COMBINED AND SELECTIVE EFFECTS OF ENVIRONMENTAL AND PSYCHOSOCIAL WORKPLACE HAZARDS:

ASSOCIATIONS WITH HEALTH AND WELL-BEING IN PUBLIC SECTOR EMPLOYEES

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Thesis submitted to Cardiff University

for the degree of

Doctor of Philosophy

School of Psychology

Cardiff University

September 2008

CARDIFF UNIVERSITY

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SUMMARY

Associations between occupational stressors and poor health are well-documented. However, research to date has focused on individual stressors or single job stress models and associations with a limited set of health outcomes. The main aims of this thesis were to investigate combined and selective associations between varied sources of occupational stressors (environmental and psychosocial) and a range of health outcomes in public sector employees.

Data were obtained from two cross-sectional surveys of public sector employees (n=1090 and 870). Key sources of potential stress examined were: demands, control, support, efforts, rewards, unfavourable working patterns (long hours, shift work), physical hazards (noise, harmful substances), organisational culture, role stressors (conflict, ambiguity), interpersonal relationships (Leader-Member and Team-Member Exchange) and workplace bullying. Key health outcomes comprised work-related stress, clinical anxiety and depression, lifetime, 12-month and acute symptom prevalence and use of prescribed medication within the last 12 months and 14 days. Analyses were carried out using logistic regression.

Results indicate that stressors explain more variance in health outcomes when studied in combination. Cumulative exposure to stressors was measured by a composite additive score derived from traditional job stress models (Demand-Control-Support, Effort-Reward Imbalance) and items assessing working hours/physical hazards, and was associated with an increased likelihood of reporting the majority of key health outcomes. The addition of novel stressors to the composite score (e.g. role, interpersonal relationships, culture) did not explain additional variance with the exception of workplace bullying. For some outcomes (work-related stress) associations with stressors were linear; for others (clinical depression), only very high levels of exposure were associated with a negative outcome (i.e. a 'threshold' effect). These different patterns of effect are suggestive of selective, as well as cumulative relationships: certain health outcomes are associated with particular risk factors. Limitations, directions for future research and stress management and policy implications are discussed.

ACKNOWLEDGEMENTS

I would like to thank the many people who made this thesis possible.

Firstly, I would like to thank my supervisor, Professor Andy Smith, for his support, advice and intellectual input over the last 7 years. I would also like to thank all of my colleagues in the Centre for Occupational and Health Psychology, with whom it has been a pleasure to work and who are too numerous too mention individually. I would however like to thank the following people in particular for their contributions: Katherine Chaplin and George Mark for their help in collecting data, and Emma Wadsworth for her valuable comments on the first draft.

I would also very much like to thank my parents, family and friends, for their support and encouragement over the years. In particular I would like to express my gratitude to my father who supported and encouraged me in many ways in work and life, and who I hope would be proud.

Last and by no means least, I would like to thank my husband Giles for his support, kindness and patience – I quite literally couldn't have done it without you.

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CHAPTER 1

INDIVIDUAL AND COMBINED EFFECTS OF PHYSICAL AND PSYCHOSOCIAL OCCUPATIONAL STRESSORS ON HEALTH & WELL-BEING: A LITERATURE REVIEW

1.1 OVERVIEW

The following chapter summarises the literature relating to the effects of occupational stressors, both individually and in combination, on health and well-being. 'Occupational stress' and its effects on the health of the workforce, are discussed with particular reference to the most influential theoretical models of the last 40 years, and where possible, within the context of public sector employment, and nursing in particular. More recent research highlighting the explanatory benefits of examining the potentially negative health effects of occupational stressors (e.g. high demands, low control, low social support, high effort and low reward) in combination is also discussed.

1.2 DEFINITIONS OF WORK-RELATED STRESS

As Calnan, Wainwright and Almond (2000) note, the purpose of much of the early stress research was to maximise recruitment of psychologically robust employees, particularly within military contexts (e.g. Lazarus, Deese & Osler, 1952; Lazarus & Erikson, 1952; cited in Calnan et al., 2000). Early theory was therefore greatly influenced by this context.

There has historically been much debate and little consensus within the literature as to the most appropriate definition of 'occupational stress'. However, Cox and Griffiths (1995) propose three conceptualisations of stress: the first is described as an 'engineering' approach (where stress is viewed as the stimulus). The second conceptualisation, as proposed by Selye (1952; cited in Clegg, 2001) is termed the physiological approach, in which stress is viewed as a physiological reaction to a stimulus (or stressor). Selye describes two distinct consequences of this interaction:

'eustress', a positive response, and 'distress', a negative and maladaptive response. The third conceptualisation as defined by Cox and Griffiths (1995) perceives 'stress' as an interaction between the stimulus or stressor, and the individual's response: in other words, a 'stress state'. The latter conceptualisation of stress differs significantly from the other two, in that it takes into account the role of individual differences to some degree.

1.3 OCCUPATIONAL STRESS: THOERETICAL MODELS AND HEALTH EFFECTS

The following section outlines the most influential theoretical models of stress of the last 40 years, and summarises the potentially negative health effects for the workforce.

1.3.1 The Demand-Control (Support) model: theory & criticisms

1.3.1.1 Model overview

The Job Demand-Control model (Karasek, 1979) is perhaps the most frequently used job stress model (Bosma, Peter, Siegrist & Marmot, 1998) in terms of attempts to describe relationships between the psychosocial work environment and health outcomes. The basic premise of the model is that psychological strain occurs when an individual experiences high levels of job demand, in combination with a low level of control ('decision latitude') over work tasks. High strain in turn, may lead to poor health outcomes for the individual. It is also hypothesised that jobs characterised by high demands and high control (termed 'active jobs') may have protective effects on an individual's health. Where demands are low and control is high ('passive jobs'), job activity and problem solving activities are thought to decrease: therefore an interaction between demands and control is hypothesised. A third dimension, social support at work, was later added to the model (Johnson & Hall, 1988). The adapted Demand-Control-Support model incorporated the concept of 'Iso-Strain', where demands are high, and control and social support are low ('iso' refers to isolation, or low social support).

1.3.1.2 The 'strain' vs. 'buffer' hypotheses

The Demand-Control (Support) (DCS) model has been extensively examined with particular reference to two distinct hypotheses: the strain hypothesis (i.e. those in high strain jobs experience the most negative outcomes, and demands, control and support have strong independent effects), and the buffer hypothesis (i.e. job control [and social support] may moderate the negative impact of high demands). Where appropriate, results are presented to support both hypotheses: however, support for the strain hypothesis is well-established, whereas support for the buffer hypothesis is more equivocal (Van der Doef & Maes, 1998; Stansfeld, Head & Marmot, 1999a).

According to Van der Doef and Maes (1998) it is difficult to compare the validity of the two hypotheses, as they have tended not to be tested on the same outcome(s); furthermore, the authors suggest that the two hypotheses should actually be considered as theoretically distinct models. Practical implications in terms of interventions or job-redesign also differ between the two hypotheses: for example, if the buffer hypothesis explains the greatest variance in terms of well-being outcomes, it would be possible to reduce stress by increasing control only. However, if the strain hypothesis better explains negative outcomes, then focusing on control alone would be inadequate, given the independent negative effect of high job demands.

1.3.1.3 Pattern of association: Linearity vs. curvilinearity

Van der Doef and Maes (1998) also point out that research should seek to determine whether demands, control and support are linearly or non-linearly associated with health outcomes. Some research is suggestive of threshold effects (e.g. Schnall, Landsbergis & Baker, 1994 & Landsbergis, Schnall, Deitz & Friedman, 1992; cited in Van der Doef & Maes 1998), whereas other researchers propose that the relationship between stressors and health is curvilinear (e.g. Warr, 1990). Van der Doef and Maes (1998) conclude their review by suggesting that the relative lack of support for the buffer hypothesis may be explained in part by studies of the earlier Demand-Control model, prior to the inclusion of social support, as some studies indicate that high strain has particularly negative effects where support is low. Furthermore, the authors propose the consideration of other potential moderators of the relationship between (iso)-strain and health.

1.3.1.4 Measurement issues and theoretical criticisms

Another often-cited criticism of the DCS model is its reliance on self-report measures, and therefore susceptibility to common method bias (i.e. both independent and dependent variables are assessed via self-report), which may lead to an over-estimation of the strength of associations between job characteristics and health outcomes (Van der Doef & Maes, 1999).

In order to address this criticism, De Jonge, Reuvers, Houtman, Bongers and Kompier (2000a) incorporated an objective outcome measure, and a more focused measure of job control in their examination of demand, control, support and health outcomes in a 3-year prospective cohort study (n=1739). Results indicated that the relationship between DCS characteristics and job satisfaction, psychosomatic health complaints and sickness absence was linear and additive, whereas emotional exhaustion and depression were better explained by curvilinear models. No evidence of interactions were observed, therefore the authors conclude that greater emphasis should be given to curvilinear models in future research. The DCS model was not significantly predictive of the objective outcome measure, however.

It has also been suggested that the DCS model fails to take account of critical workplace stressors such as job instability, underemployment, redundancy and forced occupational mobility, and as such is an overly simplistic approach with which to characterise the modern labour market (Calnan, Wadsworth, May, Smith & Wainwright, 2004). Therefore, inclusion of additional variables that capture the complexity of modern working environments is recommended (Van Veldhoven, Taris, de Jonge & Broersen, 2005).

Much of the research examining the predictive power of the DCS is cross-sectional in nature, which may lead researchers to erroneously infer causality in some instances. De Lange, Taris, Kompier, Houtman and Bongers (2003) conducted a review of longitudinal research into the DCS model, and found only modest support for the job strain hypothesis, and even less for interactive effects (i.e. the buffer hypothesis).

Morrison, Payne and Wall (2003) argue that the DCS model was intended to describe jobs, and not individual perceptions of jobs, as is usually found to be the level of analysis. Using multi-level modelling, the authors report results of both individual and job-level analyses from more than 6,700 people in 81 different jobs. The results indicated that the DCS model is only useful for predicting individual perceptions of jobs, and how these relate to psychological well-being. When job perceptions were aggregated (i.e. to assess the collective experience of workers) the model was of little predictive value.

1.3.2 Demand-Control (Support) and health outcomes

1.3.2.1 Physical health

Associations between the Demand-Control (Support) model and cardiovascular disease have received a considerable amount of attention within the literature. High job strain has been linked to cardiovascular risk factors such as high blood pressure (e.g. Schnall, Pieper, Schwartz, Karasek, Schlussel, Devereaux, Ganau, Alderman, Warren & Pickering, 1990; Theorell, Karasek & Eneroth, 1990; Landsbergis, Schnall, Warren, Pickering & Schwartz, 1994), high blood pressure and increased serum cholesterol (Kawakami and Haratani, 1999) as well as with an increased risk of cardiovascular disease itself (e.g. Karasek, Baker, Marxer, Ahlbom & Theorell, 1981; Theorell & Karasek, 1998), myocardial infarction (e.g. Karasek, Theorell, Schwartz, Schnall, Pieper & Michela, 1988; Yoshimasu, 2001) and cardiovascular mortality risk (Kivimäki, Leino-Arjas, Luukkonen, Riihimäki, Vahtera and Kirjonen, 2002).

High demands only (no effects were observed for control) were found to be associated with higher total cholesterol levels in a mixed gender sample of Chinese rural workers (Tsutsumi, Kayaba, Ishikawa, Gotoh, Nago, Yamada, Mizooka, Sakai & Hayasaka, 2003). However, low control has been identified as a key factor in predicting cardiovascular disease and sickness absence in a number of studies (e.g. Bosma, Marmot, Hemingway, Nicolson, Brunner & Stansfeld, 1997; Johnson, Stewart, Hall, Fredlund & Theorell, 1996; North, Syme, Feeney, Shipley & Marmot, 1996).

There is however, a body of literature that does not support associations between the Demand-Control-Support model and cardiovascular disease, and/or associated risk factors (e.g. Reed, LaCroix, Karasek, Miller & MacLean, 1989; Netterstrom, Kristensen, Damsgaard, Olsen & Sjol, 1993; Hlatky, Lam, Lee, Clapp-Channing, Williams, Pryor, Califf & Mark, 1995; Emdad, Belkic, Theorell, Cizinsky, Savic &

Olsson, 1997; Hanke & Dudek, 1997; Bosma et al. 1998). In a study examining the possible effects of demands, decision latitude and social support on risk factors for cardiovascular disease (e.g. high cholesterol, high blood pressure) in a group of female nurses (n=165), Riese, Doornen, Houtman and De Geus (2000) found no effect of either job strain or social support.

A number of studies indicate that aspects of the DCS model are associated with musculoskeletal problems, e.g. high demands to neck and shoulder symptoms, low social support to back pain and low control to neck symptoms (Skov, Borg & Orhede, 1996). High demands (in addition to overcommitment and self-reported psychosocial work stress) were significantly associated with musculoskeletal pain in a sample of public transport employees (Joksimovic, Starke, Knesbeck & Siegrist, 2002a). Nahit, Pritchard, Cherry, Silman and Macfarlane (2002) also reported associations between high demands, low control, high psychological distress and lower back, shoulder, wrist/forearm and knee pain.

1.3.2.2 Psychological health

There is a significant body of evidence which suggests the DCS model may also predict psychological health. Job characteristics (as measured by the DCS model) were found to be significant predictors of job stress in general practice staff, in addition to marital and health status (Calnan, Wainwright, Forstythe, Wall & Almond, 2001). Both the job strain and job iso-strain hypotheses were supported in a study by Pelfrene, Vlerick, Kittel, Mak, Kornitzer & De Backer (2002a), specifically in relation to psychological well-being outcomes (depression, fatigue, sleep problems and psychoactive drug use). No support was found for the buffer hypotheses, however.

Jobs characterised by high demand have also been linked with an increased risk of psychiatric disorder (Stansfeld, Fuhrer, Shipley & Marmot, 1999b), depression (Stansfeld, Head & Marmot, 1998a; Tsutsumi, Kayaba, Theorell & Siegrist, 2001a), anxiety (Perrewe, 1986), 'psychological distress' (Bourbonnais, Brisson, Moisan & Vezina, 1996; Yeung & So-kum Tang, 2001) and poor mental health status (Yang, Ho, Su & Yang, 1997). High strain jobs (high demands, low control) are associated with low job satisfaction, depression, psychosomatic symptoms (Landsbergis, 1988), neurotic disorders (Cropley, Steptoe & Joekes, 1999) and anxiety (Cropley et al., 1999; Evans & Steptoe, 2002).

1.3.2.3 Gender differences

It is largely unclear whether there are gender differences in terms of the effects of job demands on psychological distress (Vermaulen & Mustard, 2000: cited in Muhonen & Torkelson, 2003). However, in a review of the Demand-Control-Support model with respect to psychological well-being outcomes, Van der Doef & Maes (1999) suggest that exclusively male or mixed samples were more likely to provide support for the DCS model than were studies comprised of largely female samples.

Muhonen and Torkelson (2003) studied main and interactive effects of the DCS model on both women and men's health in a Swedish sample of telecom workers. Results supported the main effect hypothesis for both sexes, and no interaction effects were observed for either males or females. However, only demands significantly predicted women's health, whereas both demands and low social support were found to predict men's health.

Pelfrene, De Backer, Mak, de Smet and Kornitzer (2002b) measured associations (main effects) between demands, control and support and cardiovascular risk in both male (n=16,329) and 5,090 female (n=5,090) workers in Belgium. Job demands were found to be positively associated with blood pressure and total cholesterol in men, and with hypertension in women (adjusted for age and level of education).

However, as Fillion, Tremblay, Truchon, Cote, Ward-Struthers and Dupuis (2007) point out, the interaction hypothesis is rarely supported in female samples (see e.g. Elovainio & Kivimäki, 1996).

1.3.2.4 Summary: The Demand-Control-Support model, theory, criticism and health effects

The Demand-Control-Support model is possibly the job stress model most often used to describe associations between job characteristics and health (Bosma et al., 1998). Support for the strain hypothesis (i.e. high demand, low control, low support) in terms of predicting negative health consequences is well-established: support for the buffer hypothesis (i.e. the moderating effect/s of control and/or social support) much less so. The role and predictive validity of these two distinct hypotheses has caused much debate and provoked some criticism of the model within the literature (see e.g. Van der Doef & Maes, 1998). It has also been suggested that further research is needed to determine whether the effects of demands, control and support are linearly or non-linearly related to health outcomes (Van der Doef & Maes, 1998). The DCS model has also been criticised for over-reliance on self-report measures (and therefore the likely problem of common method variance) and cross-sectional study designs. It has also been suggested that the DCS model does not take into account characteristics of the modern working environment, such as job insecurity (Calnan et al., 2004).

In terms of heath effects, associations between the DCS model and cardiovascular disease and associated risk factors have been extensively studied, and are well-established. Job strain has been found to predict high blood pressure (e.g. Schnall et al., 1990; Theorell et al., 1990; Landsbergis et al., 1994), high blood pressure and cholesterol (e.g. Kawakami & Haratani, 1999), cardiovascular disease itself (e.g. Theorell & Karasek, 1998), myocardial infarction (e.g. Yoshimasu, 2001) and cardiovascular mortality risk (e.g. Kivimäki, et al., 2002). However, there are studies that have failed to support such associations (e.g. Bosma et al., 1998; Riese et al., 2000). There is a scarcity of literature relating the DCS model to other physical health outcomes: however, there is some support for an association between DCS and musculoskeletal symptoms (e.g. Skov et al., 1996).

Job characteristics as measured by the DCS (in particular high demand) have also been found to predict a number of psychological health outcomes, such as increased risk of psychiatric disorder (e.g. Stansfeld et al., 1999a), depression (e.g. Stansfeld et al., 1998a; Tsutsumi et al., 2001a), anxiety (e.g. Perrewe, 1986; Cropley et al., 1999; Evans & Steptoe, 2002), 'psychological distress' (e.g. Bourbonnais et al., 1996; Yeung & So-kum Tang, 2001) and poor mental health status (e.g. Yang et al., 1997).

1.3.3 The Effort-Reward Imbalance model

1.3.3.1 Model overview

The Effort-Reward Imbalance (ERI) model (Siegrist, 1996) was proposed as an alternative to the DCS model, and the Person-Environment-Fit model (French, Caplan

& Harrison, 1982) to examine the relationship between work demands and health. The theory underpinning the model asserts that the degree of reciprocity between an individual and their work environment is critical in explaining negative health consequences. Any imbalance between the level of perceived effort and associated rewards is hypothesised to result in negative health outcomes.

A distinction is made between two types of effort included in the ERI model: intrinsic and extrinsic effort. Intrinsic effort is defined as the individual's level of motivation and their need for control, whereas extrinsic effort refers to more objective job demands. Intrinsic effort is also often referred to within the literature as 'overcommitment'. Overcommitment can be viewed as the person-specific component, whereas extrinsic effort and rewards are essentially situation-specific (Van Vegchel, De Jonge, Bosma & Schaufeli, 2005). Reward comprises three categories: financial gains, 'esteem' (i.e. recognition and support from colleagues/superiors) and 'status control' (i.e. job insecurity or lack of promotion prospects).

1.3.3.2 Validity and theoretical issues

As Calnan et al. (2000) note, the job strain approach characteristic of the DCS model does not shed any light on individual differences in perceived stress. The ERI model however, takes individual differences into account to some degree, by incorporating intrinsic effort, which may be viewed as "need for control" (Matschinger, Siegrist, Siegrist and Dittmann, 1986, cited in Bosma et al., 1998). As Vearing and Mak (2007) note, the ERI model incorporates both personal and work-related situational factors. It has also been suggested that the ERI model is a better predictor of stress in service professions than the DCS, in particular those requiring human contact such as nursing (Marmot, Siegrist, Theorell & Feeney, 1999; Calnan et al., 2004).

Tsutsumi and Kawakami (2004) reviewed ERI studies to determine the validity of the model as a measure of occupational stress. The authors conclude that the ERI model is a valid tool for evaluating stress in the modern labour market. Furthermore, they note that the aspects of the work environment measured by the ERI differ from those measured by the DCS model, and that adverse health effects are independent of each other, suggesting the two models are complimentary. The authors also conclude that psychosomatic symptoms are appropriate short-term outcomes for study in relation to the model, but that it would be preferable for future studies to include measures of job satisfaction, morale, motivation and performance as organizational-level outcomes.

Van Vegchel et al. (2005) reviewed 45 ERI studies undertaken between 1986 and 2003. They note that the ERI model is actually comprised of three distinct hypotheses: (1) the extrinsic effort hypothesis, which states that high efforts in combination with low rewards increases the likelihood of negative health outcomes; (2) the intrinsic effort/overcommitment hypothesis, which states that a high level of overcommitment likely increases the risk of poor health, and (3) the interaction hypothesis, which states that employees reporting a high extrinsic ERI and who also demonstrate high levels of overcommitment, are at the greatest risk of negative health outcomes. The authors conclude that the extrinsic ERI hypothesis has received the most attention in the literature and is well-supported. Results regarding overcommitment however, remain inconsistent and the moderating effect of overcommitment in terms of the relationship between (extrinsic) ERI and health has been largely ignored.

A further criticism of ERI theory and research concerns the role of overcommitment. Originally, overcommitment was thought to comprise part of the effort (i.e. intrinsic effort) component. However, in later versions of the model (Siegrist, 2002) overcommitment is viewed as an independent concept. As Van Vegchel et al. (2005) note, the role of overcommitment has been conceptualised in several different ways within the literature: overcommitment can be considered a moderator of the relationship between ERI and health (e.g De Jonge, Bosma, Peter & Siegrist, 2000b), or it may have a direct effect on health, with or without reward. Other possible roles of commitment are that it directly influences ERI, or it could even be thought of as an outcome of ERI (Appels, Siegrist & de Vos, 1997; cited in Van Vegchel et al., 2005). However, Ostry, Kelly, Demers, Mustard and Hertzman (2003) suggest that use of an ERI model without the inclusion of intrinsic effort may reduce common methods variance associated with this characteristic.

Van Vegchel et al. (2005) suggest a further potential criticism of the ERI model, in that the effort and reward variables comprise a variety of items, whilst representing different dimensions. This global approach may lead researchers to overlook the importance of particular types of efforts and rewards, specific to an occupational group.

1.3.4 Effort-Reward Imbalance and health outcomes

1.3.4.1 Physical health

The Effort-Reward Imbalance (ERI) model has also for the most part been studied in relation to cardiovascular disease and associated risk factors (see Siegrist, 1996; Bosma et al., 1998).

Low status control and high effort (either intrinsic or extrinsic) have been found to independently predict acute myocardial infarction and/or sudden cardiac death in a prospective (6.5 year) cohort of male blue-collar workers (n=416) who had no symptoms of coronary heart disease at baseline (Siegrist, 1996). Kivimäki et al. (2002) also presented data from a prospective cohort of factory workers (n=812: baseline measurements were taken in 1973) to suggest that high effort and low rewards (specifically low salary, lack of approval and poor career prospects) significantly predicted rates of cardiovascular mortality (controlling for age, gender, occupational group and biological/behavioural risk factors at baseline).

Kuper, Singh-Manoux, Siegrist and Marmot (2002) found baseline measures of ERI to predict increased incidence of coronary heart disease (CHD) and both fatal and non-fatal myocardial infarction at a mean follow up of 11 years during the first phase of the Whitehall II study (1985-1988: 6895 male and 3213 female civil servants aged 33-55). Results also indicated that a single-item measure of intrinsic effort ('has your work often stayed with you so that you are thinking about it after work hours?') may be sufficient to predict increased likelihood of developing CHD. ERI has also been found to predict angina and doctor-diagnosed ischemia at a mean follow up of 5.3 years in the same sample (after controlling for occupational factors, negative affectivity and CHD risk factors such as cholesterol and hypertension: Bosma et al., 1998).

Cross-sectional data from two studies of middle-managers also support an association between high effort and low reward, and cardiovascular risk factors such as hypertension (Siegrist, 1996; Peter & Siegrist, 1997) and cholesterol (Peter & Siegrist, 1997), particularly in men (Peter, Alfredsson, Knutsson, Siegrist & Westerholm, 1998).

Several studies have investigated possible associations between ERI and musculoskeletal symptoms. Joksimovic, Siegrist, Meyer-Hamer, Peter, Franke, Klimek, Heintzen and Strauer (2002b) found overcommitment to be associated with increased musculoskeletal pain (after adjusting for age, gender, socioeconomic status, shiftwork and negative affectivity). Tsutsumi, Ishitaki, Peter, Siegrist and Matoba (2001b) found high intrinsic effort to be associated with musculoskeletal problems such as pain and/or stiffness in the neck, shoulders, upper and lower arm, wrists, fingers and upper and lower back. Van Vegchel, De Jonge, Bakker and Schaufeli (2002) reported an increased risk of reporting pain in the neck/shoulders, middle and lower back and arms or legs amongst those categorised by high effort/high salary.

With regards other indicators of physical well-being, the literature is comparatively sparse. However, Van Vegchel et al. (2002) found those categorised by high effort/high salary, high effort/low esteem, and high effort/low job security to be more likely to report minor health complaints (e.g. headaches in the last 6 months). Peter et al. (1998) also found a significant association between ERI and gastrointestinal symptoms, and self-reported general health. Kuper et al. (2002), in a cohort study taken from the Whitehall II sample, found ERI to predict reduced (self-reported) physical functioning (independently of age, gender and occupational grade).

Weyers, Peter, Boggild, Jeppesen and Siegrist (2006) also observed an increased risk of poor self-rated health in a Dutch sample of nurses reporting high effort and low reward. Effects were further enhanced in those respondents who also reported high levels of overcommitment.

1.3.4.2 Psychological health

Although comparatively less attention has been paid to associations between ERI and psychological well-being than to physical (largely cardiovascular) health outcomes, a number of studies have consistently demonstrated that ERI significantly predicts psychological distress. Van Vegchel et al. (2002) found that risk of reporting mental exhaustion was more than 7 times higher under conditions of high effort/low salary than for low effort/high salary. Exhaustion was also more likely to be reported where effort was high and esteem low, than where effort was low and esteem high. Peter et al. (1998) reported a significant association between high effort/low reward jobs, and sleep disturbance and self-reported fatigue.

Kuper et al. (2002) observed an association between ERI and poor mental functioning (as measured by the SF-36 Health Survey in a cohort study taken from Whitehall II: n=10308). Furthermore, Stansfeld et al. (1998a) studied possible associations between ERI and General Health Questionnaire (GHQ) scores in the same cohort and reported a significant relationship at follow-up (controlling for age, employment grade, and baseline GHQ scores).

In a study of German nurses (n=204), Bakker, Kilmer, Siegrist and Schaufeli (2000) found those who reported a high level of imbalance reported higher scores on 2 out of 3 core dimensions of burnout (emotional exhaustion and depersonalisation). Significant interaction effects indicated burnout (emotional exhaustion and reduced personal accomplishment) was particularly high in those who reported high ERI and high intrinsic effort.

Pickhart, Bobak, Pajak, Malyutina, Kubinova, Topor et al. (2004) found that a high effort-reward imbalance tended to predict depression (cited in Vearing & Mak, 2007). Furthermore, ERI (including overcommitment) has been linked to depressive symptoms in Japanese factory workers (Tsutsumi et al., 2001a). Calnan et al. (2004) suggest however, that job stress models (either DCS or ERI) may not be as predictive of depression and anxiety as for other physical or psychological health outcomes.

1.3.4.3 Gender differences

There is relatively little research which explicitly examines gender-specific relationships between the ERI model (or components of) and health outcomes. However, Tsutsumi and Kawakami (2004) argue that the ERI may be more predictive of outcomes in female populations than the DCS model. They suggest that female workers are likely to emphasise the balance/imbalance between 'costs' and 'gains', rather than their need for job control.

1.3.4.4 Intervention studies

Tsutsumi and Kawakami (2004) cite two intervention studies based on the ERI model. Aust, Peter and Siegrist (1997; cited in Tsutsumi & Kawakami, 2004) introduced a 12-week stress management programme for male bus drivers, which included 90-minute sessions of techniques for relaxation, management of conflict with supervisors, and coping with anger and overcommitment. The intervention group were also told about the ERI model, and given suggested strategies for reducing any imbalance. Results indicated that mean overcommitment level was significantly reduced in the intervention group; an effect that was still observed 3 months later. However, no significant effects on mood or self-reported symptoms were found. Vearing and Mak (2007) suggest that in a similar manner to that described by Aust et al. (1997), organisations could perhaps provide stress prevention and/or management programmes that focus on relaxation skills, physical activity, increased awareness of emotions, and coping strategies to reduce anxiety. Practical implications for workplace support could include investment in increasing support from both supervisors and co-workers.

Irie, Tsutsumi and Kobayashi (2003; cited in Tsutsumi & Kawakami, 2004) distributed the ERI questionnaire to 441 production company workers. Physical and psychological profiles were also measured. The authors explained the survey results and provided general information about occupational stress to all participants: 69 employees reporting long working hours were then selected and given counselling to modify Type A behaviour. At 1 year follow-up, reductions in overcommitment, self-reported sleepiness and frequency of burnout symptoms were observed. However, there was no significant reduction in ERI in the intervention group, and physical health was generally found to be worse at 1 year.

1.3.4.5 Summary: The Effort-Reward Imbalance model, theory, criticism and health effects

The Effort-Reward Imbalance (ERI) model (Siegrist, 1996) was proposed as an alternative to earlier job stress models such as the DCS model. The theory underlying the model states that an imbalance between perceived effort and job rewards will likely result in negative health outcomes. The ERI model addresses some of the criticisms levelled at the DCS model, in that it incorporates some measure of individual differences in the form of intrinsic effort, or need for control (Calnan et al., 2000). It has also been suggested that the ERI model might better predict stress in nursing and other service professions than the DCS (Marmot et al., 1999; Calnan et al., 2004). The ERI is a valid measure of occupational stress in the current labour market, and although originally proposed as an alternative to the DCS model, there is some evidence to suggest the two models are complementary in that the different aspects of the work environment measured by each tend to demonstrate independent effects (Tsutsumi & Kawakami, 2004). However, the ERI model has received some criticism with regards the conceptualisation of overcommitment, or intrinsic effort. In the original model, overcommitment was considered part of the effort component, yet in later versions of the model, overcommitment is viewed as an independent concept. The ERI hypothesis has been most extensively tested in the literature and is well-supported. Results regarding overcommitment however, have been inconsistent.

In terms of physical health outcomes, the ERI model has largely been studied in relation to cardiovascular disease (see Siegrist, 1996; Bosma et al., 1998; Kivimäki et al., 2002; Kuper et al., 2002) and associated risk factors (e.g. Siegrist, 1996; Peter & Siegrist, 1997; Peter et al., 1998). However, there is some evidence linking ERI with musculoskeletal symptoms (e.g. Tsutsumi et al., 2001b; Joksimovic et al., 2002a; Van Vegchel et al., 2002), headaches (Van Vegchel et al., 2002), gastrointestinal symptoms (Peter et al., 1988), reduced physical functioning (Kuper et al., 2002) and poor self-rated general health (Weyers et al, 2006).

Several studies have also demonstrated an association between ERI and psychological outcomes such as mental exhaustion (Van Vegchel et al., 2002), sleep disturbance and self-reported fatigue (Peter et al., 1998), poor mental functioning (Kuper et al., 2002), psychological distress (Stansfeld et al., 1998a), burnout (Bakker et al., 2000) and depression (Tsutsumi et al., 2001a; Pickart et al., 2004). However, it has also been suggested (Calnan et al., 2004) that job stress models generally (i.e. either DCS or ERI) may not be as predictive of depression and anxiety as for other physical or psychological health outcomes. There is also some evidence to suggest that the ERI may be more predictive of outcomes in female populations than the DCS model (Tsutsumi & Kawakami, 2004).

Furthermore, the limited research on workplace interventions based on ERI suggest that stress prevention and/or management programmes that focus on relaxation skills and coping strategies to reduce anxiety may be effective in reducing overcommitment (Aust et al., 1997; Irie et al., 2003; Vearing & Mak, 2007), if not ERI itself.

1.3.5 Additional job stress models: Theoretical and practical implications

1.3.5.1 Extensions of the DCS model

Van Veldhoven et al. (2005) present an overview of a number of recent extensions to the DCS model. The ways in which these models add complexity can be summarised as: inclusion of additional job characteristics, examination of specific relationships/hypotheses, and inclusion of situation-specific component/s. Parker, Wall and Cordery (2001; cited in Van Veldhoven et al. 2005) for example, cite the following work characteristics for inclusion in an extended model: environmental uncertainty, organisational factors, feedback, types of job demands (i.e. cognitive, physical, emotional), role conflict, opportunity for skill acquisition, social contact and team aspects.

Several authors (Bakker, Demerouti, Taris & Schreurs, 2003; Demerouti, Bakker, Nachreiner & Schaufeli, 2001) have suggested the Job-Demands-Resources (JDR) model as an extension and alternative to the DCS model. The JDR model includes additional variables, and acknowledges the need for situational specificity, whilst retaining the principle of general constructs, as in the DCS model. According to the JDR model, there are two general categories of work characteristics that are associated with health outcomes: job demands (i.e. physical, social and/or organisational job components that require sustained effort) and job resources (i.e. physical, social and/or organisational job components that are functional in terms of achieving goals, reducing job demands, or fostering personal development). However, Van Veldhoven et al. (2005) argue that this level of situational specificity is not really needed, and that a more general model is usually the most logical initial approach. The authors comment further that situation-specific models may only be valid in homogenous samples.

1.3.5.2 The Vitamin model

Warr (1994) proposed a model of the effects of workplace stressors on well-being, which views the effects of stressors as analogous to the effects of vitamins. Warr (1994) outlined 9 job characteristics, and suggested that three factors (safety, salary and task significance) are similar in their effects to C and E vitamins, i.e. a deficiency is detrimental to health, but excess amounts do not have any negative effects. The remaining 6 factors (job demands, autonomy, social support, skill utilization, skill variety and task feedback) are thought to exert a similar influence to A and D vitamins, i.e. harmful in high doses. Van der Doef and Maes (1998) point out that according to Warr's (1994) model, the dimensions of the DCS model would behave like A/D vitamins (i.e. having negative effects on psychological well-being at both low and high levels). However, the vitamin model is considerably more complex than other job stress models, and as such, has yet to be fully investigated (Van Veldhoven et al., 2005), although research has provided support for some aspects of the model (e.g. Van Veldhoven, 1996; De Jonge & Schaufeli, 1998; cited in Van Veldhoven et al., 2005).

1.3.5.3 The Person-Environment-Fit model

The underlying premise of the Person-Environment-Fit Model (French, 1973) is that the degree of congruence or 'fit' between an individual and his or her work environment can impact significantly on health and well-being and performance outcomes (French et al., 1982). The theory behind the model builds on early stress research, in that factors attributable to the individual, and not simply the work environment, are seen as key in determining outcomes. However, the model has received some criticism related to the conceptualisation of the degree of fit as inert, rather than flexible and context-specific (Lazarus, 1991).

1.3.5.4 Additional job stress models

The current chapter is not intended to be an exhaustive review of the literature relating to models of work-related stress, but rather to summarise the research relating to models that have proved most predictive of health and well-being outcomes, and in particular to summarise any research in which one or more models, or 'sets' of workplace characteristics, have been examined in combination. However, there are a number of other theories and models relevant to the researcher with an interest in work-related stress: these are therefore summarised briefly in the following section.

The socio-technical approach, based on open systems theory and work undertaken at the Tavistock Institute in the 1950's, views the stress process as an interaction between the individual and his or her environment, as in the P-E fit model. However, the sociotechnical approach is not a conventional model of work stress; rather it provides an ideal for organisational design (or potentially re-design) (Kompier, 2003). In contrast, the job characteristics model (Hackman & Oldham, 1980) comprises the following job characteristics: skill variety, task identity, task significance, autonomy and feedback (as measured by the Job Diagnostic Survey). However, these job characteristics are also measured with a view to job-redesign: there is no real evidence to suggest an association between these characteristics and health outcomes.

In the Michigan model (Caplan, Cobb, French, Van Harrison & Pinneau, 1975), role stressors (role ambiguity, conflict, expectations) are considered central to the model, in which the relationship between perceptions of stress and health outcomes is thought to be moderated by individual differences and social support. However, Jones, Smith and Johnston (2005) conclude there is little evidence to support the model's predictive validity in terms of health outcomes. There are also several transactional models of occupational stress which expand on the role of individual differences: coping style is seen as a critical component in the appraisal of, and subsequent response to stressful situations (Lazarus & Folkman, 1984; Cox & Ferguson, 1991). The theory underpinning these models will be discussed in more detail in Chapter 7, where the role of individual differences in the stress process is specifically examined.

1.3.5.5 Summary: Additional job stress models

There are a number of alternative job stress models to the DCS and ERI, including some recent extensions to the DCS model (see Demerouti et al., 2001; Bakker et al., 2003; Van Veldhoven et al., 2005). These models add additional job and interpersonal characteristics, and include some measure of situational specificity, although there is some debate about whether the latter is of value except in homogenous populations (Van Veldhoven et al., 2005). Other models (e.g. Warr's 1994 'Vitamin Model') are complex and as such have yet to be fully tested: for others, there is little evidence of an association with health outcomes (e.g. the Michigan Model, Caplan et al., 1975), or the theoretical focus is on job design/redesign (e.g. the socio-technical approach: see Kompier, 2003, and the Job Characteristics Model, Hackman & Oldham, 1980). There are also a number of transactional stress models, which view coping style as critical in the appraisal and consequences of stressful situations (see Lazarus & Folkman, 1984; Cox & Ferguson, 1991: further description of these models is given in Chapter 7).

1.4 INDEPENDENT EFFECTS OF PHYSICAL WORKPLACE STRESSORS: WORKING HOURS, NOISE AND ENVIRONMENTAL HAZARDS

The focus of the current chapter thus far, has been on psychosocial workplace stressors and their impact on health and well-being. In the following section, the independent effects of physical workplace stressors such as shift work, night work, noise and other environmental hazards is briefly described.

1.4.1 Exposure to noise

Effects of occupational exposure to noise are generally classified as either auditory (i.e. communication problems, damage to/direct effects on the auditory system) or non-auditory (e.g. effects on performance, physiological responses and indirect effects on health outcomes). Non-auditory effects of noise are the focus of interest for the current review.

Acute noise exposure is thought to influence physical health via catecholamine excretion and cardiovascular function, despite methodological weakness in some studies (Butler, Graveling, Pilkington & Boyle, 1999). Annoyance is a likely psychological consequence of exposure to noise, and may be associated with the development of psychological distress. However, as Smith (1991) notes, it is problematic to separate the role of noise exposure from other confounding work characteristics in determining psychological distress. It is nonetheless generally agreed that noise may interfere with normal sleep patterns and sleep quality (Smith & Broadbent, 1992).

(For detailed reviews of the effects of noise on well-being, see Smith and Broadbent, 1992; Berglund and Lindvall, 1995; HSE, 1998; Butler et al., 1999).

1.4.2 Working hours

The term 'working hours' refers in the current context to the following: day/night work, (other) shift work, long working hours, and unfavourable working patterns. Sparks, Cooper, Fried and Shirom (1997) reviewed literature relating to the effects of working hours on health outcomes, and found significant, if small, associations between general health symptoms, indicators of psychological well-being and number of hours worked per week. Long working hours have also been linked to increased risk of coronary heart disease (CHD) and myocardial infarction in a meta-analysis of 21 studies (Sparks et al., 1997); however, in an earlier review of the literature, Rutenfranz, Haider and Koller (1985) found little evidence to support an association between long working hours and cardiovascular disease.

The detrimental effects of night shift work on health have long been established (e.g. Rutenfranz et al., 1985): negative effects most likely occur as a result of disruption to normal circadian rhythms. Night shift work has also been associated with an increased risk of developing colorectal cancer in female nurses (n= 78,586: Schernhammer, Laden, Spiezer, Willett, Hunter, Kawachi, Fuchs & Colditz, 2003). Furthermore in his review of the literature, Knutsson (2003) proposed associations between shift work and peptic ulcer disease, CHD and poor pregnancy outcomes. There is also evidence to support a link between long working hours and poor psychological well-being (Sparks et al. 1997; Borg & Kristensen, 1999).

1.4.3 Summary: Independent effects of physical workplace stressors

It is not the aim of the current chapter to exhaustively review the available literature on the effects of physical workplace hazards on health outcomes, but rather to summarise the literature that might be relevant when studying shift-working populations such as nurses. There is a significant literature linking the (non-auditory) effects of noise to health outcomes such as catecholamine excretion and cardiovascular function, psychological distress, sleep patterns and sleep quality. Associations between working hours, particularly night shift work and long working hours, and negative health consequences such as increased risk of coronary heart disease, myocardial infarction, poor pregnancy outcomes, colorectal cancer (in women) peptic ulcer disease, general health symptoms and psychological well-being, have also been established.

1.5 COMBINED EFFECTS OF OCCUPATIONAL STRESSORS

The following sections summarises the findings from studies in which stress models, or aspects of stress models have been examined in combination.

1.5.1 Combined effects of occupational stressors: Demand-Control-Support and Effort-Reward Imbalance

A number of studies have examined the relative and combined influence of both the Demand-Control-Support (DCS) and Effort-Reward Imbalance (ERI) models. Bosma et al. (1998) examined potential associations between DCS, ERI and coronary heart disease (CHD) risk among civil servants in a prospective cohort study of 6895 men and 3413 women aged 35-55 years (Whitehall II). Results indicated that at a mean follow-up of 5.3 years, both models of job stress were significantly predictive of new CHD cases. An imbalance between efforts and rewards was associated with a 2-fold increased risk of new CHD cases.

Job strain and high demands were not significantly associated with the outcome, however low control did significantly predict new cases of disease. The results therefore indicate that the effects of the two models are independent. However, while the models are clearly conceptually different, there is some overlap between the extrinsic effort/job demands and esteem reward/social support dimensions (Kasl, 1996; cited in Bosma et al., 1998). Stansfeld, Bosma, Hemingway and Marmot (1998b) examined the influence of both the DCS and ERI models, and social support at baseline on SF-36 scores at 5 years. They concluded that high demands and ERI, and poor social support independently predict poor health status.

Despite their independent effects, it has however, been suggested that the models may explain more variance in combination (Calnan et al. 2000). Calnan et al. (2000) examined the effects of the two models both separately and in combination and results indicated that both models independently predicted mental distress and job satisfaction. However, models that combined different dimension of DCS and ERI were the strongest predictors of both outcomes.

De Jonge et al. (2000b) investigated the effects of both DCS and ERI on well-being in a cross-sectional survey of Dutch men and women (n=11,636). Findings indicated that those characterised by high demands (both physical and psychological) and low control were more likely to report emotional exhaustion, psychosomatic and physical health complaints and job dissatisfaction. Odds ratios were generally higher for those reporting both high efforts and low rewards. High effort and low rewards were stronger predictors of poor well-being than low control when both models were simultaneously adjusted. Findings indicate independent, cumulative effects of both models on well-being (no significant gender or age differences were observed).

Tsutsumi et al. (2001a) compared both models in terms of predicting depression in a sample of Japanese employees experiencing high levels of job insecurity (n=190). Results indicated that the two models were actually associated with different job conditions: job strain was most prevalent among assembly line workers, whereas high ERI was more prevalent amongst those working on indirect supportive tasks. Symptoms of depression were more prevalent in support staff, the employees under the greatest threat of job losses. In summary, low control, ERI and overcommitment all predicted depressive symptoms independently, and those at most risk of redundancy were most likely to be depressed.

Kivimäki et al. (2002) examined the effects of both the DCS and ERI models in terms of predicting cardiovascular disease mortality risk in a prospective cohort (mean length of follow-up was 25.6 years). Results indicated that high demand in combination with low control was associated with 2.2-fold increased mortality risk. The risk ratio for ERI was 2.4. Peter, Siegrist, Hallqvist, Reuterwall and Theorell (2002) combined both models in a case-control study of 951 incidences of myocardial infarction (MI). Results indicated independent effects of both models, but those reporting both high job strain and ERI demonstrated the greatest mortality risk.

Ostry et al. (2003) compared the predictive validity of both models (independently and in combination) for self-reported health status and (self-reported) presence of any chronic disease in a sample of sawmill workers. Findings suggested that both models predicted self-reported health status, whereas ERI only predicted chronic disease. The combined model best predicted both outcomes. When ERI was modelled with intrinsic effort, the model demonstrated marginally better predictive validity than when modelled with extrinsic effort alone.

Fillion et al. (2007) examined an integrated job stress model comprised of both DCS and ERI in a sample of palliative care nurses (n=209). Using two hierarchical regression models including DCS, ERI, and specific palliative care stressors and resources, results showed the best predictors of job satisfaction to be: job demand, effort, reward and people-oriented culture. The best predictors of emotional distress however were reward, professional and emotional demands and self-efficacy. The authors conclude that results indicate the importance of using situation-specific models.

Griffin, Greiner, Stansfeld and Marmot (2007) have compared the predictive power of two self-report methods of assessing work stress (i.e. the DCS and ERI models), with an observational method, the hindrance/utilization model. The hindrance/utilization model is based on Action Regulation Theory (ART) (Volpert, 1982; Hacker, 1994; cited in Griffin et al., 2007). The model evaluates the structure and content of job tasks; parallels can be drawn with both task autonomy (Hackman & Oldham, 1975; cited in Griffin et al., 2007) and decision latitude (DCS) although the authors argue it is a theoretically different concept. Cross-sectional data from 98 Whitehall II participants were used to test which of the three models (or components of) best predicted depression and anxiety. Observational methods were also used to determine the degree of common methods variance between the self-reported job conditions and outcome measures.

Results indicated that the DCS model explained the most variance in depression and anxiety (associations were not fully accounted for by common methods variance). Measures associated with 'job resources' (i.e. skill discretion, social support and skill utilization) had a protective effect on outcomes. Demands, effort and overcommitment were not consistently associated with either outcome. The authors concluded that the absence of associations between ERI and symptoms of depression and anxiety may suggest that the ERI model best predicts physical health outcomes.

Rydstedt, Devereaux and Sverke (2007) sought to compare the predictive validity of the DCS and ERI models for mental strain, and also to determine whether the two models and associated levels of mental strain differed between two occupational groups (managers/professionals and manual workers). Both models were found to explain small but significant proportions of variance in mental strain for both occupational groups. Results also suggest that a combination of both models may increase the proportion of variance in mental strain explained by either model alone.

Smith, McNamara and Wellens (2004) examined the combined effects of the DCS model (demands, control, support), the ERI model (intrinsic effort, extrinsic effort, reward), working hours and physical stressors (noise and exposure to physical hazards) on health outcomes in a population sample of full-time employees. Stressors were combined and assessed in terms of the effects of a composite score on outcomes. Results indicated that exposure to a combination of all negative occupational factors was frequently more strongly associated with negative health outcomes than either single stressors, or combinations of fewer stressors.

However, where significant associations with outcomes were observed, these tended to demonstrate several distinct patterns of effect, dependent to some extent on the outcome measure studied. For example, linear effects were observed for work stress, clinical anxiety and acute psychological problems. Depression and acute health problems (e.g. upper-respiratory tract infections, gastrointestinal symptoms, back pain) were significantly associated with high levels of exposure to negative occupational factors only. Acute respiratory symptoms were associated with exposure to occupational stressors at moderate and high levels, and use of pain relief and/or indigestion medication in the last 14 days was associated with moderate exposure only.

1.5.2 Combined effects of occupational stressors: Additional variables

Akerboom and Maes (2006) examined the relationships between work conditions and a number of outcomes (job satisfaction, emotional exhaustion, psychological distress and somatic complaints) from a broad organizational perspective, inclusive of demands-control-support, and staffing resources, communication, social hindrance, training opportunities, job skills and material resources. Findings indicate that these novel risk factors explained additional variance in each outcome measure to that accounted for by the DCS model.

Noblet, McWilliams, Teo and Rodwell (2006) examined work characteristics likely to have a significant impact on extra-role performance (as measured by the helping dimension of organisational citizenship behaviour) and employee well-being (job satisfaction and psychological health) in local government. The work characteristics examined comprised the original DCS components, and additional organisation-specific characteristics. Results indicated that DCS components were predictive of extra-role performance, just as they have been consistently associated with more traditional indicators of job stress.

Hollmann, Heuer and Schmidt (2001) examined the potential buffering effect of control at work in relation to psychological demands and physical workload, in terms of musculoskeletal outcomes. Results indicated that control buffered the effects of high demands, but not of high physical workload; a buffering effect of control was only observed where physical workload was low.

Vearing and Mak (2007) investigated the joint effects of the 'Big 5' personality dimensions (extraversion, neuroticism, agreeableness, conscientiousness and openness to experience: McCrae & Costa, 2003, cited in Vearing & Mak, 2007) and an extended model of work stress based on the ERI model. The extended model included the ERI ratio, intrinsic effort (overcommitment) and workplace social support. Results indicate a significant association between overcommitment and neuroticism, and suggest that neuroticism, workplace social support, conscientiousness and the ERI ratio accounted for 44% of the variance in depressive symptoms in a cross-sectional sample of 224 Australian employees.

1.5.3 Combined effects of occupational stressors: Noise and working hours

A number of studies have examined the combined effects of noise and working hours on health outcomes. Jansen and Schwarze (1988) found a significant association between noise only and cardiovascular disease in a longitudinal study. However, combined noise and shift work have been linked to elevated blood pressure (Petiot, Parrot, Lobreau, Smolik & Guilland, 1991; Lercher, Hortnagl & Kofler, 1993).

1.5.4 Additional combined effects of occupational stressors

There are a number of studies which have considered large numbers of occupational stressors in combination, taking an additive approach. Researchers in Israel (Luz, Melamed, Najenson, Bar & Green, 1990; Melamed, Yekutieli, Froom, Kristal-Boneh & Ribak, 1999; Shirom, Melamed & Nir-Dotan 2000) developed the Ergonomic Stress Level (ESL) measure. The purpose of the tool is to measure the following: body motion and posture, physical effort, active hazards and environmental stress using a mixed-method approach of self-report and expert ratings. The authors demonstrated a linear association between the ESL and accidents at work (Luz et al., 1990; Melamed et al., 1999) and serum uric acid levels in males (Shirom et al., 2000).

Devereux, Vlachonikolos and Buckle (2002) investigated the combined effects of physical and psychosocial factors on musculoskeletal disorders, and found that individuals reporting high levels of both factors were most likely to report musculoskeletal symptoms. Tafalla and Evans (1997) also studied the combined effects of physical and psychosocial stressors, and found that exposure to noise was associated with increased heart rate, norepinephrine and cortisol excretion, but only under conditions of high effort.

1.5.5 Summary: Combined effects of occupational stressors

1.5.5.1 The Job Demand-Control-Support and Effort-Reward Imbalance models

A number of studies have examined the relative and/or combined influence of both the Demand-Control-Support (DCS) and Effort-Reward Imbalance (ERI) models. Results indicate that although both models independently predict outcomes such as coronary heart disease (e.g. Bosma et al., 1998; Kivimäki et al., 2002) and poor health status (e.g. Stansfeld et al., 1998b) the most variance in health is explained by a combination of the two models. For example, both models have been found to predict mental distress and job satisfaction independently, with the greatest variance in both outcomes explained by a combination of both models (Calnan et al., 2000). Peter et al. (2002) reported a similar finding with respect to cardiovascular mortality risk, as did Rydstedt et al. (2007) for mental strain. Some research also indicates that components of the two models may be associated with different job conditions (Tsutsumi et al., 2001a), and also that different models or components of models may be differentially related to certain outcomes. For example, Ostry et al. (2003) found both models to predict self-reported health status, but only ERI was predictive of chronic disease.

The addition of situation-specific stressors to the DCS and ERI models has also been advocated: in a study of palliative care nurses, the best predictors of job satisfaction were found to be job demand, effort, reward, and people-oriented culture, whereas reward, emotional demands and self-efficacy best predicted emotional distress (Fillion et al., 2007). Comparison of the DCS and ERI with a third model (the hindrance/utilization model) revealed that the DCS explained the most variance in depression and anxiety, and also that measures associated with 'job resources' (i.e. skill discretion, social support and skill utilization) had a protective effect on outcomes. The absence of associations between ERI and outcome measures may suggest that the ERI model best predicts physical health outcomes.

Recent research (Smith et al., 2004) provides further support for the two main findings summarised above: firstly, that a combination of models (and additional work environment stressors) predicts significantly more variance in outcomes than models, or components of models alone. However, the findings also indicated a degree of selectivity, in that certain models or components of models tended to be differentially related to particular outcomes.

1.5.5.2 Combined effects: Additional variables

The addition of further organisational variables to existing job stress models has also produced some interesting results. For example, Akerboom and Maes (2006) demonstrated that staffing resources, communication, social hindrance, training opportunities, job skills and material resources explained additional variance in outcomes (job satisfaction, emotional exhaustion, psychological distress, somatic complaints) to that accounted for by the DCS model. Personality characteristics such as neuroticism have also been found to account for additional variance to ERI in explaining depression (Vearing & Mak, 2007).

There are a number of studies which have also considered large numbers of occupational stressors in an additive approach (e.g. Luz et al., 1990; Melamed et al., 1999) and demonstrated a linear relationship between a composite score (comprising body motion, posture, physical effort, active hazards and environmental stress) and outcomes such as work-related accidents. Further support for such a 'combined effects' approach can be found in studies of musculoskeletal disorders. It has been demonstrated that individuals reporting high levels of both physical and psychological stressors were most likely to report symptoms (Devereux et al., 2002), and that noise exposure was associated with increased heart rate and norepinephrine and cortisol excretion, but only where effort was also high. In addition, there is evidence to support a combined effect of physical stressors on health outcomes (e.g. noise and shift work, and elevated blood pressure: Petiot et al., 1991; Lerchner et al., 1993).

1.6 NURSING-SPECIFIC EFFECTS

1.6.1 Background

There is an emerging and substantial literature suggesting that NHS staff are at significant risk of work-related stress (Firth-Cozens & Payne, 1999; cited in Calnan et al., 2000; Fillion et al., 2007). Nurses in particular have been fairly extensively studied with respect to the phenomenon of occupational stress (Clegg, 2001) and stress in nursing has been associated with high rates of sickness absence (Kinkler & Whittick, 1991; cited in Clegg, 2001).

1.6.2 Work characteristics associated with stress in nursing

Many factors have been cited as increasing the risk of stress in nursing, such as unpredictable staffing and scheduling, lack of role clarity, lack of involvement in decision making, poor status, poor (social) support (Williams, Michie & Pattani, 1998; cited in Bennett, Lowe, Matthews, Dourali & Tattersall, 2001) under-skilled staff (Glazer & Gyurak, 2008), leadership style and professional conflict (McVicar, 2003).

Chang, Hancock, Johnson, Daly and Jackson (2005) identified the following work characteristics as associated with work stress in nursing; low control, high demands, low social support, coping with death/dying, shortage of essential resources, being moved between wards/care units, and workload. The authors also defined a list of environmental factors thought to influence the stress process; uncooperative family members/patients, concerns about poor quality care (nursing and medical), shift rotation, poor relationships with colleagues/supervisors and poor organisational commitment. However, according to Akerboom and Maes (2006), work-related, as opposed to interpersonal factors, are more consistent predictors of health and well-being.

French, Lenton, Walters and Eyles (2000) sought to draw together and categorise all potential stressors relevant to nursing and create a measure based on these categories. The authors identified 9 components of work stressors in nursing: conflict with physicians, inadequate preparation, problems with peers, problems with supervisor/s, discrimination, workload, uncertainty concerning treatment, dealing with death and dying, patients and families. Additionally, as Chang et al. (2005) note, role stress is also an important area of interest in nursing. Nursing roles have recently undergone significant changes within the NHS, which, as McVicar (2003) notes, may have significant implications for approaches to stress management. Furthermore, initiatives aimed at reducing stress in junior doctors may actually serve to increase pressure on nurses, by adding to responsibilities in what is becoming an increasingly complex role (Muncer, Taylor, Green & McManus, 2001).

1.6.3 Health outcomes in nurses

In a survey of UK NHS Trust staff, Borrill, Wall, West, Hardy, Shapiro, Carter, Golya and Haynes (1996) found that 27% reported psychological distress, as compared with 18% of the national workforce. Rates of distress were similar amongst nurses and doctors (29% and 28% respectively), although trust managers reported the highest levels of disturbance (33%). Bennett et al. (2001) found the following to be predictive of negative affect in a sample of nurses: lack of management support, job overspill, making decisions under time pressure and lack of organisational recognition. NHS staff in general are also thought to suffer more stress-related psychological problems (anxiety, depression) than employees in other professional occupations (Williams, 1989; cited in Muncer et al., 2001).

Bradley and Cartwright (2002) measured perceived social support, job stress, health and job satisfaction in nurses employed by four organisations in North West England. Their findings suggest that perceived organisational support is strongly predictive of both health and job satisfaction. As the authors note, social support is often cited as a critical factor in stress management (e.g. Boyle, Grap, Younger & Thornby, 1991; Fletcher, Jones & McGregor, 1991; cited in Bradley & Cartwright, 2002) and also as a source of stress and dissatisfaction (e.g. Fagin, Brown, Bartlett, Leary & Carson, 1995; cited in Bradley & Cartwright, 2002).

Nurses are thought to be particularly susceptible to burnout (Bakker et al., 2000), defined as a psychological syndrome comprising emotional exhaustion, depersonalisation and reduced personal accomplishment (Maslach & Schaufeli, 1993; Maslach, 1993; cited in Bakker et al., 2000). Burnout has been shown to correlate positively with the amount of time nurses spend with patients (Cronin-Stubbs & Brophy, 1985; cited in Bakker et al., 2000), the intensity of emotional demands made by patients (Lewinson, Conley & Blessing-Moore, 1981; cited in Bakker et al., 2000) and with caring for patients with a poor prognosis (Hare, Pratt & Andrews, 1981; cited in Bakker et al., 2000).

There is also some evidence to suggest that mortality rates (including suicide and stress-related disease), psychiatric admissions and physical illness may be elevated in nurses (Tyler & Cushway, 1992; cited in Kircaldy & Martin, 2000). As Kircaldy and Martin (2000) note, stress is often cited as the primary reason for leaving the profession (Fimian, Fastenau & Thomas 1988; McGrath, Reid & Boore, 1989; cited in Kircaldy & Martin, 2000).

1.6.4 Summary: Nursing-specific effects

It is well-recognised that NHS staff, and nurses in particular, are at significant risk of experiencing work-related stress (e.g. Firth-Cozens & Payne, 1999; Fillion et al., 2007). A wide variety of factors have been suggested as causal in the stress process, which include components of the models discussed earlier in the current chapter. The following list of nursing stressors is not exhaustive, but covers much of the current literature: unpredictable staffing and scheduling, lack of role clarity, lack of involvement in decision making, poor status (Williams et al. 1998), leadership style (McVicar, 2003), low control, high demands, shortage of resources, being moved between care units, shift rotation, poor organisational commitment (Chang et al., 2005), discrimination, uncertainty concerning treatment (French et al., 2000), low social support (Williams et al., 1998; Chang et al., 2005), professional conflict/poor relationships with colleagues/supervisors (French et al., 2000; McVicar, 2003; Chang et al., 2005), under-skilled staff/poor quality care (Chang et al., 2005; Glazer & Gyurak, 2008), lack of management support, job overspill, making decisions under time pressure, lack of organisational recognition (Bennett et al., 2000), workload, coping with death and dying, and patients and families (French et al., 2000; Chang et al., 2005). However, according to Akerboom and Maes (2006), work-related, as opposed to interpersonal factors, are more consistent predictors of health and well-being.

