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**Job demands, resources and work-related well-being in UK firefighters**

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## **Abstract**

**Background** There is evidence that firefighters are at risk of work-related stress and mental health problems, but little is known about the organizational hazards they experience. Insight is needed into the work-related factors that are most likely to threaten or protect their work-related well-being.

**Aims** To identify levels of job demands and resources (including demands relating to workload, work patterns and the working environment, relationship conflicts, control, support, role clarity and change management) among firefighters, and to use a job demands-resources framework to examine their impacts on work-related well-being. The role played by recovery strategies in predicting work-related well-being was also considered.

**Methods** Job demands and resources were assessed by the Health and Safety Executive (HSE) Management Standards Indicator Tool. Validated scales measured recovery strategies (detachment, affective rumination and problem-solving pondering) and work-related well-being (anxiety-contentment and depression-enthusiasm). The impact of job demands, resources and recovery strategies was tested by multiple linear regression.

**Results** The sample comprised 909 firefighters across seven Fire and Rescue Services in the UK (85% male). Levels of job demands and resources did not meet HSE benchmarks. The main risk factors for poor work-related well-being were relationship conflicts and affective rumination, but resources such as role clarity and job control and the use of problem-solving pondering and

detachment were beneficial.

**Conclusions** Interventions that aim to reduce relationship conflicts at work and promote problem-solving rather than affective rumination, and detachment from work when off-duty, are likely to improve work-related well-being. Attention to enhancing job resources may also be beneficial.

**Key words** Detachment, firefighters, job demands, job resources, mental health, recovery, rumination, stress, well-being.

## **Introduction**

Research findings indicate that members of the emergency services are at high risk of work-related stress [1,2,3]. Firefighters are thought to be particularly prone to stress: they perform tasks that are physically and emotionally demanding under hazardous conditions, are expected to make immediate, life-critical decisions and regularly observe the extremes of human suffering [4]. Unsurprisingly, there is evidence that firefighters are not only disproportionately affected by mental health problems but also experience more extreme emotional responses to their work such as burnout, post-traumatic stress disorder (PTSD) and suicidal ideation [2,5,6]. Like other emergency service professionals, firefighters are also at high risk of work-life conflict due to long, nonstandard working hours, fatigue and difficulty ‘switching off’ from work concerns [7,8].

Most studies that have examined well-being of firefighters have focused on experiences of trauma and the prevalence of PTSD [6]. Although exposure to life-threatening situations is a major cause of stress-related disorders, there is some evidence that organizational factors, such as high demands, role pressures and lack of support, are more detrimental to their well-being [9,10,11,12, 13,14]. Little is known, however, about the organizational hazards experienced by firefighters and the implications for their well-being. This study explores these issues by assessing levels of job demands and resources in a sample of UK firefighters in comparison to benchmarks (based on data from 136 organizations collated by the Health and Safety Executive (HSE; [https://www.the-stress-site.net/uploads/2/7/0/6/2706840/analysis\\_tool\\_manual.pdf](https://www.the-stress-site.net/uploads/2/7/0/6/2706840/analysis_tool_manual.pdf)) and by examining the impact of these factors on work-related well-being using a job demands-resources (JDR) framework [15]. The JDR model specifies generic job demands as the physical, social or organizational aspects of the job that

require sustained effort and have the potential to deplete energy and impair health. Conversely, job resources help employees meet the demands of their work and protect their well-being [15]. This study conceptualized job demands as demands related to workload, work patterns and the working environment, as well as relationship conflicts. Control, support, role clarity and change management assessed job resources as they have the potential to help firefighters manage the demands of their work more effectively and protect their well-being. Resources can be individual as well as organizational. As highlighted above, firefighters have problems disengaging from work problems while off-duty [7], therefore this study also examines recovery strategies that may aid this process as an individual-level or personal resource.

