarette dependence scale; AUDIT-C: Alcohol use identification test; PSQI: Pittsburgh sleep quality index; ESS: Epworth sleepiness scale; DASS: Depression anxiety stress scale.

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Table 1. Descriptive statistics and medical conditions of respondents to the health and lifestyle survey organised by occupational role and sex. Data are means (±SD) unless otherwise stated.

Descriptive / FRS role	Occupational Role					
	Firefighter (FF)		Emergency Control (EC)		Administrative Support (AS)	
	Male	Female	Male	Female	Male	Female
n (%)	2037 (91)	199 (9)	42 (23)	142 (77)	538 (60)	375 (41)
Age (y)	43 (±8)	37 (±7)[bc]	43 (±10)	42 (±9)[ac]	44 (±10)	47 (±10)[ab]
Body mass (kg)	87 (±12)	67 (±10)[bc]	93 (±15)	74 (±15)[ac]	88 (±14)	68 (±13)
Height (m)	1.80 (±0.06)	1.68 (±0.07)[c]	1.79 (±0.06)	1.66 (±0.07)[c]	1.64 (±0.07)	1.78 (±0.07)[ab]
BMI ($kg.m^{-2}$)	27.0 (±3.1)	23.5 (±2.8)[bc]	28.6 (±4.3)	26.3 (±4.4)[a]	25.1 (±4.2)	27.5 (±3.9)[a]
< 25 n(%)	582 (28.6)	148 (74.4)	9 (21.4)	68 (47.9)	301 (±56.0)	107 (28.5)
≥ 25 & ≤ 30 n(%)	1123 (55.1)	44 (22.1)	21 (50)	43 (30.3)	167 (±31.0)	171 (45.6)
≥ 30 n(%)	332 (16.3)	7 (3.5)	12 (28.6)	31 (21.8)	70 (±13.0)	97 (25.9)
WC (m)**	0.87 (±0.07)	0.77 (±0.08)[bc]	0.91 (±0.09)	0.82 (±0.12)[a]	0.79 (±0.10)	0.89 (±0.08)[a]
WtHr ($m.m^{-1}$)**	0.49 (±0.04)	0.46 (±0.05)[bc]	0.52 (±0.06)	0.50 (±0.08)[a]	0.48 (±0.07)	0.50 (±0.05)[a]
Employment (y)	18 (±8)	11 (±7)[bc]	15 (±10)	17 (±10)[a]	9 (±7)	16 (±11)[a]
Heart condition n(%)*	40 (2)	1 (0.5)	3 (7.1)	4 (2.8)	10 (1.9)	15 (4)
Stroke n(%)*	1 (0.0)	1 (0.5)	0	0	3 (0.6)	5 (1.3)
Diabetes n(%)*	19 (0.9)	1 (0.5)	3 (7.1)	2 (1.4)	12 (2.2)	11 (2.9)
Hypertension n(%)*	155 (7.6)	7 (3.5)	8 (19)	13 (9.2)	51 (9.5)	68 (18.1)
Dyslipidemia n(%)*	5 (0.2)	1 (0.5)	0	0	1 (0.1)	0
Asthma n(%)*	5 (0.2)	0	0	3 (2.1)	9 (1.7)	7 (1.9)

Significantly different from (females) [a]operational, [b]control, [c]support, $p<0.05$. *As a result of small numbers for these variables, differences are reported within the results section according to FRS role. **WC indicates waist circumference; WtHr indicates waist to height ratio.