In terms of the observed effects of the above characteristics on self-reports of stress and ill-health, there is growing evidence of significant associations. Borrill et al. (1996) found the prevalence of (self-reported) psychological distress to be significantly higher in nurses (and other NHS staff) than in the national workforce, and Bennett et al. (2001) report an association between job characteristics such as lack of management support and recognition, and making decisions under time pressure, and negative affect. Bradley and Cartwright (2002) provide further evidence for a link between perceived organisational support and health and job satisfaction. Furthermore, rates of anxiety and depression are thought to be higher amongst NHS staff in general than in other professional occupations (e.g. Williams, 1989). Nurses are thought to be particularly susceptible to burnout (e.g. Bakker et al., 2000), and there is evidence to suggest that (all-cause) mortality rates, psychiatric admissions and physical illness may all be higher in nurses (see Tyler & Cushway, 1992; cited in Kircaldy & Martin, 2000) than in the general working population.

1.7 SUMMARY: INDIVIDUAL AND COMBINED EFFECTS OF PHYSICAL AND PSYCHOSOCIAL OCCUPATIONAL STRESSORS ON HEALTH & WELL-BEING

1.7.1 Chapter overview

The aim of the current chapter was to summarise key literature relating to occupational stress research, including definitions, early theory development, and how job characteristics (individually and in combination) impact on health and well-being. 'Occupational stress' was discussed with reference to the most influential theoretical models of the last 40 years and their associations with health outcomes. Where possible, results obtained in public sector and nursing samples are presented. Recent research, highlighting the predictive validity of extensions to existing job stress models is also discussed, with particular reference to a 'combined effects' approach.

1.7.2 Influential job stress models and health outcomes

1.7.2.1 The Demand-Control-Support (DCS) model

The DCS model has historically been most often used to examine associations between job characteristics and health (Bosma et al., 1998). Support for the strain hypothesis (i.e. high demand, low control, low support) is well-established, whereas support for the buffer hypothesis (i.e. the moderating effects of control and social support) is more equivocal. The role and predictive validity of these two hypotheses has provoked some criticism of the model. Other criticisms of the model include over-reliance on self-report measures, and the omission of characteristics relevant to the modern working environment (e.g. job insecurity: Calnan et al., 2004).

In terms of heath effects, job strain has been found to predict cardiovascular disease (e.g. Theorell & Karasek, 1998), myocardial infarction (e.g. Yoshimasu, 2001), high blood pressure (e.g. Landsbergis et al., 1994) and cholesterol (e.g. Kawakami & Haratani, 1999). However, some studies failed to support such associations (e.g. Bosma et al., 1998; Riese et al., 2000). There is some support for an association between DCS and musculoskeletal symptoms (e.g. Skov et al., 1996) and psychological health outcomes, such as increased risk of psychiatric disorder (e.g. Stansfeld et al., 1999a), depression (e.g. Tsutsumi et al., 2001a), anxiety (e.g. Evans & Steptoe, 2002) and poor mental health status (e.g. Yang et al., 1997).

1.7.2.2 The Effort-Reward Imbalance (ERI) model

The ERI model addresses some criticisms of the DCS model, in that intrinsic effort can be viewed as a personal need for control, and therefore comprises a measure of individual differences. The model is also a valid measure of stress in the modern workplace, as factors such as job insecurity are addressed. However, the conceptualisation of overcommitment within the model has been the focus of some criticism. In the original model, overcommitment was viewed as a component of (intrinsic) effort, but later versions of the model suggest overcommitment is an independent concept. The ERI hypothesis has been extensively tested in the literature and is well-supported: results regarding overcommitment are inconsistent.

In terms of physical health outcomes, ERI has been associated with cardiovascular disease (e.g. Siegrist, 1996; Kivimäki et al., 2002; Kuper et al., 2002) and known risk factors (e.g. Siegrist, 1996; Peter et al., 1998), musculoskeletal symptoms (e.g. Van Vegchel et al., 2002), headaches (Van Vegchel et al., 2002), gastrointestinal symptoms (Peter et al., 1998), reduced physical functioning (Kuper et al., 2002) and poor self-rated general health (Weyers et al, 2006). Several studies have demonstrated associations between ERI and psychological outcomes such as mental exhaustion (Van Vegchel et al., 2002), sleep disturbance and fatigue (Peter et al., 1998), poor mental functioning (Kuper et al., 2002), psychological distress (Stansfeld et al., 1998a), burnout (Bakker et al., 2000) and depression (Pickart et al., 2004).

1.7.2.3 Additional job stress models

There are several alternative job stress models, including recent extensions to the DCS model (see Van Veldhoven et al., 2005). These models add additional job and interpersonal characteristics, and situational specificity. Some models (e.g. Warr's 1994 'Vitamin Model') are complex and as such have not been fully tested: for others, there is little evidence of associations with health outcomes (e.g. the Michigan Model), or the theoretical focus is on job design (e.g. the socio-technical approach (Kompier, 2003); the Job Characteristics Model (Hackman & Oldham, 1980)).

1.7.2.4 Independent effects of physical workplace stressors

There is a significant literature linking the (non-auditory) effects of noise to health outcomes (e.g. cardiovascular function, psychological distress, sleep). Associations between working hours and negative health consequences such as increased risk of coronary heart disease, myocardial infarction, poor pregnancy outcomes, colorectal cancer (in women) peptic ulcer disease, general health symptoms and psychological well-being, have also been established.

1.7.3 Combined effects of occupational stressors

A number of studies have examined the relative and/or combined influence of both the DCS and ERI models. Results indicate that although both models independently predict outcomes such as coronary heart disease (e.g. Kivimäki et al., 2002) and poor health status (e.g. Stansfeld et al., 1998b) the most variance in health is explained by a combination of the two models for outcomes such as mental distress (e.g. Rydstedt et al., 2007) and cardiovascular mortality risk (Peter et al., 2002). Some research also suggests that models or components of models may be differentially related to certain outcomes (e.g. Ostry et al., 2003; Smith et al., 2004). The addition of situation-specific stressors (Fillion et al., 2007) and other organisational variables (Akerboom & Maes, 2006) has also added to variance in health outcomes explained. A number of studies have considered large numbers of occupational stressors in an additive approach (e.g. Luz et al., 1990) and demonstrated a linear relationship between a composite score and outcomes such as work-related accidents.

1.7.4 Nursing-specific effects

Nurses are at significant risk of experiencing work-related stress (e.g. Fillion et al., 2007). A wide variety of factors have been suggested as causal in the stress process, which include components of established models and situation-specific characteristics such as dealing with death/dying, uncooperative patients and families, and concerns about poor quality patient care. These characteristics have been associated with psychological distress (Borrill et al., 1996), negative affect (Bennett et al., 2001), general health and job satisfaction (Bradley & Cartwright, 2002), anxiety and depression (e.g. Williams, 1989), burnout (e.g. Bakker et al., 2000), mortality rates, psychiatric admissions and physical illness (Tyler & Cushway, 1992; cited in Kircaldy & Martin, 2000).

1.8 ADDITIONAL STRESSORS AND THE ROLE OF INDIVIDUAL DIFFERENCES

There are a number of additional psychosocial and interpersonal workplace stressors which may also impact on health and well-being such as bullying, the quality of relationships between employees and supervisors and employees and co-workers, role stressors and organisational culture. These stressors are considered and discussed in depth in Chapter 4 of this thesis. Furthermore, the role of individual differences such as personality and coping style, may also impact significantly on relationships between characteristics of the work environment and health outcomes. These issues form the central focus of Chapter 7 of the current thesis, and are therefore outlined in detail at the beginning of the chapter.

1.9 DIRECTIONS FOR THE CURRENT RESEARCH

The research presented so far in this chapter indicates that job stress models explain more variance in health when studied in combination (e.g. Calnan et al., 2000) and also that physical and psychosocial stressors combine cumulatively to produce negative health effects (e.g. Tafalla & Evans, 1997; Smith et al., 2004), although the majority of research has focused on a limited set of largely physical health outcomes. Recent research in this area has tended to pursue two different, if complementary approaches: examination of the combined effects of physical and environmental workplace stressors and traditional job stress models (Smith et al., 2004), and examination of novel stressors, either generic or occupation-specific, in combination with traditional job stress models (Van Veldhoven et al., 2005; Fillion et al., 2007).

It has been suggested that more attention should be paid to interpersonal stressors (such as conflict and bullying at work), organisational culture and role stress when attempting to define and explain the nature of occupational stress and subsequent consequences for health (Cox, 1990; HSE, 2007: see Chapter 4 for further discussion of these issues). Broadly defined, the aims of this thesis are to draw together these different approaches to the study of combined effects of workplace stressors, and examine paradigms inclusive of traditional job stress models, physical and environmental workplace hazards, organisational culture and interpersonal and role stressors, in terms of associations with a broad range of both physical and psychological health outcomes.

CHAPTER 2

INTRODUCTION TO THESIS: OVERVIEW OF SAMPLE POPULATIONS AND METHODOLOGY

2.1 OVERVIEW AND OBEJCTIVES

The aim of the following brief chapter is to introduce the main objectives of the current thesis, the sample populations and methodologies used to study them. The main aim of the research subsequently described is to examine the combined effects of physical and psychosocial workplace hazards on a range of psychological and physical health outcomes. The potential workplace stressors considered in combination are derived from the evidence presented in Chapter 1, relating to the effects of traditional job stress models (DCS and ERI) and physical and environmental workplace hazards (see Chapter 3). Further novel stressors such as those comprising interpersonal conflict, organisational culture and role stress are also considered in later Chapters (4-8), in terms of what they might add to existing job stress models.

As noted at the end of Chapter 1, there is a dearth of research examining associations between established job stress models and health outcomes (predominantly physical health outcomes, and cardiovascular disease and associated risk factors in particular). However, there is comparatively very little research which attempts to examine how a wide range of potential physical and psychosocial workplace stressors might combine to produce negative health effects on a comprehensive set of both physical and psychological outcomes, which forms the primary objective of this thesis.

2.2 NATURE OF ASSOCIATIONS

The evidence presented in Chapter 1 suggests components of job stress models tend to demonstrate independent, rather than interactive effects: analyses described throughout this thesis are therefore primarily focused on independent, and not interactive effects of predictors. Combined effects of workplace stressors are for the most part assessed in terms of associations between an additive (stressor) score and health outcomes: interaction terms between score sub-components are not therefore directly assessed in a formal statistical sense, where an additive stressor score or scores serve as independent measures. However, conceptually at least, the composite Negative Occupational Factors (NOF) score described throughout this thesis does account for and include relationships which might elsewhere be expressed as interaction terms. For example, the literature (see Chapter 1) suggests that job demands may interact with control and/or social support at work, and the NOF score comprises the risk dimensions of these potential stressors (i.e. high demands, low control and low support). Later chapters (6 - 8) in this thesis also address the issue of interactions more directly. Where the NOF score is broken down into its' constituent parts and two or more factors are found to be associated with a particular outcome, interaction terms between these stressors are formally assessed. However, there is little evidence to suggest associations are accounted for by anything other than independent and cumulative effects.

2.3 SAMPLE POPULATIONS

Analyses described in this thesis were undertaken on two different occupational samples. The first was a public sector sample comprising two distinct occupational groups: nurses/healthcare professionals (allied to nursing) and individuals employed in social services and local government (n=1090), and the second comprised exclusively nurses and healthcare professionals (n=870). These samples were chosen given the likely and well-documented high prevalence of stress in service occupations such as healthcare and social services, and established associations with poor health and well-being.

In the first survey described (Chapters 3-6, healthcare and social services/local government employees), a number of significant differences were observed between the two occupational groups in terms of demographic characteristics and prevalence of health outcomes. Individuals employed in the healthcare sector were more likely to be female and of a younger age than the sample of local government/social service employees: other observed differences are most likely attributable to discrepancies in gender and age. However, analyses detailed in Chapters 3-6 were carried out on the sample as a whole, rather than each group individually. The rationale for this approach was based on the fact that the samples differed significantly on very few psychological or acute health outcomes, which were the main focus of interest. Furthermore, occupational group, gender and age were included in all models as covariates. Moreover, the majority of respondents (n=791 vs. n=299) comprised healthcare workers. For this reason, the second sample described in this thesis comprised healthcare workers only.

2.4 METHODOLOGY AND STATISTICAL TECHNIQUES

2.4.1 Derived stressor scores: NOF and demographic risk

The Negative Occupational Factors (NOF) score represents exposure to multiple workplace stressors. The original score comprises: job demands, (low) decision latitude, (low) social support, high effort (intrinsic and extrinsic), (low) reward, unfavourable working hours and exposure to physical hazards (the additional impact of 'novel' stressors, in particular workplace bullying, is also assessed in the current thesis via modifications to the original score). The score is derived based on the mean of quartile splits[1] of included stressors (an adjustment is made for missing data by multiplying the mean value by the number of scales comprising the total score, i.e. 7). The score can be thought of as analogous to a derived measure of Socio-Economic Status (SES): specific outcomes are associated with particular components within SES, yet the combined score gives a reliable indicator of the relationships between demographic factors and poor health. A similar pattern of effect is expected for an occupational equivalent, i.e. NOF.

[1] Later versions of the NOF score include some stressors based on dichotomous as opposed to categorical items: all NOF scores are therefore calculated based on quartile splits of total scores. However, according to Smith et al. (2004) the method of NOF calculation has little impact on the nature of associations observed with health outcomes. Therefore, a similar pattern of effects would be expected were a score based on individual items within stressor scales utilised.

A conceptually similar demographic 'risk' score is also calculated for both samples described in this thesis, and its' impact on health outcomes assessed. The rationale for this approach, is to determine whether NOF is associated with a greater number of significant associations, and whether these are larger in magnitude than those observed for demographic and individual risk factors. For both sets of data, demographic and individual characteristics (age, gender, marital status, education, social class, part-full time employment, income, occupational group, negative affectivity and for Survey II, coping style) were entered into a stepwise (backward) regression model, in order to determine their relative influence on key health outcomes. For both datasets, dichotomies of characteristics significantly associated with key outcomes (psychological well-being and acute health) were included in a combined score. Based on the frequency distribution of risk factors, 3-category variables were created to reflect discrete levels of exposure or risk (dependent on the number of key risk factors identified for each sample). It should be noted however, that it was not the aim of the current thesis to determine the absolute influence of individual and demographic risk factors in terms of health outcomes, but to demonstrate the effects of the NOF score relative to demographic characteristics.

2.4.2 Main analytical approach: binary logistic regression

Research described in this thesis comprised two cross-sectional self-report surveys. All analyses were carried out using binary logistic regression (SPSS 12). Logistic regression was chosen given that the subsequently described dependent measures are dichotomous, and that the aim of all analyses is to determine the likelihood of reporting particular health outcomes based on a set of predictor (independent) variables. Logistic regression is an effective way of describing the relationship between one or more risk factors and a dichotomous outcome. Use of binary dependent variables is considered a violation of many of the assumptions of linear regression (e.g. homoscedasticity, or assumed equal/similar variance around the dependent measure for all values of the independent variable). Traditional linear regression models are not therefore an appropriate approach to analysis, given the nature of outcome measures under study in this thesis. All symptom and medication outcomes were binary in nature. Psychological well-being outcomes were converted to binary (dichotomous) variables for several reasons: the original measure of work-related stress was categorical, not continuous in nature. Although measures of anxiety and depression were continuous and therefore theoretically suitable for analysis using a linear model, these two outcomes were converted to dichotomies to allow comparison with effect sizes for other dependent variables.

A potential disadvantage of logistic regression is that the approach requires more data than standard linear models (minimum of 50 data points per predictor as opposed to a lower bound of 20). However, both samples detailed in this thesis are more than large enough to satisfy this requirement.

Depending on the aim of the analyses, two different entry techniques are employed. For the majority of analyses, where the objective is to determine the influence of a particular independent variable on a particular outcome whilst controlling for the effects of covariates (i.e. demographic characteristics), the enter method is used (i.e. all model terms are entered in a single step). However, where the aim of analyses (see Chapter 4) is to determine which, of a set of independent measures explains the most variance in a particular health outcome, a (backwards) stepwise entry method is employed. A stepwise, as opposed to hierarchical method was chosen, given the exploratory nature of analyses described in Chapter 4: no assumptions about the entry order or likely importance of independent variables were made.

In models based on the enter method, and where the primary independent measure comprises four or more categories, several types of contrast are used. All models are first analysed using an indicator contrast (e.g. where the lower quartile of a score is set as the reference category and each subsequent category is compared to this directly). Secondly, analyses are repeated using either a repeated contrast (where each successive category is compared to the previous, if the aim is to determine whether effects are cumulative), or a deviation contrast (where each category of a score is compared to the effect of the variable overall, if the aim is to determine the category which explains the greatest variance in a particular health outcome). Goodness of fit of all models was assessed using Hosmer and Lemeshow's statistic: unless otherwise stated, all models demonstrated adequate goodness of fit. Multicollinearity was assessed by means of a series of linear regressions: all tolerance values exceeded 0.1 and all VIF values were less than 10[2].

2.4.3 Correlations between dependent, and independent measures

All correlations between dependent variables detailed (Appendix III) are non-parametric given the dichotomous nature of outcomes measures. Correlations described between independent measures are also non-parametric (Spearman's rho). Although it is possible to describe parametric correlations between all independent variables, a non-parametric approach was chosen, given all subsequently described analyses are based on either quartile or median splits of independent variables as opposed to the original continuous measure. This enabled consistency of comparison with correlations amongst dependent measures. However, parametric correlational analyses (Pearson's r) of continuous independent measures in Survey I revealed a similar pattern of association and no evidence of multicollinearity.

2.4.4 Independent measures: quartile and median splits

All analyses described in the current thesis utilise either quartile or median splits of independent measures. This approach was taken for a number of reasons: firstly, to enable comparison with previously described research (Smith et al., 2004). Secondly, this approach allows the researcher to determine the relative influence of discrete levels of exposure to a particular stressor. Depending on the type of contrast used, it is possible for example, to directly compare the relative effects of 'low' and 'high' exposure to work-related stressors in terms of a particular health outcome. However, it should be noted that the categorisation of stressors in this way is to some degree arbitrary, and a different pattern of effects would emerge if continuous independent measures were utilised. Use of continuous measures would enable more robust conclusions about the linearity or non-linearity of associations between stressors and health to be drawn; however, a key aim of this thesis is to describe the combined and cumulative effects of stressors, and to determine the relative influence of discrete levels of exposure. Use of derived categorical independent measures best facilitates this approach.

[2]Tolerance values of less than 0.1 (Menard, 1995) and VIF (Variance Inflation Factor) values of greater than 10 (Myers, 1990) are indicative of collinearity.

2.5 THESIS STRUCTURE

Following on from the review of the literature detailed in Chapter 1, Chapters 3-6 describe the first survey and analyses carried out on the healthcare and social services/local government sample. The purpose of analyses detailed in these chapters is to determine whether previously established combined effects of a composite (Negative Occupational Factors: NOF) score are replicable within a more homogenous occupational group than the community sample described by Smith et al. (2004). Further aims of these chapters are to determine the influence of an additional set of interpersonal and organisational stressors (described in detail in Chapter 4) relative to NOF, and also to determine whether NOF components are selectively, as well as cumulatively, associated with health outcomes. Chapters 7-8 describe analyses carried out on the sample of healthcare workers only. The main aims of these chapters are to determine whether cumulative and selective effects of workplace stressors demonstrated in preceding chapters are replicable within a single occupational group. Other objectives explored in Chapters 7 and 8 are to determine the effects of an occupation-specific stress model relative to a more generic model (i.e. that represented by the NOF score), and to explore the role of individual differences such as negative affectivity and coping style in explaining associations between stressors and health outcomes.

CHAPTER 3

COMBINED EFFECTS OF PHYSICAL AND PSYCHOSOCIAL WORKPLACE HAZARDS: HEALTH AND WELL-BEING IN A SAMPLE OF PUBLIC SECTOR EMPLOYEES

3.1 INTRODUCTION

3.1.1 Overview

The following chapter describes a cross-sectional self-report study of the relationship between combined effects of workplace hazards and measures of health and well-being in a sample of public sector workers (nurses and local government/social services employees). The primary aim of the current chapter is to replicate previous findings with regards the significant additive relationship between occupational stressors and a set of physical and psychological health outcomes (Smith et al., 2004). Evidence which highlights both the cumulative and selective effects of occupational stressors on subjective measures of health and well-being is outlined briefly in the following sections, with particular reference to the Smith et al. study (see Chapter 1 for a more complete review of the literature).

3.1.2 Independent and combined effects of workplace stressors

The independent effects of both the Demand-Control-Support (DCS) and Effort-Reward Imbalance (ERI) models on heath outcomes, in particular cardiovascular disease and associated risk factors (e.g. Peter et al., 1998; Theorell & Karasek, 1998; Kivimäki, et al., 2002) are well established across a variety of occupational groups and are described in detail in Chapter 1. Support has also been found for associations between both models and musculoskeletal outcomes (e.g. Skov et al., 1996; Tsutsumi et al., 2001b; Van Vegchel et al., 2002), and between ERI and minor physical health complaints (e.g. Peter et al., 1998; Kuper et al., 2002; Van Vegchel et al., 2002; Weyers et al, 2006). These two most influential job stress models have also been found to predict a number of psychological health outcomes (e.g. Stansfeld et al., 1998a, 1999a; Bakker et al., 2000; Tsutsumi et al., 2001a; Evans & Steptoe, 2002; Pickart et al., 2004). However, neither of the above models considers the potentially negative impact of environmental workplace stressors (i.e. noise and irregular working hours), although there is evidence to suggest the non-auditory effects of noise on health include poorer cardiovascular function (Butler et al., 1999), psychological distress (Smith, 1991) and poor sleep quality (Smith & Broadbent, 1992). Irregular working hours have also been found to predict coronary heart disease, poor pregnancy outcomes, colorectal cancer, peptic ulcer disease, general health symptoms and poor psychological well-being (e.g. Sparks, 1997; Borg & Kristensen, 1999; Knutsson, 2003; Schernhammer et al., 2003).

As outlined in Chapter 1, there is evidence to suggest that combinations of job stress models explain greater variance in well-being outcomes than a single model studied in isolation. It is suggested that the most variance in health is often explained by a combination of the two models for outcomes such as mental distress and job satisfaction (Calnan et al., 2000), cardiovascular mortality risk (Peter et al., 2002) and mental strain (Rydstedt et al., 2007). Some studies have also suggested that particular models or components of models, tend to have differential impacts on health outcomes (e.g. ERI and chronic disease outcomes: Bosma et al., 1998; Peter et al., 2002; Ostry et al., 2003; Fillion et al., 2007).

Some researchers have investigated the predictive validity of assessing situation-specific and/or organisational stressors in addition to components of either the DCS or ERI models (e.g. Akerboom & Maes, 2006; Fillion et al., 2007). Several studies have also combined relatively large numbers of occupational stressors (e.g. Luz et al., 1990; Melamed et al., 1999) and demonstrated a linear relationship between a composite score and outcomes such as work-related accidents. Recent research (Smith et al., 2004) also lends weight to the suggestion that a combination of job stress models (and additional work environment stressors) predicts significantly more variance in health outcomes than either the DCS, ERI (or components of each) alone. However, the findings also indicated that particular components of models tended to be differentially related to health outcomes.

3.1.3 Calculation of a combined Negative Occupational Factors (NOF) score

Previous research has examined the effect of a combined Negative Occupational Factors (NOF) score on health and well-being outcomes in a population sample of full-time employees (data from the Bristol Stress & Health at Work Survey and the

Cardiff Community Survey as described by Smith et al., 2004). It was hypothesised that the negative influence of job characteristics would be greatest in combination, therefore a combined (NOF) score was calculated based on mean scores for all individual items within the Job Demand-Control-Support and Effort-Reward Imbalance models and specific items relating to working hours (four items: shift work, night work, long/unsociable hours, unpredictable hours) and exposure to workplace hazards (four items: background noise, ringing in the ears, exposure to/inhalation of harmful substances, handling harmful substances). The resulting score comprised 53 items in total. A quartile split of this variable was subsequently entered into a series of logistic regression analyses in order to examine its' impact on health outcomes (both physical and psychological), accidents and injuries.

3.1.4 Additive and selective effects of the NOF score

In the results described by Smith et al. (2004) the combined NOF score was not found to be significantly associated with a number of health and health-related behaviour outcomes, such as smoking, alcohol consumption above recommended levels, lifetime prevalence of coronary heart disease (CHD) and associated risk factors (i.e. high blood pressure and serum cholesterol; diabetes), lifetime prevalence of cancer and a 12-month history of back pain and asthma and/or hay fever. A high NOF score was not found to predict recent use (i.e. within the last 14 days) of psychotropic medication either.

Where significant associations with outcomes were observed, these tended to demonstrate several distinct patterns of effect, dependent to some extent on the outcome measure studied. Linear effects were observed for work stress, clinical anxiety and acute psychological problems, in that the likelihood of reporting these outcomes continued to increase significantly with each successive quartile of the NOF score. Depression (i.e. scores indicating probable clinical depression) and acute health problems such as upper-respiratory tract infections, gastrointestinal symptoms (vomiting and/or diarrhoea) and back pain were significantly associated with high levels of exposure to negative occupational factors only (i.e. scores falling within the upper quartile). Acute respiratory symptoms were associated with exposure to occupational stressors at both moderate (2^{nd} quartile) and high (4^{th} quartile) levels, and use of pain relief and/or indigestion medication in the last 14 days was associated with moderate exposure only, i.e. reported use did not increase significantly with higher exposure.

3.1.5 Occupation-specific effects of the NOF score

Further examination of these patterns of effect in relation to occupational group (e.g. managers/administrators, professional occupations, sales, mechanical/plant operatives) and employment status (e.g. self-employed, supervisor, manager, employee) suggest it is unlikely that the majority of these effects are occupation-specific (Smith et al., 2004). The impact of the NOF score on work-related stress, anxiety and acute lower respiratory symptoms was found to be independent of current employment status. However, the effect of the NOF score on a number of other outcomes did vary according to employment status, for example: acute back pain was most likely to be reported amongst self-employed individuals and managers in the upper quartile of the NOF score.

3.1.6 Negative occupational factors and stress mediation

Each quartile of the NOF score was also stratified according to high or low work stress in order to determine whether the influence of the total score reflected self-reports of stress, rather than level of exposure to negative occupational factors (Smith et al., 2004). No effects of stress mediation were evident for depression, acute psychological or lower respiratory tract symptoms. However, acute back pain and gastrointestinal symptoms were found to increase as a function of stress for individuals exposed to high levels of occupational stressors only (i.e. the upper quartile of the NOF score). The relationship between the NOF score and clinical anxiety does appear to be mediated by self-reports of work-related stress at all levels of exposure.

3.1.7 Current hypotheses

Given the findings outlined above, it was hypothesised that a composite occupational stressor score based on the same variables (i.e. demand-control-support, effort-reward imbalance, working hours/hazards) is likely to demonstrate the following patterns of association with health and well-being outcomes in a sample of public sector employees:

1. Cumulative, linear effects are likely to be observed between the NOF score and measures of psychological well-being such as work-related stress and probable clinical anxiety. Likelihood of reporting probable clinical depression however, is expected to demonstrate a significant association with very high levels of exposure to negative occupational factors only.

2. Individual and factor-derived composite chronic (lifetime prevalence) and long-term (12-month) health outcomes are likely to demonstrate few significant associations with a Negative Occupational Factors (NOF) score, due to the low prevalence of individual symptoms and the absence of significant effects observed by Smith et al. (2004). Total symptom scores are however likely to demonstrate significant associations with high levels of NOF at least, and therefore comprise the only measures of longer-term health problems assessed in this thesis.

3. Exposure to very high levels of stressors only, is likely to be significantly associated with acute physical health symptoms such as upper-respiratory tract infections, gastrointestinal symptoms and musculoskeletal complaints. However, a cumulative relationship between exposure to occupational stressors and acute psychological ill-health is likely to be observed, based on previous findings.

4. Recent use of prescribed medications such as pain killers and medicines for indigestion, is likely to be associated with relatively low levels of exposure to negative occupational factors: risk of reporting is not thought to increase with additional exposure to stressors above a particular threshold. The impact of 12-month use of prescribed medications is likely to follow a similar pattern, although 12-month use of psychotropic medication may be significantly associated with NOF, given the higher prevalence of this outcome as compared to 14-day use (14-day use of prescribed psychotropic medication was not previously associated with NOF).

Subsequently described are the methodology employed to assess these hypotheses, summary statistics and logistic regression analyses where a composite stressor score (NOF) served as the predictor variable across a number of health outcomes.

3.2 METHOD

The measures included in the survey, the sample and response rates are detailed in the following sections. It should be noted however, that it is not the purpose of the current study to identify a truly representative sample of public sector employees, or to estimate the prevalence of poor health outcomes within this occupational group. Rather, the aim of this chapter is to determine potential work-related correlates of poor health.

3.2.1 Participants and procedure

4,500 questionnaires were sent to members of the Royal College of Nursing (RCN) and UNISON in Wales; the response rate was 26.4%.[3] The final sample consisted of 1090 individuals currently employed in nursing, social and public services and local government.[4] The questionnaire comprised 35 pages[5], including instructions to respondents, and contact details for the principal researcher. A covering letter from a senior union representative, highlighting their support for the research project was enclosed. Also included in the questionnaire pack was a freepost envelope and sheet on which participants could register their interest in future research should they wish to do so. Respondents were assured of the confidentiality of any information provided: contact details were not kept unless participants specifically expressed an interest in taking part in future research.

3.2.2 Demographic, occupational and individual characteristics

Information on the following demographic, occupational and personality characteristics was collected: gender, age, income, education, marital status, work

[3] The response rates (questionnaires returned completed) for the Bristol Stress and Health at Work Survey and the Cardiff Community Survey were 41.6% and 26.6% respectively (Smith et al. 2004).
[4] The total number of respondents was 1188. However, 98 individuals were excluded as they worked in the private sector, or did not provide adequate information regarding their occupational status.
[5] See Appendix I.

pattern (full versus part-time), socio-economic status and negative affectivity. Negative affectivity was measured using three items[6] from The Eysenck Personality Inventory Neuroticism Scale (Eysenck & Eysenck, 1968): 'Are your feelings rather easily hurt?', 'Would you call yourself tense or highly strung?', and 'Do you worry about awful things that might happen?' Responses to these items (0=no, 1=yes) were summed to give a neuroticism score. The coefficient alpha for the three items was .59. Eysenck, Barrett, Wilson and Jackson (1992) report internal consistencies between .70 and .80 for the scales comprising the 21-components of the original P-E-N[7] system.

Measures of physical and psychosocial hazards and health outcomes are described subsequently in detail.

3.2.3 Independent measures

Independent measures were employed to assess the following occupational and interpersonal characteristics: job demands, control over work, social support, intrinsic effort, extrinsic effort, reward, unfavourable working patterns and exposure to physical hazards.

<u>The job demand-control-support model (JDCS: Karasek, 1979; Johnson & Hall, 1988)</u>

Job demand was measured using a 4-item scale (e.g. 'Do you have to work very fast?') scored from 0 to 4 (0=often, 1=sometimes, 2=seldom 3=never/almost never and 4=not applicable). In order to calculate the job demand score, all 'not-applicable' responses were recoded as 'never/almost never' and appropriate items were reversed[8] so that a high score indicated high demands. The total score was calculated by summing included items and expressing this value as a percentage of the maximum possible raw score.

Decision latitude (control) consists of two sub-scales: skill discretion and decision authority. The skill discretion scale comprises 6 items (e.g. 'Does your work demand a high level of skill?') and the decision authority scale comprises 9 items (e.g. 'I have a

[6] The reliability of this 3-item scale as compared to the original measure is assessed in Chapter 7.
[7] Psychoticism-Extroversion-Neuroticism
[8] The questionnaire described in this chapter can be found in Appendix I. Where items were reversed in order to calculate scale totals, these are marked with an asterisk.

great deal of say in decisions about my work'). Scores for these sub-scales were calculated in the same manner previously described for the job demand sub-scale; 'non-applicable' responses were recoded as 'never/almost never', and appropriate items were reversed in order that a high score was indicative of high skill discretion and decision authority. Total scores were calculated by summing responses to items and expressing this value as a percentage of the maximum possible raw score. Decision latitude was calculated by summing the skill discretion and decision authority scores and dividing by 2.

The social support sub-scale comprises 6 items (e.g. 'How often are colleagues willing to listen to work-related problems?'). 'Non-applicable' responses were recoded as 'never/almost never', and appropriate items were reversed in order that a high score indicated high support. The total scale score was calculated in the same way as for job demand, skill discretion and decision authority.

Cronbach's alpha reliability coefficients in a UK sample of civil servants were reported as .84 for decision latitude, .67 for job demand and .79 for social support (Stansfeld et al., 1998a). Coefficient alphas for the current sample were as follows: decision latitude = .81, job demand = .65, social support = .85.

The effort-reward imbalance model (ERI: Siegrist, 1996)

Eight items within the model required participants to rate to what extent they agreed or disagreed with a series of statements about work (0=agree, 3=disagree). For a further 12 items, participants were asked whether they agreed or disagreed (yes=1 or no=0) with a statement, and were then required to rate to what extent they felt distressed by it (0=not at all distressed, 3=very distressed). Where participants disagreed with a particular item, this was recoded as low exposure (i.e. low distress). The model comprises three sub-scales: intrinsic effort, extrinsic effort and reward. The extrinsic effort scale consists of 4 items (e.g. 'I have constant pressure due to a heavy workload'), and the intrinsic effort scale comprises 8 items, all but one of which was reversed ('When I come home, I can easily relax and switch off from work problems') in order that a high score indicated high effort. The reward scale also comprises 8 items (e.g. 'I receive the respect I deserve from superiors and colleagues'). Siegrist (1996) advocates calculating scale totals as a ratio of effort as compared to rewards. However, the intention of the analyses subsequently outlined in further chapters is to compare the relative impact of components of the NOF score. Therefore, for the purposes of the current analysis, total scores were created separately for intrinsic effort, extrinsic effort and reward.

Sub-scale scores were calculated by summing responses to included items and expressing values as a percentage of the maximum possible raw score.[9] Hanson, Schaufeli, Vrijkotte, Plomp and Godaert (2000) reported the following alpha coefficients for the sub-scales within a Dutch sample: extrinsic effort = .71, intrinsic effort = .82, status control (reward) = .70 and esteem reward (reward) = .77. Coefficient alphas for the current sample were as follows: extrinsic effort = .75, intrinsic effort = .78 and reward = .80.

Shift work, long working hours and exposure to physical hazards

The following 8 items were included in order to assess the proportion of respondents reporting unfavourable working patterns, or exposure to noise and hazardous substances: (taken from the Bristol Stress & Health at Work Survey; Smith Johal, Wadsworth, Davey-Smith & Peters, 2000) 'Do you work at night?', 'Do you do shift work?', 'Do you have to work long or unsociable hours?', 'Do you have unpredictable working hours?', 'Does your job ever expose you to breathing fumes, dusts or other potentially harmful substances?', 'Does your job ever require you to handle or touch potentially harmful substances or materials?', 'Do you ever have work tasks that leave you with a ringing in your ears or a temporary feeling of deafness?', and 'Do you work in an environment where the level of background noise disturbs your concentration?'. Responses were scored from 0 (often) to 3 (never/almost never). A total 'exposure' score was calculated by reversing responses to each item (in order that a high score indicated a negative outcome), summing the total and expressing the result as a percentage of the maximum possible raw score. The coefficient alpha for the current sample was .79.

[9] For the extrinsic effort and reward sub-scales, adjustments were made for missing data (>5% missing). Missing values were recoded as zero, and adjustments made in order that one missing item per sub-scale was allowed for. The total score was then corrected using the formula: total score *(number of items within scale/number of items within scale -1).

Negative occupational factors (NOF score)

A composite stressor variable was created across the job demand-control-support and effort-reward imbalance models, and the unfavourable working hours/exposure to hazards score. A novel variable was created based on quartile splits[10] of the following scores; job demand, decision latitude, social support[11], extrinsic effort, intrinsic effort, reward and unfavourable working hours/exposure to physical hazards. The coefficient alpha for the current sample was .73. The current method of calculating NOF differs from that described by Smith et al. (2004) (the latter score was based on the mean of individual items within the scales outlined above). The NOF score was calculated as outlined in the current chapter in order to enable consistent comparison with analyses described in Chapter 5. However, as reported by Smith et al. (2004) the way in which the composite NOF score is calculated has little impact on the pattern of results observed.

3.2.4 Dependent measures

Dependent measures assessed in the subsequently described analyses include: work-related stress, probable clinical anxiety and depression, total symptom scores for lifetime prevalence of disease and 12-month symptoms, 12-month sciatica/back pain[12], measures of acute (i.e. within the last 14 days) physical and psychological well-being, and 12-month and 14-day use of prescribed medication.

Previous research examining the influence of a composite stressor score (NOF) on health-related behaviours (i.e. smoking status and alcohol consumption above recommended weekly levels) did not indicate any significant associations. Health-related behaviours were not therefore included in analyses as dependent variables (smoking status is however included as a covariate where significant associations between independent variables and lower respiratory tract infections are observed).

[10] An adjustment was made for missing data by calculating the mean score and multiplying this value by the number of scales comprising the total score (i.e. 7).

[11] For decision latitude and social support, appropriate items were reversed and the total scores re-calculated, so that a high score was indicative of negativity; i.e. low control and low support.

[12] Two single-item measures of musculoskeletal problems were also included separately as outcome measures: sciatica in the last 12 months and back pain in the last 14 days. Musculoskeletal disorders have been identified as a priority programme by the UK Health & Safety Executive, given they comprise the most prevalent form of occupational ill-health (Parkes, Carnell & Farmer, 2005).

Prevalence of current smokers and alcohol consumption above recommended levels is provided for information.

Individual and derived chronic and long-term health outcomes (other than total symptom scores and 12-month sciatica/back pain) were not considered as dependent variables in the current analyses either, given the low prevalence of the majority of individual items and the relative absence of significant associations in the study described by Smith et al. (2004).

A single-item dichotomous dependent measure of work-related stress in the last 12 months was included in analyses (not at all/mildly/moderately stressed vs very/extremely stressed). Remaining health outcomes are described below in detail.

Clinical anxiety and depression

Clinical anxiety and depression were measured using the Hospital Anxiety and Depression scale (Zigmond & Snaith, 1983). Both sub-scales (i.e. anxiety and depression) comprise 7 items. Participants were required to state their level of agreement with each of the 14 statements on a scale from 0 to 3. Items were reversed where necessary in order that a high score indicated a negative response. Responses to each of the items within the sub-scales were summed to create anxiety and depression scores. The clinical cut off for both sub-scales was set at 10: coefficient alphas were .86 for the anxiety and .83 for the depression sub-scales respectively. Reliability (Cronbach's alpha) has been reported as .82 for the anxiety and .77 for the depression sub-scales in a non-clinical UK general population sample (Crawford, Henry, Crombie & Taylor, 2001).

Physical and psychological symptom scores

Three symptom checklists were included in the questionnaire. The first (containing 12 items) asked: "Have you ever been told by the doctor that you have, or have had any of the following"? (yes/no). The second and third lists referred to symptoms of poor health and psychological functioning in the last 12 months (14 items) and 14 days (21 items) respectively. A number of novel outcome variables were created based on these items; firstly, total symptom scores[13] were calculated across each of the symptom lists (created by summing the number of positive responses). Secondly, exploratory factor analysis (varimax rotation) of the acute (14-day) symptom checklists revealed a logical structure[14]:

- Upper respiratory tract symptoms in the last 14 days
- Depression/fatigue in the last 14 days
- Lower respiratory symptoms in the last 14 days
- Gastrointestinal symptoms in the last 14 days
- Back pain/swollen ankles in the last 14 days
- Tooth/earache in the last 14 days

Items loading on these factors were summed to create appropriate dependent measures.

Use of medication

Use of prescribed medication during the last 12 months and last 14 days was assessed[15]. The following types of medication were included in a checklist: pain killers, medicines for indigestion, blood pressure tablets, sleeping pills, antidepressants, medicines for stress or anxiety, laxatives and 'other medicines'. Outcome measures were based on separate exploratory factor analyses (varimax rotation)[16] of medication use within the last 12 months and last 14 days respectively. These were as follows:

- Pain killers and indigestion medication in the last 12 months
- Psychotropic medication in the last 12 months
- Pain killers and indigestion medication in the last 14 days
- Psychotropic medication in the last 14 days

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[13] Categories of 'other symptoms' were included in total symptom scores for the last 12 months and 14 days but were not entered into subsequent factor analyses.
[14] Factor loadings are presented in Appendix II. However the following items did not load highly on any factor (<.50): heartburn, dizziness, chest pains and skin rashes in the last 14 days.
[15] Prescribed medication use within the last month was also assessed in the questionnaire. However, only acute (14-day) and long-term (12-month) use were examined in the current analysis.
[16]Factor loadings are presented in Appendix II.

Items loading on these factors were summed to create appropriate dependent measures. However, blood pressure tablets, sleeping pills and laxatives did not load highly on any factor.[17] Total 'use of medication' scores were also created by summing positive responses to medicines taken in the last 12 months and 14 days respectively.

3.3 SUMMARY STATISTICS

Covariates comprised negative affectivity, demographic and specific occupational characteristics; descriptive statistics are presented in this chapter. All independent variables comprised additive scales (means and standard deviations presented in the following section). All dependent variables were dichotomous and comprised physical and psychological health outcomes. Descriptive statistics are presented for the sample as a whole, and for the two occupational groups: healthcare workers and social services/local government employees (N.B. descriptives are the same for Chapters 4-6 and are not therefore presented again).

3.3.1 Demographic, occupational and individual characteristics

Descriptive statistics for demographic and occupational characteristics (where these variables served as covariates in subsequent analyses) are shown in Tables 1 and 2.

[17] Laxatives did load highly (.61) with pain killers and indigestion medication in the last 14 days. However, for the purposes of consistency, laxatives were not included in the composite score.

Table 1: Demographic characteristics of a sample of public sector employees

	Healthcare	Social services/local government	Total sample
Male	77 (9.8%)	96 (32.7%)	173 (16.0%)
Female	707 (90.2%)	198 (67.3%)	905 (84.0%)
19-30 yrs	99 (12.7%)	20 (6.9%)	119 (11.1%)
31-40 yrs	243 (31.1%)	76 (26.1%)	319 (29.7%)
41-50 yrs	260 (33.2%)	101 (34.7%)	261 (33.6%)
51-65 yrs	180 (23.0%)	94 (32.3%)	274 (25.5%)
< £10,000 p.a.	74 (9.5%)	40 (13.8%)	114 (10.6%)
£10-19,999 p.a.	370 (47.3%)	147 (50.9%)	517 (48.2%)
£20, 000+ p.a.	339 (43.3%)	102 (35.3%)	441 (41.1%)
No academic achievements	22 (2.8%)	25 (8.8%)	47 (4.4%)
GSCE/O levels	146 (18.6%)	65 (22.8%)	211 (19.7%)
A levels	46 (5.9%)	15 (5.3%)	61 (5.7%)
City & Guild	76 (9.7%)	68 (23.9%)	144 (13.5%)
BA/BSc	61 (7.8%)	21 (7.4%)	82 (7.7%)
Higher Degree	434 (55.3%)	91 (31.9%)	525 (49.1%)
Married/cohabiting	614 (78.3%)	232 (78.6%)	846 (78.4%)
Single/divorced/separated/widowed	170 (21.7%)	63 (21.4%)	233 (21.6%)
White[18]	762 (96.8%)	282 (97.9%)	1044 (97.1%)
Non-white	25 (3.1%)	6 (2.1%)	31 (2.9%)

The sample of health care workers comprised significantly more women (χ^2 [1, 1078] = 82.73, p<.0001), were younger (χ^2 [3, 1073] = 15.45, p < .001), tended to earn higher salaries (χ^2 [2, 1072] = 21.01, p<.0001) and have a higher level of educational attainment than the social services/local government sample (χ^2 [5, 1070] = 73.49, p<.0001).

[18] Ethnicity was not included as a covariate in subsequently described analyses due the very low proportion of non-white respondents.

Table 2: Occupational characteristics of a sample of public sector employees

	Healthcare	Social services/local government	Total sample
Full-time	574 (72.8%)	237 (79.3%)	811 (74.5%)
Part-time	215 (27.2%)	62 (20.7%)	277 (25.5%)
Manual work	25 (3.2%)	119(40.1%)	144 (13.3%)
Non-manual work	764 (96.8%)	178 (59.9%)	942 (86.7%)
Professional	*697 (88.3%)*	*51 (17.2%)*	*748 (68.9%)*
Managerial & technical	*25 (3.2%)*	*55 (18.5%)*	*80 (7.4%)*
Skilled: non-manual	*42 (5.3%)*	*72 (24.2%)*	*114 (10.5%)*
Skilled: manual	*3 (0.4%)*	*28 (9.4%)*	*31 (2.9%)*
Partly skilled	*18 (2.3%)*	*68 (22.9%)*	*86 (7.9%)*
Unskilled	*4 (0.5%)*	*23 (7.7%)*	*27 (2.5%)*

The healthcare sample comprised significantly fewer full-time (χ^2 [1, 1088] = 4.85, p<.02) and manual workers (χ^2 [1, 1086] = 255.41, p<.0001).

Table 3 shows the prevalence of negative affectivity across the sample, as measured by three items taken from The Eysenck Personality Inventory Neuroticism Scale (Eysenck & Eysenck, 1968).

Table 3: Prevalence of negative affectivity in a sample of public sector employees

	Healthcare	Social services/local government	Total sample
Are your feelings rather easily hurt?	473 (60.6%)	153 (52.0%)	626 (58.3%)
Would you call yourself tense /highly strung?	179 (23.1%)	68 (23.3%)	247 (23.1%)
Do you worry about awful things that might happen?	313 (40.3%)	112 (38.5%)	425 (39.8%)
High negative affectivity[19]	303 (39.2%)	103 (35.4%)	406 (38.2%)

[19] A dichotomous variable was created for use in subsequent analyses: low negative affectivity was defined as zero or 1 positive response and high negative affectivity as 2 or 3 positive responses. The 2 occupational groups did not differ significantly on this variable.

3.3.2 Dependent measures

Descriptive statistics for work-related stress and psychological health (and health-related behaviours) are shown in Table 4 (descriptives are the same for Chapters 4-6 and are therefore not presented again).

Table 4: Prevalence of stress, poor physical & psychological health and health-related behaviours

	Healthcare	Social services/local government	Total sample
Very/extremely stressed at work	193 (24.6%)	60 (20.3%)	253 (23.4%)
Clinically anxious	191 (24.9%)	79 (27.7%)	270 (25.6%)
Clinically depressed	50 (6.5%)	26 (9.3%)	76 (7.2%)
Currently smoking	*145 (18.5%)*	*40 (13.6%)*	*185 (17.2%)*
Alcohol above recommended levels	*141 (23.1%)*	*48 (21.5%)*	*189 (22.7%)*

Occupational groups differed significantly in terms of smoking prevalence only: χ^2 (1, 1077) = 3.63, p < .03.

Prevalence of physical and psychological symptoms is shown in Tables 5 and 6. (N.B. bivariate correlations between all dependent measures are given in Appendix III).

Table 5: Lifetime & 12-month prevalence of physical/psychological symptoms

Symptom/disease	Healthcare	Social services/local government	Total sample
Lifetime prevalence of disease			
Angina	5 (0.7%)	3 (1.1%)	8 (0.8%)
Heart attack	2 (0.3%)	3 (1.1%)	5 (0.5%)
High blood pressure	121 (15.8%)	65 (23.0%)	186 (17.7%)
High cholesterol	73 (9.6%)	32 (11.3%)	105 (10.1%)
Diabetes	20 (2.6%)	12 (4.3%)	32 (3.1%)
Stroke	2 (0.3%)	1 (0.4%)	3 (0.3%)
Breast cancer	8 (1.1%)	1 (0.4%)	9 (0.9%)
Other cancer	16 (2.1%)	6 (2.2%)	22 (2.1%)
Asthma	101 (13.3%)	45 (15.9%)	146 (14.0%)
Bronchitis	55 (7.2%)	29 (10.4%)	84 (8.1%)
Emphysema	2 (0.3%)	0 (0.0%)	2 (0.2%)
Depression	160 (20.9%)	67 (23.7%)	227 (21.6%)
12-month symptoms			
Sciatica/lumbago/backache	*312 (40.8%)*	*111 (39.4%)*	*423(40.4%)*
Arthritis/rheumatism	109 (14.4%)	56 (20.0%)	165 (15.9%)
Persistent foot trouble	98 (12.9%)	27 (9.7%)	125 (12.1%)
Varicose veins	69 (9.1%)	11 (4.0%)	80 (7.7%)
Bronchitis	50 (6.6%)	6 (2.2%)	56 (5.4%)
Asthma	79 (10.4%)	36 (12.9%)	115 (11.1%)
Hay fever	146 (19.2%)	60 (21.7%)	206 (19.9%)
Being constipated most of the time	84 (11.1%)	24 (8.6%)	108 (10.4%)
Piles	131 (17.4%)	33 (11.8%)	164 (15.9%)
Mouth/gums	85 (11.3%)	30 (10.9%)	115 (11.2%)
Skin problems	122 (16.1%)	37 (13.3%)	159 (15.4%)
Depression	89 (11.7%)	42 (14.9%)	131 (12.6%)
Stomach problems	200 (26.2%)	78 (27.9%)	278 (26.7%)

Significant differences between occupational groups were observed for lifetime prevalence of any symptom (χ^2 [1, 1027] = 4.28, $p < .02$) but not for 12-month symptom prevalence.

Table 6: 14-day prevalence of physical/psychological symptoms

Symptom/disease	Healthcare	Social services/local government	Total sample
14-day upper respiratory tract symptoms	*424 (56.2%)*	*143 (51.6%)*	*567 (54.9%)*
Cold/flu	254 (33.2%)	83 (29.5%)	337 (32.2%)
Cough/catarrh/phlegm	300 (39.0%)	101 (35.8%)	401 (38.2%)
Sore throat	243 (31.8%)	88 (31.4%)	331 (31.7%)
Blocked/runny nose	263 (34.6%)	100 (36.1%)	363 (35.0%)
14-day depression/fatigue	*601 (79.5%)*	*205 (74.3%)*	*806 (78.1%)*
Nervy/tense/depressed	208 (27.3%)	82 (29.3%)	290 (27.8%)
Tired for no apparent reason	348 (45.4%)	124 (43.8%)	472 (45.0%)
Difficulty sleeping	421 (54.7%)	136 (48.4%)	557 (53.0%)
Headache	423 (55.1%)	144 (50.7%)	567 (53.9%)
14-day lower respiratory symptoms	*93 (12.3%)*	*50 (18.3%)*	*143 (13.9%)*
Wheeziness	60 (7.9%)	35 (12.7%)	95 (9.2%)
Shortness of breath	75 (9.8%)	36 (13.1%)	111 (10.7%)
14-day gastrointestinal symptoms	*146 (19.4%)*	*40 (14.5%)*	*186 (18.1%)*
Diarrhoea	93 (12.3%)	35 (12.6%)	128 (12.3%)
Nausea/vomiting	86 (11.4%)	11 (4.0%)	97 (9.4%)
14-day back pain/swollen ankles	*339 (44.5%)*	*114 (41.3%)*	*453 (43.7%)*
Back pain	*311 (40.7%)*	*102 (36.6%)*	*413 (39.6%)*
Swollen ankles	91 (11.9%)	32 (11.5%)	123 (11.8%)
Acute tooth/earache	*166 (21.9%)*	*68 (24.6%)*	*234 (22.7%)*
Toothache/gum problems	85 (11.2%)	33 (11.9%)	118 (11.4%)
Earache/discomfort in ears	109 (14.3%)	44 (15.8%)	153 (14.7%)
Heartburn	252 (32.9%)	111 (39.6%)	363 (34.7%)
Dizziness	128 (16.8%)	41 (14.6%)	169 (16.2%)
Chest pain	48 (6.3%)	20 (7.2%)	68 (6.6%)
Rashes/skin problems	145 (19.1%)	51 (18.3%)	196 (18.9%)

Significant differences between occupational groups were observed for 14-day depression/fatigue (χ^2 [1, 1032] = 3.22, p < .05), 14-day lower respiratory symptoms (χ^2 [1, 1031] = 6.14, p< .01) and 14-day gastrointestinal symptoms (χ^2 [1, 1030] = 3.24, p< .04).

Prevalence of medication use within the last 12 months and last 14 days is shown in Table 7.

Table 7: Prevalence of prescribed medication use

Medication	Healthcare	Social services/local government	Total sample
Within the last 12 months:			
Pain killers/indigestion medication	415 (62.5%)	133 (55.2%)	548 (60.6%)
Pain killers	402 (59.6%)	136 (54.8%)	538 (58.3%)
Medicines for indigestion	161 (22.8%)	47 (18.7%)	208 (21.7%)
Psychotropic medication	*58 (8.1%)*	*24 (9.3%)*	*82 (8.4%)*
Antidepressants	56 (7.8%)	19 (7.3%)	75 (7.6%)
Medicines for anxiety or stress	24 (3.3%)	15 (5.8%)	39 (4.0%)
Blood pressure medication	56 (7.8%)	27 (10.3%)	83 (8.5%)
Sleeping pills	41 (5.7%)	8 (3.1%)	49 (5.0%)
Laxatives	61 (8.5%)	11 (4.3%)	72 (7.4%)
Within the last 14 days:			
Pain killers/indigestion medication	*321 (45.7%)*	*92 (37.1%)*	*413 (43.4%)*
Pain killers	341 (45.8%)	96 (36%)	437 (43.2%)
Medicines for indigestion	109 (15.3%)	37 (14.7%)	146 (15.1%)
Psychotropic medication	44 (6.1%)	16 (6.4%)	60 (6.2%)
Antidepressants	39 (5.4%)	14 (5.6%)	53 (5.5%)
Medicines for anxiety or stress	24 (3.3%)	7 (2.8%)	31 (3.2%)
Blood pressure medication	73 (10.1%)	35 (13.4%)	108 (11.0%)
Sleeping pills	30 (4.2%)	4 (1.6%)	34 (3.5%)
Laxatives	31 (4.3%)	8 (3.2%)	39 (4.0%)

Significant differences between occupational groups were observed for use of any medication in the last 12 months (χ^2 [1, 881] = 3.05, p< .05) and pain killers/indigestion medication in the last 12 months (χ^2 [1, 905] = 3.96, p< .03) only. Short-term psychotropic medication use (i.e. within the last 14 days) was excluded from further analyses given the low prevalence (<10%).

3.3.3 Independent measures

Descriptive statistics for independent measures are shown in Table 8.

Table 8: Descriptive statistics for independent measures

Measure	Sample	N	Min	Max	Mean	SD
Job demand	Healthcare	782	.00	100.00	63.74	19.37
	Social services/LG	291	.00	100.00	58.91	22.99
	Total	1073	.00	100.00	62.43	20.51
Social support[20]	Healthcare	776	.00	100.00	29.73	20.63
	Social services/LG	292	.00	100.00	32.53	22.45
	Total	1068	.00	100.00	30.50	21.17
Decision latitude	Healthcare	776	.00	83.33	36.30	14.18
	Social services/LG	288	4.63	95.37	40.58	16.37
	Total	1064	.00	95.37	37.46	14.92
Extrinsic effort	Healthcare	769	.00	100.00	32.38	20.30
	Social services/LG	284	.00	100.00	25.65	20.26
	Total	1053	.00	100.00	30.83	20.44
Intrinsic effort	Healthcare	773	.00	95.83	48.23	20.73
	Social services/LG	286	.00	100.00	50.00	20.97
	Total	1059	.00	100.00	48.71	20.80
Reward	Healthcare	746	.00	91.67	14.37	16.74
	Social services/LG	271	.00	91.67	17.11	18.44
	Total	1017	.00	91.67	15.10	17.24
Undesirable working hours/ exposure to hazards	Healthcare	774	.00	100.00	36.76	23.42
	Social services/LG	287	.00	91.67	21.28	21.10
	Total	1061	.00	100.00	32.58	23.82
Negative occupational factors score (NOF)	Healthcare	791	7.00	28.00	17.27	5.02
	Social services/LG	299	8.00	27.00	16.68	4.59
	Total	1090	7.00	28.00	17.11	4.91

LG = local government

Non-parametric correlations (Spearman's rho) between quartile splits of independent variables are given below in Table 9.

[20] Figures for social support and decision latitude refer to reversed scale calculations (i.e. high scores represent low social support and low decision latitude).

Table 9: Non-parametric (Spearman's rho) correlations between independent measures

	Job demand (N)	Social support (N)	Decision latitude (N)	Extrinsic effort (N)	Intrinsic effort (N)	Reward (N)	Work hrs/ hazards (N)	NOF (N)
Job demand	-	-	-	-	-	-	-	-
Social support	.256** (1059)	-	-	-	-	-	-	-
Decision latitude	.086** (1055)	.335** (1051)	-	-	-	-	-	-
Extrinsic effort	.574** (1037)	.289** (1036)	.110** (1028)	-	-	-	-	-
Intrinsic effort	.423** (1045)	.268** (1044)	.122** (1035)	.476* (1028)	-	-	-	-
Reward	.326** (1002)	.471** (1002)	.303** (994)	.373** (1007)	.351** (997)	-	-	-
Work hrs /hazards	.235** (1047)	.079* (1039)	.177** (1036)	.235** (1027)	.123** (1032)	.116** (992)	-	-
NOF	.645** (1073)	.614** (1068)	.468** (1064)	.690** (1053)	.617** (1059)	.654** (1017)	.437** (1061)	-

* Correlation significant at 0.05 level (2-tailed).
** Correlation significant at 0.01 level (2-tailed).

3.3.4 Analytic procedure

A quartile split of the NOF score served as an independent predictor in a series of logistic regression analyses (enter method). Two types of contrast were used; firstly, the lower quartile of NOF was set as the reference category and secondly a repeated contrast was used. The following variables were included in the model as covariates: gender, age, income, educational attainment, marital status, work pattern (full/part time), socio-economic status, negative affectivity and occupational group (i.e. health services/nursing and social services/local government). Unless otherwise stated, all models demonstrated adequate goodness of fit and variables were assessed for multicollinearity.

3.4 THE IMPACT OF NEGATIVE OCCUPATIONAL FACTORS (NOF) ON PHYSICAL AND PSYCHOLOGICAL WELL-BEING

As previously stated, a primary aim of the survey was to replicate the established additive association between combined effects of workplace hazards and physical and psychological well-being. Outcomes with prevalence rates of less than 10% were excluded from all analyses[21]. Results of the logistic regression analyses employed to assess this aim are described in detail in the following sections.

3.4.1 Outcomes not associated with the NOF score

No significant associations were observed between the NOF score and prescribed psychotropic medication use in the last 12 months. Patterns of association between NOF and the remaining outcome measures are described subsequently.