The Effort-Recovery model [16] specifies that people must have sufficient opportunities to recover from work in order to recoup their mental and physical resources. There is evidence that the ability to disengage from work psychologically can promote recovery and protect well-being [16]. Alternatively, ruminating about work (thinking about work-related issues and events) when off-duty can reduce the ability to detach from work and can impair well-being [17,18]. This study measures three recovery strategies: detachment, affective rumination and problem-solving pondering [17]. Detachment is the ability to ‘switch off’ from thinking about work altogether, whereas the other two dimensions involve perseverative thinking about work. Affective rumination describes repetitive thinking about work issues that evokes negative affect, whereas problem-solving pondering is less emotional in nature as it focuses on potential ways to solve work difficulties. As such, there is some evidence that, unlike affective rumination, problem-solving pondering may not be detrimental to recovery processes [18,19,20].

It is generally agreed that mental health is complex and multi-faceted. Occupational studies have assessed specific affective reactions to work (domain specific well-being such burnout) as well as well-being that is 'context free' [21]. This study measures two aspects of work-related well-being using dimensions of pleasure (depression-enthusiasm) and arousal (anxiety-contentment) [22]. It is anticipated that higher demands will predict more work-related anxiety and depression. It is also predicted that greater resources (both job-related and personal) will predict reduced work-related anxiety and depression (and thus more contentment and enthusiasm). Identifying the demands and resources experienced by firefighters and how they relate to work-related well-being should help inform interventions to improve their well-being.

## **Methods**

After gaining approval from the first author's University Psychology Department's Research Ethics Committee, data were obtained by an online survey. A link to this survey was provided to potential participants by gatekeepers of seven Fire and Rescue Services (FRS) in the UK via email, newsletters and noticeboards. Some demographic information was collected such as gender, age and length of employment in the FRS.

Job demands and resources were measured using the 35-item HSE Management Standards Indicator tool. Originally developed in 2004 [23], this assesses seven organizational factors and has previously been used to assess demands and resources within a JDR framework [24]. As explained earlier, the present study measured employees' perceptions of two aspects of job demands using the subscales that assess demands (workload, work patterns and the working environment) and relationship conflicts. Job resources were measured using the subscales for

control, role clarity, manager and coworker support and change management. Each item was scored on a five-point response scale from 1 (never) to 5 (always). Mean scores were calculated across each of the categories, such that higher scores represent greater satisfaction with each organizational factor (and thus higher scores denote higher job resources such as control, but lower job demands).

Disengagement from work was measured using the 15-item Work-Related Rumination Scale [19] that assesses detachment (e.g. ‘Do you find it easy to unwind after work?’), affective rumination (e.g. ‘Do you become tense when you think of work-related issues during your free time?’) and problem-solving pondering (e.g. ‘I find solutions to work-related problems in my free time’). Participants were asked how much they experienced these thoughts when off duty using a five-point response scale from 1 (never) to 5 (always). Mean scores were calculated for each of the three subscales, with higher scores representing greater use of that strategy.

Finally, work-related well-being was measured using a 12-item scale [22] that assesses work-related anxiety-contentment and depression-enthusiasm. Participants were asked how much of the time their job makes them feel, for example, tense, worried, contented (anxiety-contentment), and depressed, gloomy, enthusiastic (depression-enthusiasm). The items were scored on a six-point response scale from 1 (never) to 6 (all the time). Mean scores were calculated for anxiety-contentment and depression-enthusiasm, with relevant items reverse scored such that higher scores represent reduced anxiety and depression and thus greater contentment and enthusiasm respectively. For reasons of brevity, these will henceforth be referred to as work-related anxiety and depression. All measures were reliable as shown by Cronbach’s alphas in Table 1.

Analysis was conducted using SPSS 24. Multiple linear regression was used to examine the impact of job demands, job resources and recovery strategies on work-related anxiety and depression.