Table 2. Physical activity, lifestyle behaviours and diet according to occupational role.
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Descriptive	FF	EC	AS	Group differences
	Occupation Role			
n*	2236	184	913	
Physical activity (MET.mins.week^{-1})				
Total physical activity*	4882 (±3542)[bc]	2992 (±2542)[a]	3185 (±2749)[a]	F=38.04; P<0.01
Vigorous physical activity*	2558 (±2639)[bc]	1334 (±1751)[a]	1456 (±1864)[a]	F=26.85; P<0.01
Moderate physical activity*	1368 (±2016)[bc]	590 (±854)[a]	821 (±1366)[a]	F=19.89; P<0.01
Walking*	1102 (±1244)[c]	943 (±962)	813 (±1016)[a]	F=14.67; P<0.01
Sitting (Mins.day^{-1})	302 (±163)[bc]	494 (±197)[ac]	429 (±166)[ab]	F=94.00; P<0.01
Lifestyle behaviours				
Self-rated health (1-4)**	1.9 (±0.6)[bc]	2.1 (±0.6)[a]	2.0 (±0.6)[a]	F=6.0; P<0.05
Sleep (hrs.night^{-1})	6.74 (±1.1)	6.80 (±1.4)	6.70 (±1.1)	NS
Sleep disturbance (0-3)***	1.12 (±0.5)	1.28 (±0.5)	1.22 (±0.5)	NS
Sleep quality (0-3)***	1.11(±0.7)[bc]	1.26 (±0.8)[ac]	1.01 (±0.7)[ab]	F=11.78; P<0.01
Sleepiness (0-24)***	5.77 (±4.2)[c]	5.44 (±3.8)	5.19 (±4.1)[a]	F=4.3; P<0.05
Smoking n(%)	152 (6.8)[b]	28 (15.3)[ac]	60 (6.6)[a]	F=7.87; P<0.01
Diet				
Alcohol (score)	4.81 (±2.4)[bc]	3.96 (±2.2)[ac]	4.01 (±2.4)[a]	F=6.17; P<0.01
Total fat (score)	37 (±6)	39 (±6)	39 (±6)	NS
Saturated fat (score)	25 (±4)	27 (±4)	27 (±4)	NS
Vegetable (≥3 servings.day^{-1}.week^{-1})	1.64 (±0.7)	1.63 (±0.7)	1.56 (±0.6)	NS
Fruit (≥2 servings.day^{-1}.week^{-1})	1.72 (±0.7)	1.69 (±0.7)	1.63 (±0.7)	NS
Grains (≥3 servings.day^{-1}.week^{-1})	1.81 (±0.7)[bc]	1.95 (±0.8)[a]	1.94 (±0.8)[a]	F=4.11; P<0.05
Meat (servings.week^{-1})	1.72 (±0.7)	1.88 (±0.7)	1.85 (±0.7)	NS

Data are means (±SD) unless otherwise stated. Significantly different from [a]operational, [b]control, [c]support, p<0.05. * Total n (3105), FF (2120), EC (169), AS (816) differs for all physical activity due to missing data. **A higher self-rated health score indicates poorer health. ***A higher score indicates greater sleep disturbance, and/or poorer sleep quality, and/or higher daytime sleepiness.

Table 3. Psychosocial construct score according to FRS role. Data are means (±SD).

	Occupation Role			
Psychosocial construct (score)	FF	EC	AS	Group differences
n*	2169	182	881	
Depression (0-21)*	3.17 (±3.9)	3.85 (±4.2)	3.16 (±3.8)	NS
Anxiety (0-21)*	1.55 (±2.0)	1.90 (±2.39)	1.57 (±2.0)	NS
Stress (0-21)*	3.94 (±3.9)[b]	4.79(±3.8)[ac]	4.16 (±3.8)[b]	NS
Positive affect (0-25)	16.6 (±4.9)[b]	15.2 (±5.2)[ac]	16.4 (±4.7)[b]	NS
Negative affect (0-25)	6.55 (±2.3)[bc]	6.93 (±2.4)[a]	6.80 (±2.4)[a]	NS
Satisfaction with life (0-35)	18.6 (±7.1)[bc]	17.1 (±7.4)[a]	17.7 (±7.2)[a]	F=6.34; P<0.01

Significantly different from [a]operational [b]control, [c]support, p<0.05.
*Total n(3232), FF(2169), EC(182), AS(881) differs for depression, anxiety, stress due to missing data.

Table 4. Regression models for psychological distress (depression, anxiety, stress) and psychological wellbeing (satisfaction with life) among UK FRS employees.

Dependent variable; reported psychological distress (DAS composite score)					
Predictor variable	F	R^2	ß	t	Sig
	226.86	.23			
Sleep quality			.27	14.9	***
Sleepiness			.17	10.46	***
Self-rated health			.16	9.83	***
Sleep disturbance			.14	8.11	***
Dependent variable; reported psychological wellbeing (satisfaction with life)					
Predictor variable	F	R^2	ß	t	Sig
	147.96	.18			
Sleep quality			-.21	-10.35	***
Self-rated health			-.19	-11.65	***
Sleep duration			.10	-5.23	***
Sleep disturbance			-.08	-4.60	***
Sleepiness			-.07	-4.58	***