3.4.2 The Negative Occupational Factors (NOF) score, work-related stress and psychological well-being

Odds ratios and 95% confidence intervals where work-related stress and probable clinical anxiety and depression[22] served as dependent measures are shown below in Table 10 (in this instance the lower quartile of NOF was set as the reference category).

Table 10: Exposure to NOF, work-related stress, clinical anxiety & depression

		N	OR	95% CI
Work-related stress	1st quartile	272	1.00	
	2nd quartile	263	3.34+	1.59-7.01
Wald = 161.81, p<.0001	3rd quartile	272	8.25**	4.08-16.65
	4th quartile	213	43.75***	21.16-90.43
Clinical anxiety	1st quartile	275	1.00	
	2nd quartile	261	4.20***	2.09-8.44
Wald = 160.83 p<.0001	3rd quartile	264	10.74***	5.52-20.90
	4th quartile	212	40.48***	20.51-79.89

[21] Two outcomes were included in further analyses, despite a prevalence of <10%. Probable clinical depression was included as an outcome measure, given previous findings indicating NOF as a significant predictor of depression. 12-month use of prescribed psychotropic medication was also included as an outcome, as the impact of NOF on long-term psychotropic medication use had not previously been assessed.
[22] Negative affectivity was not included as a covariate where clinical anxiety or depression comprised dependent measures, due to the similarity of the variables.

Clinical depression	1st quartile	275	1.00	
	2nd quartile	259	2.06	0.51-8.42
Wald = 53.63 p<.0001	3rd quartile	264	9.69**	2.82-33.28
	4th quartile	211	28.44***	8.43-95.99

Note: repeated contrasts + (p<.05) ** (p<.001) *** (p<.0001)

Repeated contrasts confirm that risk of reporting work-related stress increased significantly with each successive quartile of the NOF score. However, this relationship is curvilinear, rather than linear: risk of reporting this particular outcome increased successively across the first three quartiles of the NOF score, but exposure falling within the upper quartile was associated with a substantially greater risk, over and above a simply additive effect. A similar effect was observed for clinical anxiety. Repeated contrasts revealed a significant association between exposure to NOF at the 3rd and 4th quartiles (i.e. high levels of exposure) for clinical depression. This pattern of results is indicative of a threshold effect: only relatively high levels of negative occupational factors are significantly associated with more severe psychological ill-heath.

3.4.3 The Negative Occupational Factors (NOF) score, lifetime prevalence of disease and 12-month symptoms

Odds ratios and 95% confidence intervals where lifetime prevalence of disease and 12-month health outcomes served as dependent measures are shown in Table 11, where the lower quartile of NOF was set as the reference category.

Table 11: Exposure to NOF, lifetime prevalence of disease & 12-month health

		N	OR	95% CI
Lifetime prevalence of	1st quartile	258	1.00	
disease/ill-health	2nd quartile	252	0.98	0.68-1.41
	3rd quartile	257	1.08	0.75-1.56
Wald = 12.74, p<.005	4th quartile	199	1.91*	1.26-2.90
12-month symptom	1st quartile	248	1.00	
score	2nd quartile	242	1.25	0.85-1.84
	3rd quartile	234	1.53	1.04-2.26
Wald = 27.66, p<.0001	4th quartile	186	3.09**	1.99-4.79
Sciatica in last 12	1st quartile	263	1.00	
months	2nd quartile	254	1.08	0.75-1.57

	3rd quartile	260	1.22	0.85-1.77
Wald = 14.77, p<.002	4th quartile	204	2.11*	1.39-3.19

Note: repeated contrasts * (p<.01) ** (p<.001)

Repeated contrasts show that risk of reporting lifetime prevalence of any disease was associated with exposure to NOF in the upper quartile only. High exposure to NOF at 4th quartile levels was also associated with an increased risk of reporting any symptom, and musculoskeletal outcomes (sciatica/back pain) in the previous 12 months.

3.4.4 The Negative Occupational Factors (NOF) score and acute ill-health

Odds ratios and 95% confidence intervals where 14-day health outcomes served as dependent measures are shown in Table 12 (where the lower quartile of NOF was set as the reference category).

Table 12: Exposure to NOF & acute ill-health

		N	OR	95% CI
14-day symptom score	1st quartile	247	1.00	
	2nd quartile	243	1.31	0.90-1.90
Wald = 37.45, p<.0001	3rd quartile	234	1.86+	1.27-2.73
	4th quartile	183	3.86**	2.46-6.08
Depression/fatigue in	1st quartile	261	1.00	
last 14 days	2nd quartile	253	1.27	0.86-1.87
	3rd quartile	253	2.84***	1.80-4.47
Wald = 40.54, p<.0001	4th quartile	204	5.58	2.95-10.53
Upper respiratory tract	1st quartile	262	1.00	
symptoms in last 14	2nd quartile	254	0.99	0.69-1.41
days	3rd quartile	252	1.29	0.90-1.86
Wald = 7.37, p<.05	4th quartile	201	1.60	1.06-2.42
Lower respiratory	1st quartile	259	1.00	
symptoms in last 14	2nd quartile	253	1.31	0.74-2.33
days[23]	3rd quartile	254	1.54	0.87-2.72
Wald = 7.85, p<.05	4th quartile	202	2.26	1.25-4.09
Gastrointestinal	1st quartile	261	1.00	
symptoms in last 14	2nd quartile	252	1.06	0.64-1.76

[23] This effect is no longer significant when smoking status is included in the model as a covariate, although non-smokers are marginally more likely to report lower respiratory tract infections when levels of work stressors (i.e. NOF) are high (Wald = 7.33, p<.06).

days	3rd quartile	252	1.06	0.64-1.76
Wald = 14.95, p<.002	4th quartile	202	2.25*	1.35-3.74
Backache/swollen	1st quartile	261	1.00	
ankles in last 14 days	2nd quartile	254	1.56	1.08-2.25
	3rd quartile	255	1.50	1.03-2.17
Wald = 14.73, p<.002	4th quartile	203	2.24+	1.48-3.39
Back pain in last 14	1st quartile	261	1.00	
days	2nd quartile	256	1.67*	1.15-2.43
	3rd quartile	258	1.57	1.07-2.30
Wald = 16.64, p<.001	4th quartile	205	2.37+	1.56-3.62
Tooth/earache in the	1st quartile	261	1.00	
last 14 days	2nd quartile	254	1.33	0.83-2.14
	3rd quartile	254	1.94	1.23-3.07
Wald = 10.06, p<.02	4th quartile	201	1.92	1.16-3.17

Note: repeated contrasts + (p<.05) * (p<.01) ** (p<.001) ***(p<.0001)

Repeated contrasts indicate that risk of reporting any symptom of poor health within the last 14 days was significantly associated with 3rd and 4th quartiles of NOF. Only very high levels of NOF (i.e. exposure falling within the upper quartile) were associated with acute gastrointestinal symptoms and back pain/swollen ankles; 3rd quartile level of NOF only were significantly associated with depression and/or fatigue in the last 14 days. An overall association with NOF was observed for the following outcomes: upper and lower respiratory symptoms, and tooth and/or earache in the last 14 days. Likelihood of reporting back pain in the previous 14 days was significantly associated with 2nd and 4th quartile levels of the NOF score.

3.4.5 The Negative Occupational Factors (NOF) score and prescribed medication use

Odds ratios and 95% confidence intervals where prescribed medication use outcomes served as dependent measures are shown in Table 13 (where the lower quartile of NOF was set as the reference category).

Table 13: Exposure to NOF & prescribed medication use

		N	OR	95% CI
Prescribed medication	1^{st} quartile	217	1.00	
in the last year	2^{nd} quartile	227	1.19	0.80-1.77
	3^{rd} quartile	219	1.08	0.72-1.62
Wald = 10.48, p<.02	4^{th} quartile	168	1.98*	1.26-3.12
Use of pain/indigestion	1st quartile	222	1.00	
medication in the last	2nd quartile	232	1.31	0.88-1.93
year	3rd quartile	224	0.94	0.64-1.38
Wald = 11.89, p<.008	4th quartile	175	1.91**	1.20-3.03
Use of prescribed	1st quartile	229	1.00	
medication in last 14	2nd quartile	225	1.03	0.71-1.52
days	3rd quartile	226	1.17	0.80-1.73
Wald = 15.51, p<.001	4th quartile	178	2.29*	1.45-3.61
Use of pain/indigestion	1st quartile	238	1.00	
medication in last 14	2nd quartile	231	0.96	0.65-1.41
days	3rd quartile	237	1.28	0.87-1.88
Wald = 19.67, p<.0001	4th quartile	189	2.30*	1.50-3.54

Note: repeated contrasts * (p<.01) ** (p<.001)

Repeated contrasts indicate that very high exposure to Negative Occupational Factors (NOF) was associated with increased use of any prescribed medication, and prescribed pain killers and/or indigestion medications within the last year and last 14 days.

3.5 DISCUSSION

In the following section, critical findings presented in the current chapter are summarised and directions for future research outlined. A summary of key findings is presented in Table 14.

Table 14: Summary of combined & selective NOF score effects

- Cumulative, linear patterns of association were evident between NOF and work-related stress & clinical anxiety (curvilinear for work stress)
- 'Threshold' effect for clinical depression at relatively high levels of NOF exposure (3^{rd} quartile): likelihood of reporting does not increase significantly with increased exposure
- Threshold effects for lifetime & 12-month symptoms at high levels of NOF exposure (4^{th} quartile)
- Threshold effect for 14-day symptoms (any) at high levels of NOF (3^{rd} quartile): likelihood of reporting continues to rise at higher levels of exposure (i.e. 4^{th} quartile)
- Patterns of effect for individual/symptom clusters within the last 14 days were generally less robust (smaller effect sizes & lower significance levels) with the exception of acute psychological problems
- The same pattern of effect as observed for clinical depression was found for 14-day depression/fatigue
- Only very high levels of NOF exposure (i.e. falling within the upper quartile) were associated with prescribed medication use outcomes

3.5.1 Differences between occupational groups

The results outlined in this chapter were adjusted for occupational group (amongst other demographic covariates). However, the two groups comprising the current sample (healthcare workers and social services/local government employees) differed significantly on a number of demographic and health outcomes. Employees in the healthcare sector were more likely to be female, of a younger age group, earn a higher salary, and have a higher level of educational attainment. This occupational group also contained more part-time, and fewer manual workers. In terms of health related behaviours and health outcomes, healthcare workers were more likely to smoke, but reported fewer acute lower respiratory symptoms (likely due to their younger age). However, they were more likely to report depression and/or fatigue and gastrointestinal symptoms in the last 14 days. Use of pain killers and/or indigestion medication in the last 12 months and 14 days was also higher in the healthcare sector.

3.5.2 Combined effects of negative occupational factors: Work-related stress and psychological well-being

It was hypothesised at the start of the chapter (hypothesis 1) that cumulative linear effects were likely to be observed between the NOF score and measures of psychological well-being such as work-related stress and probable clinical anxiety. The current findings support this assertion: a cumulative pattern of effects is evident in that likelihood of reporting these outcomes increased significantly with each successive quartile of the NOF score. However, the relationship appears curvilinear rather than linear in that risk of reporting increased successively across the first three quartiles of NOF, but exposure falling within the upper quartile was associated with a substantially increased risk, over and above a simply additive effect.

It was predicted that probable clinical depression would likely demonstrate a significant association with very high levels of exposure to negative occupational factors only. In the current sample however, lower levels of exposure (3rd quartile) were significantly associated with clinical depression; likelihood of reporting this outcome was further increased with higher levels (4th quartile) of exposure to negative occupational stressors. The incidence of probable clinical depression in the current sample appears slightly higher than that reported in the Smith et al. (2004) study (7.2% as compared to 5.7%). This may explain the slightly different pattern of effects: however, it is not known whether the incidence of clinical depression differs significantly between the two samples.

Calnan et al. (2004) suggested that job stress models generally may not be as predictive of depression and anxiety as for other psychological health outcomes such as work-related stress. This assertion is partially supported by the current results, given that the NOF score explained greater variance in work-stress than for clinical anxiety and depression. However, a combined stressor score (i.e. one that includes multiple stressors) likely predicts a greater proportion of the variance in these outcomes than a single model studied in isolation.

3.5.3 Combined effects of negative occupational factors: Lifetime prevalence of disease and 12-month symptoms

It was hypothesised at the start of the current chapter (hypothesis 2) that total symptom scores representing lifetime and 12-month prevalence of ill-health would likely demonstrate significant associations with high levels of NOF. This assertion is supported by the current results. Cumulative associations between lifetime and 12-month prevalence of ill-health and NOF were not observed however. This may be explained by the prevalence and severity of symptoms; lower levels of exposure to occupational stressors are likely to be associated with more prevalent and less severe health complaints only.

Although not presented in the current chapter, the relationship between NOF and cardiovascular disease risk factors (high blood pressure and/or serum cholesterol) was examined, given the established associations between components of NOF, in particular high effort and low demands, and cardiovascular disease and associated risk factors. No significant association was observed in the current sample however, which may be due in part to the relatively young mean age of the population under study.

12-month prevalence of musculoskeletal complaints was also significantly associated with exposure to high levels of occupational stressors in the current sample, an association not reported by Smith et al. (2004). Prevalence of this outcome within the current sample however, was higher (40%) than that reported in the Smith et al. (2004) study (30%); occupation-specific factors may underlie this apparent discrepancy.

3.5.4 Combined effects of negative occupational factors: Acute ill-health

Exposure to very high levels of stressors only, was expected (hypothesis 3) to demonstrate significant relationships with acute physical health symptoms such as upper-respiratory tract infections, gastrointestinal symptoms and musculoskeletal complaints. This hypothesis is partially supported by the current results. High levels of exposure to NOF only, were associated with acute gastrointestinal symptoms in the current sample. However, although the NOF score was associated with acute upper respiratory symptoms, no particular pattern of effect was observed for this outcome (prevalence was approximately 50% in both the current and Smith et al. studies).

Acute back pain was significantly associated with exposure to NOF at the 2nd and 4th quartiles of the score. However, the proportion of the current sample reporting this outcome appears slightly higher than in the Smith et al. study (39.6% as compared to 33.8%). It is not known whether the two samples are statistically different in terms of this outcome.

A number of acute health outcomes not previously measured were found to be differentially related to the NOF score. Risk of reporting any symptom of acute ill-health was associated with 3rd and 4th quartile levels of NOF. Back pain and/or swollen ankles in the last 14 days were associated with upper quartile levels of NOF only, lending support to the 3rd hypothesis. However, only overall associations between NOF and the following acute health outcomes were observed: 14-day lower respiratory symptoms and tooth and/or earache.

It was also hypothesised that a cumulative relationship between exposure to occupational stressors and acute psychological ill-health would likely be observed. However, in the current sample, acute depressive symptoms were associated with exposure to NOF at 3rd quartile levels only: additional exposure did not explain further variance in this particular outcome. However, acute psychological symptoms appeared more prevalent within the current sample (78% as compared to 54%). It should also be noted that the composite variable reflecting acute psychological health problems was calculated differently in the current sample and included 'headache' as indicated by exploratory factor analysis. This likely accounts for the apparent discrepancy in results.

3.5.5 Combined effects of negative occupational factors: Prescribed medication use

It was suggested at the beginning of this chapter (hypothesis 4) that recent use of prescription medications such as pain killers and medicines for indigestion, would demonstrate a significant association with exposure to negative occupational stressors at low levels (i.e. 2nd quartile). This hypothesis was not supported by the current results: high levels of exposure only (i.e. at the 4th quartile of NOF) were associated with this outcome in the current sample. However, calculation of this composite variable differed between the current study and that described by Smith et al. (2004), based on results of exploratory factor analysis. In the Smith et al. (2004) study, laxatives were included in this measure, which may explain some variation in the results. Perhaps of more significance, is the much higher reported short-term use of prescribed medications in the current sample (43.4% as compared to 21%).

In the current dataset, longer-term use of pain killers and/or indigestion medication was also evaluated: exposure to high levels of negative occupational factors (i.e. 4th quartile) was associated with use within the last year. Use of any prescribed medication in the last 12 months and 14-days, was also significantly associated with 4th quartile levels of NOF. The impact of NOF on use of psychotropic medication in the last 12 months was also evaluated in the current study: a relationship not previously examined. However, this outcome did not demonstrate a significant association with negative occupational factors, although those in the upper quartile of the NOF score were marginally more likely to report psychotropic medication use. The prevalence of this outcome in the current sample however, was relatively low in comparison to other health measures (8.4%).

3.5.6 Summary: Combined and additive effects of occupational stressors

The current findings are therefore supportive of previous research in that poorer health outcomes are most likely reported where both physical and psychological stressors are high (e.g. Devereux et al., 2002), and that occupational stressors tend to combine cumulatively to produce negative effects on measures of health and well-being (e.g. Luz et al., 1990; Melamed et al., 1999; Smith et al., 2004). The precise nature of this relationship however, is dependent to some extent on the particular outcome under observation (Smith et al., 2004; Fillion et al., 2007).

The purpose of the current study was to determine whether patterns of effect described by Smith et al. (2004) could be replicated using a similarly calculated score based on the same set of stressors, but within a different occupational sample. Although some subtle differences are evident between the effects of the NOF score in each of these samples, the overall picture appears broadly similar. Differences observed can more than likely be attributed to demographics and differential prevalence of poor health outcomes.

3.5.7 Selectivity of effects

It is likely however, that the selective pattern of effects described in this chapter relates in part to the different categories of stressor represented by the NOF score. It is probable that some outcomes, for example work-related stress, have multiple aetiologies: both physical and interpersonal stressors are intuitively likely to result in self-reports of work stress. The relative role of the different components of the NOF score in terms of other self-reported health outcomes will be examined in detail in subsequent chapters.

3.5.8 Method of NOF categorisation

It should be noted that the patterns of association described in this chapter may also be dependent to some extent on the method of NOF categorisation. More specifically, were the composite occupational stressor variable considered as a continuous measure, threshold effects would perhaps be less evident. Similarly, had a median split of the NOF score been used, the relationship between occupational stressors and health outcomes would have been simplified to some extent. It would then have been possible only to infer which outcomes evidenced the highest odds ratios in respect of moderate/high exposure to NOF components.

3.5.9 Limitations of the current study: Directions for future research

Problems inherent within cross-sectional and self-reported data are well documented. Although it is not possible to infer causality from the findings described in this chapter, it is nevertheless evident that occupational hazards demonstrate greater associations with health and well-being outcomes in combination than when studied in isolation. Furthermore, controlling for negative affectivity goes some way to alleviating the potential bias created by individual differences. However, a number of factors not measured in the current study may account for, or partially explain some of these effects. The role of personality has not been fully explored within the current sample, and it is feasible that adaptive coping strategies may moderate some of the negative relationships outlined. These issues are explored further in Chapter 7.

In addition, the analyses detailed previously consider only main effects. This potential criticism is addressed to some extent in Chapter 6: however, research examining the possible interactive effects of components of job stress models (i.e. the 'buffering' effects of control and social support as hypothesised in the DCS model, and the moderating effects of overcommitment, or intrinsic effort on (extrinsic) effort-reward imbalance) is equivocal and inconclusive (Van der Doef & Maes, 1998, 1999; Van Vegchel et al, 2005).

The current results replicate previous findings with regards the cumulative effect of occupational stressors. Broadly speaking, the greater the exposure to potential stressors, the stronger the association between the NOF score and poor health. It remains to be seen however, whether an additional set of occupational stressors demonstrate similar associations with the above outcomes, and furthermore to determine whether such additional measures of potential workplace hazards contribute additively to associations demonstrated by an existing combined effects model. These issues will be addressed in subsequent chapters. The aim of Chapter 4 is to determine the effects of additional psychosocial and interpersonal stressors relative to the NOF score: more specifically, to determine whether organisational culture, interpersonal relationships and role stress explain variance in health outcomes over and above that demonstrated by the NOF score.

CHAPTER 4

THE ROLE OF ADDITIONAL PSYCHOSOCIAL WORKPLACE STRESSORS: IMPACT ON HEALTH AND WELL-BEING

4.1 INTRODUCTION

4.1.1 Overview

The results presented in Chapter 3 broadly replicate previous findings with regards the cumulative effect of occupational stressors. It was generally found to be the case that the greater the exposure to potential stressors, the stronger the association between the NOF score and poor health. A secondary aim of the survey detailed in Chapter 3 was to determine which, of an additional set of psychosocial workplace stressors (both occupational and interpersonal), could explain further variance in physical and psychological health to that accounted for by the Negative Occupational Factors (NOF) score. Additional stressors not previously examined in terms of their relationships with health outcomes comprised Leader-Member Exchange (LMX), Team-Member Exchange (TMX), organisational culture, role conflict, role ambiguity and bullying behaviours.

4.1.2 Additional interpersonal and organisational stressors

The literature relating job strain and effort-reward imbalance to negative health outcomes is large (see Chapter 1 for a review). High demands in conjunction with low control, and high effort/low reward are associated with cardiovascular disease and associated risk factors and psychiatric disorder (e.g. Kivimäki et al., 2002; Stansfeld et al., 1998a, 1999a). More recently, job strain (i.e. high demands and low control) and effort-reward imbalance have been linked with comparatively minor health complaints (Smith et al., 2004).

However, the role of other potentially detrimental sources of psychosocial stress in determining health status have been less well documented. The UK Health and Safety Executive (HSE) defined the most likely sources of job stress in an attempt to standardise approaches to stress-management (HSE, 2007). In addition to high demands, low control and low support, it is suggested that interpersonal relationships and aspects of role should be taken into account. Cox (1990) proposed a similar, if more inclusive set of factors for consideration in the stress process (in addition to high demands and low control): organisational culture (e.g. non-supportive), role within the organisation (e.g. ambiguity/conflict), career development (e.g. uncertainty, poor status/pay), interpersonal relationships (e.g. conflict), the home/work interface (e.g. conflicting demands of work and home), work scheduling (e.g. shift work) and the physical environment (e.g. high levels of noise). The purpose of the current chapter therefore, is to examine the influence of a wide range of workplace stressors on health and well-being, and to determine the impact of these sources of stress, relative to the established effects of the NOF score, in terms of negative health consequences for the individual.

4.1.3 Quality of interpersonal relationships: Leader-Member Exchange (LMX) and Team-Member Exchange (TMX)

LMX comprises a theoretical framework within which to interpret workplace leadership (e.g. Gerstner & Day, 1997; Liden, Sparrowe & Wayne, 1997). LMX represents a departure from traditional leadership theory, in that the focus is on the interplay between employees and their supervisors, rather than simply on the behaviour and characteristics of the 'leader'. LMX and TMX refer to the quality of interpersonal exchange between employees and their line managers and other members of the work team respectively. Where LMX relationships are of low quality ('out-group' exchanges), it is hypothesised that individuals receive fewer rewards or resources, whereas a high quality LMX relationship ('in-group' exchanges) results in receipt of valued resources and rewards (Dansereau, Cashman & Graen, 1973). Brower, Schoorman and Tan (2000) clarify the definition of LMX as a relationship built on interpersonal exchanges in which both parties assess the ability, integrity and goodwill of the other, and that it is these perceptions which influence personal and organisational outcomes. TMX was originally proposed as a complementary construct to LMX (Seers, 1989).

Previous research has tended to concentrate on the relationship between these stressors and work-related well-being and organisational outcomes. A great deal of research exists relating to the consequences of leader-member exchange, such as job satisfaction, satisfaction with supervision, affective commitment to the organisation, job performance and role conflict and role clarity (see Gerstner & Day, 1997 for a review; Richins, 2003). Quality of LMX has also been associated with intention to leave, although not with actual turnover (Gerstner & Day, 1997). Recent research (Hooper & Martin, 2008) has also investigated how the extent to which LMX relationships are perceived to vary within a team, is associated with job satisfaction and well-being over and above the effects of LMX quality at the individual level. Findings suggest that differential treatment of team members is associated with poor team communication, and also impacts negatively on trust and respect amongst colleagues. In a similar vein, Sparr and Sonnentag (2008) investigated whether perceptions of fairness of supervisory feedback impacted on employee well-being, and perceived control at work. Results indicated that fairness perceptions were related to LMX, and LMX to well-being (depression, job satisfaction and turnover intentions).

LMX has also been found to moderate or mediate a number of established relationships between, for example, locus of control and job satisfaction, commitment and work-related well-being (Epitropaki & Martin, 1999; Martin, Thomas, Charles, Epitropaki & McNamara, 2005). Martin et al. (2005) studied the relationship between locus of control, LMX quality and work reactions, including intrinsic/extrinsic job satisfaction, work-related well-being and organisational commitment in two samples (n=404 & 51). Results indicated that employees with an internal locus of control tended to develop better quality LMX relationships, and that higher quality LMX relationships were associated with more favourable outcomes.

Other work-related factors have been shown to affect the development of LMX, referred to as antecedents, including relational demography, leader and member personality traits, and leader-member similarity. Epitropaki and Martin (2005) evaluated the role of implicit leadership theories as antecedent to LMX quality, and also as predictors of work-related outcomes in a longitudinal study (n=439). Results indicated that the closer the match between an employee's implicit theory of desirable leadership and their supervisor's leadership style, the higher the quality of LMX. LMX quality was in turn associated with employee well-being. The role of individual differences as antecedent to LMX has received relatively little research attention (see

Liden et al., 1997 for a review of LMX antecedents). However, as Seers (1989) notes, individual differences are likely to moderate the relationship between TMX and performance, as there is some evidence to suggest this is the case for LMX (Graen, Novak & Sommerkamp, 1982; cited in Seers, 1989).

A number of variables are thought to moderate or mediate the relationship between LMX quality and work-related attitudes, such as differences in tenure (Epitropaki & Martin, 1999) and fulfilment of employees basic psychological needs (Hepperlen, 2003). Quality of exchange between team members (TMX) has been linked to job performance (Seers, 1989), and has been found to explain a substantial proportion of variance in organisational citizenship behaviour and job satisfaction; in some cases over and above that explained by LMX quality (Wech, 2002).

Several studies have examined the role of both LMX and TMX in predicting outcomes. In a study of new employees (n=248), Major, Kozlowski, Chao and Gardner (1995) found that both LMX and TMX were significant predictors of organisational commitment, turnover intention and job satisfaction. Both LMX and TMX were also found to moderate relationships between unmet role expectations and negative outcomes. Liden, Wayne and Sparrowe (2000) tested the role of empowerment as a potential mediator of the relationships between job characteristics, LMX, TMX and work outcomes such as job satisfaction, organisational commitment, and performance. The findings indicated that two dimensions of empowerment, meaning and competence, mediated the relationship between job characteristics and satisfaction. Meaning also mediated the relationship between job characteristics and organisational commitment, but empowerment (any dimension) was not found to mediate relationships between LMX, TMX and outcome measures. LMX and TMX were directly related to organisational commitment, and TMX directly to job performance.

Kamdar and Van Dyne (2007) examined the effects of LMX and TMX and employee personality (conscientiousness and agreeableness) on task and citizenship performance (n=230). High quality exchange relationships were found to moderate associations between personality and performance. Tse, Dasborough and Ashkanasy (2008) investigated a multi-level model integrating LMX, TMX, organisational climate, and friendship at work. At the individual level, LMX was associated with workplace friendship; workplace friendship was associated with TMX, and also mediated LMX-TMX relationships. At the team level, the relationship between LMX and friendship was moderated by climate. Taken together, results suggest that high quality LMX is predictive of workplace friendship, particularly when climate (or culture) is perceived to be strong.

Comparatively little attention has been paid to associations between these measures of interpersonal relationship quality, and health and well-being, other than job satisfaction. However, it has been suggested that LMX is negatively related to burnout and medical problems (Rose, 1998), and that quality of LMX affects perceptions of work stress (Nelson, Basu & Purdie, 1998).

4.1.4 Organisational culture

Similarly, research in the area of organisational culture has tended to focus on organisational level outcomes, such as job performance (e.g. Bollar, 1996; Petty, Beadles, Lowery, Chapman & Connell 1996; Patterson, West, Lawthom & Nickell, 1999). The relationship between culture and individual outcomes has often been considered within a person-environment (P-E) fit framework (e.g. O'Reilly, 1991), where the degree of P-E fit predicts job satisfaction, commitment to the organisation and turnover. These results highlight the importance of considering culture in terms of individual preferences.

There is also much debate within the literature as to appropriate terms, definitions, and measurement level of 'culture'. As Parker, Baltes, Young, Huff, Altman, Lacost and Roberts (2003) note, there is confusion between the constructs of psychological climate, organisational climate and organisation culture. Terms are often used interchangeably, whereas Parker et al. (2003) argue that climate refers to individual perceptions, and culture to the aggregation of these perceptions at the group or organisational level. Culture is perhaps best described as a normative approach, and is intended to capture values and beliefs about appropriate behaviour (Rousseau, 1990; Schein, 1990; Sackmann, 1991; cited in Parker et al., 2003). Climate could be viewed as the individual-level manifestation of culture (Schein, 1990). Scott-Findlay and Estabrooks (2006) report a review of organisational research in nursing, and note the multiple definitions that exist, although attributes such as 'values', 'assumptions' and 'beliefs' are often shared.

There may however, be context-specific aspects of culture relevant to employee well-being in healthcare organisations. According to Raelin (1986; cited in Vandenberghe, 1999) a professional culture will value autonomy, expertise, ethics, meaningful and challenging work, and dedication to service delivery, whereas corporate cultures in contrast place greater emphasis on control, close supervision, quality and productivity. Vandenberghe (1999) notes that competing sources of culture within hospitals may result in a fragmented culture, or sub-cultures that vary according to differing values amongst different groups of professionals (Martin, 1992; cited in Vandenberghe, 1999). Schluter, Winch, Holzhauser and Henderson (2008) tentatively suggest a link between (unresolved) moral distress, poor ethical climate and turnover in nursing.

A number of studies of culture within healthcare systems have demonstrated associations with job satisfaction in nurses. Tzeng, Ketefian and Redman (2002) investigated relationships between staff nurses' perceptions of organisation culture, job satisfaction and inpatient satisfaction. Strength of culture was found to predict job satisfaction, which in turn was predictive of inpatient satisfaction. It has also been suggested that culture may mediate associations between demography and satisfaction and commitment in nurses. In a survey of 381 nurses, Taylor (2003) found that the organisational culture attributes of affiliation and recognition partially mediated relationships between gender similarity, and job satisfaction and accomplishment; recognition and strength of culture partially mediated the relationship between gender similarity and organisational commitment. Aspects of culture at the team level have also been linked to turnover in hospital staff. Kivimäki, Vanhala, Pennti, Länsisalami, Virtanen, Elovainio and Vahtera (2007) found team climate (defined as clear and shared goals, participation, task orientation and support for innovation) to be predictive of turnover intentions and actual turnover in a large cohort (n=6441) of hospital employees.

Very little research relating culture to health outcomes has been carried out, although previous work indicates that culture may moderate the appraisal of stress. 'Collective' work-related stress may occur as a result of poor adaptation to the organisational culture or sub-culture, and/or conflict within the work team (Länsisalmi, Peiro & Kivimäki, 2000). Furthermore, it has been suggested that culture is an important component in the development of work stress, and may play a key role in creating effective stress management interventions (Peterson & Wilson, 2002).

4.1.5 Aspects of job role: Ambiguity and conflict

The concept of 'role stress' is based on the premise that all individuals perform roles, where a role originates from expectations about the required behaviour in a social structure (Rizzo, House & Lirtzman, 1970). Role stress is made up of three distinct factors: role conflict (i.e. incompatibility between role expectations), role ambiguity (i.e. uncertainty about the behaviour required to fulfil role expectations) and role overload (i.e. insufficient time and/or resources to fulfil role requirements) (Ortqvist & Wincent, 2006).

Aspects of job role (i.e. ambiguity and conflict) have been extensively studied in relation to work outcomes such as satisfaction and performance. Across a range of occupations, role ambiguity evidences a strong relationship with job performance, although the correlation between role conflict and performance is negligible (see Jackson & Schuler, 1985; Tubre & Collins, 2000 for reviews). Both constructs appear strongly related to job satisfaction, however. Yousef (2000) investigated the effects of role conflict and ambiguity on job satisfaction, and attitudes towards organisational change in a sample of manufacturing and service industry sector employees (n=397). No interactive effects between role conflict and ambiguity were observed for job satisfaction or attitudes towards organisational change. However, both concepts were found to independently and negatively influence all outcomes.

Few studies have examined associations between role ambiguity and conflict and health outcomes, although both constructs have been linked to the three dimensions of burnout in a sample of hospice nurses and social workers (n=234). Role conflict was negatively associated with emotional exhaustion and depersonalisation, whereas role ambiguity was positively associated with these two dimensions. As role conflict increased, personal accomplishment was found to decrease (Boyd, 1996). In a review of the literature relating specifically to burnout in nurses, role ambiguity was found to be among the best predictors, along with workload, age, hardiness, active coping and social support (Duquette, Kerouac, Sandhu & Beaudet, 1994).

Ortqvist and Wincent (2006) also found role conflict, ambiguity and to a greater extent, role overload, to be associated with the burnout construct of emotional exhaustion. Peiro, Gonzalez-Roma, Tordera and Manas (2001) conducted a longitudinal study that supports this finding with respect to all three dimensions of burnout. The authors found that all three components of role stress (conflict, ambiguity and overload) predicted the emotional exhaustion dimension of burnout, whereas only role conflict and overload were found to predict depersonalisation, and only role ambiguity was related to reduced personal accomplishment.

In a more recent study, Lu, While and Barriball (2008) explored nurses' views of their job roles in mainland China. The authors report that the majority of respondents felt the content of their roles matched personal role expectations. Furthermore, nurses' ratings of role perceptions and actual role content were associated with job satisfaction, work-related stress, role conflict and role ambiguity.

Siegall (2000) proposes an extension to the traditional role-stress model. The author suggests that measures of role stress would be enhanced by the inclusion of some degree of threat appraisal. Traditional measures of role conflict and ambiguity evaluate the frequency of role expectations, whereas the cognitive stress model (Lazaurs & Folkman, 1984) states that an event does not result in distress unless it is perceived to be threatening (Siegall, 2000). In a cross-sectional survey of employees at an electronics/software organisation, this new measure of role was found to be more predictive of physical and psychological strain than a more traditional measure.

4.1.6 Exposure to bullying in the workplace

The role of bullying in occupational stress is currently receiving a great deal of attention within the literature, and unlike other potential sources of stress at work, has been fairly extensively studied in relation to a range of negative health and organisational outcomes.

Kivimäki, Virtanen, Elovainio, Vahtera and Keltikangas-Järvinen (2003) examined workplace bullying as a risk factor for cardiovascular disease and depression, using prospective data from a large (n=5432) cohort of hospital employees. In terms of prevalence, 5% of employees reported bullying at baseline, and 6% at 2-year follow up. Results indicated that bullying was a causal factor in the development of depression, and also that victims of bullying may be at increased risk of developing cardiovascular disease, although being overweight may partially explain the latter association. The experience of bullying at work has also been linked to psychosomatic health problems. Mikkelsen and Einarsen (2002) investigated the relationships between bullying and (self-reported) psychological and psychosomatic health complaints, and the extent to which any associations might be mediated by state negative affectivity, or moderated by self-efficacy in a study of Danish manufacturing sector employees (n=224). Bullying accounted for 27% of the variance in psychological health, and 10% of the variance in psychosomatic symptoms. Negative affectivity appeared to partially mediate relationships between bullying and both sets of outcomes. Generalised self-efficacy was not directly associated with bullying, but appeared to moderate the relationship between bullying and psychological well-being. Vartia (2001) also reported increased psychotropic medication use (sleeping tablets and sedatives) in targets of bullying behaviour.

Negative organisational consequences of workplace bullying such as low job satisfaction (Quine, 2003) and increased sickness absence in hospital staff (Kivimäki, Elovainio & Vahtera, 2000) have also been reported. However, it is only in the last two decades that the effects of bullying on adults have been considered: therefore theories are still emerging with regards appropriate definitions, methods of measurement, and how best to operationalise the process. Furthermore, much of the available research has been carried out in Scandinavian populations (for reviews, see Rayner & Hoel, 1997 & Einarsen, 1998). Rayner and Hoel (1997) note in their overview of the literature of workplace bullying, that results from school bullying have provided a base for adult research.

There has been much discussion and debate within the literature about how best to define bullying. According to Zapf and Gross (2001) bullying begins with a single critical incident, or interpersonal conflict. Zapf (1999) asserts that for behaviour to be considered bullying, it must occur at least once a week for a minimum of 6 months. Quine (1999) observes that most definitions of workplace bullying incorporate three elements, influenced by laws governing racial and sexual harassment. Firstly, bullying is defined in terms of its effects on the target (as opposed to 'intention' on the part of the bully); secondly, for behaviours to be defined as bullying there must be a negative effect on the target and thirdly, the behaviour must be consistent.

Cowie, Naylor, Rivers, Smith and Pereira (2002) reviewed methods of research into workplace bullying, taking into account issues surrounding definition (including type, frequency and duration of bullying acts), and also the role of values and norms in workplace culture in influencing perception and measurement. The authors distinguish between three approaches to measurement: (1) self-report (including questionnaires, interviews, diary keeping); (2) objective approaches such as observational methods and peer report, and (3) multi-method approaches. Cowie et al. (2002) further note that culture may play an important role in determining bullying behaviours; culture is thought to influence the ways in which behaviours are interpreted, and may inform acceptance or tolerance of certain types of behaviour (e.g. Einarsen & Skogstad, 1996).

The prevalence and effects of bullying in UK health professionals has received some attention in the literature. Prevalence appears to be high: in a survey of NHS community trust staff, Quine (1999) found 38% of staff to report experiencing one or more types of bullying behaviour in the last year: where bullying did occur, managers were the most likely perpetrators. Victims of bullying reported low levels of job satisfaction, and higher levels of stress, depression, anxiety and intention to leave, although there was some evidence to suggest that social support in the workplace may have a protective effect. In a similar survey of junior doctors (Quine, 2002) 37% reported having been bullied in the previous 12 months. Hoosen and Callaghan (2004) surveyed psychiatric trainees and found that 47% had experienced one or more bullying behaviours in the previous year. In a study of UK nurses, 44% reported experiencing one or more types of bullying in the previous 12 months, compared to 35% of other NHS staff, and approximately half of the sample had witnessed the bullying of others. The experience of such behaviours was associated with increased levels of anxiety and depression, reduced job satisfaction and propensity to leave

(Quine, 2001). Again, some evidence of the protective effect of social support was found.

Individual characteristics are likely to play a role in reactions to bullying behaviours. Djurkovic, McCormack and Casimir (2005) examined the role of neuroticism as a moderator of the relationship between bullying and negative affect. However, results indicated that bullying and neuroticism were independently associated with negative affect, supporting the psychosocial model of workplace bullying (i.e. bullying results in negative affect, which in turn lead to poor physical health outcomes). Furthermore, qualitative research investigating bullying in female professionals indicates that social processes and environments have a more significant role in the development of bullying than individual characteristics (Lewis & Orford, 2005), which mirrors the assertion that culture may act as a filter through which bullying behaviours are interpreted and tolerated (e.g. Einarsen & Skogstad, 1996). Nielsen, Matthiesen and Einarsen (2008) investigated the influence of personal sense of coherence as a possible protective factor for targets of bullying. Findings indicated that low levels of bullying have a stronger effect on targets with a low sense of coherence. However, the protective effects of sense of coherence appear to reduce with increasing severity of bullying behaviours. There is little evidence to indicate any gender differences in terms of bullying prevalence amongst targets, or in terms of effects on stress, mental health and job satisfaction. However, in a study of prison officers, Vartia and Hyyti (2002) found that female officers were usually bullied by colleagues, whereas male officers were most often bullied by a superior.

There are also likely a number of organisational antecedents to bullying. In a review of the literature, Salin (2003) notes that explanations of bullying behaviour can be broadly classified into three groups: enabling structures such as perceived power imbalances, low perceived costs and dissatisfaction/frustration; motivating structures such as competition, reward systems and expected benefits, and triggering circumstances such as organisational change, and changes in work group. Salin (2003) argues that bullying often occurs as a result of an interaction between factors from all three groups. Strandmark and Hallberg (2007) examined antecedents of bullying in public service occupations in qualitative interviews with 22 victims of bullying. Findings indicate that bullying may be preceded by long-standing power struggles, which in turn likely result from conflict and organisational-level attributes such as leadership style.

4.1.7 Current study and hypotheses

The following additional measures are considered as potential workplace stressors in the current chapter:

- quality of leader-member exchange (LMX)
- quality of team-member exchange (TMX)
- unsupportive organisational culture
- role ambiguity
- role conflict
- the experience of bullying at work

There is scant literature relating to associations between these stressors and health outcomes, with the exception of bullying. However, given the vast literature examining associations between other job characteristics (e.g. demands, control and effort) and health outcomes it would seem logical that the interpersonal and occupational characteristics listed above would explain further variance in psychological and physical health to that accounted for by the composite NOF score previously described. The following hypotheses were therefore generated based on previous findings:

1. Measures of psychological well-being such as work-related stress, and probable clinical anxiety and depression likely have multiple aetiology, and are therefore possibly significantly associated with multiple occupational and interpersonal stressors. Quality of leader-member exchange (LMX), an unsupportive organisational culture and aspects of role (ambiguity and conflict) are likely to be associated with work-related stress, according to previous research.

2. Lifetime, 12-month and 14-day prevalence of ill-health are likely to demonstrate significant relationships with NOF and the experience of bullying at work, based on previous research and findings presented in the wider

literature. Associations between other novel stressors and health are more difficult to anticipate. However, it is plausible that some stressors not previously considered, e.g. aspects of job role, may be associated with poor health, given previously established relationships between e.g. role ambiguity and burnout in nurses.

3. Previous research also indicates that bullying is likely to demonstrate a significant association with use of psychotropic medication. It is probable however, that the relationship between other additional workplace stressors and medication use depends to some extent on the presence or absence of significant associations between stressors and poor health outcomes.

Subsequently described are the methodology employed to assess these hypotheses, summary statistics and logistic regression analyses where stressors served as predictor variables across a number of health and well-being outcomes.

4.2 METHOD

The measures employed in the survey, the sample and response rates are summarised in the following sections.

4.2.1 Participants and procedure

1090 volunteers from the health services and social services/local government sectors completed a 35-page questionnaire comprising items assessing exposure to occupational hazards, and health and well-being (for a full description of procedures, see Chapter 3, section 3.2.1).

4.2.2 Demographic, occupational and individual characteristics

See Chapter 3, section 3.2.2.

4.2.3 Independent measures

Independent measures were employed to assess poor quality exchange relationships (LMX, TMX), unsupportive organisational culture, role ambiguity, role conflict and bullying behaviours.

Leader-member exchange (7-item version: Scandura & Graen, 1984)

All participants completed the 7-item version of the Leader-Member Exchange (LMX) scale (Scandura & Graen, 1984) as it is thought to possess better psychometric properties than either longer or shorter versions (Coefficient alpha=.89; Gerstner & Day, 1997; current sample = .93). Example items include: 'How well does your manager recognise your potential?' and 'How well do you feel that your manager understands your problems and needs?'. Responses were scored from 0 to 4, with a high score indicating a positive response. Total scores were calculated by summing responses to reversed individual items (in order that a high score indicated a negative relationship) and expressing this value as a percentage of the total possible raw score.

Team-member exchange (Seers, 1989)

Team-Member Exchange was measured using Seers' (1989) 10-item measure. Internal consistency for the scale is reported as .83 (Seers, Petty & Cashman, 1995: current sample = .88). Responses were scored from 0 to 4, with a high score indicating a positive response. Example items include: 'How well do other members of your team recognise your potential?' and 'In busy situations, how often do other team members ask you to help out?'. The total score was calculated by summing responses to reversed individual items (in order that a high score indicated a negative relationship) and expressing values as a percentage of the total possible raw score.

The organisational culture profile (O'Reilly, Chatman & Caldwell, 1991)

Organisational culture was measured using the Organisational Culture Profile (OCP: O'Reilly, Chatman & Caldwell, 1991). The OCP comprises 54 statements that tap organisational values. Respondents were asked to consider the extent to which each statement was characteristic of their organisation. Responses were scored from 0 (extremely characteristic) to 4 (not at all characteristic). O'Reilly et al. (1991) advocate the use of a q-sort technique, yet for the current sample exploratory factor analysis (varimax rotation[24]) provided an intuitively useful solution. Using a forced 4-factor solution, a clear structure emerged tapping the following aspects of organisational culture:

- Supportive (19 items[25], e.g. being people-oriented, respect for individual rights, offering praise for good performance: $\alpha = .93$)
- Performance-driven (11 items, e.g. achievement oriented, results oriented, demanding: $\alpha = .86$)
- Enterprising (4 items, e.g. willing to experiment, risk taking, quick to take advantage of opportunities: $\alpha = .67$)
- Traditional (3 items: stability, predictability, security of employment [$\alpha = .66$])

Scores were created across these factors by summing responses to individual items, and expressing values as a percentage of the total possible raw score[26]; high scores indicated that a particular factor was uncharacteristic of the organisation. However, 17 items did not load significantly on any of the above factors (<.49)[27]. Unsupportive culture represents the only culture factor used as an independent measure, as it correlated most highly with work-related stress ($r = 0.27$, $p<.01$).

Role conflict and role ambiguity (Rizzo, House & Lirtzman, 1970)

Role conflict and ambiguity were measured using Rizzo, House and Lirtzman's (1970) 29-item questionnaire (14 items refer to role ambiguity and 15 to role conflict). Items were scored from 0 (never) to 4 (always) and were reversed where necessary, so that a high score indicated a negative response. Example items include: 'I feel I have enough time to complete my work' (role conflict) and 'I feel certain about how much authority I have' (role ambiguity). Scale scores were calculated by summing responses to individual items and expressing values as a percentage of the maximum possible

[24] Factor loadings for individual items are shown in Appendix II.
[25] A single item 'being aggressive' was reversed in order that a high score reflected this as extremely characteristic of the organisation.
[26] For supportive culture, missing data was greater than 5%. In order to allow for missing data on a single item within the sub-scale, missing values were recoded as zero, prior to scale calculation. Scores were then adjusted using the formula: total scale score*(number of items within scale/number of items within scale -1).
[27] A list of all items within the culture scale can be found in Appendix I.

raw score.[28] Rizzo et al. (1970) report internal consistency as .82 for the role conflict scale and .78 for the role ambiguity scale. Coefficient alphas for the current sample were as follows: role conflict = .82; role ambiguity = .79.

Bullying behaviour (Quine, 1999)

Participants were asked to state whether they had been subjected to any of the bullying behaviours listed (20 items) in the last 6 months (0=no, 1=yes). The scale was taken from Quine (1999) and contained items relating to each of the five types of bullying behaviour identified by Rayner and Hoel (1997): threat to professional status (4 items: e.g. 'persistent attempts to undermine your work'), threat to personal standing (7 items: e.g. 'undermining your personal integrity'), isolation (3 items: e.g. 'withholding of necessary information'), overwork (2 items: e.g. 'setting of impossible deadlines') and destabilisation (4 items: e.g. 'removal of areas of responsibility without consultation'). A total scale score was calculated by summing the number of positive responses and expressing this value as a percentage of the maximum possible raw score ($\alpha = .88$).

4.2.4 Dependent measures

See Chapter 3, section 3.2.4.

4.3 SUMMARY STATISTICS

4.3.1 Demographic, occupational and individual characteristics

See Chapter 3, section 3.3.1.

4.3.2 Dependent measures

See Chapter 3, section 3.3.2.

[28] Missing data for the total scores on both sub-scales was greater than 5%. In order to allow for missing data on a single item within each sub-scale, missing data was recoded as zero, prior to scale calculation. This value was then adjusted using the formula: total scale score*(number of items within scale/number of items within scale -1).

4.3.3 Independent measures

Summary statistics for the independent measures utilised in this chapter are given in Table 15.

Table 15: Descriptive statistics for independent measures

Measure	Sample	N	Min	Max	Mean	SD
LMX	Healthcare	769	.00	100.00	46.84	23.70
	Social services/LG	290	.00	100.00	46.13	24.09
	Total	1059	.00	100.00	46.65	23.80
TMX	Healthcare	775	.00	82.50	36.98	15.70
	Social services/LG	286	.00	95.00	42.38	19.67
	Total	1061	.00	95.00	38.43	17.03
Unsupportive culture	Healthcare	767	.00	93.42	41.29	19.49
	Social services/LG	283	.00	100.00	44.89	20.74
	Total	1050	.00	100.00	42.26	19.89
Role conflict	Healthcare	766	.00	76.67	38.95	12.99
	Social services/LG	285	1.67	76.67	41.57	14.13
	Total	1051	.00	76.67	39.66	13.36
Role ambiguity	Healthcare	771	1.79	75.00	35.77	12.47
	Social services/LG	286	3.57	76.79	37.66	13.60
	Total	1057	1.79	76.79	36.28	12.81
Bullying	Healthcare	777	.00	100.00	12.70	17.93
	Social services/LG	293	.00	100.00	15.43	19.67
	Total	1070	.00	100.00	13.45	18.45

Bivariate correlations between median splits of independent variables are shown in Table 16.

Table 16: Non-parametric (Spearman's rho) correlations between independent measures

	Bullying	LMX	TMX	Culture	Role conflict	Role ambiguity	NOF
Bullying	-	-	-	-	-	-	-
LMX	.366** (1045)	-	-	-	-	-	-
TMX	.072* (1048)	.228** (1039)	-	-	-	-	-
Culture	.335** (1035)	.368** (1031)	.116** (1027)	-	-	-	-
Role conflict	.405** (1040)	.271** (1027)	.026 (1031)	.342** (1019)	-	-	-
Role ambiguity	.343** (1046)	.403** (1035)	.162** (1036)	.326** (1023)	.508** (1047)	-	-
NOF	.431** (1070)	.362** (1059)	.063* (1061)	.363** (1050)	.438** (1051)	.334** (1057)	-

* Correlation significant at 0.05 level (2-tailed).
** Correlation significant at 0.01 level (2-tailed).

Independent measures were highly correlated, with the exceptions of TMX quality and role conflict, and TMX and bullying. However, values are not suggestive of multicollinearity.

4.3.4 Analytic procedure

Stepwise (backward) logistic regression analyses were performed where median splits of stressor scores (LMX, TMX, unsupportive culture, role conflict, role ambiguity and bullying) served as independent predictors, in addition to a median spilt of the NOF score (all demographic variables were included in the model as covariates). Results are shown in Tables 17-20: variables are listed in the order in which they were entered into the model.

4.4 THE IMPACT OF NOF AND ADDITIONAL OCCUPATIONAL FACTORS ON PHYSICAL AND PSYCHOLOGICAL WELL-BEING

4.4.1 Outcomes not significantly associated with any stressor

No significant associations were observed for 12-month use of prescribed pain killers and/or indigestion medication.

4.4.2 NOF, additional stressors and psychological well-being

Odds ratios and 95% confidence intervals where the NOF score and all additional stressors served as independent predictors in a stepwise regression model, are shown in Table 17 for psychological health outcomes.

Table 17: NOF, additional stressors & psychological well-being

		N	OR	95% CI
Work stress	NOF	485	1.00	
	(Wald = 55.63, p<.0001)	439	5.35	3.44-8.31
Clinical anxiety[29]	Bullying	505	1.00	
	(Wald = 17.46, p<.0001)	415	2.24	1.53-3.26
	NOF	488	1.00	
	(Wald = 62.15, p<.0001)	342	5.24	3.47-7.90
Clinical depression	NOF	486	1.00	
	(Wald = 36.25, p<.0001)	432	9.34	4.51-19.33

As is evident from the Table, clinical anxiety was most strongly associated with the NOF score and bullying, whereas clinical depression and work stress were significantly associated with NOF only.

4.4.3 NOF, additional stressors, lifetime prevalence of disease and 12-month symptoms

Odds ratios and 95% confidence intervals where the NOF score and all additional stressors served as independent predictors (stepwise regression model) are shown in Table 18 for lifetime prevalence of disease and 12-month symptoms.

Table 18: NOF, additional stressors, lifetime prevalence of disease & 12-month symptoms

		N	OR	95% CI
Lifetime prevalence of disease	Bullying	478	1.00	
	(Wald = 11.09, p<.001)	395	1.62	1.22-2.15
12-month symptoms	Bullying	458	1.00	
	(Wald = 8.48, p<.004)	368	1.65	1.18-2.31

[29] Negative affectivity was not included as a covariate where clinical anxiety or depression comprised dependent measures.

	Role ambiguity	373	1.00	
	(Wald = 7.24, p<.007)	453	1.58	1.13-2.21
	NOF	445	1.00	
	(Wald = 5.13, p<.02)	381	1.49	1.06-2.09
12-month sciatica	Role conflict	453	1.00	
	(Wald = 8.31, p<.004)	434	1.58	1.16-2.45

Bullying only was associated with increased likelihood of reporting lifetime prevalence of any disease. Symptoms of ill-health in the last 12 months were most strongly associated with bullying, role ambiguity and the NOF score. Musculoskeletal problems (12-month sciatica/back pain) were associated with role conflict only.

4.4.4 NOF, additional stressors and 14-day symptoms

Odds ratios and 95% confidence intervals (stepwise model) are shown in Table 19 for symptoms of ill-health in the last 14 days.

Table 19: NOF, additional stressors & 14-day symptoms

		N	OR	95% CI
14-day symptoms	Bullying	461	1.00	
	(Wald = 19.04, p<.0001)	366	2.08	1.50-2.90
	NOF	446	1.00	
	(Wald = 8.48, p<.004)	381	1.64	1.18-2.28
14-day upper respiratory tract symptoms	Bullying	481	1.00	
	(Wald = 6.32, p<.01)	396	1.46	1.09-1.95
14-day depression/fatigue	Bullying	483	1.00	
	(Wald = 5.49, p<.02)	397	1.62	1.08-2.43
	Role conflict	454	1.00	
	(Wald = 4.69, p<.03)	426	1.55	1.04-2.31
	NOF	466	1.00	
	(Wald = 13.64, p<.0001)	414	2.22	1.45-3.39
14-day respiratory symptoms[30]	Bullying	480	1.00	
	(Wald = 14.93, p<.0001)	397	2.25	1.49-3.40
14-day gastrointestinal symptoms	Bullying	409	1.00	
	(Wald = 8.79, p<.003)	467	1.77	1.21-2.57

[30] This effect is still significant when smoking status is added to the model as a covariate.

14-day back pain/swollen ankles	Role conflict	456	1.00	
	(Wald = 8.73, p<.003)	425	1.62	1.18-2.23
14-day back pain	Role conflict	456	1.00	
	(Wald = 11.84, p<.001)	431	1.76	1.27-2.42
14-day tooth/earache	NOF	467	1.00	
	(Wald = 10.28, p<.001)	411	1.77	1.25-2.51

14-day symptoms of ill-health were most strongly associated with bullying and the NOF score and 14-day depression and/or fatigue by the NOF score, bullying and role conflict. 14-day back pain and/or swollen ankles and 14-day back pain were associated with role conflict only. 14-day upper and lower respiratory tract symptoms and 14-day gastrointestinal symptoms were significantly associated with bullying only, and 14-day tooth and/or earache by the NOF score only.

4.4.5 NOF, additional stressors and use of prescribed medication

Odds ratios and 95% confidence intervals where the NOF score and all additional stressors served as independent predictors in a stepwise regression model, are shown in Table 20 for use of prescribed medication.

Table 20: NOF, additional stressors & use of prescribed medication

		N	OR	95% CI
Prescribed medication in last 12 months	Bullying	410	1.00	
	(Wald = 17.13, p<.0001)	348	1.90	1.40-2.58
Prescribed psychotropic medication in last 12 months	Bullying	420	1.00	
	(Wald = 3.82, p<.05)	355	1.35	1.00-1.81
Prescribed medication in last 14 days	Bullying	426	1.00	
	(Wald = 4.65, p<.03)	356	1.45	1.03-2.03
	NOF	413	1.00	
	(Wald = 4.92, p<.03)	369	1.47	1.05-2.07
Prescribed pain/indigestion medication in last 14 days	Bullying	444	1.00	
	(Wald = 3.90, p<.05)	373	1.39	1.00-1.92
	NOF	427	1.00	
	(Wald = 7.75, p<.005)	390	1.60	1.15-2.24

Use of prescribed medication in the last 12 months (any) and use of prescribed psychotropic medication in the last 12 months were most strongly associated with bullying only. Prescribed medication (any) in the last 14 days and pain killers/indigestion medication in the last 14 days were most strongly associated with NOF and bullying.

4.5 DISCUSSION

The results presented in the current chapter support the assertion by the UK HSE (2007) and Cox (1990) that a wider ranger of potentially negative occupational factors (e.g. interpersonal relationships and aspects of role) should be considered important sources of work stress, and that exposure to such stressors, in particular the experience of bullying at work evidences strong associations with negative health outcomes. Critical findings presented in the current chapter, and directions for future research are summarised in the following sections. A summary of key findings is presented in Table 21.

Table 21: Effects of novel stressors vs NOF

- NOF effects held up against novel stressors for psychological well-being outcomes (work stress, clinical anxiety & depression)
- Of novel stressors, only bullying was significantly associated with clinical anxiety in addition to NOF
- Bullying alone was associated with lifetime disease prevalence
- Bullying was most strongly associated with 12-month symptoms, followed by role ambiguity & NOF
- 12-month musculoskeletal symptoms were most strongly associated with role stress (conflict) only
- Bullying was most strongly associated with the majority of acute (14-day) health outcomes, except musculoskeletal symptoms (strongest association with role conflict) and acute tooth/earache (associated with NOF only)
- 12-month prescribed medication use was most strongly associated with

bullying only

- 14-day prescribed medication use was most strongly associated with bullying, although NOF accounted for additional variance

4.5.1 NOF, additional stressors and psychological well-being

The first hypothesis outlined earlier in the current chapter, suggested that measures of psychological well-being such as work stress, and probable clinical anxiety and depression, likely have multiple aetiology, and that multiple stressors would therefore be associated with these outcomes. This assertion is only partially supported by the current results. Although the NOF score was significantly associated with all three outcomes and comprises multiple stressors, only bullying was significantly associated with clinical anxiety in addition to NOF. Although further additional stressors may be individually associated with these outcomes, such effects do not explain further variance over and above that of the NOF score. The current results however, lend support to the assertion that workplace bullying is associated with increased reports of psychological distress (Quine, 2001, 2003; Mikkelsen & Einarsen 2002; Kivimäki et al., 2003), and that such associations may be independent of individual characteristics such as neuroticism (e.g. Djurkovic et al., 2005: see Chapters 7 and 8 of this thesis for further discussion of this issue).

It was also hypothesised that poor quality leader-member exchange, an unsupportive organisational culture and aspects of role would be significantly associated with work-related stress, in addition to the NOF score. This assertion was based on previous evidence that quality of leader-member exchange is related to job satisfaction (Gerstner & Day, 1997; Ritchins, 2003), which might be considered the opposite end of the spectrum to work stress. However, only the NOF score was significantly associated with work-related stress. Therefore, although quality of exchange relationships may be independently associated with perceptions of work stress (Nelson, 1998) these effects do not hold up against a combined negative occupational factors score. Previous research also indicates that high quality exchanges are linked with higher levels of job satisfaction (e.g. LMX & TMX: Major et al., 1995; TMX: Wech, 2002). However, this assertion is not supported within the context of the current results.