## **Results**

The survey was completed by 909 firefighters. Most respondents were male (85%) with a mean age of 42 (SD = 7.96) and a mean length of service of 17 years (SD = 8.54). Mean scores for all variables are shown in Table 1, alongside HSE post-2004 benchmarks ([https://www.the-stress-site.net/uploads/2/7/0/6/2706840/analysis\\_tool\\_manual.pdf](https://www.the-stress-site.net/uploads/2/7/0/6/2706840/analysis_tool_manual.pdf)). The HSE recommends organizations aim for the 80<sup>th</sup> percentile in relation to the benchmark data. Organizations that do not meet this are categorized as ‘urgent action needed’ (below the 20<sup>th</sup> percentile), ‘clear need for improvement’ (between the 20<sup>th</sup> and 49<sup>th</sup> percentile), and ‘good, but need for improvement’ (between the 50<sup>th</sup> and 79<sup>th</sup> percentile). The mean scores for firefighters on six of the seven work factors were below average compared to the benchmarks and fell in the ‘clear need for improvement’ range. Only demands was just above average compared to the benchmark and in the ‘good, but need for improvement’ range. Thus none of the job demands and resources reported by firefighters met the benchmarks, and satisfaction with role clarity and job control were particularly low.

*TABLE 1 HERE*

Two multiple linear regressions examined the impact of job demands (demands and relationship conflicts), job resources (control, role clarity, manager and coworker support and change

management,) and recovery strategies (affective rumination, detachment and problem-solving pondering) on work-related anxiety and depression (shown in Table 1). A total of 34% of the variance in work-related anxiety was explained by the variables. The two job demands, entered in step 1, explained 21% of the variance but only greater relationship conflicts made a significant contribution to higher anxiety ( $\beta = .12, p < .01$ ). The five job resources, entered in step 2, explained 3% of the variance with only role clarity significantly predicting lower anxiety ( $\beta = .08, p < .05$ ). The three recovery strategies explained a further 10% of the variance with lower affective rumination ( $\beta = -.36, p < .001$ ) and higher problem-solving pondering ( $\beta = .08, p < .05$ ) and detachment ( $\beta = .11, p < .01$ ) being significant predictors of lower anxiety.

A total of 42% of the variance in work-related depression was explained by the job demands and resources. The two job demands, entered in step 1, explained 26% of the variance, with only greater relationship conflicts making a significant contribution to higher depression ( $\beta = .17, p < .001$ ). The job resources, entered in step 2, further explained 7% of the variance with higher control being the only significant predictor of lower depression ( $\beta = .09, p < .01$ ). The recovery strategies explained 9% of the variance; lower affective rumination ( $\beta = -.36, p < .001$ ) and higher problem-solving pondering ( $\beta = .17, p < .001$ ) were the significant predictors of lower depression.

## **Discussion**

This study found that greater relationship conflicts was a particularly strong predictor of work-related anxiety and depression in a sample of UK firefighters. Role clarity was the only job resource that reduced work-related anxiety, and control was the only job resource that reduced

work-related depression. Furthermore, less engagement in affective rumination and greater use of problem-solving pondering appeared to reduce work-related anxiety and depression. Detachment from work concerns also predicted lower levels of work-related anxiety.

Relationship conflicts, but not demands relating to workload, work patterns and the working environment, emerged as a key risk factor for work-related anxiety and depression in firefighters. The mean score for relationship conflicts in this sample, however, was lower than the recommended HSE benchmark. This puts relationship conflicts in the category of ‘clear need for improvement’. Thus, steps need to be taken to reduce any conflict, bullying or harassment and improve the general quality of interpersonal relationships within the FRS. Previous research has also found relationship conflicts to threaten the well-being of firefighters [12]. Conflicts with managers and colleagues, as well as the wider interpersonal culture in the organization, may also stigmatize the disclosure of work-related stress and mental health problems and limit opportunities to seek support [5]. Mental health training within the FRS has been found to help reduce this stigma [25] and may increase the acceptability of support-seeking.

The findings suggest that certain job resources may protect well-being, but the level of resources found in the present study fell below the HSE benchmarks, indicating ‘clear need for improvement’ in all areas. Role clarity, control and change management scores were particularly low. This is of concern, as role clarity was the only job resource that predicted lower work-related anxiety (and thus higher contentment), and control was the only job resource that predicted lower work-related depression (and thus higher enthusiasm). Thus, their ability to protect work-related well-being is limited, providing added impetus to the need for improvement

in these areas. Surprisingly, other job demands, and resources did not emerge as significant predictors of work-related well-being among firefighters in this study. This may question the utility of a JDR framework in examining stress in firefighters, especially as demands and support were not significant predictors. These findings are unusual in that previous studies of this occupational group have found that these factors were strongly related to a range of well-being outcomes [11,12]. It should be noted, however, that demands related to workload, working patterns and the working environment was the only area in which HSE standards were almost met, which may in part explain why these demands did not predict work-related well-being in the present study. Additionally, the architects of the JDR [15] suggest that each occupation may have its own specific risk factors for stress; this may be particularly the case for safety-critical jobs such as firefighting where the work is highly emotionally and physically demanding. Thus, occupation specific demands and resources may be more important than global ones assessed by the HSE. For example, camaraderie has been found to be a more important predictor of the mental health of firefighters than global resources [26]. Future research should examine the importance of more job-specific demands and resources for work-related well-being in this occupational group.

Recovery strategies, which may be considered a personal resource, were key predictors of work-related well-being. A tendency to ruminate about work concerns was the strongest predictor of work-related anxiety and depression overall. Previous research has found that firefighters have difficulties disengaging from work problems while off-duty [7], so helping them develop strategies to avoid affective rumination appears crucial for their work-related well-being. In contrast, problem-solving pondering was beneficial for both aspects of work-related well-being

and detachment predicted lower work-related anxiety. Problem-solving pondering is an unemotional and constructive form of rumination (i.e. cognitive rumination) and this may be a useful strategy to adopt to aid recovery from work [18,20].

This study has several limitations which should be taken into account. The use of a self-selected sample means the findings may not be generalized to all firefighters. Additionally, the use of self-report measures means that response bias may be an issue. For example, the most highly stressed firefighters may have been more motivated to complete the survey. It was not possible to establish a response rate, as we do not know how many firefighters received notification about the survey, or to consider the characteristics of firefighters who did not respond, as participants were anonymous. This may limit the ability to extend the findings more widely. The difficulties in establishing a response rate for online surveys are acknowledged [27]. Future research could involve gatekeepers in stratifying a sample based on demographic and job-related variables, whereby a response rate could be calculated. However, care should be taken as this may lead participants to feel they could be identifiable.

Another limitation is that this was a cross-sectional survey, so relationships between variables do not necessarily indicate causality. For example, those experiencing higher levels of work-related anxiety and depression may be more likely to see their work as more demanding. It is likely, however, that perceptions of organizational hazards influence work-related well-being, which, in turn, increase perceptions of organizational hazards. The direction of causality should be examined using longitudinal or daily diary studies. Finally, it should be noted that this study focused on domain-specific work-related well-being rather than context-free well-being or

mental health [22]. Warr's measure of work-related anxiety and depression is widely used as an outcome measure [28] and is unlikely to be confounded with measures from the HSE Management Standards Indicator tool, as these assess perceptions of the existence of organizational hazards rather than affective reactions to them. Additionally, scores on Warr's measure of work-related anxiety and depression are highly correlated with context-free clinical measures of anxiety and depression [29]. Nevertheless, future research should examine the impact of job demands, resources and recovery strategies using clinical measures of mental health in firefighters.