There is scant literature examining associations between culture and employee emotional well-being: however, the current data do not support assertions that culture may be linked to job satisfaction in nurses (Tzeng et al., 2002) or that culture is important in the development of work-related stress (Peterson & Wilson, 2002). The role of culture as a moderating influence on the appraisal of work stress was not tested (Länsisalami, et al., 2000). However, there is some debate within the literature surrounding the appropriate definition of, and measurement level for culture. It could be argued that the current measure of 'supportive culture' would be more accurately classified as a measure of 'climate', or individual perceptions of organisational culture; such individual perceptions would need to be aggregated in order to reflect culture in a more global sense (Parker et al., 2003). Kivimäki et al. (2007) found a measure of team climate to predict turnover intentions and actual turnover in nurses, although this outcome was not measured in the current sample. It may simply be the case that measures of culture or climate are better suited to the study of variance in organisational outcomes, or that context-specific cultural measures are required when studying public sector (in particular healthcare) populations (e.g. Raelin, 1986; cited in Vandenberghe, 1999).

Role stress (ambiguity, conflict and overload) has also been studied extensively with respect to work-related outcomes such as satisfaction and performance. However, there is also some evidence that role stress is predictive of burnout, in particular the dimension of emotional exhaustion in nurses (e.g. Duquette et al., 1994; Boyd, 1996; Peiro et al., 2001; Ortqvist & Wincent, 2006). These constructs may well predict psychological health outcomes independently; however, these effects do not hold up when compared directly to the NOF score.

4.5.2 NOF, additional stressors, lifetime prevalence of disease and 12-month symptoms

The second hypothesis outlined at the start of the current chapter stated that lifetime and 12-month prevalence of ill-health would likely demonstrate significant relationships with bullying based on the wider literature (e.g. Kivimäki et al., 2003) and that previously demonstrated associations between chronic ill-health and the NOF score would remain evident. This hypothesis is partially supported by the current results: bullying was associated with chronic (lifetime prevalence) ill-health symptoms. However, the previously established association between NOF and this outcome was no longer significant when additional stressors were added to the model. Bullying at work was most strongly associated with 12-month symptoms, although role ambiguity and NOF also demonstrated significant effects.

There is little research examining remaining additional stressors in terms of health outcomes: such relationships are therefore difficult to anticipate. However, it is plausible that some stressors not previously considered e.g. role, may be associated with poor health, given previously established relationships between, e.g. role ambiguity and burnout in nurses (Duquette et al., 1994; Boyd, 1996). Reporting any symptom of ill-health within the last 12 months was significantly associated with role ambiguity in addition to bullying and NOF as stated above, and role conflict only was associated with 12-month sciatica and/or back pain.

4.5.3 NOF, additional stressors and 14-day symptoms

Several significant associations between the NOF score and 14-day health outcomes were observed in the current analyses. NOF alone was associated with 14-day tooth and/or earache, and of any symptom of ill-health within the last 14 days in addition to bullying (although a higher odds ratio was observed for bullying). Depression and/or fatigue in the previous 14 days was most strongly associated with NOF, although significant associations were also seen for bullying and role conflict. Bullying was in fact associated with the majority of acute health problems, as hypothesised. In addition to the results outlined above, bullying alone was associated with both upper and lower respiratory tract symptoms, and 14-day gastrointestinal symptoms. Role conflict alone was also associated with 14-day back pain/swollen ankles and 14 day back pain.

In summary, it was hypothesised at the start of the current chapter (hypothesis 2) that both the NOF score and workplace bullying would be significantly associated with the majority of 14-day health outcomes, and that role (conflict and/or ambiguity) may be significantly associated with poor physical health. This hypothesis was largely supported by the current results. Bullying and the NOF score demonstrated the most consistent patterns of association; however role conflict was associated with acute musculoskeletal problems.

The results presented in this chapter therefore support previous findings in terms of the association between workplace bullying and relatively minor somatic health complaints (Mikkelsen & Einarsen, 2002). However, no support was found for the suggestion that LMX quality is negatively related to medical problems (Rose, 1998).

4.5.4 NOF, additional stressors and use of prescribed medication

Previous research indicates that workplace bullying is likely to predict use of psychotropic medication (Vartia, 2001). As stated at the beginning of this chapter, the relationship between other stressors and use of prescribed medication is difficult to predict given the limited available evidence. It is however possible that the presence or absence of significant associations between remaining stressors and medication outcomes depends to some extent on associations between stressors and symptoms of ill-health. Results indicate that bullying, and to a lesser degree, the NOF score was most strongly associated with prescribed medication. Bullying alone was associated with 12-month medication use (both any medication and psychotropic medication), and both NOF and bullying were significantly associated with 14-day use of pain killers and/or indigestion medication (a higher odds ratio was observed for the upper quartile of the NOF score) and 14-day use of any medication.

The current results therefore support the third hypothesis in that bullying was associated with not only psychotropic medication use, but also 12-month use of any medication and short (14-day) term use of prescribed medications generally. That the NOF score is significantly associated with short-term medication use is unsurprising, given that NOF was associated with a number of acute health outcomes. However, the absence of significant associations between medication use and remaining stressors does not support the hypothesis, in that the presence or absence of such associations is not solely dependent on established relationships between a particular stressor and commonly reported health complaints.

4.5.5 Independent effects of additional stressors

The purpose of the analyses described in the current chapter was to determine whether an additional set of workplace stressors not considered thus far, could explain variance in health over and above that of the NOF score. Although not detailed in the current chapter, it is likely that the set of additional stressors considered would demonstrate independent associations with many of the health and well-being outcomes examined. However, when the effects of LMX, TMX, unsupportive culture, role ambiguity, role conflict and workplace bullying on physical and psychological health are considered relative to each other (i.e. without including the NOF score as a predictor in regression equations), a similar pattern of effects emerges. The experience of bullying at work explains significantly greater variance in terms of negative health consequences, for the majority of outcomes.[31] This is perhaps unsurprising given the high prevalence of bullying behaviours in public sector, and particularly healthcare organisations: 48% of the current sample had reported exposure to at least one bullying behaviour in the last 6 months, which is comparable with rates reported in other studies of healthcare populations (e.g. 44% of nurses, as opposed to 35% of other NHS trust employees: Quine, 2001).

4.5.6 Limitations and directions for future research

Although suggestive of some interesting patterns of association, the current chapter is subject to a number of limitations. Firstly, the use of stepwise regression techniques is controversial, given that they tend to 'over-fit' the model, and depending on which particular technique is used (i.e. forwards or backwards) the final model may reflect spurious associations created by statistical artefacts. However, when used as an exploratory method, stepwise techniques can help to identify the best predictors of a particular outcome among a large number of independent variables. Secondly, the cross-sectional nature of the current study precludes any conclusions regarding causality.

The current chapter was of an exploratory nature, the primary aim being to determine the potentially negative health consequences of a number of psychosocial workplace stressors not previously considered within the context of this thesis, in relation to the established effects of the NOF score. Despite suggestion within the literature that models of work stress should consider interpersonal stressors (e.g. LMX and bullying), culture and aspects of job role as contributory factors (Cox, 1990; HSE, 2007), there exists only a very small body of literature which seeks to examine these stressors in relation to health outcomes. The experience of bullying in the workplace

[31] The results of these analyses are presented in Appendix IV.

is an exception however: there is a significant and growing research literature suggesting the negative impact of bullying on physical and psychological health.

The current data suggest that, of the set of novel stressors examined, the experience of bullying at work has the most consistently negative impact on health and well-being. In some cases, this association is observed in addition to the established effects of a composite negative occupational factors score; for other outcomes, bullying alone emerged as most strongly associated with negative effects. However, role conflict was consistently associated with musculoskeletal outcomes (12-month sciatica/back pain; 14-day back pain/swollen ankles; 14-day back pain).

Furthermore, the measure of workplace bullying used in the current chapter may over-estimate the strength of associations between bullying and health outcomes. The current measure did not asses frequency of exposure to behaviours, contrary to Zapf's (1996) assertion that behaviours must occur at a relatively high frequency (once a week for at least 6 months) in order to be classified as bullying. This criticism is addressed in Chapter 7. It may also be the case that relationships between the stressors studied in the current chapter follow quite complex patterns, which may require a different analytical approach to disentangle. For example, it has been suggested that certain aspects of culture may be antecedent to the development of workplace bullying (e.g. Salin, 2003; Strandmark & Hallberg, 2007), or that culture acts as a 'filter' through which bullying behaviours are tolerated within an organisation (Einarsen & colleagues, e.g. 1991; 1996). LMX and TMX may also serve to moderate or mediate relationships between for example, bullying and health outcomes, and it is also plausible that role stress (ambiguity, conflict or overload) may influence relationships between other workplace stressors and health. Approaches required to test these hypotheses such as structural equation modelling, are however beyond the scope of the current thesis. The possibility that workplace stressors may have interactive effects on outcomes is nonetheless examined to some degree in Chapter 6.
The results presented in the current chapter support the assertion that occupational and interpersonal stressors produce the most detrimental impact when considered in combination, and also suggest that additional stressors, in particular workplace bullying, merit inclusion in a composite measure of occupational stress. Furthermore, the current results also suggest that relationships between categories of stressors and

health and well-being outcomes are to some extent selective: the precise nature of an association between a set of stressors and poor health, appears to depend to some extent on the outcome under study.

The following chapters (5-6) will therefore examine the influence of modified NOF scores, in terms of health and well-being, and also seek to clarify both the cumulative and selective influence of the components of a combined NOF score. The specific aims of Chapter 5 are to compare associations between the following NOF scores and health outcomes: the original score as detailed in Chapter 3; NOF inclusive of bullying; NOF inclusive of bullying and role stress; and NOF inclusive of all additional stressors studied in this chapter (i.e. unsupportive culture, LMX, TMX, role conflict, role ambiguity and bullying). A further aim of Chapter 5 is to compare the effects of NOF with those of a similarly calculated variable, based on demographic and individual 'risk' factors, such as negative affectivity.

CHAPTER 5

EXTENSION AND FURTHER ANALYSIS OF THE NEGATIVE OCCUPATIONAL FACTORS SCORE: IMPACT ON HEALTH AND WELL-BEING

5.1 INTRODUCTION

5.1.1 Overview

Analyses presented in the previous chapter demonstrate the relative influence of a combined Negative Occupational Factors (NOF) score, and a number of novel occupational and interpersonal stressors on health and well-being outcomes. These potential stressors, not previously examined in this thesis, comprised Leader-Member Exchange (LMX), Team Member Exchange (TMX), an unsupportive organisational culture, role ambiguity, role conflict, and workplace bullying. Analyses presented in Chapter 4 suggest that, of these additional stressors, workplace bullying is most strongly associated with negative health outcomes. In some cases, these associations are observed in addition to the established effects of the NOF score; for other outcomes, bullying alone was significantly associated with negative effects. However, aspects of role were significantly associated with a comparatively small number of outcomes, in particular role conflict was consistently associated with musculoskeletal symptoms.

The results presented in Chapter 4 support the assertion that workplace stressors impact most negatively on health and well-being when considered in combination. Previously described findings also indicate that additional stressors, the experience of bullying at work in particular, merit inclusion in a composite measure of occupational stress. Furthermore, results presented so far suggest that relationships between categories of stressors and measures of health and well-being may be selective: the precise nature of associations between a set of stressors and poor health, may depend to some extent on the particular outcome of interest. The current chapter will therefore seek to examine both the cumulative and selective impact of modified NOF scores on health and well-being outcomes.

Moreover, the findings presented thus far in this thesis have controlled for the potentially significant influence of demographic characteristics and negative affectivity. In the current chapter, the effects of demographic and/or individual 'risk' factors on health outcomes are specifically examined. It is of particular interest to determine whether demographic characteristics and individual differences (negative affectivity) demonstrate similar effects to the NOF score when considered in combination, and if so, to determine the influence of these effects relative to NOF on health outcomes.

5.1.2 Independent and combined effects of occupational stressors

The independent and combined effects of occupational stressors and job stress models of which the Negative Occupational Factors (NOF) score is comprised, are described in detail in Chapters 1 and 4: a brief summary only is provided in the following sections.

5.1.2.1 The Demand-Control-Support (DCS) and Effort-Reward Imbalance (ERI) models

Associations between DCS, ERI and well-being outcomes are well-established, although the available literature has largely focused on cardiovascular disease outcomes and risk factors (e.g. Siegrist, 1996; Bosma et al., 1998; Theorell & Karasek, 1998; Yoshimasu, 2001; Kivimäki et al., 2002). Models have also been found to predict musculoskeletal problems (Skov et al., 1996; Joksimovic et al., 2002a; Nahit et al., 2002), work-related stress (Calnan et al., 2001), depression (Stansfeld et al., 1998a; Tsutsumi et al., 2001a; Pelfrene et al., 2002a; Pickart et al., 2004), anxiety (Perrewe, 1986; Cropley et al., 1999) and psychiatric disorder (Stansfeld et al., 1999a).

More research is needed however, to determine the pattern of association between job stress models (and components of), and health outcomes. Van der Doef and Maes (1998) asserted that more research is required to determine whether demands, control and support are linearly or non-linearly associated with health outcomes. There is some evidence of both threshold (Landsbergis et al., 1992; Schnall et al., 1994, cited in Van der Doef & Maes, 1998) and curvilinear effects. Warr (1994) proposed an alternative model which views the effects of stressors as analogous to the effects of vitamins: some job characteristics are hypothesised to be similar in their effects to C and E vitamins in that a deficiency is detrimental to health, but excess amounts do not have negative consequences. Others are thought to exert a similar influence to A and D vitamins: harmful in high doses. More recent research has also suggested that job stress models should include additional variables that capture the complexity of modern working environments (e.g. Demerouti et al., 2001; Bakker et al., 2003; Van Veldhoven et al., 2005). However, some would argue (see Van Vegchel et al., 2005) that including situational specificity in such models is unnecessary and unhelpful unless the population under study is homogenous.

5.1.2.2 Independent effects of environmental workplace stressors

The independent effects of noise and working hours on well-being at work have been quite extensively studied. Acute noise exposure is thought to negatively influence physical health via catecholamine excretion and cardiovascular function (e.g. Butler et al., 1999), and noise annoyance has been linked to psychological distress (Smith, 1991). Long working hours and shift work, have been associated with psychological well-being (Sparks et al., 1999), an increased risk of developing colorectal cancer (Schernhammer et al., 2003), peptic ulcer disease, CHD and poor pregnancy outcomes (Knutsson, 2003).

5.1.2.3 Independent effects of additional workplace stressors

The following additional stressors were introduced in the previous chapter: Leader-Member Exchange (LMX), Team-Member Exchange (TMX), supportive organisational culture, role conflict, role ambiguity and bullying at work. Little research has previously investigated the effects of these stressors on health outcomes with the exception of bullying. However, a number of relevant associations have been suggested, such as between LMX, and burnout, physical health problems (Rose, 1998), work-related stress (Nelson et al., 1998) and (reduced) job satisfaction (Major et al., 1995). Organisational culture has also been found to predict job satisfaction in nurses (Tzeng et al., 2002) and work-related stress (Länsisalmi et al., 2000; Peterson & Wilson, 2002). Role stress, in particular role ambiguity and conflict, have been fairly widely studied in relation to burnout (Duquette et al., 1994; Boyd, 1996; Peiro et al., 2001; Ortqvist and Wincent, 2006).

Bullying at work has been suggested as a risk factor for cardiovascular disease and depression (Kivimäki et al., 2003), psychological and psychosomatic complaints (Mikkelsen & Einarsen, 2002), increased use of psychotropic medication (Vartia, 2001) and negative organisational consequences such as low job satisfaction and increased sickness absence in hospital staff (Kivimäki et al., 2000).

5.1.2.4 Combined effects of existing job stress models and environmental stressors

It has been suggested that the DCS and ERI models may explain greater variance in health outcomes when studied in combination (Calnan et al., 2000; Peter et al., 2002; Ostry et al., 2003; Rydstedt et al., 2007). Moreover, Akerboom and Maes (2006) found novel risk factors such as staffing resources and communication to explain additional variance in outcomes (job satisfaction, psychological well-being and somatic complaints) than the DCS alone, and Fillion et al. (2007) found the addition of occupation-specific (palliative care) stressors to existing job stress models explained greater variance in emotional distress.

A number of researchers have examined the combined effects of physical and environmental stressors on health and well-being outcomes. Using an additive approach, researchers in Israel (Luz et al., 1990; Melamed et al., 1999; Shirom et al., 2000) demonstrated a linear association between a composite measure of physical hazards, and accidents at work and serum uric levels in males. Smith et al. (2004) found that exposure to a combination of all negative occupational factors comprised in a composite (NOF) score was frequently more strongly associated with negative health outcomes than either single stressors, or combinations of fewer stressors. However, significant associations tended to demonstrate distinct patterns of effect, dependent to some extent on the outcome of interest.

The current chapter builds on the work of Smith et al. (2004), and extends this previous research by taking into account some of the additional stressors suggested in the literature by the UK HSE (2007: demands, control, support, interpersonal relationships and role stressors) and Cox (1990: high demands, low control, unsupportive organisational culture, role ambiguity/conflict, career development, interpersonal relationships, the home/work interface, work scheduling and the physical environment). The effects of adding some or all of the following additional stressors to the Negative Occupational Factors (NOF) score described by Smith et al. (2004) is investigated in the current chapter: LMX, TMX, unsupportive organisational culture, role conflict, role ambiguity and bullying at work.

5.1.3 Occupation-specific effects

Although there is some debate within the literature as to the usefulness of job stress models which incorporate situational specificity (see Van Vegchel et al., 2005), a diverse set of stressors thought to be important in terms of predicting negative outcomes in nurses has been proposed (e.g. staffing and scheduling, role clarity, lack of involvement in decision making, (Williams et al., 1998), leadership style (McVicar, 2003), low control, high demands, shortage of resources, being moved between care units, shift rotation, poor organisational commitment (Chang et al., 1995), discrimination, uncertainty concerning treatment (French et al., 2000), low social support (Williams et al., 1998; Chang et al., 2005), professional conflict/poor relationships with colleagues/supervisors (French et al., 2000; McVicar, 2003; Chang et al., 2005), under-skilled staff/poor quality care (Chang et al., 2005; Glazer & Gyurak, 2008), lack of management support, job overspill, making decisions under time pressure, lack of organisational recognition (Bennett et al., 2000), workload, coping with death and dying, and patients and families (French et al., 2000; Chang et al., 2005). A great many of these stressors are addressed in the current chapter: however, for a comparison of a global measure (i.e. NOF) with nursing-specific stressors, see Chapter 7.

5.1.4 Current hypotheses

Given the findings outlined thus far, the following hypotheses were formulated:

1. Bullying is likely to add to the explanatory power of the NOF score in terms of increased risk of reporting the majority of poor health (physical and psychological) outcomes, given the consistently significant relationship between bullying and health outcomes described in Chapter 4.

2. A novel NOF score comprising workplace bullying as a component, will likely be selectively associated with health outcomes, given the pattern of results demonstrated by an existing composite stressor score outlined in Chapter 3.

For certain outcomes (e.g. work stress) a cumulative association with the novel score will likely be evident: for physical health outcomes, it is likely that only high exposure (i.e. at 4^{th} quartile levels) will be associated with an increased risk of reporting.

3. A novel NOF score comprising aspects of job role in addition to bullying, may be most strongly associated with musculoskeletal symptoms, based on the findings described in Chapter 4.

4. The addition of further novel stressors to this NOF score is likely to increase the strength of association between work stressors and health outcomes of multiple aetiology, e.g. work stress.

5. Demographic characteristics and individual differences are likely to be selectively associated with the majority of health outcomes. They may also combine cumulatively in a similar pattern to that demonstrated by NOF. However, NOF is thought to better predict likelihood of reporting any negative health consequence.

5.2 METHOD

The nature of the survey and sample demographics have been previously described (see Chapter 3, sections 3.2.1 and 3.2.2).

5.2.1 Independent measures

Independent measures were as follows:

<u>Novel NOF score inclusive of bullying behaviours</u>

A composite stressor variable was created across the job demand-control-support and effort-reward imbalance models, the unfavourable working hours/exposure to hazards score[32] and bullying behaviours. A score based on quartile splits[33] of the following

[32] See Chapter 4, section 4.2.3 for calculation of these items.

scales was created; job demand, decision latitude, social support[34], extrinsic effort, intrinsic effort, reward, unfavourable working hours/exposure to physical hazards and bullying behaviours[35]. The coefficient alpha for the composite score was .77.

Novel NOF score inclusive of bullying, role ambiguity and role conflict

This composite score was calculated as described above, and based on quartile splits of the following: job demand, decision latitude, social support, extrinsic effort, intrinsic effort, reward, unfavourable working hours/exposure to physical hazards, bullying behaviours, role conflict and role ambiguity. The coefficient alpha for the composite score was .83.

Novel NOF score inclusive of all additional stressors

This score was calculated as described for the previous novel scores, based on quartile splits of the following: job demand, decision latitude, social support, extrinsic and intrinsic effort, reward, working hours/hazards, bullying, role conflict, role ambiguity, unsupportive culture and LMX and TMX. The coefficient alpha for the score was .85.

Demographic/individual risk factors composite score

The following demographic and individual characteristics were entered into a stepwise (backward) regression model, in order to determine their relative influence on key health outcomes: age, gender, marital status, education, social class, part/full-time employment, income, occupational group and negative affectivity.[36] A number of characteristics were not significantly associated with any outcome, and were therefore not included in the combined score: income, education, social class, gender and occupational group (i.e. healthcare or social services/local government sector). Dichotomies of the following characteristics only were included in the composite score:

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[33] An adjustment was made for missing data by calculating the mean score and multiplying this value by the number of scales comprising the total score (i.e. 8).

[34] For decision latitude and social support, appropriate items were reversed and the total score re-calculated, so that a high score was indicative of negativity; i.e. low control and low support (as for the total demand-control-support score).

[35] It was not possible to use a quartile split of the bullying scale due to its' non-normal distribution. A 4-category variable was created where those reporting no exposure to bullying comprised the reference category, and a tertile split of remaining scores represented all other levels of exposure.

[36] Results are presented in Appendix V for the following outcomes: work-related stress, probable clinical anxiety and depression, lifetime prevalence of disease and 12-month and 14-day symptoms.

- Age (<40 / 41-65 yrs)
- Marital status (married/cohabiting; single/divorced/widowed)
- Part / full-time employment
- Negative affectivity (low / high)

Based on the frequency distribution of risk factors, a three-category variable was created to reflect the following: 0/1 'risk' factor; 2 'risk' factors and 3/4 risk factors.

5.2.2 Dependent measures

Dependent measures comprised a number of health, medication and well-being outcomes. These are described in detail in Chapter 3 (section 3.2.4).

5.3 SUMMARY STATISTICS

Descriptive statistics for all dependent measures and covariates are provided in Chapter 3, sections 3.3.1 and 3.3.2. Summary statistics for independent measures utilised only in the current chapter are provided in Tables 22 and 23.

Table 22: Descriptive statistics for continuous independent measures[37]

Measure	Sample	N	Min	Max	Mean	SD
Novel NOF score (inclusive of bullying)	Healthcare	791	8.00	32.00	19.34	5.72
	Socials services/LG	299	9.00	31.00	18.91	5.37
	Total	1090	8.00	32.00	19.22	5.63
Novel NOF score (inclusive of bullying and role)	Healthcare	791	10.00	40.00	24.33	7.15
	Social services/LG	299	11.00	39.00	24.25	6.94
	Total	1090	10.00	40.00	24.31	7.10
Novel NOF score (inclusive of all additional stressors)	Healthcare	791	13.00	51.00	31.63	8.71
	Social services/LG	299	15.00	50.00	32.03	8.65
	Total	1090	13.00	51.00	31.74	8.69

[37] Correlations (Spearman's r) between quartile splits of novel scores range from .88 to .92, significant at the 0.01 level (2-tailed).

Table 23: Frequency of demographic risk factors

	Healthcare	Social services/ local government	Total sample
0/1 risk factor	*256 (33.6%)*	*73 (25.7%)*	*329 (31.5%)*
0 risk factors	48 (6.3%)	10 (3.5%)	58 (5.6%)
1 risk factor	208 (27.3%)	63 (22.2%)	271 (25.9%)
2 risk factors	*316 (41.5%)*	*132 (46.5%)*	*448 (42.9%)*
3/4 risk factors	*187 (24.8%)*	*79 (27.8%)*	*268 (25.6%)*
3 risk factors	163 (21.4%)	67 (23.6%)	230 (22.0%)
4 risk factors	26 (3.4%)	12 (4.2%)	38 (3.6%)

5.4 ANALYTIC PROCEDURE

Analyses in the current chapter are presented in two sections: in the first, the relative influence of the different NOF scores on health outcomes is compared: in the second section, the influence of demographic risk, and demographic risk relative to the original NOF score on health outcomes is examined. In the first section, the following variables were included in all models as covariates: gender, age, income, educational attainment, marital status, work pattern (full/part time), socio-economic status, negative affectivity and occupational group (i.e. health services/nursing and social services/local government). In the second section, the following outcomes only were included as covariates: gender, income, educational attainment, socio-economic status and occupational group. Unless otherwise stated, all models demonstrated adequate goodness of fit (no evidence of multicollinearity was observed).

5.5 ASSOCIATIONS BETWEEN NOVEL NOF SCORES AND HEALTH & WELL-BEING

The novel NOF scores as described above served as independent predictors in a series of logistic regression analyses, co-varying for demographic characteristics and negative affectivity. Two types of contrast were used; firstly, the lower quartile of the score was set as the reference category and secondly a repeated contrast was used. Results are compared to the original score (Chapter 3) and presented in the following sections.

5.5.1 Outcomes not associated with the NOF score

No significant associations were observed between prescribed psychotropic medication in the last 12 months. Patterns of association between the novel NOF scores and the remaining outcome measures are described subsequently.

5.5.2 Negative Occupational Factors (NOF) scores, work-related stress and psychological well-being

Odds ratios and 95% confidence intervals where work-related stress and probable clinical anxiety and depression[38] served as dependent measures are shown below in Table 24 (the lower quartile of the novel NOF scores were set as the reference category).

Table 24: Novel NOF scores, work-related stress, clinical anxiety & depression

		N	OR	95% CI
Work-related stress				
NOF (original score)	1st quartile	272	1.00	
	2nd quartile	263	3.34+	1.59–7.01
Wald = 161.81, p<.0001	3rd quartile	272	8.25**	4.08–16.65
	4th quartile	213	43.75***	21.16–90.43
NOF (bullying)	1st quartile	298	1.00	
	2nd quartile	233	3.60*	1.80-7.20
Wald = 147.74, p<.0001	3rd quartile	237	6.43*	3.31-12.50
	4th quartile	252	30.48***	15.76-58.95
NOF (bullying & role)	1st quartile	289	1.00	
	2nd quartile	230	2.48*	1.29-4.79
Wald = 132.34, p<.001	3rd quartile	276	5.84***	3.20-10.65
	4th quartile	225	21.88***	11.82-40.51
NOF (all additional stressors)	1st quartile	242	1.00	
	2nd quartile	289	2.17+	1.13-4.16
	3rd quartile	237	4.80**	2.56-9.01

[38] Negative affectivity was not included as a covariate where clinical anxiety or depression comprised dependent measures.

Wald = 115.96, p<.0001	4th quartile	252	15.45***	8.32-28.66
Clinical anxiety				
NOF (original score)	1st quartile	275	1.00	
	2nd quartile	261	4.20***	2.09-8.44
Wald = 160.83 p<.0001	3rd quartile	264	10.74***	5.52-20.90
	4th quartile	212	40.48***	20.51-79.89
NOF (bullying)	1st quartile	300	1.00	
	2nd quartile	231	4.90***	2.43-9.90
Wald = 158.21, p<.0001	3rd quartile	230	10.76**	5.49-21.09
	4th quartile	251	38.55***	19.79-75.10
NOF (bullying & role)	1st quartile	292	1.00	
	2nd quartile	226	3.14**	1.64-6.01
Wald = 171.18, p<.0001	3rd quartile	272	7.43***	4.10-13.47
	4th quartile	222	32.90***	17.89-60.51
NOF (all additional stressors)	1st quartile	254	1.00	
	2nd quartile	265	3.37***	1.70-6.65
	3rd quartile	267	7.72***	4.04-14.76
Wald = 162.13, p<.0001	4th quartile	226	32.46***	16.86-62.48
Clinical depression				
NOF (original score)	1st quartile	275	1.00	
	2nd quartile	259	2.06	0.51-8.42
Wald = 53.63 p<.0001	3rd quartile	264	9.69**	2.82-33.28
	4th quartile	211	28.44***	8.43-95.99
NOF (bullying)	1st quartile	300	1.00	
	2nd quartile	230	2.71	0.66-11.04
Wald = 56.51, p<.0001	3rd quartile	231	7.78+	2.20-27.52
	4th quartile	248	29.91***	8.98-99.66
NOF (bullying & role)	1st quartile	291	1.00	
	2nd quartile	226	3.24	0.82-12.79
Wald = 51.90, p<.0001	3rd quartile	271	8.42+	2.43-29.11
	4th quartile	221	28.34***	8.46-94.90
NOF (all additional stressors)	1st quartile	253	1.00	
	2nd quartile	265	3.21	0.86-11.99
	3rd quartile	265	5.43	1.54-19.19
Wald = 52.62, p<.0001	4th quartile	226	22.86***	6.86-76.18

Note: repeated contrasts + (p<.05) * (p<.01) ** (p<.001) *** (p<.0001)

It is evident from the above Table that the NOF score inclusive of bullying is associated with greater risk of reporting work-related stress, and probable clinical anxiety and depression than the other two novel composite stressor scores examined. However, the original NOF score is associated with the greatest increased risk of reporting work stress and clinical anxiety. The NOF score inclusive of bullying is associated with a marginally greater risk of reporting clinical depression than the original NOF score.

5.5.3 Negative Occupational Factors (NOF) scores, lifetime prevalence of disease and 12-month health

Odds ratios and 95% confidence intervals where chronic and 12-month ill-health outcomes served as dependent measures are shown in Table 25, where the lower quartile of the novel NOF scores were set as the reference category.

Table 25: Novel NOF scores, lifetime & 12-month symptoms

		N	OR	95% CI
Lifetime prevalence of disease				
NOF (original score)	1st quartile	258	1.00	
	2nd quartile	252	0.98	0.68–1.41
Wald = 12.74, p<.005	3rd quartile	257	1.08	0.75–1.56
	4th quartile	199	1.91*	1.26–2.90
NOF (bullying)	1st quartile	282	1.00	
	2nd quartile	226	0.90	0.62-1.31
Wald = 17.81, p<.0001	3rd quartile	223	1.05	0.72-1.52
	4th quartile	235	1.97*	1.33-2.91
NOF (bullying & role)	1st quartile	277	1.00	
	2nd quartile	220	0.88	0.61-1.29
	3rd quartile	258	0.98	0.68-1.40
Wald = 17.00, p<.001	4th quartile	211	1.93**	1.29-2.89
NOF (all additional	1st quartile	231	1.00	
stressors)	2nd quartile	275	1.00	0.69-1.45
	3rd quartile	228	0.96	0.65-1.41
Wald = 12.81, p<.005	4th quartile	232	1.77**	1.19-2.65
12-month symptom score				
NOF (original score)	1st quartile	248	1.00	
	2nd quartile	242	1.25	0.85–1.84
Wald = 27.66, p<.0001	3rd quartile	186	1.53	1.04–2.26
	4th quartile		3.09**	1.99–4.79
NOF (bullying)	1st quartile	271	1.00	
	2nd quartile	216	1.12	0.76-1.66

Wald = 31.38, p<.0001	3rd quartile	206	1.39	0.94-2.06
	4th quartile	217	2.97***	1.97-4.48
NOF (bullying & role)	1st quartile	265	1.00	
	2nd quartile	209	1.08	0.72-1.61
Wald = 42.00, p<.0001	3rd quartile	241	1.46	0.99-2.14
	4th quartile	195	3.68***	2.39-5.67
NOF (all additional stressors)	1st quartile	220	1.00	
	2nd quartile	264	1.24	0.83-1.83
	3rd quartile	212	1.40	0.93-2.13
Wald = 31.23, p<.0001	4th quartile	214	3.08***	2.00-4.72
Sciatica/back pain in last 12 months				
NOF (original score)	1st quartile	263	1.00	
	2nd quartile	254	1.08	0.75–1.57
Wald = 14.77, p<.002)	3rd quartile	260	1.22	0.85–1.77
	4th quartile	204	2.11*	1.39–3.19
NOF (bullying)	1st quartile	287	1.00	
	2nd quartile	228	1.16	0.80-1.68
Wald = 13.03, p<.005	3rd quartile	226	1.16	0.79-1.68
	4th quartile	240	1.95*	1.33-2.87
NOF (bullying & role)	1st quartile	279	1.00	
	2nd quartile	222	1.16	0.80-1.70
Wald = 17.42, p<.001	3rd quartile	263	1.30	0.90-1.87
	4th quartile	217	2.26**	1.51-3.38
NOF (all additional stressors)	1st quartile	234	1.00	
	2nd quartile	276	1.25	0.86-1.83
	3rd quartile	231	1.27	0.86-1.89
Wald = 12.76, p<.005	4th quartile	240	2.02+	1.35-3.02

Note: repeated contrasts + (p<.05) * (p<.01) ** (p<.001) ***(p<.0001)

The results presented in Table 25 suggest that the NOF score inclusive of bullying may be associated with a marginally greater risk of reporting lifetime prevalence of disease than either the original or other two novel NOF scores. For 12-month symptoms, the novel score inclusive of all stressors is associated with a similar risk of reporting as the original score. The score inclusive of bullying was associated with a lower risk in the upper quartiles, whereas the score which includes both bullying and role is associated with the greatest risk of reporting. A similar pattern of association was observed for 12-month sciatica, except that the original NOF score is associated with a marginally increased risk of reporting than the score inclusive of all stressors.

5.5.4 Negative Occupational Factors (NOF) scores and acute ill-health

Odds ratios and 95% confidence intervals where 14-day health outcomes served as dependent measures are shown in Table 26 (where the lower quartile of the novel NOF scores were set as the reference category).

Table 26: Novel NOF scores & acute ill-health

		N	OR	95% CI
14-day symptom score				
NOF (original score)	1st quartile	247	1.00	
	2nd quartile	243	1.31	0.90–1.90
Wald = 37.45, p<.0001	3rd quartile	234	1.86+	1.27–2.73
	4th quartile	183	3.86**	2.46–6.08
NOF (bullying)	1st quartile	270	1.00	
	2nd quartile	219	1.16	0.79-1.69
Wald = 47.10, p<.0001	3rd quartile	204	1.67	1.13-2.45
	4th quartile	214	4.09***	2.67-6.27
NOF (bullying & role)	1st quartile	265	1.00	
	2nd quartile	213	1.36	0.93-1.99
	3rd quartile	236	1.78	1.23-2.60
Wald = 42.24, p<.0001	4th quartile	193	4.21***	2.70-6.56
NOF (all additional stressors)	1st quartile	221	1.00	
	2nd quartile	266	1.45	0.99-2.13
	3rd quartile	211	1.84	1.23-2.76
Wald = 37.08, p<.0001	4th quartile	209	3.76**	2.43-5.83
Depression/fatigue in last 14 days				
NOF (original score)	1st quartile	261	1.00	
	2nd quartile	253	1.27	0.86–1.87
Wald = 40.54, p<.0001	3rd quartile	253	2.84***	1.80–4.47
	4th quartile	204	5.58	2.95–10.53
NOF (bullying)	1st quartile	286	1.00	
	2nd quartile	228	1.11	0.75-1.64
Wald = 42.86, p<.0001	3rd quartile	218	2.35**	1.49-3.71
	4th quartile	239	6.17+	3.35-11.38
NOF (bullying & role)	1st quartile	280	1.00	
	2nd quartile	220	1.49	0.99-2.24
Wald = 41.95, p<.0001	3rd quartile	255	2.55+	1.65-3.95
	4th quartile	216	6.61**	3.52-12.43
NOF (all additional stressors)	1st quartile	235	1.00	
	2nd quartile	274	1.77*	1.18-2.65

	3rd quartile	226	2.56	1.62-4.06
Wald = 42.24, p<.0001	4th quartile	236	6.28*	3.50-11.26
Upper respiratory tract symptoms in last 14 days				
NOF (original score)	1st quartile	262	1.00	
	2nd quartile	254	0.99	0.69–1.41
Wald = 7.37, p<.05	3rd quartile	252	1.29	0.90–1.86
	4th quartile	102	1.60	1.06–2.42
NOF (bullying)	1st quartile	287	1.00	
	2nd quartile	228	1.25	0.88-1.79
Wald = 10.89, p<.01	3rd quartile	217	1.13	0.79-1.63
	4th quartile	237	1.87*	1.27-2.74
NOF (bullying & role)	1st quartile	281	1.00	
	2nd quartile	221	1.22	0.85-1.75
Wald = 10.26, p<.02	3rd quartile	253	1.08	0.76-1.53
	4th quartile	214	1.84*	1.23-2.72
NOF (all additional	1st quartile	235	1.00	
stressors)	2nd quartile	276	1.14	0.79-1.63
	3rd quartile	224	1.18	0.81-1.73
Wald = 8.23, p<.04	4th quartile	234	1.74+	1.17-2.58
Lower respiratory symptoms in last 14 days[39]				
NOF (original score)	1st quartile	259	1.00	
	2nd quartile	253	1.31	0.74–2.33
Wald = 7.85, p<.05	3rd quartile	254	1.54	0.87–2.72
	4th quartile	202	2.26	1.25–4.09
NOF (bullying)	1st quartile	283	1.00	
	2nd quartile	228	1.16	0.65-2.10
Wald = 12.46, p<.006	3rd quartile	219	1.63	0.92-2.89
	4th quartile	238	2.47	1.42-4.31
NOF (bullying & role)	1st quartile	277	1.00	
	2nd quartile	221	1.24	0.68-2.26
Wald = 10.77, p<.01	3rd quartile	256	1.75	1.00-3.05
	4th quartile	214	2.43	1.37-4.32
NOF (all additional	1st quartile	232	1.00	
stressors)	2nd quartile	275	1.91+	1.00-3.65
	3rd quartile	226	2.65	1.39-5.06
Wald = 13.20, p<.004	4th quartile	235	3.11	1.63-5.94

[39] As noted in Chapter 3, the association between the original NOF score and acute lower respiratory tract symptoms no longer reaches significance when smoking status in included in the model as a covariate. However, relationships between 14-day lower respiratory tract symptoms and the remaining 3 NOF scores remain highly significant when smoking status is co-varied for.

Gastrointestinal symptoms in last 14 days				
NOF (original score)	1st quartile	261	1.00	
	2nd quartile	252	1.06	0.64–1.76
Wald = 14.95, p<.002	3rd quartile	252	1.06	0.64–1.76
	4th quartile	202	2.25*	1.35–4.09
NOF (bullying)	1st quartile	286	1.00	
	2nd quartile	226	0.98	0.59-1.63
Wald = 11.08, p<.01	3rd quartile	217	1.12	0.68-1.86
	4th quartile	238	1.95+	1.20-3.15
NOF (bullying & role)	1st quartile	280	1.00	
	2nd quartile	219	1.26	0.75-2.12
Wald = 11.32, p<.01	3rd quartile	254	1.25	0.76-2.07
	4th quartile	214	2.22*	1.34-3.68
NOF (all additional	1st quartile	235	1.00	
stressors)	2nd quartile	273	0.89	0.53-1.49
	3rd quartile	224	1.04	0.61-1.76
Wald = 13.31, p<.004	4th quartile	235	1.93*	1.17-3.18
Backache/swollen ankles in last 14 days				
NOF (original score)	1st quartile	261	1.00	
	2nd quartile	254	1.56	1.08–2.25
Wald = 14.73, p<.002	3rd quartile	255	1.50	1.03–2.17
	4th quartile	203	2.24+	1.48–3.39
NOF (bullying)	1st quartile	286	1.00	
	2nd quartile	228	1.50+	1.04-2.17
Wald = 14.68, p<.002	3rd quartile	220	1.43	0.98-2.08
	4th quartile	239	2.13+	1.44-3.14
NOF (bullying & role)	1st quartile	280	1.00	
	2nd quartile	221	1.24	0.85-1.80
Wald = 13.98, p<.003	3rd quartile	257	1.52	1.06-2.18
	4th quartile	215	2.09	1.40-3.12
NOF (all additional	1st quartile	235	1.00	
stressors)	2nd quartile	276	1.64*	1.13-2.38
	3rd quartile	226	1.77	1.19-2.62
Wald = 12.37, p<.006	4th quartile	236	1.94	1.30-2.91
Back pain in last 14 days				
NOF (original score)	1st quartile	261	1.00	
	2nd quartile	256	1.67*	1.15–2.43
Wald = 16.64, p<.001	3rd quartile	258	1.57	1.07–2.30
	4th quartile	205	2.37+	1.56–3.62
NOF (bullying)	1st quartile	286	1.00	
	2nd quartile	229	1.73*	1.19-2.52

Wald = 16.72, p<.001	3rd quartile	224	1.62	1.11-2.38
	4th quartile	241	2.22	1.50-3.30
NOF (bullying & role)	1st quartile	280	1.00	
	2nd quartile	221	1.42	0.97-2.09
Wald = 14.51, p<.002	3rd quartile	262	1.72	1.19-2.49
	4th quartile	217	2.12	1.41-3.18
NOF (all additional	1st quartile	235	1.00	
stressors)	2nd quartile	276	1.62*	1.11-2.38
	3rd quartile	229	1.89	1.27-2.82
Wald = 12.81, p<.005	4th quartile	240	1.96	1.30-2.95
Tooth/earache in the last 14 days				
NOF (original score)	1st quartile	261	1.00	
	2nd quartile	254	1.33	0.83–2.14
Wald = 10.06, p<.02	3rd quartile	254	1.94	1.23–3.07
	4th quartile	201	1.92	1.16–3.17
NOF (bullying)	1st quartile	286	1.00	
	2nd quartile	228	1.10	0.68-1.77
Wald = 10.12, p<.02	3rd quartile	219	1.75	1.11-2.76
	4th quartile	237	1.82	1.15-2.89
NOF (bullying & role)	1st quartile	280	1.00	
	2nd quartile	221	1.29	0.79-2.10
Wald = 11.45, p<.01	3rd quartile	256	1.93	1.24-3.03
	4th quartile	213	2.00	1.23-3.24
NOF (all additional	1st quartile	235	1.00	
stressors)	2nd quartile	275	1.11	0.69-1.80
	3rd quartile	225	1.60	0.98-2.59
Wald = 11.89, p<.008	4th quartile	235	2.07	1.28-3.35

Note: repeated contrasts + (p<.05) * (p<.01) ** (p<.001) *** (p<.0001)

The pattern of association between acute health outcomes and NOF scores is highly variable. However, for the majority of outcomes, novel scores inclusive of bullying (with or without role) are associated with greater risk of reporting than the novel score inclusive of all stressors. For the following outcomes, the novel scores inclusive of bullying (with out without role) were associated with a greater risk than the original score: 14-day symptoms, 14-day depression and/or fatigue, 14-day upper and lower respiratory tract symptoms and14-day tooth and/or earache. However, the original NOF score remains most strongly associated with risk of reporting the following: 14-

day gastrointestinal symptoms, 14-day back pain and 14-day back pain/swollen ankles.

5.5.5 Negative Occupational Factors (NOF) scores and prescribed medication use

Odds ratios and 95% confidence intervals where prescribed medication use outcomes served as dependent measures are shown in Table 27 (where the lower quartile of the novel NOF scores were set as the reference category).

Table 27: Novel NOF scores and prescribed medication use

		N	OR	95% CI
Prescribed medication in the last year				
NOF (original score)	1st quartile	217	1.00	
	2nd quartile	227	1.19	0.80–1.77
Wald = 10.48, p<.02	3rd quartile	219	1.08	0.72–1.62
	4th quartile	168	1.98*	1.26–3.12
NOF (bullying)	1st quartile	238	1.00	
	2nd quartile	204	0.92	0.62-1.37
Wald = 3.35, p<.003	3rd quartile	189	1.06	0.71-1.59
	4th quartile	200	1.91*	1.25-2.91
NOF (bullying & role)	1st quartile	232	1.00	
	2nd quartile	199	0.97	0.65-1.45
Wald = 12.06, p<.007	3rd quartile	217	1.03	0.69-1.53
	4th quartile	183	1.89*	1.22-2.92
NOF (all additional	1st quartile	196	1.00	
stressors)	2nd quartile	241	1.07	0.72-1.60
	3rd quartile	192	0.97	0.63-1.50
Wald = 7.88, p<.05	4th quartile	202	1.65*	1.07-2.54
Use of pain/indigestion medication in the last year				
NOF (original score)	1st quartile	222	1.00	
	2nd quartile	232	1.31	0.88–1.93
Wald = 11.89, p<.008	3rd quartile	224	0.94	0.64–1.38
	4th quartile	175	1.91**	1.20–3.03
NOF (bullying)	1st quartile	244	1.00	
	2nd quartile	207	1.00	0.68-1.47
Wald = 10.52, p<.02	3rd quartile	195	0.92	0.62-1.37
	4th quartile	207	1.76*	1.14-2.70
Use of prescribed medication in last 14 days				

NOF (original score)	1st quartile	229	1.00	
	2nd quartile	225	1.03	0.71–1.52
Wald = 15.51, p<.001	3rd quartile	226	1.17	0.80–1.73
	4th quartile	178	2.29*	1.34–3.61
NOF (bullying)	1st quartile	248	1.00	
	2nd quartile	206	0.84	0.57-1.23
Wald = 17.17, p<.001	3rd quartile	193	1.17	0.79-1.74
	4th quartile	211	2.00*	1.31-3.05
NOF (bullying & role)	1st quartile	246	1.00	
	2nd quartile	191	0.95	0.64-1.40
Wald = 12.53, p<.006	3rd quartile	229	1.10	0.75-1.61
	4th quartile	192	1.95*	1.26-3.00
NOF (all additional stressors)	1st quartile	207	1.00	
	2nd quartile	243	0.97	0.66-1.43
	3rd quartile	198	1.15	0.76-1.73
Wald = 10.19, p<.02	4th quartile	210	1.79+	1.17-2.76
Use of pain/indigestion medication in last 14 days				
NOF (original score)	1st quartile	238	1.00	
	2nd quartile	231	0.96	0.65-1.41
Wald = 19,67, p<.0001	3rd quartile	237	1.28	0.87-1.88
	4th quartile	189	2.30*	1.50-3.54
NOF (bullying)	1st quartile	258	1.00	
	2nd quartile	210	0.79	0.53-1.17
Wald = 27.19, p<.0001	3rd quartile	204	1.27+	0.86-1.87
	4th quartile	223	2.27*	1.52-3.39
NOF (bullying & role)	1st quartile	256	1.00	
	2nd quartile	197	0.70	0.47-1.04
Wald = 24.07, p<.0001	3rd quartile	239	1.23*	0.85-1.79
	4th quartile	203	2.00*	1.33-3.02
NOF (all additional stressors)	1st quartile	215	1.00	
	2nd quartile	251	0.72	0.49-1.07
	3rd quartile	208	1.17*	0.78-1.76
Wald = 17.22, p<.001	4th quartile	221	1.64	1.09-2.47

Note: repeated contrasts + (p<.05) * (p<.01) ** (p<.001)

As is evident from the above Table, the original NOF score remains associated with the greatest risk of reporting all medication use outcomes.

5.6 DEMOGRAPHIC AND INDIVIDUAL CHARACTERISTICS, NOF AND HEALTH & WELL-BEING

The demographic/individual risk factor score described above served as an independent predictor in a series of logistic regression analyses, both with and without the inclusion of the original NOF score in the model. Analyses were carried out on a reduced set of outcome measures, as the purpose was to demonstrate the general influence of demographics, and to contrast these effects with the results demonstrated by NOF scores, which are the central focus of the current chapter. The following outcomes were therefore considered: work-related stress, probable clinical anxiety and depression, lifetime prevalence of disease, 12-month and 14-day symptoms. The following variables were included as covariates: gender, income, educational attainment, socio-economic status and occupational group. Two types of contrast were used; firstly, the lower quartile of the score (demographic risk and NOF where appropriate) was set as the reference category and secondly a repeated contrast was used. Results are presented in the following sections.

5.6.1 Demographic characteristics, negative affectivity and psychological & physical health

Odds ratios and 95% confidence intervals where psychological and physical health outcomes served as dependent measures are shown in Table 28 (where the lower category of the demographic risk score was set as the reference).

Table 28: Demographic risk factors and psychological & physical health

		N	OR	95% CI
Work-related stress	0/1 factor	324	1.00	
	2 factors	434	1.17	0.81-1.71
Wald = 24.09, p<.0001	3/4 factors	262	1.41***	1.63-3.58
Lifetime prevalence of disease	0/1 factor	317	1.00	
	2 factors	408	1.55*	1.13-2.11
	3/4 factors	241	2.33*	1.63-3.33
Wald = 21.84, p<.0001				
12-month symptoms	0/1 factor	300	1.00	
	2 factors	380	0.90	0.65-1.24
Wald = 13.54, p<.001	3/4 factors	230	1.66***	1.15-2.38

14-day symptoms	0/1 factor	299	1.00	
	2 factors	388	1.36	0.99-1.86
Wald = 17.96, p<.0001	3/4 factors	220	2.21*	1.53-3.19

For clinical anxiety and depression, negative affectivity was removed as a potential individual risk factor, due to its' similarity with the outcome measures. Demographic risk factors (age, marital status, full versus part-time employment) were not found to be significantly associated with these outcomes. However, as is evident from the Table, likelihood of reporting all ill-health is associated with cumulative demographic/individual risk factors: older age (>40), being single/divorced/widowed, working full-time and scoring highly on the measure of negative affectivity.

5.6.2 Demographic characteristics, negative affectivity, NOF and psychological & physical health

The relative influence of demographic and individual risk factors as compared to the original NOF score was also examined. Odds ratios and 95% confidence intervals where both NOF and the novel demographic/individual risk factor score served as independent measures are shown in Table 29 (lower categories of both scores were set as the reference).

Table 29: Demographic risk, NOF and psychological & physical health[40]

		N	OR	95% CI
Work-related stress				
NOF	1st quartile	272	1.00	
	2nd quartile	263	3.51**	1.68-7.32
Wald = 178.64, p<.0001	3rd quartile	272	8.62***	4.30-17.31
	4th quartile	213	46.92***	23.10-95.29
NOF	1st quartile	268	1.00	
	2nd quartile	256	1.60	0.37-6.85
Wald = 40.03, p<.0001	3rd quartile	264	7.80**	2.27-26.84
	4th quartile	208	18.63**	5.46-63.57
Lifetime prevalence of disease				
Demographic risk factors	0/1 factor	317	1.00	
	2 factors	408	1.52*	1.11-2.08

[40] Demographic risk was not found to predict clinical anxiety and depression; these outcomes are not therefore included in the current analysis.

	3/4 factors	241	2.07	1.44-2.98
Wald = 15.73, p<.0001				
NOF	1st quartile	258	1.00	
	2nd quartile	252	1.02	0.71-1.46
Wald = 14.34, p<.p002	3rd quartile	257	1.09	0.76-1.57
	4th quartile	199	1.97**	1.32-2.93
12 month symptoms				
Demographic risk factors	0/1 factor	300	1.00	
	2 factors	380	0.87	0.62-1.21
	3/4 factors	230	1.35*	0.93-1.96
Wald = 6.18, p<.05				
NOF	1st quartile	248	1.00	
	2nd quartile	242	1.32	0.90-1.94
Wald = 33.17, p<.0001	3rd quartile	234	1.56	1.06-2.29
	4th quartile	186	3.29***	2.16-5.00
14 day symptoms				
Demographic risk factors	0/1 factor	299	1.00	
	2 factors	388	1.35	0.97-1.87
	3/4 factors	220	1.76	1.20-2.58
Wald = 8.50, p<.01				
NOF	1st quartile	247	1.00	
	2nd quartile	243	1.45+	1.01-2.10
Wald = 56.56, p<.0001	3rd quartile	234	2.17*	1.49-3.16
	4th quartile	183	5.01***	3.24-7.75

Note: repeated contrasts + (p<.05) * (p<.01) ** (p<.001) ***(p<.0001)

As is evident from the Table, when NOF was included in the model, the effect of cumulative demographic risk on work stress was no longer significant. For 12-month and 14-day symptom scores, demographic risk was a marginally better predictor of lifetime prevalence of disease than NOF. This is likely accounted for the higher prevalence of symptoms in respondents aged over 40 years.

5.7 DISCUSSION

The results described in the current chapter and directions for further research, are outlined in the following sections. A summary of key findings is given in Table 30.

Table 30: Effects of novel NOF & demographic risk scores

- The original NOF score emerged as most predictive of work stress & clinical anxiety than novel scores (adding additional stressors decreased size of ORs)
- Little difference was observed between the original score, and scores inclusive of bullying, and bullying & role for clinical depression (addition of further stressors beyond this point reduced effect size)
- NOF inclusive of bullying was most strongly associated with lifetime prevalence of disease
- NOF inclusive of bullying & role was most strongly associated with 12-month health outcomes
- NOF inclusive of bullying and/or role demonstrated the most robust association with 14-day health, with the exception of acute back pain/swollen ankles (most strongly associated with the original score)
- Original NOF score, followed by the score inclusive of bullying, was most strongly associated with prescribed medication use
- Demographic risk factors were cumulatively associated with poor health, but NOF explained significantly more variance

5.7.1 Novel NOF scores and health and well-being: Patterns of association

Stressors tend to explain greater variance in health outcomes when studied in combination, as is suggested by the current results and those presented in Chapter 3. This finding supports previous assertions regarding the combined effects of the DCS and ERI models in predicting well-being (Calnan et al., 2000; De Jonge et al., 2000b; Peter et al., 2002; Ostry et al., 2003; Rydstedt et al., 2007). Further support for a combined effects approach to studying variance in health outcomes has been provided by adding novel stressors to existing job stress models, some of which are situation or job specific (e.g. Akerboom & Maes, 2006; Fillion et al., 2007; Vearing & Mak, 2007). Some researchers have demonstrated the combined (linear) effects of physical workplace hazards on accidents at work (e.g. Luz et al., 1990; Melamed et al., 1999); others report combined effects of physical and psychosocial hazards on physiological, (Tafalla & Evans, 1997), musculoskeletal (e.g. Devereux et al., 2002) and both physical and psychological outcomes (Smith et al., 2004).

It was hypothesised at the start of the current chapter, that bullying would likely add to the explanatory power of NOF, in terms of increased risk of reporting the majority of physical and psychological health outcomes (given the consistently significant relationship between bullying and health outcomes described in Chapter 3). The pattern of results presented in this chapter provides some support for this hypothesis. When bullying was added to NOF, a greater risk of reporting (as indicated by increased odds ratios, particularly in the upper quartile of the composite score) was observed for the following outcomes: probable clinical depression; lifetime prevalence of disease; 14-day symptoms and upper-respiratory tract infections, lower respiratory tract symptoms, and depression and/or fatigue in the last 14 days. For remaining outcomes, the original NOF score was associated with a greater risk of poor health (work-related stress; clinical anxiety; all 12-month and medication outcomes; 14-day musculoskeletal outcomes, 14-day gastrointestinal symptoms and 14-day tooth/earache).

It was also hypothesised that a novel NOF score comprising workplace bullying as a component, would likely be selectively associated with health outcomes (given the pattern of results demonstrated by an existing composite stressor score outlined in Chapter 3). This assertion is supported by the current results, in that a similar pattern of effects was observed for the novel NOF score (inclusive of bullying) as the original, in terms of cumulative and threshold effects. Furthermore, where bullying was significantly associated with outcomes in Chapter 4, either alone or in addition to NOF, the addition of bullying to NOF tended to be associated with the greatest risk of reporting.

Given associations between negative aspects of role (particularly conflict) and musculoskeletal outcomes seen in Chapter 4, it was expected that a novel NOF score comprising role (in addition to bullying) would likely be most strongly associated with these outcomes. This hypothesis is supported for musculoskeletal problems in the last 12 months, but for acute symptoms, the addition of any novel stressor resulted in lower odds ratios in the upper quartile than observed for the original NOF score.

It was also stated at the beginning of this chapter that the addition of further novel stressors to this NOF score would likely increase the strength of association between work stressors and health outcomes of multiple aetiology, e.g. work stress. This hypothesis is not supported by the results outlined in the current chapter. The addition of further stressors to the NOF score (i.e. in addition to bullying, role conflict and role ambiguity) resulted in a lower likelihood of reporting the majority of outcomes, than was observed for any other composite score (i.e. the original NOF score, NOF inclusive of bullying, and NOF inclusive of role conflict and ambiguity).

5.7.2 Cumulative and selective effects of occupational stressors

The results outlined in the previous sections indicate, that although occupational and interpersonal stressors tend to demonstrate a more negative impact on health and well-being when considered in combination, further variance in relationships between potential stressors and poor health cannot be accounted for simply by adding additional stressors to a composite score, as found by Smith et al. (2004). Given the variable patterns of association between the NOF scores outlined above and health outcomes, it would appear that components of the NOF score may be differentially and selectively associated with certain outcomes.

This finding goes some way to addressing the question as to whether job stress models (or components of) are linearly or non-linearly associated with health outcomes (Van der Doef & Maes, 1998). The patterns of association between NOF scores and outcomes also lends weight to assertions that job stressors may be curvilinearly associated with some outcomes (Warr, 1994), whereas others may demonstrate threshold effects (Landsbergis et al., 1992; Schnall et al., 1994).

5.7.3 Demographic risk and negative occupational factors

It was also hypothesised at the start of the current chapter that demographic characteristics would be significantly and selectively associated with health outcomes, and that these variables may also combine cumulatively to produce negative health consequences (hypothesis 5). The results presented in the current chapter support this assertion, in that likelihood of reporting the majority of outcomes was increased with cumulative demographic risk factors; however, as predicted, these effects were significantly less than those demonstrated by the original NOF score, and no associations between demographic risk and mental health outcomes (clinical anxiety and depression) were observed. It is also apparent that demographic risk and certain factors in particular, may be differentially related to health outcomes e.g. age and lifetime prevalence of disease.

It should be noted however, that had a different method of assessing the relative influence of demographic characteristics been employed (e.g. if all univariate associations between possible risk factors and health outcomes had been examined, and the combined score been based on this) the composition of the total score would have been quite different (e.g. if income, gender, etc had been included). However, the purpose of the analyses was to demonstrate the general pattern of association relative to NOF, rather than to determine the precise influence of demographic risk factors on health outcomes.

5.7.4 Limitations and directions for further research

Recent research has suggested that job stress models should include additional variables that capture the complexity of modern working environments (Cox, 1990; Parker et al., 2003; Van Veldhoven et al., 2005; HSE, 2007). The current chapter sought to determine both the additive and selective effects of a wide range of stressors on health outcomes. However, although the relative influence of different composite NOF scores is described in the current chapter, where such differences in effect size are observed, it is not possible to determine whether these differences are statistically meaningful. Nonetheless, the results do indicate that further exploration of the selective nature of relationships between components of composite stressor scores and health outcomes is needed. This issue is addressed in Chapter 6. Specific aims of Chapter 6 are to determine which NOF components (i.e. demand-control-support, effort-reward imbalance, working hours/physical hazards, bullying and role stress) are most strongly associated with particular outcomes, and to what extent models, or sub-components of models, might combine to suggest negative health effects.

CHAPTER 6

THE RELATIVE INFLUENCE OF COMPONENTS OF THE NEGATIVE OCCUPATIONAL FACTORS SCORE: IMPACT ON HEALTH AND WELL-BEING

6.1 INTRODUCTION

6.1.1 Overview

The results described in Chapter 5 indicate that occupational and interpersonal stressors demonstrate a more negative impact on health and well-being when considered in combination. However, further variance in terms of associations between potential stressors and poor health cannot simply be accounted for by adding additional stressors to a composite score. The original NOF score was found to be a better predictor of a significant proportion of outcomes than scores inclusive of additional stressors. NOF inclusive of bullying however, tended to demonstrate stronger relationships with a number of key outcomes such as clinical depression, lifetime prevalence of disease and several acute health outcomes. Adding further stressors to NOF did not increase explanatory power. Moreover, it appears that components of the NOF scores may be differentially and selectivity associated with certain outcomes, as indicated by the analyses presented in Chapter 4. Further exploration of the selective nature of relationships between components of composite stressor scores and health outcomes is therefore required, and is the focus of the current chapter. The effects of NOF components relative to each other (i.e. demand-control-support, effort-reward imbalance, working hours/physical hazards, bullying and role stress) will be examined. Analyses will also seek to determine which NOF components are most strongly associated with particular outcomes, and to what extent models or components of models, might be suggestive of additive effects.

6.1.2 Independent and selective effects of workplace stressors

The independent effects of components of the NOF scores described in the previous chapter are discussed in the following sections, in terms of the effects of particular job stress models (or components of), environmental workplace stressors (e.g. noise, shiftwork), role stress and bullying at work.

6.1.2.1 Job stress models

The Demand-Control-Support (DCS) model has been found to predict cardiovascular disease and associated risk factors (Schnall et al., 1990; Theorell et al., 1990; Landsbergis et al., 1994; Theorell & Karasek, 1998; Yoshimasu, 2001; Kivimäki, et al., 2002). However, there are also studies that have failed to support such associations (Bosma et al., 1998; Riese et al., 2000). There is a scarcity of literature relating the DCS model to other physical health outcomes: yet there is some support for an association between the DCS and musculoskeletal symptoms (Skov et al., 1996). Job characteristics measured by the DCS (in particular high demand) have also been found to predict a number of psychological health outcomes, such as increased risk of psychiatric disorder (Stansfeld et al., 1999a), depression (Stansfeld et al., 1998a; Tsutsumi et al., 2001), anxiety (Perrewe, 1986; Cropley et al., 1999; Evans & Steptoe, 2002) 'psychological distress' (Bourbonnais et al., 1996; Yeung & So-kum Tang, 2001) and poor mental health status (Yang et al., 1997). Support for the strain hypothesis of the DCS model (i.e. independent effects of high demand, low control, low support) in terms of predicting negative health consequences is well-established, whereas support for the buffer hypothesis (i.e. the moderating effect/s of control and/or social support) is more equivocal.

The Effort-Reward Imbalance (ERI) model has also been found to predict cardiovascular disease and associated risk factors (Siegrist, 1996; Peter & Siegrist, 1997; Bosma et al., 1998; Peter et al., 1998; Kivimäki et al., 2002; Kuper et al., 2002), musculoskeletal symptoms (Tsutsumi et al., 2001b; Joksimovic et al., 2002a; Van Vegchel et al., 2002), headaches (Van Vegchel et al., 2002), gastrointestinal symptoms (Peter et al., 1998), reduced physical functioning (Kuper et al., 2002), poor self-rated general health (Weyers et al, 2006), mental exhaustion (Van Vegchel et al., 2002), sleep disturbance and self-reported fatigue (Peter et al., 1998), poor mental functioning (Kuper et al., 2002), psychological distress (Stansfeld et al., 1998a), burnout (Bakker et al., 2000) and depression (Tsutsumi et al., 2001a; Pickart et al., 2004). However, it has been suggested (Calnan et al., 2004) that job stress models generally (i.e. either DCS or ERI) may not be as predictive of depression and anxiety as for other physical or psychological health outcomes. The ERI model addresses some of the criticisms levelled at the DCS model, in that it incorporates some measure of individual differences in the form of intrinsic effort, or need for control (Calnan et al., 2000). However, the ERI model has received some criticism with regards the conceptualisation of intrinsic effort, or overcommitment. In the original model, overcommitment was considered part of the effort component, yet in later versions of the model, overcommitment is viewed as an independent concept. The ERI hypothesis has been most extensively tested in the literature and is well-supported, whereas results regarding overcommitment are less consistent.

6.1.2.2 Environmental workplace stressors

There is also significant literature linking the (non-auditory) effects of noise to physical health outcomes (e.g. catecholamine excretion and cardiovascular function: Butler et al., 1999), psychological distress, sleep patterns and sleep quality (Smith, 1991; Smith & Broadbent, 1992). Associations between working hours, particularly night shift work and long working hours, and negative health consequences such as increased risk of coronary heart disease, myocardial infarction, poor pregnancy outcomes, colorectal cancer (in women) peptic ulcer disease, general health symptoms and poor psychological well-being, have also been established (e.g. Sparks et al., 1997; Knutsson, 2003; Schernhammer et al., 2003).

6.1.2.3 Novel stressors: Role stress and bullying at work

Few studies have examined associations between role ambiguity and conflict and health, although both constructs have been linked to the three dimensions of burnout in hospice nurses and social workers (Boyd, 1996). Role ambiguity was also found to be among the best predictors of burnout in nursing in a review of the literature, in addition to workload, age, hardiness, active coping and social support (Duquette et al., 1994). Role conflict, ambiguity and overload have also been found to predict the burnout construct of emotional exhaustion (Ortqvist & Wincent, 2006).

Bullying has been fairly extensively studied in relation to a range of negative health outcomes, and has been cited as a risk factor for cardiovascular disease, depression (Kivimäki et al., 2003), psychosomatic symptoms (Mikkelsen & Einarsen, 2002), and increased psychotropic medication use (Vartia, 2001). Negative organisational consequences of workplace bullying such as low job satisfaction (Quine, 2003) and increased sickness absence in hospital staff (Kivimäki et al., 2000) have also been reported. The prevalence of bullying in UK healthcare workers also appears to be high: in a survey of NHS community trust staff, Quine (1999) found 38% of staff to report experiencing one or more types of bullying behaviour in last year. In a similar survey of junior doctors (Quine, 2002) 37% reported having been bullied in the previous 12 months. Hoosen and Callaghan (2004) surveyed psychiatric trainees and found that 47% had experienced one or more bullying behaviours in the previous year. In a study of UK nurses, 44% reported experiencing one or more types of bullying in the previous 12 months, compared to 35% of other NHS staff, and approximately half of the sample had witnessed the bullying of others.

6.1.3 Combined and selective effects of the DCS & ERI models, and environmental workplace stressors

6.1.3.1 The DCS & ERI models

As detailed in previous chapters, a number of studies have demonstrated both the combined and selective effects of the DCS and ERI models. For example, De Jonge et al. (2000b) found that high effort and low rewards were stronger predictors of poor well-being than low control when both models were simultaneously adjusted, and Ostry et al. (2003) found a combination of both models to best predict self-reported health status: chronic disease however, was significantly predicted by ERI only. Fillion et al. (2007) examined an integrated job stress model comprised of the DCS, ERI and specific palliative care stressors in a sample of palliative care nurses, and found the best predictors of emotional distress to be reward, professional and emotional demands and self-efficacy. Griffin et al. (2007) found the DCS to predict the most variance in depression and anxiety: however, demands, effort and overcommitment (intrinsic effort) were not consistently associated with either outcome.

6.1.3.2 The DCS and ERI models & environmental workplace stressors

Previous research (Smith et al. 2004) has examined relationships between health and well-being outcomes and the following NOF components: job demand-control-support, effort-reward imbalance and working hours/exposure to physical hazards. Variables were created to reflect all possible levels of exposure to each component (e.g. all possible permutations of high/low demands, social support and decision latitude). Where components of different models were most strongly associated with a particular outcome (e.g. high effort, high demands and unfavourable working hours/high exposure to physical hazards) new variables were created to reflect all possible permutations of exposure e.g. high/low demand, high/low effort, high/low working hours and exposure to hazards.

Results indicate that particular combinations of NOF components are differentially related to health outcomes, lending further support to the suggestion that stressors are selectively associated with health. Work-related stress for example, was most strongly associated with high job demands, high effort (intrinsic and extrinsic) and both unfavourable working hours and exposure to physical hazards. When these components were combined into a single variable, results suggest that the likelihood of reporting work-related stress was greatest where demands, effort and exposure to working hours/hazards were all high. Furthermore, effort appeared to have a greater impact than either job demand or working hours/hazards. Critical components of NOF in terms of likelihood of reporting probable clinical anxiety were identified as high demand/low control/low support, and intrinsic effort, and for probable clinical depression, low support and low control. Critical factors in terms of risk of reporting lifetime and 12-month ill-health (any) were not assessed, and no significant associations were observed for 12-month sciatica.

High effort and low reward emerged as critical components in terms of likelihood of reporting 14-day gastrointestinal symptoms and back pain. 14-day upper respiratory tract symptoms were most strongly associated with high intrinsic effort, and 14-day psychological health problems by physical hazards and intrinsic effort. Unfavourable working hours, high effort and low reward were identified as critical components in terms of likelihood of reporting 14-day lower respiratory symptoms. 14-day use of prescribed pain killers and/or indigestion medication was most strongly associated with high extrinsic and intrinsic effort combined with high reward.

The purpose of the current chapter therefore, is to take a similar approach to that outlined above, and examine the relative influence of components of the NOF score.

However, in the current chapter, the potential impact of additional stressors (bullying, negative role perceptions) is also examined.

6.1.4 Current hypotheses

Given the results outlined above and those presented in Chapters 3-5, the following hypotheses were formulated:

1. Work-related stress is likely associated with the demand-control-support, effort-reward imbalance and working hours/hazards components of the NOF score, based on the results reported by Smith et al. (2004). Furthermore, the critical factors in terms of likelihood of reporting work-related stress are likely to be high demand, high effort and exposure to both unfavourable working hours and physical hazards. Likelihood of reporting probable clinical anxiety is thought to be associated with the demand-control-support (high demand, low control, low support) and effort-reward-imbalance components (high intrinsic effort), and bullying; probable clinical depression is thought to be associated with the demand-control-support model (low support and low control).

2. Lifetime prevalence of disease and 12-month symptoms are likely significantly associated with bullying and at least one component of the original NOF score (based on results presented in Chapter 4).

3. 12-month and 14-day musculoskeletal problems are likely most strongly associated with negative role perceptions (no significant associations for 12-month sciatica were reported by Smith et al. 2004).

4. Effort-reward imbalance (in particular high intrinsic effort) is likely to demonstrate significant associations with the majority of acute (14-day) health outcomes. The working hours/hazards component is also thought to be associated with 14-day lower respiratory symptoms. Given the significant associations presented in Chapter 4, bullying is also likely to be a critical

factor in terms of likelihood of reporting the majority of acute health outcomes.

5. Use of prescribed pain killers and/or indigestion medication in the last 14-days is likely associated with the effort-reward imbalance component (high extrinsic and intrinsic effort, high reward). Analyses presented in Chapter 4 also indicate that bullying is likely to be critical in terms of predicting both long term (12-month) and acute (14-day) prescribed medication use.

6.2 METHOD

The nature of the survey and sample demographics have been previously described (see Chapter 3, sections 3.2.1 and 3.2.2).

6.2.1 Independent measures

<u>Derived scores based on the job-demand-control-support model</u>

A total score was calculated across the three sub-scales of the demand-control-support model. This was achieved by creating new scores for decision latitude and social support, so that a high score was indicative of a negative outcome. The total score was calculated by obtaining the mean of the three sub-scales. The coefficient alpha for the current sample was .84.

A novel score was also created to reflect exposure to all possible combinations of demands, control and support (based on median splits of sub-scale scores). This resulted in the creation of an 8-category variable as follows:

- High social support, high decision latitude, low job demand
- High social support, high decision latitude, high job demand
- Low social support, high decision latitude, low job demand
- Low social support, high decision latitude, high job demand
- High social support, low decision latitude, low job demand
- High social support, low decision latitude, high job demand
- Low social support, low decision latitude, low job demand

- Low social support, low decision latitude, high job demand

Derived scores based on the effort-reward imbalance model

A total score was calculated using the mean of the extrinsic effort, intrinsic effort and reward scales; a high score was indicative of high effort and low reward ($\alpha = .86$).

A novel score was also created to reflect exposure to all possible combinations of extrinsic effort, intrinsic effort and reward (based on median splits of sub-scale scores). This resulted in the creation of an 8-category variable as follows:

- Low intrinsic effort, low extrinsic effort, high reward
- Low intrinsic effort, low extrinsic effort, low reward
- High intrinsic effort, low extrinsic effort, high reward
- High intrinsic effort, low extrinsic effort, low reward
- Low intrinsic effort, high extrinsic effort, high reward
- Low intrinsic effort, high extrinsic effort, low reward
- High intrinsic effort, high extrinsic effort, high reward
- High intrinsic effort, high extrinsic effort, low reward

Unfavourable working patterns and exposure to physical hazards

8 items were included to assess the proportion of respondents reporting unfavourable working patterns, or exposure to noise and hazardous substances: (see Chapter 3, section 3.2.3). A total 'exposure' score was calculated by reversing responses to each item (in order that a high score indicated a negative outcome), summing the total and expressing the result as a percentage of the maximum possible raw score. The coefficient alpha for the current sample was .79.

A novel score was also created to reflect exposure to all possible combinations of unfavourable working hours and exposure to physical hazards (based on median splits of two scores created to reflect unfavourable working hours and exposure to hazards). This variable comprised the following four levels:

- Favourable working hours/low exposure to hazards
- Favourable working hours/high exposure to hazards
- Unfavourable working hours/low exposure to hazards

- Unfavourable working hours/high exposure to hazards

<u>Exposure to bullying behaviours</u>

Participants were asked to state whether they had been subjected to any of the bullying behaviours listed (20 items) in the last 6 months (see Chapter 3, section 3.2.3 for further details). A total scale score was calculated by summing the number of positive responses and expressing this value as a percentage of the maximum possible raw score ($\alpha = .88$).

In order to assess the relative impact of components of the bullying score, exploratory factor analysis (varimax rotation) was carried out. This resulted in the creation of four intuitive factors: explicit non-physical forms of bullying (9 items, e.g. persistent and unjustified criticism of work, destructive innuendo and sarcasm), implicit bullying behaviours (5 items, e.g. withholding necessary information, setting impossible deadlines), inappropriate jokes and teasing (2 items), and physical violence and violence to property (2 items). Two behaviours did not load highly on any factor: verbal/non-verbal threats and unreasonable refusal of applications for leave/training/promotion[41]. Median splits of the first three factors were summed (physical violence/violence to property was not included in any of the subsequently described analyses, as less than 2% of the sample reported exposure to either of these behaviours) to create a novel variable reflecting all possible combinations of exposure to the three categories of bullying behaviour as follows:

- No exposure to bullying
- No exposure to explicit behaviour, no exposure to implicit behaviour, exposure to teasing and/or inappropriate jokes
- No exposure to explicit behaviour, exposure to implicit behaviour, no exposure to teasing and/or inappropriate jokes
- No exposure to explicit behaviour, exposure to implicit behaviour, exposure to teasing and/or inappropriate jokes
- Exposure to explicit behaviour, no exposure to implicit behaviour, no exposure to teasing and/or inappropriate jokes

[41] Individual factor items and loadings are presented in Appendix II.

- Exposure to explicit behaviour, no exposure to implicit behaviour, exposure to teasing and/or inappropriate jokes
- Exposure to explicit behaviour, exposure to implicit behaviour, no exposure to teasing and/or inappropriate jokes
- Exposure to explicit behaviours, exposure to implicit behaviour, exposure to teasing and/or inappropriate jokes

Negative perceptions of role (ambiguity and conflict)

A composite score reflecting negative role perceptions was calculated by summing the role conflict and role ambiguity scales (see Chapter 3, section 3.2.3) and calculating the mean of this score ($\alpha = .89$).

A novel score was also created to reflect exposure to all combinations of role conflict and role ambiguity (based on median splits of the two scores). This variable comprised the following four levels:

- Low role conflict/low role ambiguity
- Low role conflict/high role ambiguity
- High role conflict/low role ambiguity
- High role conflict/high role ambiguity

6.2.2 Dependent measures

Dependent measures comprised health, medication and well-being outcomes and are described in detail in Chapter 3 (section 3.2.4).

6.3 SUMMARY STATISTICS

Descriptive statistics for all dependent measures and covariates are provided in Chapter 3, sections 3.3.1 and 3.3.2. Descriptive statistics for the composite scales utilised in the current chapter are shown in the Table 31.

Table 31: Descriptive statistics for independent measures

Measure	Sample	N	Min	Max	Mean	SD
Demand-control-support	Healthcare	761	2.78	85.80	43.26	13.17
	Social services/LG	281	8.02	79.94	44.26	14.08
	Total	1042	2.78	85.80	43.53	13.42
Effort-reward imbalance	Healthcare	726	0.00	83.33	31.64	15.45
	Social services/LG	216	0.00	86.11	30.83	15.96
	Total	987	0.00	86.11	31.43	15.59
Working hrs/hazards	Healthcare	774	0.00	100.00	36.76	23.42
	Social services/LG	287	0.00	91.67	21.28	21.10
	Total	1061	0.00	100.00	32.58	23.82
Bullying	Healthcare	777	0.00	100.00	12.70	17.93
	Social services/LG	293	0.00	100.00	15.43	19.67
	Total	1070	0.00	100.00	13.45	18.45
Negative role perceptions	Healthcare	763	0.89	72.50	37.39	11.77
	Social services/LG	284	7.08	75.83	39.63	12.84
	Total	1047	0.89	75.83	37.99	12.11

Non-parametric correlations (Spearman's rho) between median splits of independent variables are given below in Table 32.

Table 32: Non-parametric (Spearman's rho) correlations between independent measures

	Demand-control-support (N)	Effort-reward imbalance (N)	Working hrs/hazards (N)	Bullying (N)	Negative role perceptions (N)
Demand-control-support	-	-	-	-	-
Effort-reward imbalance	.434** (951)	-	-	-	-
Working hrs/hazards	.158** (1017)	.118** (965)	-	-	-
Bullying	.397** (1024)	.408** (975)	.062* (1041)	-	-
Negative role perceptions	.455** (1005)	.397** (956)	.065* (1022)	.450** (1036)	-

6.4 ANALYTIC PROCEDURE

Median splits of the following scores served as independent predictors in a series of logistic regression analyses: job demand-control-support, effort-reward imbalance, working hours/hazards, bullying and negative role perceptions[42]. The following variables were included in the model as covariates: gender, age, income, educational attainment, marital status, work pattern (full/part time), socio-economic status, negative affectivity and occupational group (i.e. health services/nursing and social services/local government). Results of these analyses are summarised in the following sections: odds ratios and confidence intervals are provided in Appendix VI. Where stressors emerged as significant predictors, secondary analyses were carried out using the derived variables created to reflect levels of exposure to each stressor. Analyses were carried out as described above, using a deviation contrast. Analyses are presented in the current chapter.

6.5 ASSOCIATIONS BETWEEN NOF COMPONENTS AND HEALTH & WELL-BEING

6.5.1 Outcomes not associated with any NOF component

The following outcomes were not significantly associated with any combined stressor score:

- 14-day upper respiratory tract symptoms
- 14-day gastrointestinal symptoms
- 14-day tooth and/or earache
- 12-month use of prescribed pain and/or indigestion medication
- 14-day prescribed medication use

[42] Role was included in the model for musculoskeletal outcomes only, given the previous absence of associations for other outcomes.

6.5.2 NOF components and psychological well-being

The following components were found to be significantly associated with psychological well-being[43] (odds ratios and 95% confidence intervals are shown in Appendix VI):

- job demand-control-support, effort-reward imbalance, working hours/hazards and work-related stress;
- job demand-control-support, effort-reward imbalance, bullying and clinical anxiety;
- effort-reward imbalance, working hours/hazards and clinical depression

In order to examine the above associations in more detail, analyses were repeated using the derived variables created to reflect levels of exposure to each stressor associated with work-related stress, clinical anxiety and depression[44]. Analyses were carried out using a deviation contrast. Results are shown in Table 33.

Table 33: NOF components & psychological well-being: derived category scores

		N	OR	95% CI
Work stress				
Demand-control-support	High SS/high DL/low JD	217	0.63	0.37 – 1.07
(Wald = 35.86, p<.0001)	High SS/high DL/high JD	67	1.79+	1.00 – 3.19
	Low SS/high DL/low JD	83	0.28**	0.13 – 0.61
	Low SS/high DL/high JD	67	1.34	0.78 – 2.30
	High SS/low DL/low JD	105	0.78	0.41 – 1.48
	High SS/low DL/high JD	61	1.36	0.76 – 2.45
	Low SS/low DL/low JD	148	0.81	0.50 – 1.33
	Low SS/low DL/high JD	130	2.69***	1.75 – 4.14
Effort-reward-imbalance	Low IE/low EE/high REW	183	0.28**	0.13 – 0.57
(Wald = 77.33, p<.0001)	Low IE/low EE/low REW	127	0.52+	0.27 – 1.00
	High IE/low EE/high REW	47	1.35	0.61 – 2.95
	High IE/low EE/low REW	74	0.74	0.38 – 1.42
	Low IE/high EE/high REW	68	0.78	0.39 – 1.56
	Low IE/high EE/low REW	110	0.96	0.57 – 1.62
	High IE/high EE/high REW	51	1.94+	1.04 – 3.59
	High IE/high EE/low REW	218	4.90***	3.31 – 7.27

[43] Comparable analyses were also carried out on the community data described by Smith et al. (2004). Stressors included in the model were as follows: demand-control-support, effort-reward imbalance, working hours/hazards and a dichotomous measure of bullying ('Have you experienced bullying at work in the last 12 months?' Yes/No). Results for all outcomes are presented in Appendix VI.

[44] Negative affectivity was not included as a covariate for clinical anxiety or depression.

Working hrs/hazards (Wald = 10.07, p<.02)	Low work hrs/low hazards	355	0.61*	0.43 – 0.86
	Low work hrs/high hazards	136	1.07	0.72 – 1.58
	High work hrs/low hazards	153	1.07	0.72 – 1.60
	High work hrs/high hazards	234	1.43+	1.03 – 2.00
Clinical anxiety				
Demand-control-support (Wald = 18.12, p<.01)	High SS/high DL/low JD	220	0.70	0.41-1.19
	High SS/high DL/high JD	66	0.54	0.27-1.06
	Low SS/high DL/low JD	83	0.50+	0.25-0.97
	Low SS/high DL/high JD	68	0.95	0.54-1.67
	High SS/low DL/low JD	103	1.55	0.87-2.77
	High SS/low DL/high JD	61	1.57	0.87-2.83
	Low SS/low DL/low JD	146	2.00**	1.28-3.14
	Low SS/low DL/high JD	132	1.16	0.74-1.80
Effort-reward imbalance (110.98, p<.0001)	Low IE/low EE/high REW	191	0.23***	1.12-0.46
	Low IE/low EE/low REW	125	0.30***	0.16-0.57
	High IE/low EE/high REW	47	1.38	0.66-2.90
	High IE/low EE/low REW	72	1.17	0.67-2.03
	Low IE/high EE/high REW	70	0.64	0.30-1.35
	Low IE/high EE/low REW	110	0.59	0.34-1.03
	High IE/high EE/high REW	51	3.81***	2.04-7.11
	High IE/high EE/low REW	213	6.24***	4.13-9.43
Bullying (Wald = 19.42, p<.007)	Low EX/low IM/low TE	378	0.63+	0.39-0.99
	Low EX/low IM/high TE	20	0.62	0.17-2.28
	Low EX/high IM/low TE	127	0.77	0.46-1.31
	Low EX/high IM/high TE	16	0.72	0.24-2.20
	High EX/low IM/low TE	63	1.41	0.74-2.66
	High EX/low IM/high TE	22	1.27	0.45-3.56
	High EX/high IM/low TE	163	1.05	0.66-1.69
	High EX/high IM/high TE	90	2.46**	1.43-4.25
Clinical depression				
Working hrs/hazards (Wald = 9.40, p<.02)	Low work hrs/low hazards	367	0.41*	0.23-0.75
	Low work hrs/high hazards	135	1.44	0.84-2.48
	High work hrs/low hazards	160	1.11	0.61-2.02
	High work hrs/high hazards	240	1.52	0.92-2.51

Note: deviation contrasts + (p<.05) * (p<.01) ** (p<.001) *** (p<.0001)

SS = social support DL = decision latitude JD = job demand
IE = intrinsic effort EE = extrinsic effort REW = reward
EX = explicit behaviours IM = implicit behaviours TE = teasing and/or inappropriate jokes

6.5.2.1 Work-related stress

The analyses detailed above indicate that the following categories had an effect significantly greater than that of the variable overall for work-related stress: high social support/high decision latitude/high job demand, and low social support/low decision latitude/high job demand. Other categories reflecting high job demand indicate an increased risk of reporting work-related stress, although were not statistically significant. Respondents reporting low social support/high decision latitude/low job demand were significantly less likely to report work-related stress than respondents in other categories. Analyses indicate that high job demands are most strongly associated with work stress, and that high decision latitude may have a protective effect.

The greatest risk of reporting work stress however, was seen for those reporting high intrinsic and extrinsic effort, and low reward. Those reporting high intrinsic and extrinsic effort and high reward, were also significantly more likely to report high levels of work stress. The following categories demonstrated an effect less than that of the variable overall: low intrinsic effort/low extrinsic effort/high reward; and low intrinsic effort/low extrinsic effort/low reward. Although not statistically significant, remaining categories reflecting either low intrinsic or extrinsic effort, appear to result in a marginally decreased risk of reporting work-related stress. High effort therefore, particularly the concurrent experience of both high intrinsic and extrinsic effort, appears most strongly associated with work-stress. When combined with low reward, this effect is further increased.

An increased risk of reporting work stress was also observed for respondents reporting both unfavourable working hours and high exposure to physical hazards. A significantly protective effect was observed for those reporting favourable working hours and low exposure to physical hazards.

The critical components in terms of likelihood of reporting work stress therefore appear to be high job demand, high effort and unfavourable working hours/exposure to physical hazards. A composite variable was created to reflect all possible permutations of these factors as follows:

- Low job demand/low effort (intrinsic and extrinsic), low exposure to working hours/hazards
- Low job demand, low effort, high exposure to working hours/hazards
- High job demand, low effort, low exposure to working hours/hazards
- High job demand, low effort, high exposure to working hours/hazards
- Low job demand, high effort, low exposure to working hours/hazards

- Low job demand, high effort, high exposure to working hours/hazards
- High job demand, high effort, low exposure to working hours/hazards
- High job demand, high effort, high exposure to working hours/hazards

This variable served as an independent predictor in a logistic regression equation (deviation contrast: all covariates were included in the model). Results are shown below in Table 34.

Table 34: Work stress and demand, effort & working hours/hazards

		N	OR	95% CI
Work stress	Low JD/low E/low WH	380	0.15***	1.00 – 2.40
(Wald = 152.87,	Low JD/low E/high WH	78	0.61	0.35 – 1.06
p<.0001)	High JD/low E/low WH	98	0.53+	0.32 – 0.89
	High JD/low E/high WH	53	0.75	0.40 – 1.41
	Low JD/high E/low WH	64	0.84	0.49 – 1.45
	Low JD/high E/high WH	31	1.23	0.61 – 2.46
	High JD/high E/low WH	102	4.26***	2.79 – 6.49
	High JD/high E/high WH	72	6.19***	3.71 – 10.32

Note: deviation contrasts + (p<.05) *** (p<.0001)

JD = job demand E = effort (intrinsic & extrinsic) WH = working hours/hazards

As is evident from Table 34, the following categories demonstrated an effect greater than that of the variable overall: high job demand and high effort, with both low and high exposure to unfavourable working hours/hazards. Where exposure to all stressors, and effort and working hours/hazards was low, categories demonstrated an effect less than that of the variable overall. Results indicate that high effort demonstrates the greatest independent effect; however, all three key factors demonstrate a significant additive effect when considered in combination.[45]

6.5.2.2 Probable clinical anxiety

Analyses presented in Table 33 indicate that respondents reporting low social support, low decision latitude and low demand tended to be clinically anxious, whereas those categorised by low social support, high decision latitude and low demand were marginally less likely to report high anxiety. Categories comprising low decision latitude generally appear to be associated with an increased risk of reporting this

[45] Separate logistic regression analysis of possible interactions between job demand, effort and working hours/hazards were not statistically significant.

outcome. The following categories of the ERI variable were associated with an effect greater than that of the variable overall: high intrinsic effort, high extrinsic effort and low reward; high intrinsic effort, high extrinsic effort and high reward. Categories comprising low effort (both intrinsic and extrinsic) in combination with either high or low reward were significantly associated with a reduced likelihood of reporting clinical anxiety.

With regards bullying, the following category demonstrated a greater effect than that of the overall variable: exposure to explicit bullying behaviours, exposure to implicit bullying behaviours, and inappropriate jokes and/or teasing. Although not statistically significant, remaining categories reflecting exposure to explicit bullying behaviours tended to be associated with a marginally increased risk of reporting this outcome.

The key components in terms of likelihood of reporting probable clinical anxiety appear to be low decision latitude, high effort and exposure to all types of bullying. A composite variable was therefore created to reflect all possible permutations of these factors as follows:

- High decision latitude/low effort/low exposure to bullying
- High decision latitude/low effort/high exposure to bullying
- High decision latitude/high effort/low exposure to bullying
- High decision latitude/high effort/high exposure to bullying
- Low decision latitude/low effort/low exposure to bullying
- Low decision latitude/low effort/high exposure to bullying
- Low decision latitude/high effort/low exposure to bullying
- Low decision latitude/high effort/high exposure to bullying

This variable served as an independent predictor in a logistic regression equation (deviation contrast: all covariates were included in the model). Results are shown below in Table 35.

Table 35: Clinical anxiety, effort & bullying

		N	OR	95% CI
Clinical anxiety (Wald = 165.94, p<.0001)	High DL/low E/low bullying	321	0.09***	0.51-0.15
	High DL/low E/high bullying	9	0.35	0.08-1.51
	High DL/high E/low bullying	97	1.38	0.85-2.24
	High DL/high E/high bullying	18	3.08*	1.24-7.62
	Low DL/low E/low bullying	266	0.32	0.21-0.49
	Low DL/low E/high bullying	30	0.90	0.43-1.91
	Low DL/high E/low bullying	117	2.52***	1.60-3.94
	Low DL/high E/high bullying	34	10.71***	4.39-16.10

Note: deviation contrasts * (p<.01) *** (p<.0001)

Results indicate that anxiety is most likely reported under conditions of low decision latitude, high effort and high exposure to bullying. However, high effort appears to exert the greatest effect on this outcome.[46]

6.5.2.3 Probable clinical depression

Analyses presented in Appendix VI indicate that both effort-reward imbalance and working hours/hazards are significantly associated with probable clinical depression. However, it was not possible to determine the effect of the categorical effort-reward imbalance variable in relation to this outcome, given missing data for some cells. Further analysis of all possible levels of exposure to unfavourable working hours/hazards indicates that the favourable working hours/low exposure to hazards category demonstrated a significantly lower effect than that of the variable overall (Table 33). Although not statistically significant, odds ratios indicate that remaining categories are all associated with a marginally increased risk of reporting clinical depression. This effect is most marked for unfavourable working hours/high exposure to hazards, followed by favourable working hours/high exposure to hazards.[47]

6.5.3 NOF components, lifetime prevalence of disease and 12-month symptoms

The following components were found to be significantly associated with lifetime prevalence of disease and 12-month symptoms (odds ratios and 95% confidence intervals are shown in Appendix VI):

[46] N.B. interaction terms were not statistically significant.
[47] Where a single category variable was found to predict an outcome, further analysis of more specific components was not carried out (e.g. of individual items within the working hours/hazards component) as described by Smith et al. (2004), given the much smaller sample size of the current study.

- effort-reward imbalance, bullying and lifetime prevalence of disease;
- effort-reward imbalance, bullying, working hours/hazards and 12-month symptoms;
- effort-reward imbalance, working hours/hazards and 12-month sciatica/back pain

Analyses were repeated using the derived variables created to reflect levels of exposure to each stressor associated with lifetime prevalence of disease and 12-month health (deviation contrast). Results are shown in Table 36.

Table 36: NOF components, lifetime & 12-month symptoms: derived category scores

		N	OR	95% CI
Lifetime symptom prevalence				
Effort-reward imbalance	Low IE/low EE/high REW	193	0.68*	0.49 – 0.95
(Wald = 19.10, p<.008)	Low IE/low EE/low REW	129	0.82	0.57 – 1.18
	High IE/low EE/high REW	47	1.60	0.92 – 2.78
	High IE/low EE/low REW	73	0.80	0.50 – 1.27
	Low IE/high EE/high REW	68	1.20	0.75 – 1.94
	Low IE/high EE/low REW	110	1.10	0.75 – 1.62
	High IE/high EE/high REW	52	0.67	0.39 – 1.16
	High IE/high EE/low REW	206	1.59*	1.14 – 2.20
Bullying	Low EX/low IM/low TE	378	0.76	0.55 – 1.05
(Wald = 14.40, p<.04)	Low EX/low IM/high TE	20	1.22	0.52 – 2.28
	Low EX/high IM/low TE	125	0.87	0.58 – 1.31
	Low EX/high IM/high TE	16	0.37+	0.14 – 0.99
	High EX/low IM/low TE	66	1.21	0.73 – 2.01
	High EX/low IM/high TE	21	1.81	0.80 – 4.14
	High EX/high IM/low TE	161	0.94	0.64 – 1.37
	High EX/high IM/high TE	91	1.63+	1.03 – 2.49
12-month symptoms				
Effort-reward imbalance	Low IE/low EE/high REW	177	0.96	0.67 – 1.37
(Wald = 24.88, p<.001)	Low IE/low EE/low REW	114	0.84	0.56 – 1.25
	High IE/low EE/high REW	47	1.04	0.59 – 1.84
	High IE/low EE/low REW	65	1.23	0.75 – 2.00
	Low IE/high EE/high REW	62	0.53+	0.30 – 0.93
	Low IE/high EE/low REW	100	0.57*	0.37 – 0.89
	High IE/high EE/high REW	50	1.73+	1.01 – 2.98
	High IE/high EE/low REW	193	1.87***	1.32 – 2.65
Working hrs/hazards	Low work hrs/low hazards	328	0.81	0.63 – 1.04
(Wald = 3.79, p<.29)	Low work hrs/high hazards	116	0.94	0.68 – 1.30

	High work hrs/low hazards	146	1.17	0.86 – 1.58
	High work hrs/high hazards	218	1.14	0.86 – 1.50
Bullying (Wald = 20.76, p<.004)	Low EX/low IM/low TE	356	0.59*	0.42 – 0.83
	Low EX/low IM/high TE	20	0.81	0.35 – 1.92
	Low EX/high IM/low TE	109	0.64+	0.41 – 1.01
	Low EX/high IM/high TE	15	1.11	0.42 – 2.92
	High EX/low IM/low TE	57	0.62	0.36 – 1.09
	High EX/low IM/high TE	20	2.84+	1.12 – 7.18
	High EX/high IM/low TE	148	1.20	0.81 – 1.78
	High EX/high IM/high TE	83	1.38	0.85 – 2.23
12-month sciatica				
Effort-reward imbalance (Wald = 13.62, p<.06)	Low IE/low EE/high REW	188	1.08	0.78 – 1.49
	Low IE/low EE/low REW	126	0.95	0.66 – 1.38
	High IE/low EE/high REW	51	0.62	0.35 – 1.10
	High IE/low EE/low REW	74	1.45	0.93 – 2.27
	Low IE/high EE/high REW	66	0.52*	0.30 – 0.90
	Low IE/high EE/low REW	109	1.04	0.71 – 1.53
	High IE/high EE/high REW	52	1.43	0.85 – 2.42
	High IE/high EE/low REW	212	1.39+	1.02 – 1.89
Working hrs/hazards (Wald = 11.45, p<.01)	Low work hrs/low hazards	354	0.76*	0.60 – 0.96
	Low work hrs/high hazards	135	0.88	0.66 – 1.19
	High work hrs/low hazards	155	1.01	0.76 – 1.35
	High work hrs/high hazards	234	1.47*	1.14 – 1.91

Note: deviation contrasts + (p<.05) * (p<.01) *** (p<.0001)

IE = intrinsic effort EE = extrinsic effort REW = reward
EX = explicit behaviours IM = implicit behaviours TE = teasing and/or inappropriate jokes

6.5.3.1 Lifetime prevalence of any disease

Results indicate that for the derived effort-reward imbalance variable, the following category demonstrated an effect greater than that of the variable overall: high intrinsic effort/high extrinsic effort/low reward. Low intrinsic effort, low extrinsic effort and high reward demonstrated an effect lower than that of the variable overall. Although non-significant, other categories representing high effort (either intrinsic or extrinsic) appear marginally associated with increased risk of reporting.

For the composite bullying variable, the following category demonstrated an effect greater than that of the variable overall: exposure to explicit behaviours/exposure to implicit behaviours/inappropriate jokes/teasing. No exposure to explicit behaviours, exposure to implicit behaviours and inappropriate jokes/teasing demonstrated an effect less than that of the variable overall. Although remaining categories did not demonstrate effects either significantly greater or lesser than that of the overall variable, exposure to explicit bullying behaviours was associated with a slightly increased risk of reporting lifetime prevalence of any disease.

Key predictors for lifetime prevalence of any symptom were high extrinsic effort/high intrinsic effort/low reward, and exposure to all types of bullying. A composite variable was therefore created to reflect all possible permutations of these factors as follows:

- All ERI categories except high effort/low reward, and low exposure to bullying
- All ERI categories except high effort/low reward and high exposure to bullying
- High effort/low reward and low exposure to bullying
- High effort/low reward and high exposure to bullying

This variable served as an independent predictor in a logistic regression equation (deviation contrast: all covariates were included in the model). Results are shown below in Table 37.

Table 37: Lifetime symptoms, effort, reward & bullying

		N	OR	95% CI
Lifetime symptom prevalence	ERI categories/low bullying	627	0.55***	0.41 – 0.72
(Wald = 20.72, p<.0001)	ERI categories/high bullying	45	0.96	0.58 – 1.59
	High effort/low reward & low bullying	160	1.01	0.72 – 1.41
	High effort/low reward & high bullying	46	1.90***	1.12 – 3.22

Note: deviation contrasts *** (p<.0001)

Results indicate that respondents were more likely to report lifetime prevalence of any symptom under conditions of both high effort/low reward and high exposure to bullying[48].

[48] The interaction term between high effort/low reward and bullying was non-significant.

6.5.3.2 12-month prevalence of any symptom

The following categories of the effort-reward imbalance variable were associated with a significantly increased likelihood of reporting any symptom of ill-health within the last 12 months: high intrinsic effort/high extrinsic effort/low reward; high intrinsic effort/high extrinsic effort/high reward. Low intrinsic effort, high extrinsic effort and both high and low reward, were associated with a decreased risk of reporting. The general pattern of results for remaining categories, although not statistically significant, indicates that intrinsic effort may be a key factor in terms of risk of reporting poor 12-month health.

The overall effect of the derived working hours/exposure to hazards score was not statistically significant. However, marginally increased odds ratios were observed where either unfavourable working hours alone, or combined with high hazards were reported. A single category within the derived bullying variable demonstrated an effect greater than that of the variable overall: experience of explicit bullying behaviours/no implicit bullying behaviours, and exposure to inappropriate jokes/teasing. Two categories were associated with a decreased incidence of reporting: no experience of any form of bullying, and experience of implicit bullying only.

Key predictors for 12-month symptoms were high effort, and exposure to 2 or more types of bullying behaviour. A composite variable was therefore created to reflect all possible permutations of these factors as follows:

- Low effort/low exposure to bullying (<2 factors)
- Low effort/high exposure to bullying (2 or more factors)
- High effort/low exposure to bullying
- High effort/high exposure to bullying

This variable served as an independent predictor in a logistic regression equation (deviation contrast). Results are shown in Table 38.

Table 38: 12-month symptoms, effort and bullying

		N	OR	95% CI
12-month symptoms (Wald = 51.47, p<.0001)	Low effort/low exposure to bullying	441	0.44***	0.34 – 0.55
	Low effort/high exposure to bullying	139	1.10	0.82 – 1.49
	High effort/low exposure to bullying	115	1.10	0.80 – 1.51
	High effort/high exposure to bullying	131	1.90***	1.38 – 2.61

Note: deviation contrasts *** (p<.0001)

Results indicate that respondents were more likely to report 12-month symptoms under conditions of both high effort and high exposure to bullying[49].

6.5.3.3 12-month sciatica/back pain

High extrinsic effort, high intrinsic effort and low rewards were associated with an increased risk of reporting this outcome. By contrast, low intrinsic effort, high extrinsic effort and high reward were associated with a reduced risk of reporting. Although not statistically significant, remaining categories comprising high effort, particularly intrinsic effort, were associated with a marginally increased risk of reporting 12-month sciatica and/or back pain.

A single category of the working hours/hazards variable was associated with a significantly increased risk of reporting: unfavourable working hours and high exposure to physical hazards. By contrast, favourable working hours and low exposure to physical hazards was associated with a reduced likelihood of reporting 12-month sciatica and/or back pain.

Key predictors for 12-month sciatica/back pain were high effort (intrinsic and extrinsic), low reward, and unfavourable working hours/exposure to hazards. A composite variable was therefore created to reflect all possible permutations of these factors as follows:

[49] The interaction term between high effort and bullying was non-significant.

- All ERI categories except high effort/low reward, and low exposure to working hours/hazards
- All ERI categories except high effort/low reward, and high exposure to working hours/hazards
- High effort/low reward and low exposure to working hours/hazards
- High effort/low reward and high exposure to working hours/hazards

This variable served as an independent predictor in a logistic regression equation (deviation contrast: all covariates were included in the model). Results are shown below in Table 39.

Table 39: 12-month sciatica, effort, reward & working hours/hazards

		N	OR	95% CI
12-month sciatica	ERI categories/low WH	512	0.67**	0.53 – 0.84
(Wald = 15.46, p<.001)	ERI categories/high WH	154	1.04	0.77 – 1.41
	High effort/low reward & low WH	132	0.81	0.59 – 1.10
	High effort/low reward & high WH	80	1.78**	1.22 – 2.60

Note: deviation contrasts ** (p<.001)

Results indicate that likelihood of reporting sciatica and/or back pain in the last 12 months was greatest under conditions of both high effort/low reward, and unfavourable working hours/exposure to hazards[50].

6.5.4 NOF components and 14-day symptoms

The following components were found to be significantly associated with 14-day symptoms (odds ratios and 95% confidence intervals are shown in Appendix VI):

- effort-reward imbalance, bullying and 14-day symptoms;
- effort-reward imbalance and 14-day depression/fatigue;
- bullying and 14-day lower respiratory symptoms[51];
- working hours/physical hazards, 14-day back pain and 14-day back pain/swollen ankles

[50] The interaction term between effort/reward and working hours/hazards was non-significant.
[51] This effect is still significant when smoking status is added to the model as a covariate.

Analyses were repeated using the derived variables created to reflect levels of exposure to stressors associated with 14-day symptom outcomes (deviation contrast). Results are shown in Table 40.

Table 40: NOF components & 14-day symptoms: derived category scores[52]

		N	OR	95% CI
14-day symptoms				
Effort-reward imbalance	Low IE/low EE/high REW	184	0.68+	0.48 – 0.95
(Wald = 15.78, p<.03)	Low IE/low EE/low REW	120	0.80	0.55 – 1.17
	High IE/low EE/high REW	49	1.15	0.67 – 1.97
	High IE/low EE/low REW	71	1.38	0.85 – 2.23
	Low IE/high EE/high REW	66	0.81	0.50 – 1.32
	Low IE/high EE/low REW	100	1.01	0.67 – 1.50
	High IE/high EE/high REW	48	0.83	0.48 – 1.45
	High IE/high EE/low REW	188	1.73*	1.21 – 2.47
Bullying	Low EX/low IM/low TE	362	0.64*	0.45 – 0.89
(Wald = 20.33, p<.005)	Low EX/low IM/high TE	20	0.81	0.35 – 1.90
	Low EX/high IM/low TE	117	0.61+	0.40 – 0.94
	Low EX/high IM/high TE	16	1.07	0.41 – 2.83
	High EX/low IM/low TE	60	0.57+	0.33 – 0.97
	High EX/low IM/high TE	21	3.02+	1.09 – 8.37
	High EX/high IM/low TE	150	1.14	0.76 – 1.71
	High EX/high IM/high TE	80	1.51	0.90 – 2.52
14-day depression and/or fatigue				
Effort-reward imbalance	Low IE/low EE/high REW	195	0.59*	0.42 – 0.84
(Wald = 24.06, p<.001)	Low IE/low EE/low REW	131	0.62*	0.42 – 0.91
	High IE/low EE/high REW	51	0.97	0.52 – 1.82
	High IE/low EE/low REW	74	1.14	0.63 – 2.05
	Low IE/high EE/high REW	69	0.89	0.52 – 1.53
	Low IE/high EE/low REW	107	1.02	0.65 – 1.59
	High IE/high EE/high REW	53	1.14	0.58 – 2.23
	High IE/high EE/low REW	210	2.39***	1.48 – 3.86
14-day back pain/swollen ankles				
Working hrs/hazards	Low work hrs/low hazards	378	0.69***	0.55 – 0.86
(Wald = 21.57, p<.0001)	Low work hrs/high hazards	148	1.17	0.89 – 1.54
	High work hrs/low hazards	167	0.82	0.62 – 1.07
	High work hrs/high hazards	257	1.53**	1.20 – 1.94
14-day back pain				
Working hrs/hazards	Low work hrs/low hazards	379	0.70**	0.56 – 0.87
(Wald = 18.36, p<.0001)	Low work hrs/high hazards	149	1.16	0.88 – 1.52
	High work hrs/low hazards	168	0.85	0.65 – 1.12

[52] Although bullying was significantly associated with 14-day lower respiratory tract symptoms, the impact of the derived categorical exposure variable could not be assessed due to missing data in some cells.

High work hrs/high hazards	261	1.46**	1.15 – 1.86

Note: deviation contrasts + (p<.05) * (p<.01) **(p<.001) ***(p<.0001)

IE = intrinsic effort | EE = extrinsic effort | REW = reward
EX = explicit behaviours | IM = implicit behaviours | TE = teasing and/or inappropriate jokes

6.5.4.1 14-day symptoms

Low intrinsic effort, low extrinsic effort and high rewards were associated with a significantly reduced likelihood of reporting 14-day symptoms compared to the effect of the variable overall. By contrast, high intrinsic effort, high extrinsic effort and low rewards were associated with an effect greater than that of the variable overall.

Bullying was also significantly associated with 14-day symptom prevalence. Experience of explicit bullying behaviours, and inappropriate jokes/teasing (no exposure to implicit bullying behaviours) was associated with an increased risk of reporting compared to the effect of the variable overall. The following categories of the composite bullying variable were associated with a reduced risk of reporting this outcome: no exposure to any bullying behaviours; experience of explicit bullying only, and implicit bullying only.

Key predictors for 14-day symptoms were high effort (intrinsic and extrinsic), low reward and exposure to 2 or more bullying behaviours. A composite variable was therefore created to reflect all possible permutations of these factors as follows:

- All ERI categories except high effort/low reward, and low exposure to bullying (<2 factors)
- All ERI categories except high effort/low reward, and high exposure to bullying (2 or more factors)
- High effort/low reward and low exposure to bullying
- High effort/low reward and high exposure to bullying

This variable served as an independent predictor in a logistic regression equation (deviation contrast: all covariates were included in the model). Results are shown in Table 41.

Table 41: 14-day symptoms, effort, reward & bullying

		N	OR	95% CI
14-day symptoms (Wald = 45.39, p<.0001)	ERI categories/low bullying	489	0.46***	0.36 – 0.58
	ERI categories/high bullying	149	1.21	0.88 – 1.66
	High effort, low reward & low bullying	70	1.09	0.72 – 1.64
	High effort/low reward & high bullying	118	1.66*	1.16 – 2.39

Note: deviation contrasts * (p<.01) *** (p<.0001)

Results indicate that likelihood of reporting 14-day symptoms was greatest under conditions of both high effort/low reward, and high exposure to bullying, although bullying may exert a greater independent influence on symptom prevalence[53].

6.5.4.2 14-day depression and/or fatigue

Only the effort-reward imbalance component was associated with 14-day depression and or/fatigue. A single category of the derived score was associated with an effect greater than that of the variable overall: high intrinsic effort, high extrinsic effort and low reward. The following categories were associated with a decreased likelihood of reporting 14-day depression/fatigue compared to the overall effect: low intrinsic effort/low extrinsic effort/high reward; low intrinsic effort/low extrinsic effort/low reward. Although the effect of remaining categories were not statistically significant, those representing high effort (both intrinsic and extrinsic, and either intrinsic or extrinsic) were associated with a marginally increased risk of reporting. Categories comprising high reward, combined with either high intrinsic or extrinsic effort only, were associated with a reduced risk of reporting 14-day depression and/or fatigue.

6.5.4.3 14-day back pain and/or swollen ankles & 14-day back pain

Only the working hours/hazards component was significantly associated with both 14-day back pain and/or swollen ankles and 14-day back pain. Unfavourable working hours/high exposure to physical hazards was associated with an increased risk of reporting both outcomes, whereas favourable working hours/low exposure to physical hazards was associated with a reduced likelihood of reporting, compared to the

[53] The interaction term between effort/reward and bullying was non-significant.

overall effect of the variable. Although not statistically significant, favourable working hours and high exposure to physical hazards indicates an increased likelihood of reporting both outcomes.

6.5.5 NOF components and use of prescribed medication

The following components were found to be significantly associated with prescribed medication use (odds ratios and 95% confidence intervals are shown in Appendix VI):

- Bullying and any prescribed medication in last 12 months;
- Bullying and psychotropic medication in last 12 months;
- Effort-reward imbalance and 14-day pain killers/indigestion medication

Analyses were repeated using the derived variables created to reflect levels of exposure to stressors associated with prescribed medication use (deviation contrast). Results are shown in Table 42.

Table 42: NOF components & prescribed medication: derived category scores

		N	OR	95% CI
12-month medication				
Bullying	Low EX/low IM/low TE	356	0.55***	0.40 – 0.76
(Wald = 27.08, p<.0001)	Low EX/low IM/high TE	18	1.57	0.65 – 3.77
	Low EX/high IM/low TE	115	0.76	0.50 – 1.16
	Low EX/high IM/high TE	15	1.30	0.51 – 3.32
	High EX/low IM/low TE	53	0.64	0.37 – 1.10
	High EX/low IM/high TE	19	1.18	0.51 – 2.73
	High EX/high IM/low TE	157	0.82	0.57 – 1.19
	High EX/high IM/high TE	88	1.90*	1.20 – 2.99
12-month psychotropic medication				
Bullying	Low EX/low IM/low TE	394	0.68	0.38 – 1.20
(Wald = 5.06, p<.65)	Low EX/low IM/high TE	18	1.11	0.27 – 4.47
	Low EX/high IM/low TE	128	0.84	0.40 – 1.76
	Low EX/high IM/high TE	15	0.70	0.11 – 4.57
	High EX/low IM/low TE	65	1.13	0.49 – 2.59
	High EX/low IM/high TE	20	1.26	0.37 – 4.24
	High EX/high IM/low TE	164	1.37	0.76 – 2.49
	High EX/high IM/high TE	101	1.18	0.59 – 2.37
14-day pain/indigestion medication				
Effort-reward imbalance	Low IE/low EE/high REW	175	0.88	0.64 – 1.22
(Wald = 22.78, p<.002)	Low IE/low EE/low REW	120	0.87	0.60 – 1.27
	High IE/low EE/high REW	45	0.94	0.54 – 1.65
	High IE/low EE/low REW	67	1.29	0.81 – 2.05
	Low IE/high EE/high REW	66	0.58+	0.35 – 0.96

Low IE/high EE/low REW	100	0.71	0.47 – 1.06
High IE/high EE/high REW	49	1.39	0.82 – 2.34
High IE/high EE/low REW	200	1.88***	1.37 – 2.56

Note: deviation contrasts + (p<.05) * (p<.01) ***(p<.0001)

SS = social support
IE = intrinsic effort
EX = explicit behaviours
DL = decision latitude
EE = extrinsic effort
IM = implicit behaviours
JD = job demand
REW = reward
TE = teasing and/or inappropriate jokes

6.5.5.1 12-month use of any prescribed medication

Exposure to bullying behaviours was significantly associated with 12-month use of any prescribed medication. On further examination of the categorical score, a single category, no exposure to any bullying behaviours, was associated with an effect significantly less than that of the variable overall, whereas experience of all 3 types of bullying (explicit and implicit behaviours, inappropriate jokes/teasing) was associated with an increased likelihood of 12-month medication use. Although not statistically significant, categories comprising exposure to inappropriate jokes and/or teasing were associated with a marginally increased risk of reporting, whereas categories comprising no exposure to this type of bullying behaviour were associated with a decreased likelihood of reporting.

6.5.5.2 12-month use of psychotropic medication

The effect of the categorical bullying variable on 12-month use of psychotropic medication was not statistically significant overall. However, results indicate that exposure to at least two types of bullying behaviours may marginally increase the likelihood of reporting this outcome.

6.5.5.3 Prescribed pain killers and/or indigestion medication in the last 14 days

Effort-reward imbalance was significantly associated with use of prescribed pain killers and/or indigestion medication in the last 14 days. Further examination of the categorical exposure variable indicates that a single category, low intrinsic effort, high extrinsic effort and high reward, demonstrated an effect less than that of the overall variable, whereas high intrinsic effort, high extrinsic effort and low reward were associated with an increased risk of reporting this outcome.

6.6 DISCUSSION

The results described in this chapter and directions for further research, are outlined in the following sections. A summary of key findings is presented in Table 43.

Table 43: NOF components & health outcomes

- Work-stress is likely of multiple aetiology & was associated with demand-control-support, effort-reward imbalance (ERI) & working hours/exposure to hazards
- High demand, high effort & working/hours hazards emerged as key predictors of work-stress; high effort likely exerts the greatest independent effect
- High effort, low decision latitude & bullying were key predictors of anxiety
- Clinical depression was most strongly associated with ERI & working hours/hazards only
- Lifetime & 12-month symptom prevalence were most strongly associated with high effort/low reward & bullying
- 12-month musculoskeletal symptoms were most strongly associated with ERI & working hours/hazards
- ERI & bullying were most strongly associated with 14-day symptoms (any); ERI only was associated with 14-day depression/fatigue; bullying only was associated with 14-day lower respiratory symptoms
- 14-day musculoskeletal outcomes were most strongly associated with working hours/hazards
- 12-month prescribed medication use was most significantly associated with bullying
- 14-day use of pain killers/indigestion medication was significantly associated with ERI

6.6.1 NOF components and psychological well-being: Patterns of association

It was hypothesised at the start of the current chapter that work-related stress is likely of multiple aetiology, and therefore associated with the demand-control-support, effort-reward imbalance and working hours/hazards components of the NOF score. This assertion is supported by the current results. It was also hypothesised that high demand, high effort and exposure to both unfavourable working hours and physical hazards would emerge as critical factors in terms of likelihood of reporting work stress (based on previous findings presented by Smith et al., 2004). The current results fully support this assertion, and add weight to the suggestion that the effects of such key factors are greatest when considered in combination (i.e. effects are additive); nonetheless high effort likely exerts the greatest independent effect. Bullying has been associated with increased reports of work-related stress and reduced job satisfaction (Quine, 1999; 2001; 2003), and re-analysis of the community sample described by Smith et al. (2004)[54] suggests that the experience of bullying at work may also predict levels of work stress in addition to the above factors. This was not found to be the case in the current sample, although this may simply reflect differences in sample size, or the way in which bullying was measured (in the Smith et al. study, a single-item, dichotomous measure of exposure to bullying in the previous 12 months was used).

The available literature is indicative of associations between high job strain (i.e. high demand, low control, low support) and anxiety (Perrewe, 1986; Cropley et al., 1999; Evans & Steptoe, 2002), and between effort-reward imbalance and psychological distress (Stansfeld et al., 1998a). Griffin et al. (2007) however, found the DCS to predict the most variance in anxiety (and depression): however, demands, effort and overcommitment (intrinsic effort) were not consistently associated with either outcome. Bullying has also been found to predict increased levels of anxiety (Quine, 2001). The assertion that likelihood of reporting probable clinical anxiety is predicted by effort-reward-imbalance (high intrinsic effort), and bullying (hypothesis 1) is fully supported by the current results. However, it was also hypothesised that respondents were more likely to be clinically anxious under conditions of high demand, low control and low support (as found by Smith et al., 1994), which was not the case in the current sample (nor in the Fillion et al. 2007 study, where the best predictors of emotional distress were found to be reward, professional and emotional demands and self-efficacy), although low decision latitude appears key in predicting this outcome.

[54] See Appendix VII.

Key factors in terms of predicting clinical anxiety in the current dataset were found to be low decision latitude, high effort and exposure to bullying behaviours at work.[55]

The DCS model (in particular high demands) has been associated with depression and psychiatric disorder (Yang, 1997; Stansfeld et al., 1998a; 1999a; Tsutsumi et al., 2001a), and the ERI model with poor mental functioning, burnout and depression (Bakker et al., 2000; Tsutsumi et al., 2001a; Kuper et al., 2002; Pickhart et al., 2004). Individually, both exposure to noise and unfavourable working patterns have also been linked to poor psychological health (e.g. Smith & Broadbent, 1992; Sparks et al., 1997). Probable clinical depression was significantly associated with effort-reward imbalance (see Appendix VI) and working hours/physical hazards only, contrary to the hypothesis that depression is associated with the demand-control-support model (low support and low control). However, levels of unfavourable working hours and exposure to physical hazards were higher in the current sample than in the community sample described by Smith et al. (2004), which may in part account for this apparent discrepancy.[56] In general terms, it appears the current results contradict to some extent the previous assertion that job stress models (i.e. either DCS or ERI) may not be as predictive of depression and anxiety as for other physical or psychological health outcomes (Calnan et al., 2004).

In terms of associations with psychological well-being, role ambiguity and conflict have been linked to burnout in hospice nurses and social workers (Boyd, 1996). Role ambiguity was also found to be among the best predictors of burnout in nursing in a review of the literature (Duquette et al., 1994), and role conflict, ambiguity and overload have also been found to predict the burnout construct of emotional exhaustion (Ortqvist & Wincent, 2006). However, no associations (in addition to other NOF components) between role stressors and psychological health were found in the current sample.

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[55] Re-analysis of the data described by Smith et al. (2004) also supports the assertion that bullying significantly predicts probable clinical anxiety, in this instance in addition to effort-reward imbalance, and high demands, low control and low support.

[56] Re-analysis of the Smith et al. (2004) data to include bullying as a component of NOF (see Appendix VII) indicates significant effects of demand, control, support and effort-reward imbalance only.