The findings of this study have several implications for practice. The FRS should aim to reduce job demands and increase job resources since none of the areas assessed in this study met HSE benchmarks. In particular, the strong associations found with work-related well-being suggest that reducing relationship conflicts and increasing role clarity and job control are especially important. This is crucial not only to enhance work-related well-being but also to improve safety, since stress has been found to reduce personal protective equipment compliance, adherence to safety work practices, and safety reporting and communication [30]. This study also highlights the importance of personal resources to aid recovery from work. Both face-to-face and online mindfulness-based and cognitive behavioural interventions can be effective in reducing rumination, especially where they encourage changes in thinking style, or disengagement from the emotional response to rumination [20]. This suggests, as supported by the findings of the present study, that problem-solving pondering may be useful [18,20]. Allowing some dedicated time for problem-solving pondering in order to confront difficulties initially (e.g. what can be learnt from a traumatic incident or how could things be handled differently in future) may

improve the work-related well-being of firefighters. It is also important, however, to help employees find positive ways to subsequently unwind and switch off from work to avoid work-related anxiety and impair recovery. In conclusion, although the causal direction of relationships needs to be confirmed, this study suggests that priorities to help improve the work-related well-being of firefighters include reducing relationship conflicts and increasing resources such as job control, role clarity and the ability to successfully disengage from work.

### **Key learning points**

#### **What is already known about this subject:**

- Firefighters are at high risk of work-related stress and mental health problems, but most studies have examined extreme emotional responses to the work, such as post-traumatic disorder.
- Firefighters are also affected by organizational factors, but little is known about the work demands they experience and the resources that are available to them and how these might influence their work-related well-being.
- Firefighters have difficulty disengaging from work concerns while off duty, but little is known about the recovery strategies that may challenge or protect their well-being.

#### **What this study adds:**

- Satisfaction with demands, relationships, control, role clarity, support from managers and coworkers and change management among firefighters did not meet Health and Safety Executive benchmarks.

- The main risk factors for work-related well-being among firefighters were relationship conflicts and affective rumination.
- Organizational resources, such as role clarity and control, and personal resources such as the use of problem-solving pondering and detachment, appeared to benefit work-related well-being.

**What impact this may have on practice or policy:**

- Attention is needed to reducing job demands and improving job resources in the Fire and Rescue Service, particularly enhancing the quality of interpersonal relationships, role clarity and job control.
- Evidence-informed interventions are needed to help firefighters disengage from work concerns and avoid affective rumination.
- Problem-solving pondering, or cognitive rumination about work issues, may be a useful strategy for firefighters to adopt at the end of a shift, but switching off from work is also essential.

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Table 1: Descriptive statistics and two multiple linear regressions predicting work-related anxiety and depression

	Descriptive statistics			Work anxiety				Work depression			
	Cronbach's alpha	Benchmarks 80 <sup>th</sup> percentile	Mean (SD)	Beta	B	95% CI	R <sup>2</sup>	Beta	B	95% CI	R <sup>2</sup>
Demands	.83	3.29	3.12 (.67)	.06	.08	-.02- .19	.21***	.03	.05	-.06- .15	.26***
Relationships	.77	4.04	3.77 (.78)	.12**	.14	.05- .24		.17***	.22	.12- .31	
Change	.78	3.24	2.85 (.88)	-.04	-.04	-.14- .05	.24***	.06	.07	-.02- .16	.33***
Manager supp.	.87	3.65	3.41 (.90)	.06	.07	-.02- .16		.01	.01	-.07- .09	
Coworker supp.	.82	3.89	3.72 (.74)	-.01	-.02	-.12- .08		.04	.05	-.05- .15	
Control	.86	3.72	3.03 (.82)	.04	.05	-.04- .13		.09**	.11	.02- .19	
Role clarity	.84	4.31	4.05 (.64)	.08*	.13	.01- .24		.07	.10	-.01- .22	
Aff. rumination	.94		2.85 (1.05)	-.36***	-.33	-.41- -.25	.34***	-.36***	-.34	-.41- -.26	.42***
Detachment	.81		3.01 (.87)	.11**	.12	.03- .21		.06	.07	-.02- .16	
Problem-solving	.83		2.90 (.80)	.08*	.09	.01- .18		.17***	.21	.13- .29	
Work anxiety	.79		3.73 (.97)								
Work depression	.81		4.08 (.99)								

\* p < .05, \*\* p < .01, \*\*\* p < .001