6.6.2 NOF components, lifetime prevalence of disease and 12-month health: Patterns of association

Both the DCS and ERI models have been extensively studied in relation to cardiovascular disease and associated risk factors (e.g. Landsbergis et al., 1994; Siegrist, 1996; Peter et al., 1998; Theorell & Karasek, 1998; Kawakami & Haratani, 1999; Yoshimasu, 2001; Kivimäki et al., 2002; Kuper et al., 2002). However, more general measures of chronic (inclusive of cardiovascular disease and risk factors) and 12-month health were the focus of the current thesis. Moreover, there is significant literature linking the (non-auditory) effects of noise to physical health outcomes (e.g. catecholamine excretion and cardiovascular function: Butler et al., 1999), and associations between shift work, long working hours and chronic disease and general health symptoms have also been established (e.g. Sparks et al., 1997; Knutsson, 2003; Schernhammer et al., 2003). Bullying has been cited as a risk factor for cardiovascular disease (Kivimäki et al., 2003) and psychosomatic symptoms (Mikkelsen & Einarsen, 2002).

In terms of combined effects of NOF score components (i.e. job stress models), De Jonge et al. (2000b) found that high effort and low rewards were stronger predictors of poor well-being than low control when both models were simultaneously adjusted, and Ostry et al. (2003) found a combination of both models to best predict self-reported health status: chronic disease however, was significantly predicted by ERI only. However, little is currently known about the relative effects of job stress models and bullying on physical health outcomes. It was hypothesised at the start of the current chapter that lifetime and 12-month prevalence of disease would likely be significantly associated with bullying (based on results presented in Chapter 3). The current results lend support to this assertion, in that lifetime and 12-month prevalence of any symptom were significantly associated with both effort-reward imbalance (high effort/low reward) and bullying.

There is some support within the literature for an association between DCS and musculoskeletal symptoms (Skov et al., 1996). ERI has also been found to predict musculoskeletal symptoms (Tsutsumi et al., 2001b; Joksimovic et al., 2002a; Van Vegchel et al., 2002). In the current study, 12-month musculoskeletal problems were hypothesised to be best predicted by negative role perceptions, based on the results presented in Chapter 3. This assertion was not however supported by the current results. 12-month sciatica/back pain was significantly associated with effort-reward imbalance as indicated by previous studies in the area, and working hours/hazards[57].

6.6.3 NOF components and 14-day symptoms: Patterns of association

The ERI model has been found to predict more minor health complaints such as headaches (Van Vegchel et al., 2002) and gastrointestinal symptoms (Peter et al., 1988), as has bullying at work (Mikkelsen & Einarsen, 2002). It was suggested at the beginning of this chapter (hypothesis 4) that effort-reward imbalance (in particular high intrinsic effort) and/or bullying would likely be associated with the majority of acute (14-day) health outcomes. It was also hypothesised that working hours/hazards would be significantly associated with lower respiratory symptoms (as found by Smith et al., 2004).

Current results indicate that 14-day prevalence of any symptom was most strongly associated with effort-reward imbalance and bullying, 14-day depression/fatigue by effort-reward imbalance only, and 14-day lower respiratory symptoms by bullying only. These results partially support hypothesis 4, although no support was found for the assertion that lower respiratory symptoms are significantly associated with working hours/hazards. This apparent discrepancy may be explained in part by differences in occupational group between the current study (i.e. public sector employees) and that described by Smith et al. (2004) (i.e. a general working population study). In the current sample, musculoskeletal outcomes (14-day back pain and 14-day back pain/swollen ankles) were significantly associated with working hours/hazards (acute back pain was associated with effort-reward imbalance in the sample described by Smith et al., 2004). Re-analysis of the community sample described by Smith et al. indicates a significant effect of effort-reward imbalance for the majority of acute health outcomes, and a significant association between bullying and 14-day lower respiratory symptoms.

[57] No significant associations for 12-month sciatica were reported by Smith et al. (2004); however re-analysis presented in Appendix VII indicated a significant effect for working hours/hazards.

6.6.4 NOF components and prescribed medication use: Patterns of association

It was hypothesised at the beginning of this chapter (hypothesis 5) that use of prescribed medication in the last 14-days would likely be associated with effort-reward imbalance. Bullying was also thought likely to account for a significant proportion of variance in both long term (12-month) and acute (14-day) medication use (as found by Vartia, 2001). This hypothesis is partially supported by the current results, in that 14-day use of pain killers and/or indigestion medication was significantly associated with effort-reward imbalance only[58], and 12-month medication use was most strongly associated with bullying (at least 2 separate categories of behaviour). However, no associations between bullying and acute medication use were observed.

6.6.5 NOF components and health & well-being: Summary of results

Support for the strain hypothesis of the DCS model (i.e. independent effects of high demand, low control, low support) in terms of predicting negative health consequences is well-established, whereas support for the buffer hypothesis (i.e. the moderating effect/s of control and/or social support) is more equivocal. This statement is supported by the current results, in that no interaction effects were observed between DCS components, or indeed any NOF score components, in terms of associations with health outcomes. The results presented in the current chapter are broadly comparable in terms of patterns of association to those reported in a community sample (Smith et al. 2004 and re-analysis presented in Appendix VI).

When considered together, these results suggest that the effects of occupational and interpersonal stressors are both additive and selective, providing some insight into the mechanisms underlying patterns of association observed between NOF scores and health and well-being outcomes described in Chapters 3 and 5, and further supporting the conclusions derived from analyses presented in Chapter 4, that particular NOF components are selectively associated with particular outcomes. Patterns of association described in the current chapter for psychological well-being outcomes (work-related stress, and probable clinical anxiety and depression) indicate that

[58] Re-analysis of the Smith et al. (2004) data presented in Appendix VII indicates significant associations between 14-day use of any medication, and 14-day use of pain killers/indigestion medication, and effort-reward imbalance and working hours/hazards.

multiple (although not all) NOF components are associated with negative health consequences, and that the effects of these components are additive. However, in the case of work-related stress for example, a particular category of stressor likely exerts a greater independent effect (high effort) than any other (high demands, unfavourable working hours/exposure to physical hazards). Critical factors in terms of explaining this outcome do not therefore appear to explain equal proportions of the variance.

The following outcomes also appear to be most strongly associated with multiple NOF components: lifetime and 12-month symptom prevalence, 12-month and 14-day musculoskeletal problems and 14-day symptom prevalence (any). For other outcomes, a single component of NOF emerged as most predictive: 14-day lower respiratory symptoms, 14-day depression/fatigue, and all prescribed medication use outcomes. The relationship between occupational and interpersonal stressors is therefore a complex one. Although the negative impact of NOF and NOF components is additive (no evidence of interactive effects were observed), some categories of stressor will demonstrate greater independent effects than others for a given outcome. The critical factors that combine to explain the most variance in terms of negative health consequences are therefore dependent to some extent on the health outcome under study. Outcomes which are highly prevalent likely have multiple aetiology; outcomes with a lower prevalence (most often associated with severity of symptom/disease) tend to be most strongly associated with a single component of NOF. It has also been suggested that the ERI model might better predict stress in nursing and other service professions than the DCS (Marmot et al., 1999; Calnan et al., 2004), an assertion which is supported to some extent by the results presented in the current chapter.

6.6.6 Limitations and directions for further research

The results presented thus far (Chapters 3-6) indicate both the additive and selective nature of the relationship between NOF, NOF components and health and well-being. However, the NOF score is comprised of occupational and interpersonal stressors, and comparatively little attention has been paid to date to individual characteristics[59]. This issue will be addressed in Chapter 7, where the impact of individual differences and coping styles will be considered in more depth. The specific aims of Chapter 7 are to

[59] However, a short measure of negative affectivity was included as a covariate in analyses described to date.

determine whether patterns of effect demonstrated in Chapter 3 with regards the cumulative (and selective) effects of occupational stressors as demonstrated by the NOF score are replicable in a second, more heterogeneous occupational group. The extent to which these effects are independent of, or influenced by individual differences such as negative affectivity and coping style will also be examined. Further aims of Chapter 7 are to compare the effects of NOF with those demonstrated by an occupation-specific measure of exposure to stressors, and also by a composite demographic and individual 'risk' score, comprising age, marital status and emotion-focused coping.

CHAPTER 7

COMBINED EFFECTS OF WORKPLACE HAZARDS AND HEALTH OUTCOMES: FURTHER ANALYSIS OF THE IMPACT OF INDIVIDUAL DIFFERENCES AND OCCUPATION-SPECIFIC STRESSORS

7.1 INTRODUCTION

7.1.1 Overview

Results outlined in Chapters 3-6 of this thesis highlight both the cumulative and selective nature of associations between occupational stressors and health outcomes. It is evident from findings presented in Chapter 3 that stressors do combine additively to produce negative health effects; however, associations are not simply cumulative and linear, as indicated by analyses presented in Chapters 4-6. It would also appear that particular types of stressor tend to be selectively associated with certain health outcomes. The following chapter describes a second cross-sectional self-report study of the relationships between combined effects of workplace hazards and measures of health and well-being in a sample of UK nurses only. The results presented in Chapters 3-6 are taken from a similar survey of public sector employees, and suggest that occupational stressors (as measured by a composite Negative Occupational Factors [NOF] score) are both additively and selectively associated with a range of health outcomes. The current chapter seeks to further examine these relationships in the context of the current sample, and to explore in greater detail the role of individual characteristics and occupation-specific stressors.

Results presented in Chapter 5 indicate that likelihood of reporting all negative health outcomes increased with cumulative 'exposure' to demographic and individual risk factors such as age, marital status and negative affectivity. However, as predicted, these effects were significantly less than those demonstrated by the NOF score. It was also apparent that demographic risk and certain factors in particular, may be differentially related to health outcomes e.g. age and lifetime prevalence of disease. A primary aim of the current chapter is to further consider the role of individual characteristics such as negative affectivity and coping style, in terms of established relationships between occupational stressors and health outcomes. The relative influence of the 3-item measure of negative affectivity described in Chapters 3-6 will be compared to the effects of the full 24-item version of the Eysenck Personality Inventory Neuroticism Scale (Eysenck & Eysenck, 1968). The influence of both problem and emotion-focused coping styles on poor health is also examined (Ways of Coping Checklist: Vitaliano, Russo, Carr, Maiuro & Becker, 1985).

A further aim of the current chapter is to determine the relative influence of an occupation-specific measure of workplace stressors on health outcomes, the Expanded Nursing Stress Scale (ENSS: French et al., 2000) as compared to the established effects of the NOF score. It is of interest to determine whether the NOF score explains greater variance in terms of negative health outcomes than an occupation-specific measure of exposure to workplace stressors. The extent to which the ENSS remains significantly associated with negative health consequences when individual characteristics are considered as covariates, is also examined.

7.1.2 Combined effects of occupational stressors

A primary aim of the current chapter is to replicate previously established combined effects of occupational stressors: there is a growing body of evidence to suggest that stressors may combine cumulatively to produce negative health effects. As discussed in previous chapters, a combination of the Job-Demand-Control-Support (DCS) and Effort-Reward Imbalance (ERI) models tends to explain a greater proportion of the variance in health outcomes than either model alone (e.g. Calnan et al., 2000; Peter et al., 2002; Rydstedt et al., 2007). Some findings suggest that models (and components of models) may also have differential impacts on health outcomes (e.g. Bosma et al., 1998; de Jonge et al., 2000b; Peter et al., 2002; Ostry et al., 2003; Fillion et al., 2007).

The addition of further variables to job stress models indicates that organisational variables (e.g. staffing resources, communication, social hindrance, training opportunities, job skills, material resources) may explain additional variance in outcomes to the DCS model (Akerboom & Maes, 2006), and a number of studies have demonstrated linear relationships between relatively large numbers of occupational stressors (e.g. Luz et al., 1990; Melamed et al., 1999) and outcomes such as work-related accidents. Recent research (Smith et al., 2004) also supports the assertion that a combination of job stress models (and additional work environment stressors) predicts significantly more variance in health outcomes than either the DCS, ERI (or components of each) alone. Findings also indicated that particular components of models tend to be differentially related to health outcomes. Further examination of these patterns of effect in relation to occupational group (e.g. managers/administrators, professional occupations, sales, mechanical/plant operatives) and employment status (e.g. self-employed, supervisor, manager, employee) suggest it is unlikely that the majority of these effects are occupation-specific (Smith et al., 2004).

7.1.3 Individual differences

7.1.3.1 Transactional theory: Emotion vs problem-focused coping

A secondary aim of the current chapter is to determine the influence of coping style on established relationships between the NOF score and health outcomes. Coping can be defined as an ongoing cognitive and behavioural process, where efforts are directed at managing specific demands (either internal and/or external) that are appraised as exceeding an individual's personal resources (Lazarus 1993, 1999; cited in Shimazu & Kosugi, 2003). A commonly used taxonomy of coping styles was first introduced by Lazarus and Folkman (1984) as part of their transactional theory of stress and coping. According to the model, individuals are thought to progress through two stages of cognitive appraisal when faced with potentially stressful situations: primary appraisal refers to a process of subjectively evaluating situations in terms of perceived threat. Secondary appraisal refers to a process of evaluating whether or not any perceived negative effects can be avoided. Appropriate actions or coping mechanisms are then employed. A distinction is made between problem-focused, and emotion-focused coping: the former comprises practical attempts to solve a particular problem, whereas the latter is defined as attempts to manage the emotional distress associated with the situation. The view that emotion-focused coping is maladaptive is widely held within the literature. However, coping strategies identified as emotion-focused cover a range of behaviours, for example denial, positive re-interpretation of events and seeking social support. It may be the case therefore that the effectiveness of emotion-focused coping is dependent to some extent on the particular strategy used (Carver, Scheier &Weintraub, 1989, cited in Baker & Berenbaum, 2007).

7.1.3.2 Coping, situational context and gender

Situational context may also determine coping effectiveness, at least in part. For example, previous research has found emotion-focused coping to be associated with lower depression in women dealing with stressful interpersonal situations, whereas no effect was found in achievement-oriented situations (Stanton et al., 1994, cited in Baker & Berenbaum, 2007). Baker and Berenbaum (2007) studied the relative effectiveness of emotion and problem-focused coping approaches by asking participants to identify a current stressful situation and randomly assigning them to write for 15 minutes, either about their feelings (emotion-focused coping) or about possible ways to solve their problem (problem-focused coping). Effectiveness of the two strategies was assessed by measuring positive and negative affect and physical symptoms. Results indicated that gender, type of stressful event (interpersonal or achievement) and individual differences moderated the effect of type of coping behaviour on positive affect. Most research has concluded that women are not only more likely to use emotion-focused coping strategies, but also that they are likely to be more successful in doing so. Men are thought to be more likely to successfully employ problem-focused approaches (Baker & Berenbaum, 2007).

Further support for gender-differences in use of particular types of coping strategies is provided by Gonzalez-Morales, Peiro, Rodriguez and Greenglass (2006). The authors found female finance workers to employ emotion-focused strategies more frequently than their male colleagues, yet no gender differences were observed in employees' use of problem-focused strategies. Interactive effects were also found, in that emotion-focused strategies (seeking social support) were only effective in women, whereas problem-focused approaches were more effective in reducing distress in men than in women.

DeLongis and Holtzman (2005) note the lack of consistency within the literature as to the most effective strategies for dealing with stressful events, and further point out that characteristics of the stressor may be important in determining coping responses (e.g. O'Brien & DeLongis, 1996; cited in DeLongis & Holtzman, 2005).

7.1.3.3 Coping and occupation-specific effects

In terms of occupation-specific coping effects, emotion-focused strategies such as avoidance and wishful thinking have been associated with work-related stress in doctors and nurses, whereas problem-solving approaches tend to be associated with lower stress levels (Jones & Johnson, 1996, and Tattersall, Bennett & Pugh, 1999; cited in Bennett, Lowe, Matthews, Dourali & Tattersall, 2001). Tattersall et al. (1999) examined associations between coping, job stress and well-being in doctors in a large teaching hospital. Results indicated that psychological distress (depression and anxiety) was associated with particular types of work-related stressors, and specific coping strategies. Job constraints and problems with management were associated with poorer psychological well-being, as were emotion-focused (avoidance) coping strategies. Problem-focused coping strategies have also been associated with lower levels of work-related stress and higher levels job satisfaction in nurses (Boey, 1998; cited in Clegg, 2001).

Healy and McKay (2000) examined relationships between work-related stressors and coping strategies and their impact on nurses' levels of job satisfaction and mood disturbance. It was proposed that higher levels of perceived work stress and use of avoidance coping would increase mood disturbance, while problem-focused coping would be associated with less mood disturbance. Findings provide support for a transactional model of stress as situational factors were found to influence the nurses' coping and perceptions of stress. Other studies of nursing stress (e.g. Tyler & Cushway, 1992, 1995; cited in Healy & McKay, 2000) found that use of avoidance coping predicted mental distress, in addition to perceived workload.

7.1.3.4 Potential mechanisms and criticisms

Contrary to the general consensus in the literature that emotion-focused strategies are maladaptive, it has been suggested (Cohen et al., 1986; cited in Shimazu & Kosugi, 2003) that a combination of problem and emotion-focused strategies may be beneficial. Shimazu and Kosugi (2003) examined the combined effect of emotion and problem-focused coping on psychological distress across various categories of job stressor. Problem-focused, or 'active' coping was associated with reduced levels of psychological distress across all types of job stressor. However, the effectiveness of problem-focused coping was influenced by other types of coping strategy: for example, seeking social support or distancing behaviours were found to improve effectiveness, whereas 'restraint' coping reduced effectiveness. However, as the authors point out, active or problem-focused approaches may also have negative consequences for an individual. If coping is prolonged or effortful, cognitive fatigue and physiological responses may result (Cohen, Evans, Stokols & Kranz, 1986; cited in Shimazu & Kosugi, 2003).

As O'Driscoll and Cooper (1994) note, there has been some disagreement within the literature as to the functions and consequences of engaging in particular types of coping strategies. The majority of evidence would suggest that coping moderates (i.e. 'buffers') associations between stressors and strain, however it has also been suggested that coping may mediate this relationship. Measurement of coping often also lacks consistency, therefore as O'Driscoll and Cooper (1994) note, it is not surprising that there is some confusion and inconsistency in terms of findings. Furthermore, Briner, Harris and Daniels (2004) argue that traditional approaches to understanding coping behaviour are too simplistic. The authors suggest that more thought needs to be given to whether jobs themselves can be viewed as possessing stressful characteristics which are external to the individual, or whether we as individuals actually construct our own environments.

7.1.3.5 The role of other individual difference variables

In addition to coping style and demographic characteristics such as gender, various individual difference variables have been implicated in the stress-strain relationship. With the exception of the ERI model and the concept of overcommitment or need for control, traditional job stress models have tended to overlook the role of individual differences. Although not considered within the current thesis, factors such as locus of control, hardiness and Type A behaviour are thought to be influential in the appraisal of situations as stressful, and any subsequent coping strategies employed. Locus of control has been suggested as a possible mediator of the relationship between appraisal and perception of events as threatening or stressful (Baron & Kenny, 1986); locus of control may also moderate the stress-strain relationship, in that an internal locus of control is thought to be associated with better health outcomes (see Cox & Ferguson, 1991).

Other personality factors may also play an important role in stress and coping processes. Hardiness, for example, which can be described as a measure of psychological robustness, has been suggested to moderate relationships between stressors and health outcomes (Kobasa, Maddi & Courington, 1981), although there are a number of criticisms relating to the validity of the construct (see Parkes, 1991). Type A behaviour is another aspect of personality that has been associated with health outcomes (see Spector, 2003). Neuroticism, or negative affectivity, has been found to predict a number of negative outcomes such as anxiety, somatic symptoms, and job satisfaction (e.g. Spector, 2003). High levels of neuroticism have also been associated with lower levels of problem-solving coping behaviours and increased use of emotion-focused behaviours (O'Brien & DeLongis, 1996; cited in DeLongis & Holtzman, 2005).

7.1.4 Occupation-specific stressors

A further aim of the current chapter is to determine the predictive validity of an occupation-specific measure of workplace stressors in terms of health outcomes, as compared to the established effects of the NOF score. The addition of situation-specific stressors to the DCS and ERI models has been advocated: in a study of palliative care nurses, the best predictors of job satisfaction were found to be job demand, effort, reward, and people-oriented culture, whereas reward, emotional demands and self-efficacy best predicted emotional distress (Fillion et al., 2007). However, it has also been argued that situation-specific models may only be valid in homogenous samples (Van Veldhoven et al., 2005). Comparison of the DCS and ERI with a third model (the hindrance/utilization model) revealed that the DCS explained the most variance in depression and anxiety, and also that measures associated with 'job resources' (i.e. skill discretion, social support and skill utilization) had a protective effect on outcomes. The absence of associations between ERI and outcome measures may suggest that the ERI model best predicts physical health outcomes. Akerboom and Maes (2006) note that work-related factors have repeatedly been found to be more important in determining care providers' well-being (e.g. Bersani & Heifetz, 1985; Allen, Pahl & Quine 1990; Hatton & Emerson, 1995; cited in Akerboom & Maes, 2006) despite the influence of interpersonal and patient-related factors.

It is well-recognised that nurses are at significant risk of experiencing work-related stress (e.g. Firth-Cozens & Payne, 1999; Fillion et al., 2007), and a wide variety of factors have been suggested as causal in the stress process, such as: unpredictable staffing and scheduling, lack of role clarity, lack of involvement in decision making, poor status (Williams et al. 1998), leadership style (McVicar, 2003), low control, high demands, shortage of resources, being moved between care units, shift rotation, poor organisational commitment (Chang et al., 2005), discrimination, uncertainty concerning treatment (French et al., 2000), low social support (Williams et al., 1998; Chang et al., 2005), professional conflict/poor relationships with colleagues/supervisors (French et al., 2000; McVicar, 2003; Chang et al., 2005), under-skilled staff/poor quality care (Chang et al., 2005; Glazer & Gyurak, 2008), lack of management support, job overspill, making decisions under time pressure, lack of organisational recognition (Bennett et al., 2000), workload, coping with death and dying, and patients and families (French et al., 2000; Chang et al., 2005).

French, Lenton, Walters and Eyles (2000) sought to draw together and categorise all potential stressors relevant to nursing and create a measure based on these categories. The authors identified 9 components of work stressors in nursing: conflict with physicians, inadequate preparation, problems with peers, problems with supervisor/s, discrimination, workload, uncertainty concerning treatment, dealing with death and dying, patients and families. The impact of these particular occupation-specific stressors is compared to that of the NOF score in the current chapter.

7.1.5 Current hypotheses

The following hypotheses were formulated, based on findings presented in Chapters 3-6 and the wider literature:

1. Previously established effects of a Negative Occupational Factors (NOF) score are likely to be replicated in the current sample, in terms of cumulative and selective associations between NOF and poor health.

2. NOF will remain a significant predictor of poor health outcomes when the full (24-item) version of the Eysenck Personality Inventory Neuroticism Scale (Eysenck & Eysenck, 1968) is included in models as a covariate.

3. NOF will remain a significant predictor of poor health outcomes when the influence of copying style is co-varied for in addition to negative affectivity: coping style may however, buffer negative associations between NOF and health outcomes.

4. NOF is likely to demonstrate more robust associations with negative health outcomes than an occupation-specific measure, given that NOF is a global measure of physical, psychological and interpersonal occupational stressors.

5. Likelihood of reporting all negative health outcomes is thought to increase with cumulative 'exposure' to demographic and individual risk factors e.g. age, marital status, emotion-focused coping. However, effects are likely to be significantly less than those demonstrated by the NOF score.

7.2 METHOD

The measures included in the survey, the sample and response rates are detailed in the following sections. It should be noted however, that it is the purpose of the current chapter to determine potential work-related correlates of poor health, and not to identify a truly representative sample of nurses, or to estimate the prevalence of poor health outcomes within this occupational group.

7.2.1 Participants and procedure

5000 members of the Royal College of Nursing (RCN) in the South West of England were invited to participate in a postal survey[60] (ethical approval for the survey was granted by the Cardiff University School of Psychology Ethics Committee). A copy of the questionnaire was sent to all respondents who volunteered to take part by contacting the researchers directly, along with a pre-addressed freepost envelope in which to return it. Participants were given further details regarding the nature of the survey and advised how long it should take to complete on the inside cover. Consent was by return of anonymous questionnaire only: no personal details were stored,

[60] The questionnaire described in this chapter can be found in Appendix VII. Where items were reversed in order to calculate scale totals, these are marked with an asterisk.

unless voluntarily provided at a later date by individuals who contacted researchers directly expressing an interest in receiving information about future studies. It is not therefore possible to link contact details with individual responses. Full confidentiality of responses was assured, and stressed to all participants. Participants were advised, in the event that they experienced any distress as a result of participating in the study, to contact their GP or union representative for advice. 870 completed questionnaires were returned.

7.2.2 Demographic, occupational and individual characteristics

Information on the following demographic and occupational characteristics was collected: gender, age, income, education, marital status, work pattern (full versus part-time)[61]. Measures of individual characteristics are detailed below.

Negative affectivity

Negative affectivity was measured in two ways. Firstly, using three items from the Eysenck Personality Inventory Neuroticism Scale (Eysenck & Eysenck, 1968): 'Are your feelings rather easily hurt?', 'Would you call yourself tense or highly strung?', and 'Do you worry about awful things that might happen?' Responses to these items (0=no, 1=yes) were summed to give a neuroticism score. The coefficient alpha for the three items was .49. Secondly all items within Eysenck's Neuroticism Scale (Eysenck & Eysenck, 1968) were included in the questionnaire (24 dichotomous items). The total score was calculated by summing included items and expressing this value as a percentage of the maximum possible raw score (coefficient alpha = .84). Eysenck et al. (1992) report internal consistencies between .70 and .80 for the scales comprising the 21-components of the original P-E-N[62] system.

Coping style

Coping style was measured using the Ways of Coping Checklist (Vitaliano et al. 1985). Respondents were asked to try to remember a stressful situation experienced at work (or other situation if unable to think of a work-related example) in the last 2

[61] A measure of socio-economic status was not included in the current analyses as the sample comprised a single occupational group.
[62] Psychoticism-Extroversion-Neuroticism

months, and to reflect on how often they employed a list of coping strategies to deal with that situation.

The scale comprises 42 items scored from 0 (not at all) to 3 (all of the time) and two sub-scales: problem-focused coping (15 items, e.g. 'Made a plan of action and followed it') and emotion-focused coping (27 items, e.g. 'Wished that I could change what had happened'). Scores for subscales were calculated by summing included items. The coefficient alphas were as follows: problem-focused coping = .85; emotion-focused coping = .88 (Rexrode, Petersen and O'Toole (2008) report reliability coefficients of .60 - .75 for sub-scales).[63]

Measures of physical and psychosocial hazards and health outcomes are described subsequently in detail.

7.2.3 Independent measures

Independent measures were employed to assess the following occupational and interpersonal characteristics: job demands, control over work, social support, intrinsic effort, extrinsic effort, reward, unfavourable working patterns, exposure to physical hazards and workplace bullying.

Job demands, control over work and social support

Job demands, control and support were measured using the Job-Demand-Control Support Model (JDCS: Karasek, 1979; Johnson & Hall, 1988) as detailed in Chapter 3, section 3.2.3. The coefficient alphas for the current sample were as follows: job demand = .58, control over work (decision latitude) = .79 and social support = .85.

Intrinsic effort, extrinsic effort and reward

Effort and reward were measured using Siegrist's (1996) Effort-Reward Imbalance Model as detailed in Chapter 3 (section 3.2.3). Coefficient alphas for the current sample were as follows: intrinsic effort = .78, extrinsic effort = .74 and reward = .84.

[63] The Emotion-focused scale comprises 4 sub-scales: seeking social support, self-blame, wishful thinking and avoidance. However, only the total score was of interest in the current analyses. Emotion-focused sub-scale scores were not therefore calculated.

Unfavourable working patterns

Shift work, long working hours and exposure to physical hazards were measured using 8 items taken from the Bristol Stress and Health at Work Survey (Smith et al. 2000) as described in Chapter 3 (section 3.2.3). The coefficient alpha for the current sample was .75.

Negative Occupational Factors (NOF) score

The NOF score was calculated as described in Chapter 3 (section 3.2.3) and comprised items within the job demand-control-support and effort-reward imbalance models, and the unfavourable working hours/exposure to hazards score. A novel variable was created based on quartile splits[64] of the following scores; job demand, decision latitude, social support[65], extrinsic effort, intrinsic effort, reward and unfavourable working hours/exposure to physical hazards. The coefficient alpha for the current sample was .69.

Occupation-specific stress measures

The Expanded Nursing Stress Scale was included in the survey as a measure of occupation-specific stress (ENSS; French et al. 2000). The scale comprises 57 items scored from 0 (not at all) to 3 (very frequently). Respondents were asked to consider the frequency with which they experienced statements such as 'Feeling helpless in the case of a patient who fails to improve' and 'Conflict with a physician'. The total scale score was calculated by summing all included items.

Stratification by coping

Both the NOF and ENSS scores were also stratified by coping to determine any potential buffering (or likely interactive) effects. Median splits of the NOF score and emotion-focused coping sub-scale were combined into a novel 4-category variable created to reflect the following categories:

Low NOF/low emotion-focused coping

Low NOF/high emotion-focused coping

High NOF/low emotion-focused coping

[64] An adjustment was made for missing data by calculating the mean score and multiplying this value by the number of scales comprising the total score (i.e. 7).

[65] For decision latitude and social support, appropriate items were reversed and the total scores re-calculated, so that a high score was indicative of negativity; i.e. low control and low support.

High NOF/high emotion-focused coping

Three additional novel variables were also created as outlined above, to reflect combined NOF/problem-focused coping, combined ENSS/emotion-focused coping and combined ENSS/problem-focused coping.

Demographic/individual risk factors composite score

The following demographic and individual characteristics were entered into a stepwise (backward) regression model, in order to determine their relative influence on key health outcomes: age, gender, marital status, education, part/full-time employment, income, occupational setting, negative affectivity, emotion and problem-focused coping[66]. A number of characteristics did not emerge as significantly associated with any outcome, and were therefore not included in the combined score: income, education, gender, occupational setting (i.e. community or ward-based) and problem-focused coping. Dichotomies of the following characteristics only were included in the composite score:

- Age (<40 / 41-65 yrs)
- Marital status (married/cohabiting; single/divorced/widowed)
- Part / full-time employment
- Emotion-focused coping (low / high)
- Negative affectivity (low / high)

Based on the frequency distribution of risk factors, a three-category variable was created to reflect the following: 0-1 'risk' factor; 2 'risk' factors and 3-5 risk factors.

7.2.4 Dependent measures

Dependent measures assessed in the subsequently described analyses include: work-related stress, probable clinical anxiety and depression, total symptom scores for lifetime prevalence of disease and 12-month symptoms, 12-month sciatica/back pain measures of acute (i.e. within the last 14 days) physical and psychological well-being, and 12-month and 14-day use of prescribed medication.

[66] Results are presented in Appendix V for the following outcomes: work-related stress, probable clinical anxiety and depression, lifetime prevalence of disease and 12-month and 14-day upper respiratory tract symptoms.

Individual and derived chronic and long-term health outcomes (other than total symptom scores and 12-month sciatica/back pain) were not considered as dependent variables in the current analyses (see Chapter 3, section 3.2.4). A single-item dichotomous dependent measure of work-related stress in the last 12 months was included in analyses (not at all/mildly/moderately stressed vs very/extremely stressed). Remaining health outcomes are described below in detail.

Clinical anxiety and depression

Clinical anxiety and depression were measured using the Hospital Anxiety and Depression scale (Zigmond & Snaith, 1983: see Chapter 3, section 3.2.4). Coefficient alphas for sub-scales in the current sample were as follows: depression = .78; anxiety = .84.

Physical and psychological symptom scores

Three symptom checklists were included in the questionnaire (see Chapter 3, section 3.2.2). A number of novel outcome variables were created based on these checklists; firstly, total symptom scores[67] were calculated across each of the symptom lists (created by summing the number of positive responses). Secondly, exploratory factor analysis (varimax rotation) of the acute (14-day) symptom checklists revealed a logical structure[68]. Acute (14-day) health outcomes included in subsequent analyses are based on the outcome of the factor analysis (FA), and where derived outcomes do not match those described in Chapter 3 (Survey I), these are also included. 14-day health outcomes are listed below (the source of each outcome is indicated in brackets).

- Upper respiratory tract symptoms in the last 14 days (FA & Survey I)
- Depression/fatigue/difficulty sleeping/headache in the last 14 days (Survey I)
- Depression/fatigue/difficulty sleeping/back pain in the last 14 days (FA)
- Lower respiratory symptoms in the last 14 days (FA & Survey I)
- Diarrhoea/vomiting in the last 14 days (Survey I)
- Diarrhoea/indigestion/heartburn in the last 14 days (FA)
- Earache/dizziness/nausea in the last 14 days (FA)

[67] Categories of 'other symptoms' were included in total symptom scores for the last 12 months and 14 days but were not entered into subsequent factor analyses.
[68] Factor loadings are presented in Appendix II.

- Back pain/swollen ankles in the last 14 days (Survey I)
- Tooth/earache in the last 14 days (Survey I)
- Toothache/skin problems in the last 14 days (FA)

Items loading on these factors were summed to create appropriate dependent measures.

Use of medication

Use of prescribed medication during the last 12 months and last 14 days was assessed[69]. The following types of medication were included in a checklist: pain killers, medicines for indigestion, blood pressure tablets, sleeping pills, antidepressants, medicines for stress or anxiety, laxatives and 'other medicines'. Outcome measures were based on separate exploratory factor analyses (varimax rotation)[70] of medication use within the last 12 months and last 14 days respectively. These were as follows:

- Pain killers and indigestion medication in the last 12 months
- Psychotropic medication in the last 12 months
- Pain killers and indigestion medication in the last 14 days
- Psychotropic medication in the last 14 days

Items loading on these factors were summed to create appropriate dependent measures. However, blood pressure tablets, sleeping pills and laxatives did not load highly on any factor. Total 'use of medication' scores were also created by summing positive responses to medicines taken in the last 12 months and 14 days respectively.

7.3 SUMMARY STATISTICS

Covariates comprised negative affectivity, coping style, demographic and specific occupational characteristics; descriptive statistics are presented in this chapter. All independent variables comprised additive scales (means and standard deviations

[69] Prescribed medication use within the last month was also assessed in the questionnaire. However, only acute (14-day) and long-term (12-month) use were examined in the current analysis.
[70]Factor loadings are presented in Appendix II.

presented in the following section). All dependent variables were dichotomous and comprised physical and psychological health outcomes. Descriptive statistics are presented for the sample as a whole, and separately for nurses working in community/outpatient settings and those based in hospital/nursing home settings.

7.3.1 Demographic, occupational and individual characteristics

Descriptive statistics for demographic and occupational characteristics (where these variables served as covariates in subsequent analyses) are shown in Tables 44 – 46 (N.B. descriptives are the same for Chapter 8 and are therefore not presented again).

Table 44: Demographic & occupational characteristics of a nursing population

	Community/ outpatient	Ward/other inpatient	Total sample
Male	26 (7.7%)	42 (8.7%)	68 (8.3%)
Female	312 (92.3%)	443 (91.3%)	755 (91.7%)
19-30 yrs	8 (2.4%)	47 (9.7%)	55 (6.7%)
31-40 yrs	82 (24.3%)	118 (24.4%)	200 (24.4%)
41-50 yrs	153 (45.3%)	184 (38.1%)	337 (41.0%)
51-65 yrs	95 (28.1%)	134 (27.7%)	229 (27.9%)
< £20,000 p.a.	131 (38.6%)	179 (36.8%)	310 (37.6%)
£20-29,999 p.a.	152 (44.8%)	243 (50.0%)	195 (47.9%)
£30,000+ p.a.	56 (16.5%)	64 (13.2%)	120 (14.5%)
GCSE or below	23 (6.8%)	62 (12.8%)	85 (10.4%)
A Level/City & Guilds	42 (12.5%)	92 (19.0%)	134 (16.3%)
BA/BSc	49 (14.5%)	67 (13.9%)	116 (14.1%)
Higher degree/professional	223 (66.2%)	262 (54.2%)	485 (59.1%)
Married/cohabiting	278 (82.2%)	360 (74.1%)	638 (77.4%)
Single/divorced/separated/widowed	60 (17.8%)	126 (25.9%)	186 (22.6%)
White[71]	332 (97.9%)	455 (94.0%)	787 (95.6%)
Non-white	7 (2.1%)	29 (6.0%)	36 (4.4%)
Full-time	182 (53.8%)	337 (69.2%)	519 (62.9%)
Part-time	156 (46.2%)	150 (30.8%)	306 (37.1%)

[71] Ethnicity was not included as a covariate in subsequently described analyses due the very low proportion of non-white respondents.

A number of significant differences between nurses working in different settings were observed. Those working on wards/in inpatient settings were younger (χ^2 [3, 821] = 18.60, p< .0001), reported a higher level of educational attainment (χ^2 [3, 820] = 17.03, p<.001), were less likely to be married/cohabiting (χ^2 [1, 824] = 7.62, p<.006), more likely to work full-time (χ^2 [1, 825] = 20.16, p<.0001) and more likely to describe themselves as non-white (χ^2 [1, 823] = 7.35, p<.007).

Table 45: Prevalence of negative affectivity in a nursing population

	Community/ outpatient	Ward/other inpatient	Total sample
Are your feelings rather easily hurt?	230 (68.0%)	342 (70.5%)	572 (69.5%)
Would you call yourself tense/highly strung?	90 (26.8%)	131 (27.0%)	221 (26.9%)
Do you worry about awful things that might happen?	142 (42.0%)	217 (44.8%)	359 (43.7%)
High negative affectivity[72]	140 (41.7%)	225 (46.5%)	365 (44.5%)

Table 46: Negative affectivity & coping in a nursing population

Measure	Sample	N	Min	Max	Mean	SD
EPIN	Community/outpatient	335	0.00	24.00	10.43	5.18
	Ward/other inpatient	480	0.00	23.00	11.20	5.04
	Total	815	0.00	24.00	10.89	5.11
Problem-focused coping	Community/outpatient	326	0.00	43.00	21.26	6.56
	Ward/other inpatient	472	3.00	41.00	21.50	5.91
	Total	798	0.00	43.00	21.40	6.18
Emotion-focused coping	Community/outpatient	332	3.00	62.00	26.42	11.12
	Ward/other inpatient	471	4.00	65.00	28.06	10.48
	Total	803	3.00	65.00	27.38	10.77

[72] A dichotomous variable was created for use in subsequent analyses: low negative affectivity was defined as zero or 1 positive response and high negative affectivity as 2 or 3 positive responses. The 2 occupational groups did not differ significantly on this variable.

7.3.2 Dependent measures

Descriptive statistics for work-related stress and psychological health (and health-related behaviours[73]) are shown in Table 47 (N.B. descriptives are the same for Chapter 8 and are therefore not presented again).

Table 47: Prevalence of stress, poor physical & psychological health and health-related behaviours

	Community/ outpatient	Ward/other inpatient	Total sample
Very/extremely stressed at work	97 (28.6%)	174 (35.9%)	271 (32.9%)
Clinically anxious	75 (23.1%)	134 (28.7%)	209 (26.4%)
Clinically depressed	16 (4.9%)	28 (6.0%)	44 (5.5%)
Currently smoking	*35(10.4%)*	*76 (15.7%)*	*111 (13.5%)*
Alcohol above recommended levels	*64 (20.3%)*	*90 (21.2%)*	*154 (20.8%)*

Nurses working on wards/in inpatient settings reported higher work-related stress (χ^2 [1, 824] = 4.77, p<.03) and comprised a higher proportion of smokers (χ^2 [1, 822] = 4.87, p<.03).

Prevalence of physical and psychological symptoms is shown in Tables 48 and 49. (N.B. bivariate correlations between all dependent measures are given in Appendix III).

[73] Prevalence of alcohol use above recommended levels and being a current smoker is provided for information. Where significant associations between independent measures and lower respiratory symptoms are observed, smoking status is included as a covariate.

Table 48: Lifetime & 12-month prevalence of physical/psychological symptoms

Symptom/disease	Community/ outpatient	Ward/other inpatient	Total sample
Lifetime prevalence of disease			
Angina	-	3 (0.6%)	3 (0.4%)
Heart attack			
High cholesterol	33 (9.8%)	47 (9.8%)	80 (9.8%)
High blood pressure	51 (15.1%)	89 (18.5%)	140 (17.1%)
Diabetes	4 (1.2%)	18 (3.7%)	22 (2.7%)
Stroke	1 (0.3%)	3 (0.6%)	3 (0.4%)
Breast cancer	6 (1.8%)	5 (1.0%)	11 (1.3%)
Other cancer	8 (2.4%)	17 (3.5%)	25 (3.1%)
Asthma	54 (16.0%)	68 (14.1%)	122 (14.9%)
Bronchitis	24 (7.1%)	27 (5.6%)	51 (6.2%)
Emphysema	1 (0.3%)	2 (0.4%)	2 (0.2%)
Depression	91 (26.9%)	127 (26.3%)	218 (26.6%)
12-month symptoms			
Sciatica/lumbago/recurring backache	*150 (44.5%)*	*247 (51.1%)*	*397 (48.4)*
Arthritis/rheumatism	54 (16.1%)	67 (13.9%)	121 (14.8%)
Persistent foot trouble	30 (8.9%)	63 (13.0%)	93 (11.3%)
Varicose veins	25 (7.4%)	52 (10.8%)	77 (9.4%)
Bronchitis	16 (4.7%)	14 (2.9%)	30 (3.6%)
Asthma	36 (10.7%)	44 (9.1%)	80 (9.8%)
Hay fever	73 (21.7%)	114 (23.6%)	187 (22.8%)
Being constipated most of the time	32 (9.5%)	58 (12.0%)	90 (11.0%)
Piles	55 (16.3%)	82 (17.0%)	137 (16.7%)
Mouth/gums	37 (11.0%)	56 (11.6%)	93 (11.3%)
Skin problems	44 (13.1%)	77 (15.9%)	121 (14.8%)
Depression	47 (13.9%)	70 (14.5%)	117 (14.3%)
Stomach problems	96 (28.5%)	167 (34.6%)	263 (32.1%)

Nurses working in ward/inpatient settings reported significantly more back problems in the last 12 months (χ^2 [1, 820] = 3.49, p< .04). However, groups did not differ significantly in terms of lifetime prevalence or 12-month symptoms of ill health as measured by total symptom scores.

Table 49: 14-day prevalence of physical/psychological symptoms

Symptom/disease	Community/ outpatient	Ward/other inpatient	Total sample
14-day upper respiratory tract symptoms	*148 (43.7%)*	*241 (50.1%)*	*389 (47.4%)*
Cold/flu	57 (16.8%)	90 (18.7%)	147 (17.9%)
Cough/catarrh/phlegm	88 (26.0%)	148 (30.6%)	236 (28.7%)
Sore throat	83 (24.5%)	132 (27.4%)	215 (26.2%)
Blocked/runny nose	77 (22.7%)	132 (27.4%)	209 (25.5%)
14-day depression/fatigue	*281 (83.4%)*	*409 (84.9%)*	*690 (84.2%)*
Nervy/tense/depressed	101 (30.0%)	153 (31.7%)	254 (31.0%)
Tired for no apparent reason	173 (51.0%)	240 (49.8%)	413 (50.3%)
Difficulty sleeping	171 (50.6%)	241 (50.0%)	412 (50.2%)
Headache	186 (55.0%)	290 (60.0%)	476 (58.0%)
14-day psychological symptoms	*277 (82.2%)*	*381 (79.4%)*	*658 (80.5%)*
Nervy/tense/depressed	101 (30.03%)	153 (31.7%)	254 (31.0%)
Tired for no apparent reason	173 (51.0%)	240 (49.8%)	413 (50.3%)
Difficulty sleeping	171 (50.6%)	241 (50.0%)	412 (50.2%)
Back pain	151 (44.5%)	213 (44.4%)	364 (44.4%)
14-day lower respiratory symptoms	*42 (12.4%)*	*81 (16.8%)*	*123 (15.0%)*
Wheeziness	22 (6.5%)	42 (8.7%)	64 (7.8%)
Shortness of breath	34 (10.1%)	61 (12.7%)	95 (11.6%)
14-day gastrointestinal symptoms	*68 (20.1%)*	*108 (22.5%)*	*176 (21.5%)*
Diarrhoea	51 (15.1%)	76 (15.8%)	127 (15.5%)
Nausea/vomiting	26 (7.7%)	49 (10.2%)	75 (9.2%)
14-day gastrointestinal symptoms 2	*143 (42.3%)*	*227 (47.3%)*	*370 (45.2%)*
Diarrhoea	51 (15.1%)	76 (15.8%)	127 (15.5%)
Wind/indigestion/heartburn	125 (37.0%)	208 (43.3%)	349 (40.5%)
14-day earache/nausea	*92 (27.2%)*	*167 (34.9%)*	*259 (31.7%)*
Dizziness	53 (15.6%)	102 (21.2%)	158 (18.3%)
Earache	49 (14.5%)	70 (14.6%)	126 (14.6%)
Nausea	26 (7.7%)	49 (10.2%)	75 (9.2%)
14-day back pain/swollen ankles	*167 (49.4%)*	*241 (50.3%)*	*408 (49.9%)*
Back pain	*151 (44.5%)*	*213 (44.4%)*	*364 (44.4%)*
Swollen ankles	33 (9.8%)	60 (12.5%)	97 (11.3%)
Acute tooth/earache	*82 (24.3%)*	*121 (25.2%)*	*203 (24.8%)*
Toothache/gum problems	39 (11.5%)	64 (13.3%)	111 (12.9%)
Earache/discomfort in ears	49 (14.5%)	70 (14.6%)	126 (14.6%)

14-day toothache/skin problems	*81 (24.0%)*	*124 (25.8%)*	*205 (25.0%)*
Toothache	39 (11.5%)	64 (13.3%)	111 (12.9%)
Skin trouble/rashes	55 (16.3%)	79 (16.4%)	136 (15.8%)
Chest pain	20 (5.9%)	24 (5.0%)	44 (5.4%)

Nurses working on wards/in inpatient settings were more likely to report dizziness/earache/nausea in the last 14 days (χ^2 [1, 817] = 5.35 p<.02).

Prevalence of medication use within the last 12 months and last 14 days is shown in Table 50.

Table 50: Prevalence of prescribed medication use

Medication	Community/ outpatient	Ward/other inpatient	Total sample
Within the last 12 months:			
Pain killers/indigestion medication	*160 (51.3%)*	*253 (56.0%)*	*413 (54.1%)*
Pain killers	152 (48.3%)	238 (52.2%)	390 (50.6%)
Medicines for indigestion	62 (19.4%)	102 (22.0%)	164 (21.0%)
Psychotropic medication	*31 (9.6%)*	*42 (8.9%)*	*73 (9.2%)*
Antidepressants	28 (8.6%)	38 (8.1%)	66 (8.3%)
Medicines for anxiety or stress	16 (4.9%)	21 (4.4%)	37 (4.6%)
Blood pressure medication	22 (6.8%)	38 (8.1%)	60 (7.5%)
Sleeping pills	19 (5.8%)	37 (7.8%)	56 (7.0%)
Laxatives	17 (5.2%)	35 (7.4%)	52 (6.5%)
Within the last 14 days:			
Pain killers/indigestion medication	*132 (41.4%)*	*201 (43.6%)*	*333 (42.7%)*
Pain killers	127 (39.0%)	184 (39.2%)	311 (39.1%)
Medicines for indigestion	50 (15.5%)	78 (16.7%)	128 (16.2%)
Psychotropic medication in the last 14 days	*29 (9.2%)*	*35 (7.6%)*	*64 (8.3%)*
Antidepressants	26 (8.2%)	35 (7.6%)	61 (7.8%)
Medicines for anxiety or stress	16 (5.0%)	14 (3.1%)	30 (3.9%)
Blood pressure medication	26 (8.1%)	38 (8.2%)	64 (8.2%)
Sleeping pills	17 (5.3%)	25 (5.4%)	42 (5.4%)
Laxatives	11 (3.4%)	19 (4.1%)	30 (3.9%)

Short-term psychotropic medication use (i.e. within the last 14 days) was excluded from further analyses given the low prevalence (<10%). However, 12-month use of psychotropic medication was included as an outcome measure, given associations with NOF have not previously been examined in detail (see Chapter 3).[74]

7.3.3 Independent measures

Summary statistics for independent measures utilised only in the current chapter are provided in Tables 51 and 52.

Table 51: Descriptive statistics for independent measures

Measure	Sample	N	Min	Max	Mean	SD
Job demand	Community/outpatient	332	0.00	100.00	66.69	18.21
	Ward/other inpatient	478	0.00	100.00	71.48	17.33
	Total	810	0.00	100.00	69.52	17.84
Social support[75]	Community/outpatient	335	0.00	100.00	30.83	21.57
	Ward/other inpatient	482	0.00	94.44	32.47	21.59
	Total	817	0.00	100.00	31.80	21.58
Decision latitude	Community/outpatient	330	2.78	80.56	32.40	13.53
	Ward/other inpatient	477	4.63	78.70	36.19	12.73
	Total	807	2.78	80.56	34.64	13.19
Extrinsic effort	Community/outpatient	329	0.00	100.00	35.31	20.65
	Ward/other inpatient	469	0.00	100.00	38.31	20.64
	Total	798	0.00	100.00	37.07	20.68
Intrinsic effort	Community/outpatient	334	0.00	91.67	49.96	21.28
	Ward/other inpatient	480	0.00	100.00	52.73	19.90
	Total	814	0.00	100.00	51.60	20.51
Reward	Community/outpatient	322	0.00	100.00	16.50	19.02
	Ward/other inpatient	464	0.00	100.00	17.65	19.70
	Total	786	0.00	100.00	17.18	19.42
Undesirable working hours/ exposure to hazards	Community/outpatient	337	0.00	79.17	26.60	20.96
	Ward/other inpatient	482	0.00	95.83	47.90	20.07
	Total	819	0.00	95.83	39.13	22.71
Negative occupational factors score (NOF)	Community/outpatient	339	7.00	28.00	16.51	4.52
	Ward/other inpatient	488	7.00	28.00	18.52	4.70
	Total	827	7.00	28.00	17.69	4.73

[74] Prevalence of probable clinical depression is also <10%. This outcome is included in analyses, given previously established associations with the NOF score and components.
[75] High scores represent low social support and low decision latitude.

ENSS	Community/outpatient	325	0.00	166.00	49.30	20.74
	Ward/other inpatient	466	3.00	157.00	58.94	19.80
	Total	791	0.00	166.00	54.98	20.73

Table 52: Frequency of demographic risk factors

	Community/ outpatient	Ward/other inpatient	Total sample
0/1 risk factor	*95 (29.1%)*	*73 (15.9%)*	*168 (21.4%)*
0 risk factors	18 (5.5%)	14 (3.0%)	32 (4.1%)
1 risk factor	77 (23.6%)	59 (12.8%)	136 (17.3%)
2 risk factors	*92 (28.2%)*	*132 (28.7%)*	*224 (28.5%)*
3-5 risk factors	*139 (42.6%)*	*255 (55.4%)*	*394 (50.1%)*
3 risk factors	85 (26.1%)	149 (32.4%)	234 (29.8%)
4 risk factors	39 (12.0%)	90 (19.6%)	129 (16.4%)
5 risk factors	15 (4.6%)	16 (3.5%)	31 (3.9%)

Non-parametric correlations (Spearman's rho) between median splits of independent variables utilised in Chapters 7 and 8 are given in Appendix VIII.

7.4 ANALYTIC PROCEDURE

Quartile splits of NOF scores or the occupation-specific stress scale (ENSS) served as independent predictors in a series of logistic regression analyses. Two types of contrast were used; firstly, the lower quartile of the score was set as the reference category and secondly a repeated contrast was used. The following variables were included in all models as covariates: gender, age, income, educational attainment, marital status, work pattern (full/part time) and occupational setting (i.e. community/outpatient-based and hospital/ward-based). Negative affectivity (either the full or 3-item measure) and/or coping style (emotion and problem-focused) were also included as covariates. Unless otherwise stated, all models demonstrated adequate goodness of fit and no evidence of multicollinearity between variables was observed.

7.5 NEGATIVE OCCUPATIONAL FACTORS (NOF), NEGATIVE AFFECTIVITY AND PHYSICAL & PSYCHOLOGICAL WELL-BEING

As previously stated, a primary aim of the current survey was to replicate the additive association demonstrated in Chapter 3 between a composite stressor score (i.e. NOF) and health and well-being. A second aim was to determine whether including the full version of Eysenck's Neuroticism Scale (Eysenck & Eysenck, 1968) as opposed to the 3-item measure previously utilised, would impact on the pattern of effects observed between NOF and health outcomes. Results of logistic regression analyses employed to asses both these aims are described in detail in the following sections.

7.5.1 Outcomes not associated with the NOF score

No significant associations were observed between the original NOF score and the following outcomes, where the 3-item measure of negative affectivity was included as a covariate:

- 14-day symptoms
- 14-day back pain
- 14-day diarrhoea/indigestion/heartburn
- 14-day tooth/earache
- 14-day toothache/skin problems
- 12-month use of psychotropic medication
- 12-month use of pain/indigestion medication
- 14-day use of prescribed medication (any)

Patterns of association between NOF and the remaining outcome measures are described subsequently.

7.5.2 NOF, negative affectivity and psychological well-being

Odds ratios and 95% confidence intervals where the original NOF score was included as an independent measure, and work-related stress, probable clinical anxiety and depression[76] served as dependent measures are shown below in Table 53 (N.B. the

[76] Negative affectivity measures were not included as covariates where clinical anxiety or depression comprised dependent measures.

Table gives results for work-related stress where dichotomous scales based on the 3-item, and 24-item versions of the negative affectivity measure were included as covariates: the lower quartile of NOF was set as the reference category in each model).

Table 53: NOF, negative affectivity & psychological well-being

		N	OR	95% CI
Work-related stress				
NOF (3-item EPIN)	1st quartile	208	1.00	
	2nd quartile	243	2.38**	1.34-4.22
Wald = 109.24, p<.0001	3rd quartile	166	7.51***	4.20-13.45
	4th quartile	188	16.01**	8.82-29.07
NOF (24-item EPIN)	1st quartile	207	1.00	
	2nd quartile	242	2.14*	1.20-3.82
Wald = 92.71, p<.0001	3rd quartile	165	6.42***	3.56-11.60
	4th quartile	186	12.97**	7.08-23.76
Clinical anxiety				
NOF	1st quartile	199	1.00	
	2nd quartile	235	5.27***	2.27-12.23
Wald = 115.56, p<.0001	3rd quartile	160	18.28***	7.95-42.05
	4th quartile	184	41.12***	17.86-94.65
Clinical depression				
NOF	1st quartile	200	1.00	
	2nd quartile	234	0.81	0.20-3.30
Wald = 19.63, p<.0001	3rd quartile	160	4.21*	1.33-13.31
	4th quartile	187	6.19	2.03-18.93

Note: repeated contrasts * (p<.01) ** (p<.001) *** (p<.0001)

The Table indicates that the original NOF score was significantly associated with all psychological health outcomes in the current sample of nurses. With the exception of clinical anxiety however, the magnitude of associations appears reduced in the current sample, based on the size of the odds ratios. Inclusion of the full 24-item measure of negative affectivity reduced the size of the odds ratio observed for work stress.

7.5.3 NOF, negative affectivity, lifetime and 12-month symptom prevalence

Odds ratios and 95% confidence intervals where the original NOF score was included as an independent measure, and lifetime and 12-month prevalence of symptoms served as dependent measures are shown below in Table 54 (N.B. the Table gives results where both the 3 and 24-item measures of negative affectivity were included as covariates: the lower quartile of NOF was set as the reference category in each model).

Table 54: NOF, negative affectivity, lifetime & 12-month symptom prevalence

		N	OR	95% CI
Lifetime prevalence of symptoms/disease				
NOF (3-item EPIN)	1st quartile	206	1.00	
	2nd quartile	240	0.93	0.63-1.37
Wald = 10.10, p<.02	3rd quartile	164	1.41+	0.91-2.18
	4th quartile	187	1.72	1.10-2.69
12-month symptoms				
NOF (3-item EPIN)	1st quartile	203	1.00	
	2nd quartile	235	1.94*	1.17-3.21
Wald = 22.85, p<.0001	3rd quartile	158	3.59	1.82-7.07
	4th quartile	177	4.34	2.13-8.83
NOF (24-item EPIN)	1st quartile	202	1.00	
	2nd quartile	234	1.89*	1.13-3.17
Wald = 8.49, p<>0001	3rd quartile	158	3.33	1.67-6.64
	4th quartile	176	3.89	1.86-8.12
12-month sciatica/back pain				
NOF (3-item EPIN)	1st quartile	206	1.00	
	2nd quartile	242	1.44	0.98-2.13
Wald = 13.97, p<.003	3rd quartile	165	1.82	1.17-2.82
	4th quartile	185	2.27	1.45-3.55
NOF (24-item EPIN)	1st quartile	205	1.00	
	2nd quartile	241	1.38	0.93-2.04
Wald = 9.40, p<.02	3rd quartile	164	1.68	1.07-2.63
	4th quartile	185	2.00	1.26-3.16

Note: repeated contrasts + (p<.05) * (p<.01)

The Table indicates that associations between NOF and lifetime and 12-month symptom prevalence are similar in the current sample to that described in Chapter 3 (Survey I). For 12-month symptoms, including the full measure of negative affectivity as a covariate reduced the size of the effect observed, but NOF was still significantly associated with 12-month health. However, when the full measure of negative affectivity was included as a covariate for lifetime prevalence of disease, NOF was no longer associated with this outcome.

7.5.4 NOF, negative affectivity and acute (14-day) ill-health

Odds ratios and 95% confidence intervals where the original NOF score was included as an independent measure, and 14-day health outcomes served as dependent measures are shown below in Table 55 (N.B. the Table gives results where both the 3 and 24-item measures of negative affectivity were included as covariates: the lower quartile of NOF was set as the reference category in each model).

Table 55: NOF, negative affectivity & 14-day ill-health

		N	OR	95% CI
14-day upper respiratory symptoms				
NOF (3-item EPIN)	1st quartile	206	1.00	
	2nd quartile	240	1.12	0.76-1.65
Wald = 9.92, p<.02	3rd quartile	165	1.58	1.02-2.43
	4th quartile	187	1.86	1.20-2.90
NOF (24-item EPIN)	1st quartile	205	1.00	
	2nd quartile	239	1.13	0.76-1.70
Wald = 9.55, p<.02	3rd quartile	164	1.61	1.03-2.51
	4th quartile	185	1.87	1.19-2.96
14-day depression/fatigue/difficulty sleeping/headache				
NOF (3-item EPIN)	1st quartile	204	1.00	
	2nd quartile	240	1.83*	1.13-2.97
Wald = 18.41, p<.0001	3rd quartile	166	2.99	1.59-5.61
	4th quartile	187	3.23	1.68-6.20
NOF (24-item EPIN)	1st quartile	103	1.00	
	2nd quartile	239	1.71+	1.05-2.78
Wald = 12.79, p<.01	3rd quartile	165	2.61	1.37-4.95
	4th quartile	185	2.64	1.36-5.15
14-day depression/fatigue/difficulty sleeping/back pain				
NOF (3-item EPIN)	1st quartile	203	1.00	
	2nd quartile	240	2.17**	1.36-3.45
Wald = 19.27, p<.0001	3rd quartile	166	2.35	1.36-4.05
	4th quartile	186	3.08	1.72-5.53
NOF (24-item EPIN)	1st quartile	202	1.00	
	2nd quartile	239	2.04**	1.27-3.26
Wald = 13.94, p<.001	3rd quartile	165	2.17	1.24-3.81
	4th quartile	184	2.53	1.39-4.62

14-day lower respiratory symptoms				
NOF (3-item EPIN)	1st quartile	206	1.00	
	2nd quartile	240	2.16*	1.14-4.07
Wald = 12.53, p<.006	3rd quartile	165	2.96	1.53-5.75
	4th quartile	187	3.02	1.55-5..91
NOF (24-item EPIN)	1st quartile	205	1.00	
	2nd quartile	239	2.02+	1.07-3.83
Wald = 8.47, p<.04	3rd quartile	164	2.62	1.34-5.15
	4th quartile	185	2.40	1.20-4.78
14-day diarrhoea/vomiting				
NOF (3-item EPIN)	1st quartile	205	1.00	
	2nd quartile	239	0.87	0.51-1.47
Wald = 14.68, p<.002	3rd quartile	165	1.95*	1.15-3.30
	4th quartile	186	1.87	1.09-3.21
NOF (24-item EPIN)	1st quartile	204	1.00	
	2nd quartile	238	0.78	0.45-1.33
Wald = 10.15, p<.05	3rd quartile	164	1.65**	0.86-2.84
	4th quartile	184	1.49	0.85-2.60
14-day earache/dizziness/nausea				
NOF (3-item EPIN)	1st quartile	205	1.00	
	2nd quartile	239	1.18	0.76-1.85
Wald = 12.98, p<.005	3rd quartile	165	1.78	1.11-2.88
	4th quartile	186	2.16	1.34-3.49
NOF (24-item EPIN)	1st quartile	204	1.00	
	2nd quartile	238	1.10	0.70-1.74
Wald = 7.84, p<.05	3rd quartile	164	1.59	0.97-2.59
	4th quartile	184	1.81	1.10-2.97
14-day back pain/swollen ankles				
NOF (3-item EPIN)	1st quartile	192	1.00	
	2nd quartile	218	1.84*	1.20-2.81
Wald = 8.01, p<.05	3rd quartile	151	1.39	0.87-2.24
	4th quartile	174	1.58	0.97-2.57

Note: repeated contrasts + (p<.05) * (p<.01) ** (p<.001)

7.5.5 NOF, negative affectivity and use of prescribed medication

Odds ratios and 95% confidence intervals where the original NOF score was included as an independent measure, and prescribed medication use served as a dependent measure are shown below in Table 56 (N.B. the Table gives results where both the 3 and 24-item measures of negative affectivity were included as covariates: the lower quartile of NOF was set as the reference category in each model).

Table 56: NOF, negative affectivity & prescribed medication use

		N	OR	95% CI
12-month use of prescribed medication				
NOF (3-item EPIN)	1st quartile	192	1.00	
	2nd quartile	218	1.84*	1.20-2.81
Wald = 8.20, p<.04	3rd quartile	151	1.39	0.87-2.24
	4th quartile	174	1.58	0.97-2.57

Note: repeated contrasts * (p<.01)

A single medication use outcome, use of any prescribed medication in the last 12 months, was significantly associated with the NOF score. However, this association was no longer significant when the 24-item negative affectivity measure was included in the model as a covariate.

7.5.6 NOF, negative affectivity, coping, health and well-being

The analyses detailed above were repeated (using the 24-item negative affectivity measure only) including median splits of both the emotion and problem-focused scales as covariates[77]. Odds ratios and 95% confidence intervals where the original NOF score was included as an independent measure are shown below in Table 57 for all significant associations.

Table 57: NOF, negative affectivity, coping, health & well-being

		N	OR	95% CI
Work-related stress	1st quartile	197	1.00	
	2nd quartile	233	2.14*	1.18-3.88
Wald = 81.33, p<.0001	3rd quartile	159	6.02***	3.28-11.06
	4th quartile	180	12.28**	6.58-22.93

[77] Analyses were also carried out where coping (either emotion-focused, problem-focused or both) was included as a covariate without negative affectivity. Results are provided in Appendix IX for all outcomes.

Clinical anxiety[78]	1st quartile	189	1.00	
	2nd quartile	226	5.42***	2.20-13.38
Wald = 84.40, p<.0001	3rd quartile	154	16.03***	6.52-39.38
	4th quartile	178	32.65**	13.29-80.23
Clinical depression	1st quartile	190	1.00	
	2nd quartile	226	0.53	0.12-2.45
Wald = 13.19, p<.004	3rd quartile	154	3.26*	1.00-10.59
	4th quartile	179	4.03	1.25-12.99
12-month symptoms	1st quartile	193	1.00	
	2nd quartile	226	1.86*	1.09-3.16
Wald = 18.01, p<.0001	3rd quartile	153	3.48	1.69-7.16
	4th quartile	171	4.21	1.94-9.17
12-month sciatica/back pain	1st quartile	195	1.00	
	2nd quartile	232	1.38	0.92-2.06
Wald = 8.67, p<.03	3rd quartile	158	1.69	1.06-2.68
	4th quartile	179	1.99	1.24-3.22
14-day URTIs	1st quartile	195	1.00	
	2nd quartile	230	0.99	0.66-1.48
Wald = 8.99, p<.03	3rd quartile	158	1.52+	0.96-2.40
	4th quartile	179	1.76	1.09-2.82
14-day depression/fatigue/	1st quartile	193	1.00	
difficulty sleeping/headache	2nd quartile	230	1.57	0.95-2.58
	3rd quartile	159	2.34	1.22-4.51
Wald = 9.77, p<.02	4th quartile	179	2.50	1.24-5.02
14-day depression/fatigue/	1st quartile	192	1.00	
difficulty sleeping/back pain	2nd quartile	230	1.90*	1.17-3.08
	3rd quartile	159	2.05	1.14-3.67
Wald = 12.32, p<.006	4th quartile	179	2.75	1.45-5.20
14-day gastrointestinal	1st quartile	194	1.00	
symptoms	2nd quartile	229	0.80	0.46-1.39
	3rd quartile	158	1.77**	1.01-3.09
Wald = 10.48, p<.02	4th quartile	179	1.53	0.86-2.74

Note: repeated contrasts + (p<.05) * (p<.01) ** (p<.001) *** (p<.0001)

As is evident from the Table, when coping style was included as a covariate in addition to negative affectivity, the number of significant associations between NOF

[78] Negative affectivity measures were not included as covariates where clinical anxiety and depression comprised dependent measures.

and health and well-being outcomes was reduced. However, the NOF score was still associated with work-related stress, probable clinical anxiety and depression, 12-month symptoms of ill-health, and both physical and psychological acute (14-day) ill-health.

7.5.7 NOF and health outcomes: Buffering effects of coping

The above analyses were repeated using the combined NOF/coping variables described earlier in the current chapter, to determine whether coping style acts as a buffer, or moderates/mediates established relationships between the NOF score and health outcomes. Median splits of the NOF score and coping sub-scales (emotion and problem-focused coping) were combined to create two novel 4-category variables (high/low NOF & high low coping – either emotion or problem-focused). These novel variables comprised independent measures in a series of logistic regression equations: gender, age, marital status, education, salary, full/part-time, occupational group and negative affectivity (24-item measure) were included in all models as covariates. Indicator, followed by repeated contrasts were used.

Results indicate a potential buffering effect of emotion-focused coping for a single outcome only: probable clinical anxiety (see Table 58). For problem-focused coping and all other outcomes, the only significant differences between odds ratios were observed between high and low categories of the NOF score.

Table 58: NOF, emotion-focused coping & clinical anxiety

		N	OR	95% CI
Clinical anxiety				
NOF/emotion-focused coping	Low NOF/low EFC	271	1.00	
	Low NOF/high EFC	147	2.77*	1.33-5.79
Wald = 65.64, p<.0001	High NOF/low EFC	111	6.07*	2.89-12.78
	High NOF/high EFC	223	12.67*	6.51-24.66

Note: repeated contrasts * (p<.01)

EFC = emotion-focused coping

As is evident from the above Table, clinical anxiety was most likely reported when individuals scored highly on both NOF and emotion-focused coping, suggested that those who use this type of strategy infrequently are less likely to be anxious. The NOF score however, appears to be more strongly associated with the outcome than emotion-focused coping.

7.5.8 Occupation-specific distress, negative affectivity, health and well-being

In the following section, a quartile split of the nursing-specific stress measure, the Expanded Nursing Stress Scale (ENSS: French et al. 2000) was included as an independent measure, co-varying for both the 3 and 24-item versions of the negative affectivity scales, in order to determine the predictive value of NOF relative to an occupation-specific measure of stress. Odds ratios and 95% confidence intervals are shown in Table 59 below for all significant associations.

Table 59: ENSS, negative affectivity & health & well-being

		N	OR	95% CI
Work-related stress				
ENSS (3-item EPIN)	1st quartile	181	1.00	
	2nd quartile	208	2.76**	1.53-4.96
Wald = 72.22, p<.0001	3rd quartile	185	3.94	2.21-7.04
	4th quartile	197	10.80***	5.99-19.46
ENSS (24-item EPIN)	1st quartile	181	1.00	
	2nd quartile	208	2.55**	1.41-4.60
Wald = 62.44, p<.0001	3rd quartile	185	3.61	2.02-6.47
	4th quartile	194	9.42***	5.19-17.11
Clinical anxiety[79]				
ENSS	1st quartile	174	1.00	
	2nd quartile	204	1.81	0.99-3.28
Wald = 55.55, p<.0001	3rd quartile	180	2.84	1.59-5.08
	4th quartile	190	6.90***	3.88-12.26
12-month symptoms				
ENSS (3-item EPIN)	1st quartile	176	1.00	
	2nd quartile	203	1.75	0.99-3.10
Wald = 9.54, p<.02	3rd quartile	178	1.77	0.96-3.26
	4th quartile	186	2.83	1.43-5.58

[79] Negative affectivity measures were not included as a covariate where clinical anxiety comprised the dependent measure.

12-month sciatica/back pain				
ENSS (3-item EPIN)	1st quartile	180	1.00	
	2nd quartile	207	0.99	0.65-1.51
Wald = 9.27, p<.03	3rd quartile	185	1.53+	0.99-2.36
	4th quartile	193	1.65	1.06-2.57
14-day upper respiratory tract symptoms				
ENSS (3-item EPIN)	1st quartile	180	1.00	
	2nd quartile	206	1.15	0.76-1.75
Wald = 16.80, p<.0001	3rd quartile	184	0.99	0.64-1.52
	4th quartile	194	2.15***	1.38-3.36
ENSS (24-item EPIN)	1st quartile	180	1.00	
	2nd quartile	206	1.15	0.76-1.75
Wald = 17.09, p<.001	3rd quartile	184	0.99	0.64-1.54
	4th quartile	191	2.20***	1.40-3.48
14-day depression/fatigue/difficulty sleeping/headache				
ENSS (3-item EPIN)	1st quartile	180	1.00	
	2nd quartile	205	1.06	0.63-1.77
Wald = 11.71, p<.008	3rd quartile	184	1.48	0.83-2.62
	4th quartile	195	2.92+	1.49-5.72
ENSS (24-item EPIN)	1st quartile	180	1.00	
	2nd quartile	205	0.98	0.58-1.65
Wald = 7.88, p<.05	3rd quartile	184	1.34	0.75-2.40
	4th quartile	192	2.35	1.18-4.69
14-day depression/fatigue/difficulty sleeping/back pain				
ENSS (3-item EPIN)	1st quartile	180	1.00	
	2nd quartile	204	1.57	0.95-2.60
Wald = 10.17, p<.02	3rd quartile	184	2.01	1.16-3.49
	4th quartile	195	2.33	1.32-4.12
14-day lower respiratory symptoms				
ENSS (3-item EPIN)	1st quartile	180	1.00	
	2nd quartile	206	1.58	0.78-3.19
Wald = 12.37, p<.006	3rd quartile	184	2.39	1.20-4.74
	4th quartile	194	3.04	1.54-6.01
ENSS (24-item EPIN)	1st quartile	180	1.00	
	2nd quartile	206	1.55	0.76-3.13
Wald = 9.51, p<.02	3rd quartile	184	2.26	1.13-4.50
	4th quartile	191	2.72	1.36-5.45
14-day diarrhoea/vomiting				
ENSS (3-item EPIN)	1st quartile	180	1.00	
	2nd quartile	204	0.87	0.49-1.53
Wald = 12.94, p<.005	3rd quartile	184	1.51*	0.88-2.60

	4th quartile	194	2.03	1.19-3.47
ENSS (24-item EPIN)	1st quartile	180	1.00	
	2nd quartile	204	0.82	0.46-1.45
Wald = 9.13, p<.03	3rd quartile	184	1.38	0.80-2.38
	4th quartile	191	1.73	1.00-2.99
14-day back pain/swollen ankles				
ENSS (3-item EPIN)	1st quartile	180	1.00	
	2nd quartile	204	1.33	0.88-2.02
Wald = 8.92, p<.03	3rd quartile	184	1.85	1.20-2.86
	4th quartile	194	1.69	1.09-2.62
12-month prescribed medication use				
ENSS (3-item EPIN)	1st quartile	166	1.00	
	2nd quartile	189	1.61+	1.02-2.53
Wald = 8.60, p<.04	3rd quartile	170	1.88	1.16-3.04
	4th quartile	183	1.84	1.13-2.98
12-month pain killers/indigestion medication				
ENSS (3-item EPIN)	1st quartile	167	1.00	
	2nd quartile	189	1.51	0.98-2.32
Wald = 11.39, p<.01	3rd quartile	173	1.89	1.20-2.96
	4th quartile	184	2.07	1.31-3.27
ENSS (24-item EPIN)	1st quartile	167	1.00	
	2nd quartile	189	1.47	0.95-2.27
Wald = 9.47, p<.02	3rd quartile	173	1.80	1.14-2.83
	4th quartile	181	1.98	1.24-3.16

Note: repeated contrasts + (p<.05) * (p<.01) ** (p<.001) *** (p<.0001)

The results presented above indicate that the occupation-specific stress measure utilised in the current chapter is generally much less predictive of poor health and well-being than the NOF score. Associations between ENSS and work-related stress and clinical anxiety are smaller than those observed for the NOF score, and the ENSS was not found to be significantly associated with clinical depression, or lifetime prevalence of ill-health. Smaller associations between ENSS and 12-month health are also observed; furthermore, these associations are no longer significant when the 24-item version of the negative affectivity measure is included as a covariate (associations remained significant for the NOF score). The pattern of effects is more comparable for acute health outcomes and 12-month use of medication however.

7.5.9 ENSS, negative affectivity, coping, health and well-being

The analyses detailed above were repeated (using the 24-item negative affectivity measure only) including median splits of both the emotion and problem-focused scales as covariates[80]. Odds ratios and 95% confidence intervals where the ENSS score was included as an independent measure are shown below in Table 60 for all significant associations.

Table 60: ENSS, negative affectivity, coping, health & well-being

		N	OR	95% CI
Work-related stress	1st quartile	174	1.00	
	2nd quartile	200	2.53**	1.38-4.64
Wald = 55.98, p<.0001	3rd quartile	184	3.60	1.98-6.56
	4th quartile	188	9.36***	5.02-17.47
Clinical anxiety[81]	1st quartile	167	1.00	
	2nd quartile	196	1.56	0.84-2.92
Wald = 33.04, p<.0001	3rd quartile	79	2.06	1.12-3.81
	4th quartile	183	4.78***	2.59-8.83
14-day URTIs	1st quartile	173	1.00	
	2nd quartile	198	1.02	0.66-1.57
Wald = 16.21, p<.001	3rd quartile	183	0.90	0.58-1.42
	4th quartile	185	2.06***	1.27-3.32
12-month	1st quartile	161	1.00	
pain/indigestion	2nd quartile	183	1.56	0.99-2.44
medication	3rd quartile	172	1.88	1.18-3.01
	4th quartile	177	1.98	1.20-3.24
Wald = 9.05, p<.03				

Note: repeated contrasts * (p<.01) ** (p<.001) *** (p<.0001)

As is evident from the Table above, fewer effects of the ENSS remain when coping style in included as a covariate than were observed for similar analyses carried out using the NOF score.

7.5.10 ENSS and health outcomes: Buffering effects of coping

The above analyses were repeated using the combined ENSS/coping variables described earlier in the current chapter, to determine whether coping style acts as a

[80] Analyses were also carried out where coping (either emotion-focused, problem-focused or both) was included as a covariate without negative affectivity. Results are provided in Appendix X.

[81] Negative affectivity measures were not included as a covariate where clinical anxiety comprised the dependent measure.

buffer, or moderates/mediates established relationships between the ENSS score and health outcomes. Median splits of the ENSS score and coping sub-scales (emotion and problem-focused coping) were combined to create two novel 4-category variables (high/low ENSS & high low coping – either emotion or problem-focused). These novel variables comprised independent measures in a series of logistic regression equations: gender, age, marital status, education, salary, full/part-time, occupational group and negative affectivity (24-item measure) were included in all models as covariates (indicator, followed by repeated contrasts were used).

Results indicate a potential buffering effect of emotion-focused coping for a single outcome only: probable clinical anxiety. Results are shown in Table 61 below. For problem-focused coping and all other outcomes, the only significant differences between odds ratios were observed between high and low categories of the NOF score.

Table 61: ENSS, emotion-focused coping & clinical anxiety

		N	OR	95% CI
Clinical anxiety				
ENSS/emotion-focused	Low NOF/low EFC	242	1.00	
coping	Low NOF/high EFC	123	2.27*	1.17-4.41
	High NOF/low EFC	132	1.69	0.85-3.35
Wald = 26.64, p<.0001	High NOF/high EFC	233	4.06***	2.30-7.17

Note: repeated contrasts * (p<.01)

EFC = emotion-focused coping

As is evident from the above Table, clinical anxiety was most likely reported when individuals scored highly on both ENSS and emotion-focused coping, suggesting that those who use this type of strategy infrequently are less likely to be anxious. Coping in fact, appears to be more strongly associated with the outcome than the ENSS score.

7.6 DEMOGRAPHIC/INDIVIDUAL RISK, NOF, ENSS AND HEALTH & WELL-BEING

The demographic/individual risk factor score previously outlined served as an independent predictor in a series of logistic regression analyses, both with and without the inclusion of either NOF or ENSS in the model. Analyses were carried out on a reduced set of outcome measures, as the purpose was to demonstrate the general influence of demographics, and to contrast these effects with the results demonstrated by NOF and ENSS (controlling for demographic and individual characteristics). The following outcomes were therefore considered: work-related stress, probable clinical anxiety and depression, lifetime prevalence of disease, 12-month and 14-day upper respiratory tract symptoms[82]. The following variables were included as covariates: gender, income, educational attainment, occupational setting and problem-focused coping (indicator, followed by repeated contrasts were used).

7.6.1 Demographic/individual risk factors and health outcomes

Odds ratios and 95% confidence intervals where psychological and physical health outcomes served as dependent measures are shown in Table 62 (where the lower category of the demographic risk score was set as the reference).

Table 62: Demographic/individual risk factors and health outcomes

		N	OR	95% CI
Work-related stress	0/1 factor	165	1.00	
	2 factors	215	2.79**	1.55-5.03
Wald = 62.12, p<.0001	3-5 factors	389	7.20***	4.17-12.45
Clinical anxiety[83]	0/1 factor	222	1.00	
	2 factors	275	3.07***	1.86-5.08
Wald = 38.49, p<.0001	3-4 factors	250	5.20*	3.09-8.76
Clinical depression	0/1 factor	225	1.00	
	2 factors	273	2.37	0.73-7.69
Wald = 12.07, p<.002	3-4 factors	251	5.84*	1.90-18.00
Lifetime prevalence of disease	0/1 factor	162	1.00	
	2 factors	213	1.35	0.88-2.07
	3-5 factors	386	2.28**	1.53-3.39
Wald = 19.36, p<.0001				

[82] 14-day acute upper respiratory tract symptoms were chosen as a representative acute health outcome, given that the 14-day total symptom score was not significantly associated with either NOF or ENSS in the current sample.
[83] Negative affectivity was not included as a potential risk factor for clinical anxiety and depression, due to its' similarity with the outcome measures.

12-month symptoms	0/1 factor	161	1.00	
	2 factors	210	1.29	0.73-2.28
Wald = 5.96, p<.05	3-5 factors	372	1.93	1.12-3.32

Note: repeated contrasts ** (p<.001) *** (p<.0001)

As is evident from the Table, likelihood of reporting work-related stress, clinical anxiety and depression and chronic and 12-month ill-health was associated with cumulative demographic/individual risk factors (older age, being single/divorced/widowed, working full-time, emotion focused coping, and negative affectivity for work-related stress and lifetime and 12-month symptoms only). Demographic and individual factors were not however, significantly associated with 14-day upper respiratory symptoms.

7.6.2 Demographic/individual risk factors, NOF and health outcomes

The relative influence of demographic and individual risk factors as compared to the NOF score was also examined. Odds ratios and 95% confidence intervals where both NOF and the novel demographic/individual risk factor score served as independent measures are shown in Table 63 (lower categories were set as the reference).

Table 63: Demographic/individual risk factors, NOF and health outcomes

		N	OR	95% CI
Work-related stress				
Demographic risk factors	0/1 factor	165	1.00	
	2 factors	215	2.02+	1.09-3.77
	3-5 factors	389	3.47***	1.94-6.23
Wald = 19.93, p<.0001				
NOF	1st quartile	197	1.00	
	2nd quartile	233	2.20*	1.22-3.96
Wald = 92.36, p<.0001	3rd quartile	159	6.23***	3.43-11.30
	4th quartile	180	13.04***	7.12-23.88
Clinical anxiety[84]				
Demographic risk factors	0/1 factor	222	1.00	
	2 factors	275	1.82+	1.05-3.14
	3-4 factors	250	2.88***	1.64-5.07
Wald = 13.97, p<.001				
NOF	1st quartile	189	1.00	
	2nd quartile	226	5.53***	2.25-13.59

[84] Negative affectivity was not included as a risk factor for clinical anxiety or depression.

Wald = 96.45, p<.0001	3rd quartile	154	16.89***	6.92-41.23
	4th quartile	178	36.74**	15.8-89.50
Clinical depression				
Demographic risk factors	0/1 factor	225	1.00	
	2 factors	273	1.64	0.49-5.48
Wald = 7.23, p<.03	3-4 factors	251	3.66*	1.16-11.56
NOF	1st quartile	190	1.00	
	2nd quartile	226	0.57	0.12-2.61
Wald = 14.57, p<.002	3rd quartile	154	3.65**	1.13-11.71
	4th quartile	179	4.41	1.39-14.02
Lifetime prevalence of disease				
Demographic risk factors	0/1 factor	162	1.00	
	2 factors	213	1.30	0.84-2.01
	3-5 factors	386	2.03**	1.33-3.11
Wald = 12.37, p<.002				
12 month symptoms				
NOF	1st quartile	193	1.00	
	2nd quartile	226	1.92*	1.14-3.24
Wald = 17.97, p<.0001	3rd quartile	153	3.42**	1.70-6.89
	4th quartile	171	4.18***	2.00-8.75
14 day upper respiratory tract symptoms				
NOF	1st quartile	195	1.00	
	2nd quartile	230	0.98	0.66-1.46
Wald = 10.22, p<.02	3rd quartile	158	1.52	0.97-2.39
	4th quartile	179	1.76*	1.12-2.78

Note: repeated contrasts + (p<.05) * (p<.01) ** (p<.001) *** (p<.0001)

As is evident from the Table, the impact of NOF was greater than that of demographic/individual risk factors for work stress, clinical anxiety and depression. NOF only was associated with 12-month symptoms and 14-day upper respiratory tract symptoms. However, demographic/individual risk only was associated with chronic ill-health (lifetime symptom prevalence).

7.6.3 Demographic/individual risk factors, ENSS and health outcomes

The relative influence of demographic and individual risk factors as compared to the ENSS score was also examined. Odds ratios and 95% confidence intervals where both NOF and the novel demographic/individual risk factor score served as independent measures are shown in Table 64 (lower categories of both scores were set as the reference).

Table 64: Demographic/individual risk factors, ENSS and health outcomes

		N	OR	95% CI
Work-related stress				
Demographic risk	0/1 factor	162	1.00	
factors	2 factors	208	2.43**	1.32-4.49
	3-5 factors	376	4.57**	2.59-8.09
Wald = 30.82, p<.0001				
ENSS	1st quartile	174	1.00	
	2nd quartile	200	2.32*	1.28-4.22
Wald = 58.63, p<.0001	3rd quartile	184	3.57	1.98-6.44
	4th quartile	188	8.64***	4.73-1.577
Clinical anxiety[85]				
Demographic risk	0/1 factor	220	1.00	
factors	2 factors	262	2.27**	1.35-3.84
Wald = 23.09, p<.0001	3-4 factors	243	3.75***	2.18-6.43
ENSS	1st quartile	167	1.00	
	2nd quartile	196	1.62	0.88-3.00
Wald = 43.82, p<.0001	3rd quartile	179	2.40	1.31-4.37
	4th quartile	183	5.78***	3.18-10.50
Clinical depression				
Demographic risk	0/1 factor	223	1.00	
factors	2 factors	260	1.89	0.56-6.36
	3-4 factors	243	4.80**	1.52-15.18
Wald = 9.97, p<.007				
Lifetime prevalence of disease				
Demographic risk	0/1 factor	159	1.00	
factors	2 factors	206	1.30	0.84-2.02
	3-5 factors	373	2.14*	1.41-3.25
Wald = 14.99, p<.001				
12 month symptoms				
ENSS	1st quartile	169	1.00	
	2nd quartile	195	1.59	089-2.85
Wald = 8.82, p<.03	3rd quartile	177	1.64	0.88-3.04
	4th quartile	180	3.00	1.45-6.23
14 day upper respiratory tract symptoms				
ENSS	1st quartile	173	1.00	
	2nd quartile	198	1.02	0.66-1.55
Wald = 17.45, p<.001	3rd quartile	183	0.92	0.59-1.43
	4th quartile	185	2.10***	1.32-3.35

Note: repeated contrasts * (p<.01) ** (p<.001) *** (p<.0001)

[85] Negative affectivity was removed as a potential risk factor for mental health outcomes (i.e. anxiety and depression).

As is evident from the Table, the impact of ENSS is greater than that of demographic/individual risk factors for work stress and clinical anxiety. ENSS only was associated with 12-month symptoms and 14-day upper respiratory tract symptoms. However, demographic/individual risk only was associated with clinical depression and chronic ill-health (lifetime symptom prevalence).

7.7 DISCUSSION

The results described in the current chapter and directions for further research are outlined in the following sections. Key findings are summarised in Table 65.

Table 65: NOF, ENSS, demographic risk & individual differences

- Established cumulative (and selective) effects of the NOF score are replicated in the current sample
- A shortened measure (3 items) of negative affectivity serves as an adequate and appropriate proxy version of a longer (24-item) scale
- NOF remains significantly associated with poor health outcomes when the influence of coping style is co-varied for (in addition to negative affectivity)
- Coping style does not appear to act as a buffer of the relationships between stressors and poor health, with the exception of clinical anxiety
- NOF appears to be a better predictor of negative health outcomes than an occupation-specific measure (ENSS)
- Likelihood of reporting poor health increases with cumulative 'exposure' to demographic and individual risk factors but effects are significantly less than those demonstrated by the NOF score

7.7.1 Replication of established NOF score effects

It was suggested at the start of the current chapter (hypothesis 1) that the previously established effects of the NOF score would likely be replicated in the current sample, in terms of cumulative and selective associations between NOF and poor health. Using the 3-item measure of negative affectivity (as in Chapters 3-6), this hypothesis is supported by the current results. These findings further substantiate assertions that combinations of job stress models explain greater variance in health outcomes than single models (e.g. Calnan et al., 2000; Peter et al., 2002; Rydstedt et al., 2007), and that models (and components of models) may be selectively associated with particular health outcomes (e.g. Bosma et al., 1998; de Jonge et al., 2000b; Peter et al., 2002; Ostry et al., 2003; Smith et al., 2004; Fillion et al., 2007). The current findings also support the idea that multiple stressors may combine cumulatively to produce negative effects (e.g. Luz et al., 1990; Melamed et al., 1999; Smith et al., 2004Akerboom & Maes, 2006).

Some associations however, were smaller than those observed for the sample in Survey I. Prevalence of poor health is comparable across both samples, yet the current sample comprised a single occupational group and fewer respondents than that described in Chapters 3-6 which may account for this difference.

7.7.2 NOF and measurement of negative affectivity

The 2nd hypothesis outlined at the beginning of the chapter indicated that NOF would remain significantly associated with poor health outcomes when the full (24-item) version of the Eysenck Personality Inventory Neuroticism Scale (EPIN: Eysenck & Eysenck, 1968) was included in models as a covariate. This hypothesis is fully supported by the current results. However, effect sizes (as indicated by odds ratios, particularly in the upper quartile of the NOF score) appear marginally reduced when the full, as opposed to the shortened version of the EPIN was included in models as a covariate. This suggests that the full-item version likely explains greater variance in terms of health outcomes: however, the shortened (3-item) version serves as an adequate and appropriate proxy measure.

7.7.3 NOF, negative affectivity and coping

It was suggested at the beginning of this chapter (hypothesis 3) that NOF would remain significantly associated with poor health outcomes when the influence of coping style was co-varied for, in addition to negative affectivity. This assertion is supported by the current results, in that the NOF score remains predictive of key health outcomes such as work-related stress, probable clinical anxiety, 12-month symptoms and both physical and psychological acute (14-day) ill-health, when coping style was included as a covariate in addition to negative affectivity.

However, the number and strength of significant associations is reduced, for example, clinical depression was no longer significantly associated with NOF when coping was included in the model. Coping style therefore appears to explain some degree of variance in all health outcomes, particularly more severe psychological symptoms (i.e. probable clinical depression). However, despite the influence of individual differences, a composite occupational stressor score (NOF) remains significantly associated with negative health outcomes. Furthermore, coping style, with the single exception of emotion-focused coping and anxiety, did not act as a buffer of associations between NOF and health outcomes (those high on emotion-focused coping tended to be more anxious). The general consensus within the wider literature is that emotion-focused coping is maladaptive, although this was not generally reflected by the current results. However, it may be the case that some emotion-focused behaviours are more adaptive than others (e.g. Carver, Scheier &Weintraub, 1989, cited in Baker & Berenbuam, 2007).

In terms of occupation-specific effects, emotion-focused strategies such as avoidance and wishful thinking have been associated with work-related stress in nurses, whereas problem-solving approaches tend to be associated with lower stress levels (e.g. Boey, 1998, cited in Clegg, 2001; Tattersall et al., 1999, cited in Bennett et al. 2001). However, these findings are not supported by the current results. Within the current sample, both situational context and gender may go some way to explaining this apparent discrepancy, as previous research has concluded that women are more likely to successfully engage in emotion-focused coping strategies (Gonzalez-Morales, 2006; Baker & Berenbaum, 2007). Furthermore, as DeLongis and Holtzman (2005) point out, characteristics of the stressor may be important in determining coping responses. It has also been suggested (Shimazu & Kosugi, 2003) that problem-focused approaches may have negative consequences for an individual where coping is prolonged or effortful: therefore a combination of problem and emotion-focused strategies may be beneficial.

As O'Driscoll and Cooper (1994) note, there is disagreement within the literature as to the consequences of particular types of coping strategies. The majority of evidence indicates that coping moderates associations between stressors and strain, although coping may also act as a mediator of such relationships. Moreover, there is a lack of consistency in terms of measurement of coping: the resulting confusion and inconsistency in findings is therefore not surprising. Briner et al. (2004) also suggest that more thought needs to be given to whether jobs themselves can be viewed as possessing stressful characteristics which are external to the individual when measuring and analysing the effect of particular coping strategies.

7.7.4 Occupation-specific measures and health outcomes

The 4th hypothesis outlined at the start of the current chapter indicated that NOF would likely demonstrate more robust associations with negative health outcomes than an occupation-specific measure, given that NOF is a global measure of physical, psychological and interpersonal occupational stressors. This assertion is fully supported by the current results.

The Expanded Nursing Stress Scale (ENSS: French et al. 2000) was generally found to be much less predictive of poor health and well-being than the NOF score. For example, associations between ENSS and work-related stress and clinical anxiety were smaller than those observed for the NOF score, and the ENSS was not found to be significantly associated with clinical depression, or lifetime prevalence of ill-health. Furthermore, a number of associations were no longer significant when the 24-item version of the negative affectivity measure was included as a covariate (e.g. for 12-month symptoms: associations remained significant for the NOF score). Furthermore, fewer effects of ENSS remained when coping style was included as a covariate than were observed for similar analyses carried out using the NOF score. Again coping style, with the single exception of emotion-focused coping and anxiety, did not act as a buffer of associations between ENSS and health outcomes. In this instance coping appeared more strongly related to the outcome than the ENSS score.

The current results therefore support previous assertions that detailed situational specificity in job stress models is unnecessary (Van Veldhoven et al., 2005). However, there is evidence to suggest that the addition of nursing-specific stressors to job stress models may explain greater variance in outcomes (Fillion et al., 2007), although this proposition was not tested in the current thesis.

7.7.5 Demographic and individual risk factors and health outcomes

The 5th hypothesis outlined at the beginning of the current chapter asserted that likelihood of reporting all negative health outcomes would increase with cumulative 'exposure' to demographic and individual risk factors e.g. age, marital status, negative affectivity, emotion-focused coping, based on findings presented in Chapter 4. It was however also suggested that these effects would be significantly less than those demonstrated by the NOF score.

This hypothesis is largely supported by results presented in the current chapter. The impact of NOF was greater than that of demographic/individual risk factors for work stress and clinical anxiety, and NOF only was associated with 12-month symptoms and 14-day upper respiratory tract symptoms. However, demographic/individual factors were associated with a marginally greater risk of reporting clinical depression than NOF, and demographic/individual risk only was associated with chronic ill-health (lifetime symptom prevalence). These findings are unsurprising, given the likely relationship between coping style and depression discussed above, and the higher prevalence of chronic ill-health amongst older age groups.

7.7.6 Summary and directions for further research

The precise nature of relationships between individual characteristics such as negative affectivity, coping style and demographic characteristics and health outcomes is not examined in the current chapter. Although not considered in the context of the current thesis, further research might also wish to determine the sub-types of coping behaviour that are most adaptive in terms of health, and to directly measure the influence of other individual (gender, personality) and situational characteristics on coping and health outcomes. It may also be the case that the addition of situation-specific stressors to a generic job stress model such as that represented by the NOF score, would explain greater variance in health outcomes.

The primary aim of the current chapter was to assess the effects of negative affectivity, coping style and demographic characteristics on established relationships between NOF and health, and to examine the effects of individual characteristics relative to those of the NOF score. A number of measurement issues were also addressed in the current chapter; the relative effects of a full and shortened negative affectivity scale, and the association between an occupation-specific measure of workplace stressors and health, as compared to the established effects of the NOF score. The following chapter will seek to address further measurement issues, in terms of the relationships examined in Chapters 4-6 and measures of workplace bullying. Analyses presented in Chapters 4-6 suggest that the experience of bullying at work is significantly associated with a number of health and well-being outcomes. However, the measure of bullying included in analyses presented in preceding chapters comprised dichotomous items (i.e. exposure/no exposure to a particular behaviour). Perceived severity of bullying will also be examined in detail in Chapter 8. More specifically, the relative effects of bullying scales comprising dichotomous versus categorical, frequency-based items will be compared, both relative to and in addition to NOF.

CHAPTER 8

COMBINED EFFECTS OF WORKPLACE HAZARDS AND HEALTH OUTCOMES: FURTHER ANALYSIS OF THE IMPACT OF WORKPLACE BULLYING

8.1 INTRODUCTION

8.1.1 Overview

Results presented in Chapter 7 indicate that the combined effects of occupational stressors, as demonstrated by the NOF score, are robust and replicable in a heterogeneous occupational sample. Furthermore, the effects of NOF were evident despite controlling for individual differences: NOF was also found to be a better predictor of health outcomes than either a composite demographic and individual 'risk' variable, or an occupation-specific measure of exposure to workplace stressors. The primary aim of the current chapter is to address further issues relating to measurement of occupational stressors, with particular attention to the measurement of workplace bullying, and the relationships examined in Chapters 4-6. More specifically, subsequently described analyses were employed to assess the relative impact of three different measures of workplace bullying as compared to the original NOF score (comparable to analyses presented in Chapter 4); to observe the effects of adding these different bullying measures to NOF (as in Chapter 5), and finally, to further examine the relative influence of NOF components, i.e. effort-reward imbalance, demand-control-support, unfavourable working hours/hazards and workplace bullying (as Chapter 6) in terms of negative health consequences.

8.1.2 Workplace bullying: Theory and measurement

8.1.2.1 Workplace bullying and poor health

Bullying has been associated with a range of negative health and organisational outcomes, such as cardiovascular disease, depression (Kivimäki et al., 2003), psychosomatic health problems (Mikkelsen & Einarsen, 2002) and increased use of psychotropic medication (Vartia, 2001). Negative organisational consequences of workplace bullying such as low job satisfaction (Quine, 2003) and increased sickness absence in hospital staff (Kivimäki, Elovainio & Vahtera, 2000) have also been reported.

The prevalence of bullying in UK health professionals also appears to be high: Quine (1999) found 38% of NHS staff to report one or more types of bullying behaviour in the last year, and in a similar survey of junior doctors (Quine, 2002) 37% reported having been bullied in the previous 12 months. Hoosen and Callaghan (2004) found that 47% of psychiatric trainees had experienced bullying in the previous year, and 44% of UK nurses had been bullied in the previous 12 months, compared to 35% of other NHS staff; approximately half of the sample had witnessed the bullying of others (Quine, 2001).

Individual characteristics likely play a role in reactions to bullying behaviours. However, Djurkovic et al. (2005) found bullying and neuroticism to be independently associated with negative affect, supporting the psychosocial model of workplace bullying (i.e. bullying results in negative affect, which in turn lead to poor physical health outcomes). Furthermore, qualitative research investigating bullying in female professionals indicates that social processes and environments are more significant in the development of bullying than individual characteristics (Lewis & Orford, 2005).

8.1.2.2 Measurement of workplace bullying

How best to define bullying has been the focus of much discussion and debate within the literature. Zapf and Gross (2001) state that bullying begins with a single critical incident, usually an interpersonal conflict; for behaviour to be considered bullying, it must occur at least once a week for a minimum of 6 months (Zapf, 1999). Most definitions of workplace bullying incorporate three elements, influenced by laws governing racial and sexual harassment (Quine, 1999). Firstly, bullying is defined in terms of its effects on the target; secondly there must be a negative effect on the target and thirdly, the behaviour must be consistent.

The 20-item measure of workplace bullying utilised in Survey I (detailed in Chapters 4-6) comprised dichotomous assessment of exposure to included behaviours i.e. either the respondent had experienced a particular form of bullying at work in the previous 6 months or they had not. An adapted version of the 20-item Quine (1999) scale was employed in Survey II to address the frequency with which respondents experienced particular behaviours, i.e. a 'continuous' measure of workplace bullying. An additional measure of bullying was also included in Survey II (The Bergen Bullying Index; Einarsen, Raknes & Matthiesen, 1994) as an additional comparison.

8.1.3 Combined effects of NOF and bullying

A further aim of this chapter is to examine the influence of bullying when added to the existing Negative Occupational Factors (NOF) score. There is a growing body of evidence to suggest that job stress models may explain greater variance in health outcomes when studied in combination (Calnan et al., 2000; de Jonge et al., 2000b; Peter et al., 2002; Ostry et al., 2003; Rydstedt et al., 2007). Moreover, the addition of novel stressors to existing job stress models may help to capture the complexity of modern working environments (Van Veldhoven et al., 2005). Fillion et al. (2007) examined an integrated job stress model comprised of the DCS, ERI and specific palliative care stressors, in a sample of palliative care nurses and found the best predictors of job satisfaction to be job demand, effort, reward, and people-oriented culture. Emotional distress however was best predicted by reward, professional and emotional demands and self-efficacy. Further evidence for combined, additive effects of stressors on health are provided by Melamed et al. (1999), Smith et al. (2004) and Akerboom and Maes (2006) (see Chapter 1).

Analyses presented earlier in the current thesis (see Chapter 4) indicate that bullying had a significant impact on health outcomes, either in addition to, or over and above the established effects of a NOF score. The experience of bullying at work was significantly associated with the following outcomes in addition to NOF: clinical anxiety, 12-month and 14-day symptoms, 14-day depression and/or fatigue and 14-day use of prescribed medication (any). Bullying alone (when compared to the effects of NOF and other additional stressors, e.g. role conflict) was significantly associated with lifetime prevalence of disease, 14-day upper and lower respiratory symptoms, 14-day gastrointestinal symptoms and 12-month use of prescribed medication (all outcomes). It was also hypothesised earlier in this thesis (Chapter 5) that the addition of bullying to NOF would account for further variance in terms of health and well-being outcomes. This hypothesis was only partially supported however, in that for some outcomes the addition of bullying to NOF was predictive of increased associations (e.g. clinical anxiety, lifetime prevalence of disease, 14-day upper and lower respiratory symptoms) whereas for others, the original NOF score was associated with the greatest likelihood of reporting (e.g. work-related stress, all 12-month health and all medication outcomes, 14-day musculoskeletal and gastrointestinal symptoms). Workplace stressors therefore appear both additively and selectively associated with health outcomes.

8.1.4 Selective effects of NOF components

Traditional job stress models and components of models also tend to demonstrate independent and selective effects on health outcomes (see Chapter 1 for a review of the literature). Several studies in particular have demonstrated the combined and selective effects of the DCS and ERI models. De Jonge et al. (2000b) found that high effort and low rewards were stronger predictors of poor well-being than low control when both models were simultaneously adjusted, and Ostry et al. (2003) found chronic disease to be significantly predicted by ERI only. Smith et al. (2004) demonstrated that particular combinations of NOF components are differentially related to health outcomes, lending further support to the suggestion that stressors are selectively associated with health. Work-related stress for example, was most strongly associated with high job demands, high effort (intrinsic and extrinsic) and both unfavourable working hours and exposure to physical hazards. When these components were combined into a single variable, results suggest that the likelihood of reporting work-related stress was greatest where demands, effort and exposure to working hours/hazards were all high. Furthermore, effort appeared to have a greater impact than either job demand or working hours/hazards. Critical components of NOF in terms of risk of reporting probable clinical anxiety were identified as high demand/low control/low support, and intrinsic effort, and for probable clinical depression, low support and low control. Critical factors in terms of risk of reporting lifetime and 12-month ill-health (any) were not assessed, and no significant associations were observed for 12-month sciatica.

High effort and low reward emerged as critical components in terms of likelihood of reporting 14-day gastrointestinal symptoms and back pain. 14-day upper respiratory tract symptoms were most strongly associated with high intrinsic effort, and 14-day psychological health problems by physical hazards and intrinsic effort. Unfavourable working hours, high effort and low reward were identified as critical components in terms of risk of reporting 14-day lower respiratory symptoms. 14-day use of prescribed pain killers and/or indigestion medication was most strongly associated with high extrinsic and intrinsic effort combined with high reward.

When components of the NOF score were examined in more detail (i.e. effort-reward imbalance, demand-control-support, working hours/hazards and bullying: see Smith et al. 2004 and Chapter 6), a number of selective patterns of association emerged. Patterns of association for psychological well-being outcomes (work-related stress, and probable clinical anxiety) indicate that multiple (although not all) NOF components tended to demonstrate significant associations with negative health consequences, and that the effects of these components were additive. However, for work-related stress, a particular category of stressor likely exerts a greater effect (high effort) than any other (high demands, unfavourable working hours/exposure to physical hazards). Critical factors in terms of likelihood of reporting this outcome do not therefore appear to explain equal variance.

8.1.5 Current hypotheses

The following hypotheses were formulated based on the findings summarised above and those presented in the wider literature:

1. A continuous measure of workplace bullying will likely better explain variance in poor health outcomes than the dichotomous measure previously utilised.

2. Bullying (any measure) is likely to explain a significant proportion of variance in health outcomes, either in addition to, or over and above the effects of a NOF score.

3. The addition of bullying to a NOF score will likely lend support to the assertion that the effects of stressors are selective as well as additive; a composite score inclusive of bullying will be more strongly associated with some outcomes (e.g. clinical anxiety), whereas the original score will explain greater variance in other (e.g. 12-month) health outcomes.

4. Further analysis of NOF components, including workplace bullying, will support the assertion that some outcomes (e.g. psychological health) have multiple aetiology and are likely therefore to be significantly associated with at least 2 NOF components. However, these components are unlikely to explain equal variance in terms of risk of reporting. Other outcomes (e.g. 14-day symptoms) are more likely to be significantly associated with a single component of NOF only.

8.2 METHOD

The measures included in the survey, the sample and response rates are detailed in the following sections.

8.2.1 Participants and procedure

See Chapter 7, section 7.2.1.

8.2.2 Demographic, occupational and individual characteristics

Information on the following demographic and occupational characteristics was collected: gender, age, income, education, marital status, work pattern (full versus part-time)[86].

Measures of individual characteristics comprised negative affectivity (3 and 24-item versions of the Eysenck Personality Inventory Neuroticism Scale; Eysenck & Eysenck, 1968) and coping style (problem and emotion-focused coping (the Ways of Coping Checklist; Vitaliano et al. 1985). (See Chapter 7, section 7.2.2 for a full description of measures of individual characteristics).

Measures of physical and psychosocial hazards and health outcomes are described subsequently in detail.

[86] A measure of socio-economic status was not included in the current analyses as the sample comprised a single occupational group.

8.2.3 Independent measures

Independent measures were employed to assess the following occupational and interpersonal characteristics: job demands, control over work, social support, intrinsic effort, extrinsic effort, reward, unfavourable working patterns, exposure to physical hazards and workplace bullying.

Demand-Control-Support, Effort-Reward-Imbalance & unfavourable hours/physical hazards

Calculation of scores comprising the Demand-Control-Support (JDCS: Karasek, 1979; Johnson & Hall, 1988) and Effort-Reward Imbalance (ERI: Siegrist, 1996) models, and the combined working hours/physical hazards score are detailed in Chapters 3 (section 3.2.3) and 7 (section 7.2.3).

Workplace bullying

A number of measures of workplace bullying were employed in the current survey. An adapted version of the Quine (1999) scale described in Chapter 4 (section 4.2.3) was utilised. However, participants were asked to state the frequency of exposure to particular behaviours (0=not at all, 1 =seldom, 2=occasionally, 3=approximately once per week; 4=more than once per week), rather than simply whether or not they had been subjected to any of the behaviours in the last 6 months (as in the previous sample detailed in Chapter 4). Two total scale scores were calculated: firstly, all included items were summed, and this value expressed as a percentage of the maximum possible raw score. Secondly, all original scale items were converted into a dichotomy (0=no exposure to bullying behaviour, 1=any exposure) prior to calculation of a total value as described for the first score. Coefficient alphas for the two scores were .75 and .92 respectively.

The Bergen Bullying Index (Einarsen et al. 1994) was also employed in the current survey. The scale consists of 5 items scored on a 4-point scale (0=disagree strongly; 1=agree strongly), e.g. 'Bullying is a serious strain in my daily work'. The scale measures the extent to which respondents feel bullying affects both themselves and others in the workplace.[87] Responses are summed to give a total score. Cowie, Naylor, Rivers, Smith and Pereira (2002) report internal consistency for the 5-item measure as .86; the coefficient alpha for the current sample is 92.

Negative Occupational Factors (NOF) Scores

The original NOF score was calculated as described in Chapters 3 (section 3.2.3) and 7 (section 7.2.3). The second and third NOF scores include bullying behaviours as potential sources of work-related stress.

The second NOF score was calculated as described in Chapter 5 (section 5.2.1). A composite stressor variable was created across the job demand-control-support and effort-reward imbalance models, the unfavourable working hours/exposure to hazards score and bullying behaviours, as measured by the adapted version of the Quine (1999) scale. A score based on quartile splits[88] of the following scales was created; job demand, decision latitude, social support, extrinsic effort, intrinsic effort, reward, unfavourable working hours/exposure to physical hazards and bullying behaviours. The coefficient alpha for the composite score is .85.

The third NOF score was calculated as described above: however, a quartile split of the derived score based on dichotomous bullying items (i.e. 0=no exposure to bullying; 1=some exposure) was included[89]. The coefficient alpha for the current sample is .79.

Derived scores based on the job-demand-control-support model

A total score was calculated across the three sub-scales of the demand-control-support model. This was achieved by creating new scores for decision latitude and social support, so that a high score was indicative of a negative outcome. The total score was calculated by obtaining the mean of the three sub-scales. The coefficient alpha for the current sample was .78.

[87] 2 single-item measures of bullying were also included in the questionnaire, as reported by Einarsen et al. (1994) but not used for the purposes of analyses: 'Have you been subjected to bullying in the workplace in the last 6 months?' (No/now and then/about once per week/many times a week) and 'Have you seen others subjected to bullying at your workplace during the last 6 months?' (Yes/no).

[88] An adjustment was made for missing data by calculating the mean score and multiplying this value by the number of scales comprising the total score (i.e. 8).

[89] An adjustment was made for missing data as for the previous scale.

A novel score was also created to reflect exposure to all possible combinations of demands, control and support (based on median splits of sub-scale scores). This resulted in the creation of an 8-category variable as follows:

- High social support, high decision latitude, low job demand
- High social support, high decision latitude, high job demand
- Low social support, high decision latitude, low job demand
- Low social support, high decision latitude, high job demand
- High social support, low decision latitude, low job demand
- High social support, low decision latitude, high job demand
- Low social support, low decision latitude, low job demand
- Low social support, low decision latitude, high job demand

Derived scores based on the effort-reward imbalance model

A total score was calculated using the mean of the extrinsic effort, intrinsic effort and reward scales; a high score was indicative of high effort and low reward ($\alpha = .86$).

A novel score was also created to reflect exposure to all possible combinations of extrinsic effort, intrinsic effort and reward (based on median splits of sub-scale scores). This resulted in the creation of an 8-category variable as follows:

- Low intrinsic effort, low extrinsic effort, high reward
- Low intrinsic effort, low extrinsic effort, low reward
- High intrinsic effort, low extrinsic effort, high reward
- High intrinsic effort, low extrinsic effort, low reward
- Low intrinsic effort, high extrinsic effort, high reward
- Low intrinsic effort, high extrinsic effort, low reward
- High intrinsic effort, high extrinsic effort, high reward
- High intrinsic effort, high extrinsic effort, low reward

Unfavourable working patterns and exposure to physical hazards

8 items were included to assess the proportion of respondents reporting unfavourable working patterns, or exposure to noise and hazardous substances: (see Chapter 3, section 3.2.3). A total 'exposure' score was calculated by reversing responses to each item (in order that a high score indicated a negative outcome), summing the total and

expressing the result as a percentage of the maximum possible raw score. The coefficient alpha for the current sample was .75.

A novel score was also created to reflect exposure to all possible combinations of unfavourable working hours and exposure to physical hazards (based on median splits of two scores created to reflect unfavourable working hours and exposure to hazards). This variable comprised the following four levels:

- Favourable working hours/low exposure to hazards
- Favourable working hours/high exposure to hazards
- Unfavourable working hours/low exposure to hazards
- Unfavourable working hours/high exposure to hazards

<u>Exposure to bullying behaviours</u>

Total scale scores across the bullying measures (2 measures and 3 separate scores) were calculated as described above.

A novel variable was also created to reflect all possible combinations of exposure to the three categories of bullying behaviour identified in Chapter 7 (section 7.2.1): explicit non-physical forms of bullying (9 items, e.g. persistent and unjustified criticism of work, destructive innuendo and sarcasm), implicit bullying behaviours (5 items, e.g. withholding necessary information, setting impossible deadlines), inappropriate jokes and teasing (2 items). Median splits of these factors were summed to create a novel variable reflecting all possible combinations of exposure to the three categories of bullying behaviour as follows:

- No exposure to bullying
- No exposure to explicit behaviour, no exposure to implicit behaviour, exposure to teasing and/or inappropriate jokes
- No exposure to explicit behaviour, exposure to implicit behaviour, no exposure to teasing and/or inappropriate jokes
- No exposure to explicit behaviour, exposure to implicit behaviour, exposure to teasing and/or inappropriate jokes
- Exposure to explicit behaviour, no exposure to implicit behaviour, no exposure to teasing and/or inappropriate jokes

- Exposure to explicit behaviour, no exposure to implicit behaviour, exposure to teasing and/or inappropriate jokes
- Exposure to explicit behaviour, exposure to implicit behaviour, no exposure to teasing and/or inappropriate jokes
- Exposure to explicit behaviours, exposure to implicit behaviour, exposure to teasing and/or inappropriate jokes

8.2.4 Dependent measures

See Chapter 7, section 7.2.4.

8.3 SUMMARY STATISTICS

8.3.1 Demographic, occupational and individual characteristics

See Chapter 7, section 7.3.1.

8.3.2 Dependent measures

See Chapter 7, section 7.3.2.

8.3.3 Independent measures

Summary statistics for the independent measures utilised in this chapter are given in Table 66.

Table 66: Descriptive statistics for independent measures

Measure	Sample	N	Min	Max	Mean	SD
Demand-control-support	Community/outpatient	329	8.95	93.52	43.33	12.57
	Ward/other inpatient	475	10.19	82.72	46.69	12.22
	Total	804	8.95	93.52	45.32	12.47
Effort-reward imbalance	Community/outpatient	316	2.78	95.83	33.68	15.98
	Ward/other inpatient	448	0.00	91.67	36.37	15.68
	Total	764	0.00	95.83	35.25	15.84
Working hrs/hazards	Community/outpatient	337	0.00	79.19	26.60	20.29
	Ward/other inpatient	482	0.00	95.83	47.90	20.07
	Total	819	0.00	95.83	39.13	22.71

Bullying (continuous)	Community/outpatient	335	0.00	77.00	9.77	10.96
	Ward/other inpatient	482	0.00	66.00	11.67	12.34
	Total	817	0.00	77.00	10.89	11.82
Bullying (dichotomous)	Community/outpatient	335	0.00	20.00	5.93	5.11
	Ward/other inpatient	482	0.00	20.00	7.01	5.93
	Total	817	0.00	20.00	6.57	5.63
Bergen bullying index	Community/outpatient	335	0.00	12.00	1.97	3.26
	Ward/other inpatient	483	0.00	12.00	2.78	3.61
	Total	819	0.00	12.00	2.45	3.49
Negative occupational factors score (NOF)	Community/outpatient	339	7.00	28.00	16.51	4.52
	Ward/other inpatient	488	7.00	28.00	18.52	4.70
	Total	827	7.00	28.00	17.69	4.73
Novel NOF score (including bullying: continuous score)	Community/outpatient	339	8.00	32.00	18.56	5.27
	Ward/other inpatient	488	8.00	32.00	20.99	5.47
	Total	827	8.00	32.00	20.12	5.49
Novel NOF score (including bullying: dichotomous score)	Community/outpatient	339	8.00	32.00	18.92	5.26
	Ward/other inpatient	488	9.00	32.00	21.09	5.40
	Total	827	8.00	32.00	20.20	5.45

Non-parametric correlations (Spearman's rho) between median splits of independent variables utilised in Chapters 7 and 8 are given in Appendix VIII.

8.4 ANALYTIC PROCEDURE

Where indicated, median or quartile splits of independent measures served as predictors in a series of logistic regression analyses. Where quartile splits of scores comprised independent predictors, firstly indicator, and then repeated contrasts were used. The following variables were included in all models as covariates: gender, age, income, educational attainment, marital status, work pattern (full/part time) and occupational setting (i.e. community/outpatient-based and hospital/ward-based). Negative affectivity (24-item measure) and coping style (emotion and problem-focused) were also included as covariates. Unless otherwise stated, all models demonstrated adequate goodness of fit (no evidence of multicollinearity was observed).

8.5 NEGATIVE OCCUPATIONAL FACTORS (NOF), BULLYING AND PHYSICAL & PSYCHOLOGICAL WELL-BEING

As previously stated, a primary aim of the current chapter was to determine the relative influence of all 3 measures of bullying as compared to the NOF score (in a similar manner to that described in Chapter 4). Median splits of the NOF score and the three measures of bullying respectively were entered into logistic regression models as independent predictors (demographics, coping and negative affectivity were included in all models as covariates, as indicated above). Results for all health outcomes are detailed in the following sections.

8.5.1 Outcomes not associated with either NOF or bullying

No significant associations were observed between the original NOF score or any of the 3 bullying measures and the following outcomes:

- 14-day back pain
- 14-day diarrhoea/indigestion/heartburn
- 14-day toothache/skin problems
- 12-month use of prescribed pain/indigestion medication
- 12-month use of prescribed psychotropic medication
- 14-day use of prescribed medication (any)

No significant associations between the Bergen Bullying Index and health outcomes were observed, over and above those demonstrated by the NOF scores[90]. Patterns of association between NOF and the remaining 2 measures of bullying (based on the 20-item measure developed by Quine, 1999) and health outcomes are described subsequently.

8.5.2 NOF, bullying and psychological well-being

Odds ratios and 95% confidence intervals where median splits of the original NOF score and bullying measures were included as independent predictors, and work-related stress, probable clinical anxiety and depression served as dependent measures are shown below in Table 67.

[90] Significant results are presented in Appendix XI, both with and without the inclusion of coping style as a covariate.

Table 67: NOF, bullying & psychological well-being[91]

		N	OR	95% CI
Work-related stress				
Dichotomous measure:[92]				
NOF	Lower median	428	1.00	
Wald = 58.14, p<.0001	Upper median	335	4.76	3.19-7.10
Continuous measure:				
NOF	Lower median	428	1.00	
Wald = 9.58, p<.002	Upper median	335	1.29	2.86-6.42
Bullying	Lower median	392	1.00	1.26-2.77
Wald = 49.92, p<.0001	Upper median	371	1.87	
Clinical anxiety[93]				
Dichotomous measure:				
NOF	Lower median	413	1.00	
Wald = 61.06, p<.0001	Upper median	328	5.75	3.71-8.92
Bullying	Lower median	371	1.00	
Wald = 8.25, p<.004	Upper median	370	1.88	1.22-2.89
Continuous measure:	Lower median	413	1.00	
NOF	Upper median	328	5.55	3.57-8.64
Wald = 57.83, p<.0001	Lower median	402	1.00	
Bullying	Upper median	339	1.98	1.30-3.02
Wald = 9.93, p<.002				
Clinical depression				
Dichotomous measure:				
NOF	Lower median	414	1.00	
Wald = 9.53, p<.002	Upper median	329	4.15	1.68-10.25
Continuous measure:[94]				
NOF	Lower median	414	1.00	
Wald = 9.03, p<.003	Upper median	329	4.05	1.63-10.08

Results presented in the above Table indicate that the continuous (i.e. novel) bullying measure demonstrated a more robust association with work-related stress than NOF (the original bullying score, based on dichotomous items, was not associated with

[91] Results for all outcomes without the inclusion of coping style as a covariate are presented in Appendix XI.
[92] N.B. Bullying was also significantly predictive of work-related stress when coping was not included in the model as a covariate (see Appendix XI).
[93] Negative affectivity measures were not included as covariates where clinical anxiety and depression comprised dependent measures.
[94] Bullying was significantly predictive of clinical depression when coping was not covaried for (see Appendix XI).

work stress in addition to NOF). Clinical anxiety was most strongly associated with NOF; however both the original bullying score (based on dichotomous items) and a continuous measure were also significantly associated with this outcome. For clinical depression, only NOF was significantly associated with likelihood of reporting, when both bullying measures were included in the model.

8.5.3 NOF, bullying, lifetime and 12-month symptom prevalence

Odds ratios and 95% confidence intervals where median splits of the original NOF score and bullying measures were included as independent predictors, and lifetime and 12-month symptoms served as dependent measures are shown below in Table 68.

Table 68: NOF, bullying, lifetime & 12-month symptom prevalence

		N	OR	95% CI
Lifetime prevalence of disease				
Continuous measure:[95]				
Bullying	Lower median	387	1.00	
Wald = 4.77, p<.03	Upper median	368	1.46	1.04-2.06
12-month symptoms				
Dichotomous measure:				
NOF	Lower median	417	1.00	
Wald = 10.71, p<.001	Upper median	321	2.58	1.46-4.56
Continuous measure:	Lower median	417	1.00	
NOF	Upper median	321	2.35	1.32-4.17
Wald = 8.43, p<.004				
12-month sciatica/back pain				
Dichotomous measure:				
NOF	Lower median	425	1.00	
Wald = 4.87, p<.03	Upper median	333	1.48	1.05-2.10
Continuous measure:				
NOF	Lower median	425	1.00	
Wald = 5.08, p<.02	Upper median	333	1.51	1.06-2.15

As is evident from the Table, bullying did not significantly predict 12-month health over and above the effects of NOF. However, the novel continuous bullying measure

[95] The dichotomous bullying measure alone predicted lifetime prevalence of disease when coping style was not included in the model as a covariate (see Appendix XI).

was significantly associated with lifetime prevalence of disease; NOF was not found to be significantly associated with this outcome.

8.5.4 NOF, bullying and acute (14-day) ill-health

Odds ratios and 95% confidence intervals where median splits of the original NOF score and bullying measures were included as independent predictors, and 14-day symptoms served as dependent measures are shown below in Table 69.

Table 69: NOF, bullying & 14-day symptoms

		N	OR	95% CI
14-day symptoms				
Dichotomous measure:				
NOF	Lower median	413	1.00	
Wald = 6.64, p<.01	Upper median	323	2.97	1.30-6.81
Continuous measure				
NOF	Lower median	413	1.00	
Wald = 6.05, p<.01	Upper median	323	2.90	1.24-6.77
14-day upper respiratory tract symptoms				
Dichotomous measure:				
NOF	Lower median	423	1.00	
Wald = 7.26, p<.007	Upper median	333	1.62	1.14-2.30
Continuous measure:				
NOF	Lower median	423	1.00	
Wald = 6.23, p<.01	Upper median	333	1.57	1.10-2.25
14-day depression/fatigue/difficulty sleeping/headache				
Dichotomous measure:				
NOF	Lower median	421	1.00	
Wald = 7.21, p<.007	Upper median	334	2.06	1.22-3.49
Continuous measure:				
NOF	Lower median	421	1.00	
Wald = 5.81, p<.02	Upper median	334	1.93	1.13-3.31
14-day depression/fatigue/difficulty sleeping/back pain				
Dichotomous measure:				
NOF	Lower median	420	1.00	
Wald = 5.49, p<.02	Upper median	334	1.75	1.10-2.81
Continuous measure				
NOF	Lower median	420	1.00	
Wald = 4.57, p<.03	Upper median	334	1.68	1.04-2.72

14-day lower respiratory symptoms				
Dichotomous measure:				
NOF	Lower median	423	1.00	
Wald = 5.21, p<.02	Upper median	333	1.76	1.08-2.86
14-day nausea/vomiting				
Dichotomous measure:				
NOF	Lower median	421	1.00	
Wald = 9.46, p<.002	Upper median	333	1.96	1.28-3.00
Continuous measure:				
NOF	Lower median	421	1.00	
Wald = 9.15, p<.002	Upper median	333	1.95	1.27-3.02
14-day dizziness/earache				
Dichotomous measure:				
NOF	Lower median	421	1.00	
Wald = 4.24, p<.04	Upper median	333	1.49	1.02-2.18
Continuous measure:				
NOF	Lower median	421	1.00	
Wald = 5.47, p<.02	Upper median	333	1.56	1.08-2.28
14-day tooth/earache				
Dichotomous measure:				
Bullying	Lower median	381	1.00	
Wald = 5.72, p<.02	Upper median	372	1.61	1.09-2.39
Continuous measure:				
Bullying	Lower median	357	1.00	
Wald -4.78, <.03	Upper median	344	1.61	1.10-2.37

As is evident from the Table, bullying (both measures) was associated with 14-day tooth and/or earache only in addition to the established effect of the NOF score.

8.5.5 NOF, bullying and use of prescribed medication

Odds ratios and 95% confidence intervals where median splits of the original NOF score and bullying measures were included as independent predictors, and 12-month use of prescribed medication (any) served as the dependent measure are shown below in Table 70.

Table 70: NOF, bullying & 12-month use of prescribed medication

		N	OR	95% CI
12-month use of prescribed medication				
Continuous measure:				
Bullying	Lower median	357	1.00	
Wald = 5.86, p<.02	Upper median	344	1.61	1.10-2.37

As is evident from the Table, bullying (novel continuous measure) only was significantly associated with an increased likelihood of prescribed medication use in the last 12 months.

8.5.6 Summary: NOF, bullying and health outcomes

The results presented in sections 8.5.1 – 8.5.4 indicate that the NOF score emerged as a significantly better predictor of the majority of outcomes when compared directly to bullying (3 measures). However, the novel continuous bullying measure was associated with a number of outcomes: work-related stress, clinical anxiety (in addition to NOF), lifetime prevalence of disease, 14-day tooth and/or earache (N.B. the original dichotomous bullying measure was also significantly associated with this outcome) and 12-month use of prescribed medication. It should also be noted that without the inclusion of coping style as a covariate, the original dichotomous bullying measure was significantly associated with work stress (in addition to NOF) and lifetime prevalence of disease, and the novel continuous measure predicted clinical depression in addition to NOF (see Appendix XI).

8.6 NOF SCORES INCLUSIVE OF BULLYING AND PHYSICAL & PSYCHOLOGICAL WELL-BEING

A second aim of the current chapter was to determine the nature of relationships between novel NOF scores inclusive of bullying and health outcomes. Quartile splits of NOF scores inclusive of the 2 bullying scores based on the 20-item Quine et al. (1999) measure served as independent predictors in a series of logistic regression analyses. Results for all health outcomes, co-varying for demographic characteristics, negative affectivity (24-item version) and coping style (problem and emotion-focused coping) are detailed in the following sections.

8.6.1 Outcomes not associated with either novel NOF score

No significant associations were observed between either novel NOF score and the following outcomes:

- Lifetime prevalence of disease
- 14-day back pain
- 14-day lower respiratory symptoms
- 14-day gastrointestinal symptoms (nausea/vomiting/diarrhoea)
- 14-day diarrhoea/indigestion/heartburn
- 14-day dizziness/earache
- 14-day tooth/earache
- 14-day toothache/skin problems
- 12-month use of prescribed medication (all)
- 12-month use of prescribed pain/indigestion medication
- 12-month use of prescribed psychotropic medication
- 14-day use of prescribed medication (any)

8.6.2 NOF inclusive of bullying and psychological well-being

Odds ratios and 95% confidence intervals where quartile splits of both novel NOF scores were included as independent predictors, and work-related stress, probable clinical anxiety and depression served as dependent measures are shown below in Table 71.

Table 71: NOF inclusive of bullying & psychological well-being[96]

		N	OR	95% CI
Work-related stress				
NOF (dichotomous	1st quartile	204	1.00	
bullying items)	2nd quartile	198	2.06*	1.13-3.75
	3rd quartile	174	4.43**	2.46-7.99
Wald = 81.65, p<.0001	4th quartile	193	12.47***	6.78-22.95

[96] Results for all outcomes where either negative affectivity or coping alone are included as covariates are presented in Appendix XII.

NOF (continuous bullying items)	1st quartile	214	1.00	
	2nd quartile	187	2.16*	1.16-3.92
	3rd quartile	175	4.59**	2.58-8.17
Wald = 78.89, p<.0001	4th quartile	193	11.86***	6.53-21.52
Clinical anxiety[97]				
NOF (dichotomous bullying items)	1st quartile	195	1.00	
	2nd quartile	194	5.42***	2.17-13.55
	3rd quartile	167	11.66*	4.75-28.59
Wald = 89.11, p<.0001	4th quartile	191	35.63***	14.55-87.24
NOF (continuous bullying items)	1st quartile	205	1.00	
	2nd quartile	183	6.47***	2.60-16.12
	3rd quartile	167	12.45*	5.10-30.40
Wald = 82.02, p<.0001	4th quartile	192	34.68***	14.24-84.48
Clinical depression				
NOF (dichotomous bullying items)	1st quartile	196	1.00	
	2nd quartile	194	0.40	0.07-2.23
	3rd quartile	167	1.92+	0.56-6.54
Wald = 15.90, p<.001	4th quartile	192	4.56+	1.45-14.40
NOF (continuous bullying items)	1st quartile	206	1.00	
	2nd quartile	183	0.23	0.03-2.06
	3rd quartile	168	2.09+	0.62-7.10
Wald = 17.54, p<.001	4th quartile	192	5.39*	1.72-16.92

Note: repeated contrasts + (p<.05) * (p<.01) ** (p<.001) *** (p<.0001)

The Table above indicates there is little difference between the two scores. There is also little difference in terms of pattern and size of effect between either novel score inclusive of bullying and the original score (see Chapter 7, Table 57) in terms of predicting work-related stress, or probable clinical depression: the original score is however a significantly better predictor than either novel score.

8.6.3 NOF inclusive of bullying and 12-month symptoms

Odds ratios and 95% confidence intervals where quartile splits of both novel NOF scores were included as independent predictors, and 12-month symptoms served as dependent measures are shown below in Table 72.

[97] Negative affectivity measures were not included as covariates where clinical anxiety and depression comprised dependent measures.

Table 72: NOF inclusive of bullying & 12-month symptoms

		N	OR	95% CI
12-month symptoms				
NOF (dichotomous	1st quartile	200	1.00	
bullying items)	2nd quartile	193	1.60	0.92-2.78
	3rd quartile	168	2.15	1.13-4.09
Wald =12.46, p<.006	4th quartile	182	3.74	1.73-8.09
NOF (continuous	1st quartile	210	1.00	
bullying items)	2nd quartile	183	2.19*	1.23-3.88
	3rd quartile	168	2.35	1.26-4.40
Wald = 17.36, p<.001	4th quartile	182	4.28	2.00-9.15
12-month sciatica/back pain				
NOF (continuous	1st quartile	212	1.00	
bullying items)	2nd quartile	187	1.41	0.93-2.13
	3rd quartile	174	1.32	0.85-2.03
Wald = 8.77, p<.03	4th quartile	191	1.98	1.25-3.14

Note: repeated contrasts * (p<.01)

As is indicated by the results presented above, the novel NOF score including the continuous measure of bullying appears to be a better predictor of 12-month health than the NOF score comprising a dichotomous measure. However, results are comparable with the original NOF score (see Chapter 7, Table 57).

8.6.4 NOF inclusive of bullying and acute (14-day) symptoms

Odds ratios and 95% confidence intervals where quartile splits of both novel NOF scores were included as independent predictors, and 14-day symptoms served as dependent measures are shown below in Table 73.

Table 73: NOF inclusive of bullying & 14-day symptoms

		N	OR	95% CI
14-day symptoms				
NOF (continuous	1st quartile	204	1.00	
bullying items)	2nd quartile	184	2.70*	1.15-6.33
	3rd quartile	169	3.08	1.21-7.85
Wald = 9.45, p<.02	4th quartile	185	2.81	1.04-7.65
14-day upper respiratory tract symptoms				
NOF (dichotomous	1st quartile	201	1.00	
bullying items)	2nd quartile	198	0.90	0.59-1.35

	3rd quartile	172	1.40+	0.90-2.18
Wald = 10.03, p<.02	4th quartile	191	1.73	1.09-2.76
14-day depression/fatigue/difficulty sleeping/headache				
NOF (dichotomous	1st quartile	199	1.00	
bullying items)	2nd quartile	198	1.55	0.92-2.59
	3rd quartile	172	2.41	1.29-4.50
Wald = 11.10, p<.01	4th quartile	192	2.28	1.16-4.47
NOF (continuous	1st quartile	209	1.00	
bullying items)	2nd quartile	187	2.04*	1.20-3.47
	3rd quartile	173	2.88	1.55-5.36
Wald = 15,93, p<.001	4th quartile	192	2.62	1.35-5.09
14-day depression/fatigue/difficulty sleeping/back pain				
NOF (dichotomous	1st quartile	198	1.00	
bullying items)	2nd quartile	198	1.43	0.88-2.33
	3rd quartile	172	2.82+	1.54-5.15
Wald = 11.70, p<.008	4th quartile	192	1.90	1.04-3.49
NOF (continuous	1st quartile	208	1.00	
bullying items)	2nd quartile	187	1.84*	1.12-3.01
	3rd quartile	173	3.31	1.82-6.03
Wald = 17.46, p<.0001	4th quartile	192	2.21	1.22-4.00

The Table above indicates that the novel NOF score inclusive of a continuous measure of bullying is a marginally better predictor of 14-day health outcomes than the NOF score inclusive of a dichotomous measure of bullying, with the exception of 14-day upper respiratory symptoms. There is however little difference in terms of odds ratios between the original NOF score (Chapter 7, Table 57) and the novel NOF score inclusive of a (continuous) measure of bullying.

8.6.5 Summary: NOF inclusive of bullying and health outcomes

The results presented in section 8.6 suggest that novel NOF scores inclusive of bullying tend to demonstrate fewer significant associations with acute health outcomes than the original NOF score (see Chapter 7). Neither of the NOF scores including bullying as a component was significantly associated with prescribed medication (any). However, where significant associations between the novel scores and health outcomes were observed, the score inclusive of a continuous measure of bullying (i.e. one which measures frequency of particular behaviours) emerged as a better predictor of negative outcomes than the NOF score inclusive of a dichotomous measure of bullying. However, when compared to the original NOF score, the novel score inclusive of a (continuous) measure of bullying seems to explain little additional variance.

8.7 NOF COMPONENTS AND PHYSICAL & PSYCHOLOGICAL WELL-BEING

A final aim of the current chapter was to determine the nature of relationships between NOF score components, i.e. demand-control-support, effort-reward imbalance, working hours/hazards and bullying (continuous measure[98]), and health outcomes. Median splits of NOF components served as independent predictors in a series of logistic regression analyses: results for all health outcomes, co-varying for demographic characteristics, negative affectivity (24-item version) and coping style (problem and emotion-focused coping) are detailed in the following sections.

8.7.1 Outcomes not associated with any NOF component

No significant associations were observed between any NOF component and the following outcomes:

- 14-day upper respiratory tract symptoms
- 14-day lower respiratory symptoms
- 14-day back pain
- 14-day diarrhoea/indigestion/heartburn
- 14-day toothache/skin problems
- 12-month use of prescribed medication (all)
- 12-month use of prescribed pain/indigestion medication
- 12-month use of prescribed psychotropic medication
- 14-day use of prescribed medication (any)

[98] Analyses of NOF components were also carried out using median splits of the dichotomous bullying scale and the Bergen Bullying Index. Results are provided in Appendix XIII.

8.7.2 NOF components and health outcomes

Odds ratios and 95% confidence intervals where median splits of NOF components were included as independent predictors, and remaining health outcomes served as dependent measures are shown below in Table 74 (demographic characteristics, the 24-item measure of negative affectivity and problem and emotion-focused coping were included in all models as covariates[99]).

Table 74: NOF components & health outcomes

		N	OR	95% CI
Work stress	Demand-control-support	347	1.00	
	(Wald = 12.40, p<.0001)	353	2.15	1.40-3.29
	Effort-reward imbalance	327	1.00	
	(Wald = 32.20, p<.0001)	373	3.80	2.40-6.03
Clinical anxiety[100]	Demand-control-support	335	1.00	
	(Wald = 9.58, p<.002)	346	2.10	1.31-3.35
	Effort-reward imbalance	319	1.00	
	(Wald = 35.31, p<.0001)	362	4.83	2.87-8.12
Clinical depression	Demand-control-support	335	1.00	
	(Wald = 8.55, p<.003)	347	6.72	1.88-24.11
	Effort-reward imbalance	320	1.00	
	(Wald = 5.36, p<.02)	262	4.58	1.26-16.63
Lifetime prevalence of disease	Working hours/hazards	348	1.00	
	(Wald = 7.60, p<.006)	345	1.68	1.16-2.44
12-month symptoms	Demand-control-support	342	1.00	
	(Wald =5.08, p<.02)	333	1.87	1.09-3.23
12-month sciatica/back pain	Effort-reward imbalance	324	1.00	
	(Wald = 7.71, p<.005)	371	1.71	1.17-2.50
14-day symptoms	Effort-reward imbalance	318	1.00	
	(Wald = 4.17, p<.04)	360	2.33	1.04-5.27
14-day depression/ fatigue/difficulty sleeping/headache	Effort-reward imbalance	322	1.00	
	(Wald = 7.40, p<.007)	372	2.12	1.23-3.64
	Working hours/hazards	348	1.00	
	(Wald = 4.68, p<.03)	346	1.76	1.06-2.94
14-day depression/fatigue/ difficulty sleeping/back pain	Demand-control-support	342	1.00	
	(Wald = 5.17, p<.02)	352	1.71	1.08-2.72

[99] Analyses including demographic characteristics and negative affectivity (24-item version) only as covariates are present in Appendix XIII.
[100] Negative affectivity measures were not included as covariates where clinical anxiety and depression comprised dependent measures.

14-day gastrointestinal symptoms	Working hours/hazards	347	1.00	
	(Wald = 3.86, p<.05)	345	1.54	1.00-2.38
14-day dizziness/earache	Working hours/hazards	347	1.00	
	(Wald = 12.47, p<.0001)	345	2.02	1.37-2.99
14-day tooth/earache	Effort-reward imbalance	322	1.00	
	(Wald = 5.07, p<.02)	371	0.60	0.38-0.94
	Bullying	360	1.00	
	(Wald = 4.76, p<.03)	333	1.62	1.05-2.51

Work-related stress, clinical anxiety and 14-day depression/fatigue/difficulty sleeping/headache were most strongly associated with effort-reward imbalance followed by the demand-control-support component. Clinical depression in contrast was most strongly associated with demand-control-support, followed by effort-reward imbalance. 12-month symptoms and 14-day depression/fatigue/difficulty sleeping/back pain were associated with demand-control support only, and 12-month sciatica/back pain and 14-day symptoms by effort-reward imbalance only. A number of outcomes (lifetime prevalence of disease, 14-day gastrointestinal symptoms and 14-day dizziness/earache) were associated with working hours/hazards only. A single outcome (14-day tooth/earache) was significantly associated with bullying and effort-reward imbalance.

The results presented above indicate that effort-reward imbalance and demand-control-support best predicted the majority of health outcomes. Although a number of outcomes were significantly associated with unfavourable working hours/exposure to physical hazards, comparatively few effects of bullying were observed.[101]

8.7.3 Further analysis: NOF components and health outcomes

Analyses detailed in Table 74 were repeated using the derived variables created to reflect levels of exposure to each stressor found to demonstrate associations with particular outcomes (deviation contrast). Results are shown in Table 75, co-varying

[101] When coping was removed from models as a covariate, bullying (continuous measure) was also found to predict work-related stress in addition to effort-reward imbalance and demand-control-support.

for both negative affectivity (24-items) and coping style (problem and emotion-focused coping)[102].

Table 75: Further analysis of NOF components & health outcomes

		N	OR	95% CI
Work stress				
Demand-control-support	High SS/high DL/low JD	116	0.58+	0.33-1.00
(Wald = 19.83, p<.006)	High SS/high DL/high JD	94	0.92	0.56-1.53
	Low SS/high DL/low JD	53	0.79	0.41-1.51
	Low SS/high DL/high JD	73	1.21	0.73-1.99
	High SS/low DL/low JD	83	0.61	0.34-1.09
	High SS/low DL/high JD	62	2.32**	1.32-4.06
	Low SS/low DL/low JD	93	0.82	0.50-1.37
	Low SS/low DL/high JD	133	1.72*	1.14-2.60
Effort-reward imbalance	Low IE/low EE/high REW	168	0.37**	0.21-0.65
(Wald = 50.21, p<.0001)	Low IE/low EE/low REW	142	0.94	0.45-1.98
	High IE/low EE/high REW	91	0.81	0.47-1.40
	High IE/low EE/low REW	57	2.01*	1.15-3.52
	Low IE/high EE/high REW	43	0.50	0.23-1.11
	Low IE/high EE/low REW	25	0.62	0.26-1.52
	High IE/high EE/high REW	109	1.84*	1.18-2.85
	High IE/high EE/low REW	172	3.07***	2.08-4.54
Clinical anxiety[103]				
Demand-control-support	High SS/high DL/low JD	111	0.18***	0.07-0.47
(Wald = 30.75, p<.0001)	High SS/high DL/high JD	90	1.08	0.60-1.93
	Low SS/high DL/low JD	53	0.60	0.28-1.31
	Low SS/high DL/high JD	73	1.15	0.66-1.99
	High SS/low DL/low JD	80	1.00	0.53-1.87
	High SS/low DL/high JD	60	2.05*	1.11-3.79
	Low SS/low DL/low JD	91	1.18	0.68-2.05
	Low SS/low DL/high JD	130	3.02***	1.91-4.79
Effort-reward imbalance	Low IE/low EE/high REW	165	0.29**	0.14-0.60
(Wald = 57.13, p<.001)	Low IE/low EE/low REW	38	0.44	0.16-1.22
	High IE/low EE/high REW	85	0.39*	0.17-0.88
	High IE/low EE/low REW	57	0.93	0.48-1.79
	Low IE/high EE/high REW	44	1.40	0.65-3.00
	Low IE/high EE/low REW	25	1.70	0.76-3.82
	High IE/high EE/high REW	105	2.82***	1.75-4.53
	High IE/high EE/low REW	169	3.24***	2.15-4.90
12-month symptoms				
Demand-control-support	High SS/high DL/low JD	121	0.49**	0.30-0.78
(Wald = 18.23, p<.01)	High SS/high DL/high JD	93	1.01	0.55-1.85

102 Models where coping style was removed as a covariate are presented in Appendix XIV.
103 Negative affectivity measures were not included as covariates where clinical anxiety and depression comprised dependent measures.

	Low SS/high DL/low JD	56	0.60	0.30-1.17
	Low SS/high DL/high JD	81	1.38	0.66-2.87
	High SS/low DL/low JD	84	0.65	0.37-1.13
	High SS/low DL/high JD	64	1.67	0.71-3.89
	Low SS/low DL/low JD	94	0.94	0.53-1.66
	Low SS/low DL/high JD	132	2.43*	1.22-4.84
14-day depression/fatigue/difficulty sleeping/headache				
Effort-reward imbalance (Wald = 15.01, p<.04)	Low IE/low EE/high REW	166	0.53*	0.32-0.87
	Low IE/low EE/low REW	42	2.16	0.72-6.48
	High IE/low EE/high REW	90	0.47*	0.26-0.82
	High IE/low EE/low REW	58	0.64	0.32-1.29
	Low IE/high EE/high REW	43	1.11	0.44-2.77
	Low IE/high EE/low REW	24	2.84	0.47-17.19
	High IE/high EE/high REW	110	0.65	0.36-1.18
	High IE/high EE/low REW	172	1.42	0.75-2.68
14-day depression/fatigue/difficulty sleeping/back pain				
Demand-control-support (Wald =14.31, p<.05)	High SS/high DL/low JD	123	0.51**	0.33-0.77
	High SS/high DL/high JD	94	1.06	0.62-1.80
	Low SS/high DL/low JD	57	0.87	0.47-1.63
	Low SS/high DL/high JD	81	1.78	0.89-3.55
	High SS/low DL/low JD	85	0.83	0.49-1.40
	High SS/low DL/high JD	67	1.45	0.71-2.93
	Low SS/low DL/low JD	98	1.29	0.75-2.21
	Low SS/low DL/high JD	138	0.78	0.50-1.22

Note: deviation contrasts + (p<.05) * (p<.01) *** (p<.0001)

SS = social support DL = decision latitude JD = job demand
IE = intrinsic effort EE = extrinsic effort REW = reward

As is evident from the Table, a number of previously observed associations were no longer significant when derived level of exposure variables were considered as independent predictors:

- effort-reward imbalance, demand-control-support and clinical depression;
- unfavourable working hours/exposure to physical hazards and lifetime prevalence of disease, 14-day gastrointestinal symptoms and 14-day dizziness/earache;
- effort-reward-imbalance and 12-month sciatica/back pain and 14-day symptoms;
- effort-reward imbalance, bullying and 14-day tooth/earache

Remaining patterns of association can be summarised as follows:

- key factors in terms of likelihood of reporting work-related stress were high job demand and low decision latitude, and high intrinsic effort, combined with either high extrinsic effort or low reward, or both;
- key factors in terms of predicting clinical anxiety were high job demand/low decision latitude, and high effort (intrinsic and extrinsic);
- The key factors in terms of predicting poor 12-month health were high job demand/low decision latitude/low social support;
- Low extrinsic effort and high rewards appear to reduce likelihood of reporting depression/fatigue/difficulty sleeping and/or headache in the last 14 days;
- High social support, high decision latitude and low job demands reduce likelihood of reporting depression/fatigue/difficulty sleeping and/or back pain in the last 14 days.

8.7.3.1 Work-related stress

The critical components in terms of predicting work stress therefore appear to be high job demand/low decision latitude and high intrinsic effort. A composite variable was created to reflect all possible permutations of these factors as follows:

- Low demand/high decision latitude, low intrinsic effort
- Low demand/high decision latitude, high intrinsic effort
- High demand/low decision latitude, low intrinsic effort
- High demand/low decision latitude, high intrinsic effort

This variable served as an independent predictor in a logistic regression equation (deviation contrast: all covariates were included in the model). Results are shown below in Table 76.

Table 76: Work stress, demand, decision latitude & intrinsic effort

		N	OR	95% CI
Work stress	Low JD/ high DL & low IE	92	0.41**	0.23-0.72
(Wald = 56.66,	Low JD/ high DL & high IE	77	1.29	0.82-2.03
p<.0001)	High JD/low DL & low IE	186	0.64+	0.43-0.95
	High JD/low DL & high IE	352	2.94***	2.16-4.01

Note: deviation contrasts + (p<.05) ** (p<.001) *** (p<.0001)

JD = job demand DL = decision latitude IE = intrinsic effort

As is evident from the Table, work-stress was most strongly associated with high demands and/or low decision latitude and high effort. However, high intrinsic effort alone may be a stronger predictor of this outcome than high demands and/or low control (decision latitude) alone.

8.7.3.2 Clinical anxiety

The critical components in terms of predicting clinical anxiety therefore appear to be high job demand/low decision latitude and high effort (both intrinsic and extrinsic). A composite variable was created to reflect all possible permutations of these factors as follows:

- Low demand/high decision latitude, low effort
- Low demand/high decision latitude, high effort
- High demand/low decision latitude, low effort
- High demand/low decision latitude, high effort

This variable served as an independent predictor in a logistic regression equation (deviation contrast: all covariates were included in the model). Results are shown below in Table 77.

Table 77: Clinical anxiety, demand, decision latitude & effort[104]

		N	OR	95% CI
Clinical anxiety	Low JD/ high DL & low E	125	0.17***	0.08-0.38
(Wald = 81.55,	Low JD/ high DL & high E	39	1.15	0.59-2.24
p<.0001)	High JD/low DL & low E	290	1.01	0.66-1.54
	High JD/low DL & high E	234	5.08	3.41-7.58

Note: deviation contrasts ** (p<.001) *** (p<.0001)

JD = job demand DL = decision latitude E = intrinsic & extrinsic effort

As is evident from the Table, clinical anxiety was most strongly associated with both high job demands and/or low decision latitude, and high effort (intrinsic and extrinsic).

[104] It was not possible to determine the potential buffering effects of emotion-focused coping on the components of NOF found to be most predictive of clinical anxiety, as cell sizes were too small.

8.8 DISCUSSION

The results described in the current chapter and directions for further research, are outlined in the following sections. As previously stated, there were three main aims of the current chapter: firstly to assess the relative impact of three different measures of workplace bullying as compared to the original NOF score (comparable to analyses presented in Chapter 4); secondly to observe the effects of adding these different bullying measures to NOF (as in Chapter 5), and finally, to further examine the relative influence of NOF components, i.e. effort-reward imbalance, demand-control-support, unfavourable working hours/hazards and workplace bullying (as Chapter 6) in terms of negative health consequences. Key findings are summarised in Table 78.

Table 78: Combined and selective effects of NOF & bullying

- A continuous measure of bullying demonstrated more robust associations with health outcomes than a measure based on dichotomous items
- Associations between bullying & health outcomes were generally fewer than hypothesised; likely accounted for by independent effects of individual differences (negative affectivity & coping style)
- Where bullying was added to NOF, the score comprising categorical items was associated with a greater number of outcomes than the score comprising dichotomous items
- The original NOF score was generally associated with a greater number of effects
- NOF inclusive of bullying demonstrated more robust relationships with some outcomes e.g. clinical anxiety whereas the original score was most strongly associated with others e.g. work-related stress & lifetime prevalence of disease
- Some outcomes (e.g. psychological health) have multiple aetiology & tend to be associated with at least 2 NOF components (not necessarily equally weighted)
- Other outcomes (e.g. 14-day symptoms) tended to be associated with a single component of NOF

8.8.1 The measurement of workplace bullying

It was hypothesised at the start of this chapter (hypothesis 1) that a continuous measure of workplace bullying would be likely to better predict poor health outcomes than the dichotomous measure utilised in previous chapters (i.e. Survey I). This assertion is supported to some extent by the results presented in this chapter. Fewer associations between bullying and health outcomes (e.g. as compared to NOF) were evident in the current sample than were detailed in Chapter 4 (Survey I). However, where the adapted version of Quine's (1999) bullying scale was included in regression models as an independent predictor, this continuous measure was associated with a number of outcomes, work-related stress, lifetime prevalence of disease and 12-month use of prescribed medication, not significantly associated with the dichotomous measure. Furthermore, where bullying was added to NOF, the score comprising the continuous measure tended to demonstrate greater associations with health outcomes than the dichotomous measure. A continuous measure of bullying perhaps better fits the accepted definition of bullying behaviours: behaviour must be consistent (at least once per week for a minimum of 6 months) to be considered bullying (Zapf, 1999). No significant associations were observed between the Bergen Bullying Index (Einarsen et al. 1994) and health outcomes over and above those of the NOF score.

8.8.2 Bullying, NOF and negative health effects

The 2nd hypothesis outlined earlier in the current chapter stated that bullying (any measure) would likely predict a significant proportion of health outcomes, either in addition to, or over and above the effects of a NOF score (based on results detailed in Chapter 4). Associations between bullying alone and health outcomes are well-established within the literature (e.g. bullying and cardiovascular disease and depression, (Kivimäki et al., 2003) psychosomatic health problems (Mikkelsen & Einarsen, 2002) and increased use of psychotropic medication (Vartia, 2001)).

Although fewer associations between bullying and health outcomes (as compared to NOF, either alone or in addition to the composite score) were observed than hypothesised, a continuous measure appeared most strongly associated with negative health effects. It is important to note however, that both negative affectivity (24-item version) and coping style (problem and emotion-focused coping) were included as covariates in models detailed in this chapter; where coping style was excluded from models, a greater number of significant associations between bullying and health outcomes were observed, particularly for the continuous measure (see Appendix XI). Therefore, although the number of associations between bullying and health outcomes was lower than hypothesised, this is likely accounted for by the inclusion of coping style as a covariate, and also in part by the smaller size of the current sample (as compared to Survey I). Coping style therefore appears to be independently related to health outcomes. It was not possible to determine the role of coping style as a buffer of relationships examined in the current chapter; however, little evidence of buffering effects was observed in Chapter 7.

8.8.3 The addition of bullying to the NOF score

It was asserted at the start of this chapter (hypothesis 3) that the addition of bullying to a NOF score would support previous results indicating that the effects of stressors are selective as well as additive (e.g. Ostry et al., 2003; Smith et al., 2004). It was hypothesised that a composite score inclusive of bullying would demonstrate a more robust association with some outcomes (e.g. clinical anxiety), whereas the original score would likely explain greater variance in other (e.g. 12-month) health outcomes (based on results outlined in Chapter 5). Results suggested that a novel composite (NOF) score inclusive of bullying was more strongly associated with outcomes such as clinical anxiety, whereas the original score evidenced stronger relationships with others e.g. work-related stress and lifetime prevalence of disease. In the current sample however, 12-month health outcomes were most strongly associated with the NOF score inclusive of bullying.

The original score was however associated with a greater number of effects (e.g. significant associations with 12-month medication use and a number of acute health problems not significantly associated with the score inclusive of bullying). The novel score comprising a continuous measure of workplace bullying demonstrated stronger relationships with health outcomes (as observed by larger odds ratios) than the novel score comprising a dichotomous measure of bullying.

8.8.4 Components of the NOF score (inclusive of bullying)

Based on results described by Smith et al. (2004) and those detailed in Chapter 6, the 4th and final hypothesis outlined at the beginning of the current chapter stated that further analysis of NOF components including workplace bullying, would support the assertion that some outcomes (e.g. psychological health) have multiple aetiology and therefore are likely significantly associated with at least two NOF components. It was also hypothesised that these components would be unlikely to explain equal variance in terms of risk of reporting. Other outcomes (e.g. 14-day symptoms) would be more likely associated with a single component of NOF.

This hypothesis is largely supported by the current results. Both work-related stress and clinical anxiety were found to be significantly associated with the effort-reward imbalance and demand-control-support components; acute psychological well-being (14-day depression/fatigue/difficulty sleeping/headache) was also significantly associated with 2 NOF components; effort-reward imbalance and unfavourable working hours/exposure to physical hazards. Furthermore, remaining outcomes, comprising predominantly acute (14-day) symptoms were found to be significantly associated with a single component (e.g. effort-reward imbalance and 14-day symptoms [any]; working hours/hazards and 14-day gastrointestinal symptoms and 14-day dizziness/earache). Where more than one NOF component was significantly associated with an outcome, work-related stress for example, it appeared that components did not explain equal proportions of variance; intrinsic effort evidenced a stronger relationship with a negative outcome than high job demands and low control.

8.8.5 Summary and limitations of the current results

In summary, the results presented in this chapter lend further support to the idea that associations between occupational stressors and health outcomes are both cumulative and selective in nature. The experience of bullying at work is associated with a number of negative health effects (e.g. work-related stress, lifetime prevalence of disease, 12-month use of prescribed medication) in addition to established associations between NOF and the outcomes under investigation. Furthermore, the addition of a measure of workplace bullying to NOF strengthens associations for some outcomes, and lessens associations for others. Further analysis of NOF components lends additional weight to the assertion that health outcomes are selectively associated with stressors; work-related stress for example, is most strongly associated with intrinsic effort, yet other stressors (high job demands, low control) do explain additional (if not equal) variance.

A primary aim of this chapter was to further address measurement issues, in terms of assessment of workplace bullying. It was hypothesised that a continuous measure, more descriptive of the nature of exposure to behaviours, would better explain variance in health outcomes; this assertion was supported by results presented here. Furthermore, both 20-item scales (adaptations of Quine's [1999] measure) emerged as significantly better predictors of poor health than the 5-item Bergen Bullying Index (Einarsen et al. 1994). Longer scales therefore appear to have better predictive validity than the shorter 5-item Bergen Index; this is also likely related to the content of the scales (i.e. the more comprehensive list of bullying behaviours included in Quine's [1999] measure).

Although the current results are largely supportive of previous findings presented earlier in this thesis, there are a number of differences to be noted. Firstly, fewer associations were observed between workplace bullying and health outcomes than detailed in Chapters 4-6; this may be explained by a number of factors. Secondly, the current sample was smaller in size than for Survey I, and the inclusion of coping style as a covariate in all models described in the current chapter appears to explain some variance in relationships between stressors (bullying in particular) and health outcomes. It would seem plausible that an adaptive (i.e. problem-focused) coping style would lessen the impact of bullying on health, psychological well-being in particular. In the same way, individuals who respond emotively to the experience of bullying at work might be at greater risk of reporting negative health outcomes as a consequence. However, as discussed in Chapter 7, the role of coping in explaining these relationships is complex: some emotion-focused approaches may be more adaptive than others (e.g. Carver, Scheier &Weintraub, 1989, cited in Baker & Berenbuam, 2007), and a combination of emotion and problem-focused strategies may be associated with more positive outcomes (Shimazu & Kosugi, 2003). Individual and situational characteristics are also likely to play a significant role.

All of the data reported are however cross-sectional in nature; it is therefore possible only to observe associations between variables, and not to make concrete inferences in terms of causality. Furthermore, it was not possible to directly compare Quine's (1999) original dichotomous bullying measure with the modified scale utilised in the second survey; the dichotomous measure referred to in the current chapter is an approximation only (see section 8.2.3). There are also differences in the population samples between Survey I and II; the former comprised more diverse occupations (i.e. nursing and local government) and was larger in size, whereas the latter comprised a single occupational group (i.e. nurses). However, all analyses included occupational group or setting as a covariate, and there appears to be little difference between the two samples in terms of key demographic characteristics and health outcomes (see Chapter 3, sections 3.3.1 & 3.3.2, and Chapter 7, sections 7.3.1 & 7.3.2).

The issues described above and how they relate to previously detailed findings are discussed in further depth in Chapter 9 (general discussion). All results presented in this thesis are summarised in Chapter 9, with particular reference to cumulative and selective patterns of association. Relevance to previous work in the area of job stress models and combined effects as they relate to health outcomes is discussed, as are methodological limitations of the current data. Implications for UK policy and practice, and possible directions for future research are also outlined.

CHAPTER 9

COMBINED AND SELECTIVE EFFECTS OF OCCUPATIONAL STRESSORS ON HEALTH AND WELL-BEING: SUMMARY AND DIRECTIONS FOR FUTURE RESEARCH

9.1 OVERVIEW

The following chapter summarises the main findings presented in this thesis with regards the cumulative and selective effects of psychosocial and physical workplace stressors. Results are discussed within the context of previous studies, in terms of relevance and advancement of knowledge. Practical and policy implications are discussed, as are the possible mechanisms underlying the associations described, and directions for future research.

9.2 CUMULATIVE AND SELECTIVE ASSOCIATIONS BETWEEN OCCUPATIONAL STRESSORS AND HEALTH OUTCOMES: SUMMARY OF PATTERNS OF EFFECT

The following sections summarise the findings presented in Chapters 3-8, in terms of aims and patterns of association, with particular reference to the additive and selective nature of relationships between stressors and health outcomes. A large number of analyses were carried out on both samples described in this thesis: the likelihood that a number of effects were observed by chance (i.e. Type I error) is therefore high. For this reason, discussion of results in this chapter is focused on robust associations, namely large and/or highly significant effects (minimum $p<.01$), and those replicated across samples.

9.2.1 Patterns of association between an additive stressor (NOF) score and health outcomes

Results presented in Chapters 3-6 were obtained from a cross-sectional self-report study of 1090 healthcare sector and local government employees. Occupational group was included as a covariate in all regression models: however it is worth noting that several differences between these two groups were observed. Individuals employed in the healthcare sector were more likely to be female and of a younger age than the sample of local government/social service employees: other observed differences are most likely attributable to discrepancies in gender and age. Groups were not found to differ significantly in terms of key health and well-being outcomes, however.

Results detailed in Chapter 3 demonstrated cumulative, linear patterns of association between NOF and work-related stress and clinical anxiety (N.B the relationship appeared almost curvilinear for work stress). For other outcomes such as clinical depression, 'threshold' effects were evident, in that relatively high levels of NOF (3^{rd} quartile levels) were associated with this outcome: likelihood of reporting did not increase significantly with increased exposure to NOF. Threshold effects were also found for lifetime prevalence of disease and 12-month symptoms of ill-health at very high levels (4^{th} quartile) of NOF.

For acute (i.e. 14-day) health outcomes, several different patterns of effect were observed. Exposure to NOF at 3^{rd} quartile levels was significantly associated with reporting any symptom of ill-health within the last 14 days, and likelihood of reporting continued to rise at higher (i.e. 4^{th} quartile) levels. However, patterns of effect for individual symptoms or symptom clusters within the last 14 days were generally less robust (as indicated by smaller effect sizes and lower significance levels), with the exception of acute psychological problems. 14-day depression and/or fatigue demonstrated the same pattern of association with NOF as clinical depression. Associations between NOF and prescribed medication use were also generally less robust than those observed for health outcomes: only very high levels of NOF exposure (i.e. falling within the upper quartile) were associated with prescribed medication use outcomes.

There are obviously a number of weaknesses to the current approach, in that the causal nature of associations cannot be determined from cross-sectional data. Moreover, both the independent and dependent measures in the current sample were assessed via self-report, introducing a source of common method variance, and potentially over-estimating effect sizes. Furthermore, alternative categorisations of the NOF score (e.g. as a continuous or dichotomous variable) may have led to different conclusions about the pattern of relationships between stressors and health outcomes. However, the current findings do indicate that cumulative and selective associations between stressors and poor health are robust, given very similar patterns of effect have been demonstrated in both a large community working population and a more homogenous (and significantly smaller) public sector sample.

9.2.2 Patterns of association between NOF, novel occupational stressors and health

The primary aim of analyses described in Chapter 4, was to determine the effects of a group of novel stressors, Leader-Member Exchange (LMX), Team-Member Exchange (TMX), unsupportive organisational culture, role ambiguity, role conflict and workplace bullying, relative to the effects of the NOF score. Results broadly demonstrated that established NOF effects held up against the influence of novel stressors, for psychological well-being outcomes such as work-related stress, and clinical anxiety and depression. Moreover, of the novel stressors considered, only bullying was significantly associated with clinical anxiety in addition to NOF. Workplace bullying was significantly associated with a number of health outcomes, either alone, or in addition to established NOF effects. Bullying alone was significantly associated with lifetime disease prevalence, and was most strongly associated with 12-month symptoms. 12-month symptoms were also associated with role ambiguity and NOF, although the effects of NOF in particular were more marginal when the effects of novel stressors were taken into account. 12-month musculoskeletal symptoms were associated with role conflict only.

Bullying was most strongly associated with the majority of acute (14-day) health outcomes, with the exception of musculoskeletal symptoms (strongest association with role conflict) and acute tooth/earache (associated with NOF only). Prescribed medication outcomes were generally demonstrated the most robust relationships with bullying. However, effects for medication usage were generally less robust (as evidenced by lower significance levels and smaller odds ratios) than effects observed for symptom-based health outcomes. Although not tested in the current thesis, remaining novel stressors may well be independently associated with the majority of outcomes. However, when novel stressors were considered relative to each other without NOF, a similar pattern of effects emerged.

The use of stepwise regression techniques to determine the effects of stressors relative to each other could however, be considered problematic. Stepwise techniques have been criticised as they tend to 'over-fit' the model; however, the analyses described in Chapter 4 were intended to be of an exploratory nature, therefore a stepwise technique was felt to be the most appropriate method of determining associations between the relatively large number of independent variables. Another potential criticism of the approach described in detail in Chapter 4, relates to the measurement of bullying. The measure used did not take into account the frequency of behaviours experienced, and may therefore have led to over-estimation of associations between bullying and health outcomes, a criticism later addressed in Chapter 8. Furthermore, the patterns of association between the novel stressors detailed above and health outcomes may be less straightforward than the current analytical approach allows for. More complex modelling techniques such as structural equation modelling, may help to disentangle the precise nature of such relationships.

9.2.3 Patterns of association between novel NOF scores and health outcomes

The primary objective of analyses outlined in Chapter 5 was to compare the predictive validity of the original NOF score with three novel scores: the first inclusive of bullying, the second inclusive of bullying and role stressors, and the third inclusive of all novel stressors detailed in Chapter 4. A further aim to was to compare the effects of NOF with those of a similarly calculated demographic risk variable.

Findings show that the original NOF score emerged as a better predictor of work stress and clinical anxiety than novel scores: adding additional stressors to NOF actually decreased the size of observed odds ratios. For clinical depression, little difference was observed between the original score, and scores inclusive of bullying, and bullying and role. The addition of further stressors beyond this point reduced the effect size. NOF inclusive of bullying was most strongly associated with lifetime prevalence of disease, and NOF inclusive of bullying and role demonstrated the most robust association with 12-month health outcomes. For acute (14-day) health outcomes, NOF inclusive of bullying and/or role tended to account for the greatest variance. Acute musculoskeletal outcomes however (back pain and/or swollen ankles) were most strongly associated with the original score. It should be noted that effects for acute individual/symptom clusters generally tended to be less robust than those observed for psychological well-being outcomes and total symptom scores. The original NOF score, followed by the score inclusive of bullying, was most strongly associated with medication use: however, effects for prescribed medication were generally more marginal (perhaps due to their lower prevalence) than for other outcomes. Demographic risk factors were also found to be cumulatively associated with poor health, although NOF explained significantly more variance.

Taken together, the results presented in Chapter 5 indicate that stressors tend to demonstrate a more negative impact in combination, but also that further variance cannot simply be accounted for by adding additional variables to a composite score. Although conclusions about the directions of such relationships cannot be drawn from this cross-sectional sample, the addition of novel variables to NOF does help to further explain the combined effects of occupational stressors.

9.2.4 Selective effects of occupational stressors: NOF components and health outcomes

Given the complex nature of relationships between combinations of stressors and health outcomes, the focus of Chapter 6 was to determine both the selective and combined effects of NOF components, in terms of negative health outcomes. Key findings indicate that work stress is likely of multiple aetiology: this outcome was associated with the demand-control-support, effort-reward imbalance, and working hours/exposure to hazards components of NOF. High demand, high effort and working hours/hazards emerged as key predictors of work stress, although high effort likely exerts the greatest independent effect. The effect of the working hours/hazards component however was less significant (higher p-value), than those observed for demand-control-support and effort-reward imbalance. High effort, low decision latitude and bullying were found to be key predictors of clinical anxiety, whereas clinical depression was most strongly associated with effort-reward imbalance and working hours/hazards only (the effect of the working hours/hazards component was again less robust than that observed for effort-reward imbalance).

Lifetime and 12-month symptom prevalence were most strongly associated with high effort/low reward and bullying; effects of bullying however were more marginal than those observed for high effort and low reward. 12-month musculoskeletal symptoms were most strongly associated with effort-reward imbalance and working hours/hazards, although in this instance the effect of efforts/rewards was smaller than that observed for working hours/hazards. Effort-reward imbalance and bullying demonstrated the most robust associations with any symptom of ill-health within the last 14 days (a more robust association was seen for bullying in this instance). Effort-reward imbalance only was associated with 14-day depression/fatigue and bullying only with 14-day lower respiratory symptoms. 14-day musculoskeletal outcomes were most strongly associated with working hours/hazards. 12-month prescribed medication use was most significantly associated with bullying, and 14-day use of pain killers/indigestion medication was significantly associated with effort-reward imbalance alone.

Associations between NOF components and health outcomes as described above appear to demonstrate independent and cumulative, rather than interactive effects. Furthermore, the patterns of association described above were found to be broadly similar to those detailed by Smith et al. (2004) and in the re-analysis of the community sample data (see Chapter 6 and Appendix VI). In terms of patterns of effect, several outcomes (predicted as having multiple aetiology) such as work-related stress, clinical anxiety, clinical depression, lifetime and 12-month symptom prevalence, were associated with multiple NOF components; others, such as 14-day lower respiratory symptoms and depression/fatigue, and all medication outcomes, were associated with a single NOF component. It is likely that highly prevalent outcomes are of multiple aetiology, whereas outcomes with a lower prevalence (often associated with severity) tend to be associated with a single NOF component. It should be noted however, that this approach enables conclusions to be drawn about correlational, and not causal relationships.

9.2.5 Survey II: Combined and selective effects of occupational stressors in a nursing sample

Results presented in Chapters 7-8 were obtained from a cross-sectional self-report study of 870 nurses. A key aim of Chapter 7 was to replicate the effects described in Chapter 3 of this thesis, with regards the effects of a composite NOF score. Further aims were to determine whether these effects remained when a more comprehensive measure of negative affectivity was included as a covariate, and similarly, whether significant associations between NOF and health outcomes held up when coping style was co-varied for. Given the likely role of coping style as a buffer of negative associations between stressors and strain, established NOF effects were also tested for evidence of such associations. A secondary aim of the analyses outlined in Chapter 7 was to examine the predictive validity of an occupation-specific measure of workplace stressors, as compared to that of the NOF score, taking the influence of individual differences into account as previously described. Lastly, as for the first sample (as described in Chapter 6), the influence of a composite demographic 'risk' variable on health outcomes was assessed, and compared directly to NOF.

Results indicate that the previously established effects of the NOF score were replicated in the current sample, as predicted. However, some associations were smaller in the current sample, likely explained by the difference in sample size, and possibly the more homogenous nature of the sample population itself. It was further hypothesised that these effects would remain when the full 24-item version of Eysenck's neuroticism measure was co-varied for, as opposed to the 3-item proxy measure used in analyses described by Smith et al. (2004) and in Chapters 3-6. This assertion is supported by the findings; effect sizes are nonetheless marginally reduced for all outcomes. It should be noted however, that the prevalence of negative affectivity was higher (as measured by a positive response to at least 2 items within the 3-item scale) in the second sample than in the first, although the significance of this difference was not directly assessed. Furthermore, it was suggested that these effects would hold up when coping style (emotion and problem-focused coping) was co-varied for. This assertion too was largely supported by the current results, in that NOF was still significantly associated with key outcomes such as work-related stress, clinical anxiety, 12-month symptoms and acute ill-health. However, both the number and strength of associations was reduced with the inclusion of coping in the model; for example, NOF was no longer significantly associated with probable clinical depression. Coping therefore appears to explain some of the variance in relationships between workplace stressors and negative health outcomes; however, coping style was not found to buffer these relationships, with the exception of the association between NOF and probable clinical anxiety. Coping therefore appears to be independently associated with outcomes.

The assertion that NOF would better predict health outcomes than an occupation-specific measure (the Expanded Nursing Stress Scale), was fully supported by the results presented in Chapter 7. Although the occupation-specific measure was significantly associated with work-related stress and clinical anxiety, no significant associations were found for other key outcomes such as clinical depression or lifetime prevalence of disease. Furthermore, where significant associations were observed, they tended to be lower in magnitude than those observed for NOF. As for NOF, coping style appeared to exert independent main effects, rather than buffering effects on health outcomes.

The final aim of analyses described in Chapter 7 was to determine the nature of associations between a composite demographic 'risk' score and health outcomes, and to compare the influence of this score directly to NOF. It was hypothesised that effects of the demographic risk variable would be similar to, but smaller in magnitude than those observed for NOF: this hypothesis is largely confirmed by the current results. However, demographic and individual risk, inclusive of coping style, evidenced a stronger association with clinical depression than NOF, and only demographic and individual risk factors were associated with lifetime prevalence of disease. These two exceptions to the hypothesis are likely explained by independent associations between coping and depression, and the higher prevalence of chronic disease amongst older age groups.

In summary, the results presented in Chapter 7 indicate that both the cumulative and selective effects of a NOF score are not occupation-specific, i.e. they are replicable within the context of the current sample. Furthermore, the 3-item measure of negative affectivity used by Smith et al. (2004) and in Chapters 3-6 appears an adequate proxy for the full 24-item version of the EPIN. NOF remains significantly associated with health outcomes when coping style is co-varied for (in addition to negative affectivity): coping itself appears to be independently related to outcomes, yet there is little evidence of buffering effects, except for (low) emotion-focused coping and clinical anxiety. NOF also emerged as a better predictor of health outcomes than the occupation-specific Expanded Nursing Stress Scale, and a demographic and individual risk variable (with the exception of clinical depression and lifetime prevalence of disease). Further research might seek to determine which styles of coping are most adaptive in terms of reducing the likelihood of negative health outcomes, or the potentially predictive effects of adding occupation-specific stressors to a generic NOF score.

9.2.6 Survey II: Selective effects of occupational stressors in a nursing sample

The key aims of Chapter 8 were to assess the relative effects of the NOF score and measures of bullying, to assess the effects of adding bullying measures to NOF (both a dichotomous measure as used in Chapters 4-6, and a continuous, frequency-based measure comprised of the same 20 items), and finally to determine the relative effects of NOF components (including bullying, as in Chapter 6) in terms of health outcomes. The influence of individual differences (both negative affectivity and coping style) was co-varied for.

Results demonstrated that a continuous measure of bullying generally demonstrated more robust associations with health outcomes than a measure based on dichotomous items. Although associations between bullying and health outcomes were fewer than hypothesised, this can likely be accounted for by the independent effects of individual differences such as negative affectivity and coping style. Where bullying was added to NOF, the score comprising categorical items was associated with a greater number of outcomes than the score comprising dichotomous items: the original NOF score was generally associated with a greater number of effects. The NOF score inclusive of bullying demonstrated stronger associations with some outcomes, for example, clinical anxiety, whereas the original score better predicted others, such as work-related stress and lifetime prevalence of disease. It should be noted however, that effects for some outcomes (12-month musculoskeletal symptoms and any symptom of ill-health in the last 14 days) were less robust than those observed for psychological well-being, and remaining 12-month and acute health outcomes.

In terms of associations between NOF components and outcomes, some measures (e.g. psychological health outcomes) appeared to be of multiple aetiology and were therefore associated with at least two NOF components, not necessarily equally weighted in terms of effect size or variance accounted for. Other outcomes (e.g. 14-day symptoms) tended to be associated with a single component of NOF. Results presented in Chapter 8 add weight to previous similar findings (see Chapter 6), and extend research by seeking to determine the role of individual differences in terms of established relationships between NOF components and health outcomes.

9.2.7 Summary of findings

The results presented in the current thesis suggest that workplace stressors likely combine cumulatively to produce negative health effects. However, the pattern of association observed between a composite stressor score and health outcomes is to some extent selective, i.e. outcome-dependent. When the effects of a set of novel stressors (Chapter 4) are considered relative to those of a combined stressor score (NOF), only workplace bullying emerged was significantly associated with the majority of outcomes over and above the influence of NOF (comprising the DCS and ERI models, and a measure of unfavourable working hours and/or exposure to physical hazards). The addition of bullying to the NOF score provides further support for the selective nature of associations between stressors and poor health: for some outcomes, the novel NOF score explained the greatest proportion of variance, for others, the original score was associated with the greatest risk of reporting. This pattern of association was dependent to some extent on whether bullying (either alone or in addition to NOF) predicted outcomes independently.

Examination of relationships between components of the NOF score and health outcomes sheds further light on the nature of previously described selective associations. In terms of patterns of effect, several outcomes (e.g. work-related stress, clinical anxiety, clinical depression, lifetime and 12-month symptom prevalence) were associated with multiple components of NOF, whereas others, such as 14-day lower respiratory symptoms and depression/fatigue, and all medication outcomes, were associated with a single NOF component. Where multiple NOF components were associated with outcomes, these components tended not to explain equal proportions of the variance, for example, high effort appeared to exert the greatest independent effect on work-related stress. Components of the ERI model in general (high effort/low reward) were most strongly associated with the majority of outcomes, either alone or in addition to other NOF components.

Further examination of these issues in a second, homogenous occupational sample, further supports the assertion that associations between stressors and poor health are both cumulative and selective: although stressors tend to demonstrate greater negative effects when considered in combination, simply adding stressors to a composite score does not necessarily explain further variance in health outcomes. Some potential criticisms of results presented in Chapters 3-6 were addressed in Chapters 7 and 8, in that a brief (3-item) measure of negative affectivity was found to be a good proxy measure of a longer (24-item) scale. Furthermore, established relationships between the NOF score and health outcomes remained significant when the influence of coping style was co-varied for: although coping style is independently associated with health outcomes, it does not appear to buffer relationships between stressors and health, with the single exception of (low) emotion-focused coping and probable clinical anxiety.

The predictive validity of a generic composite stressor score (NOF) was also compared with that of an occupation-specific stress measure (the Expanded Nursing Stress Scale: ENSS). Although predictive of some key outcomes (e.g. work stress, clinical anxiety), the ENSS measure was not significantly associated with the majority of health outcomes, and where associations were observed, they tended to be lower in magnitude than those demonstrated by the NOF score. Further examination of the measurement of bullying indicated that a measure based on dichotomous items does not appear to over-estimate associations between bullying and poor health, when compared directly with a frequency-based measure. The influence of demographic and individual risk factors was also compared directly to NOF, and demonstrated a similar pattern, yet fewer and generally smaller effects were observed. It should be noted however that the purposes of such analyses (i.e. where a composite demographic risk variable served as an independent predictor) was not to determine the nature of associations between demographic and individual risk factors and poor health per se, but rather to demonstrate the effects of the NOF score relative to a similarly calculated measure based on demographic and individual characteristics.

The results outlined above suggest that stressors are independently and cumulatively associated with poor health outcomes. Where composite scores (i.e. NOF) served as independent predictors in regression analyses no direct tests of potential interactions between stressors were carried out. However, where possible interactions between NOF components were directly examined (see Chapter 6) no significant effects were observed, a finding which is supportive of the literature, particularly in relation to the Demand-Control-Support Model (see Chapter 1). Further evidence that stressors tend to demonstrate independent effects is presented in Chapter 8, in that coping was not found to buffer the majority of associations between stressors and poor health.

Three key findings emerged from the results outlined in this thesis. Firstly, that stressors combine to produce negative health effects, and secondly that stressors are also to some extent selectively associated with poor health. A third interpretation of the pattern of results described is that the NOF score can be considered as an occupational equivalent of socio-economic status (SES): specific outcomes are associated with particular components within SES, yet the combined score gives a reliable indicator of the relationships between demographic factors and poor health. The cumulative and selective effects currently presented are generally replicable across the samples described: however, where effects do not hold up or differ quantitatively, qualitative differences in, for example, the nature of social support available, may underlie these apparent discrepancies. Furthermore, where health effects are less pronounced in the occupation-specific samples which were the focus of this thesis, particularly in the second survey sample comprised solely of nurses, differences may be accounted for by self-selection into certain professions, i.e. the 'healthy worker' effect. It may be the case that nursing as a profession attracts individuals with particular qualities, of which psychological robustness may be a key factor.

9.3 THE WIDER LITERATURE: RELEVANCE AND INTERPRETATION OF FINDINGS

In the following sections, the findings summarised above are discussed within the context of their relevance to previous research in this area, and what they add to existing knowledge.

9.3.1 Combined and selective effects of established job stress models

The independent effects of established job stress models such as the DCS and ERI on heath outcomes are well established within both heterogeneous and homogenous occupational groups (e.g. Landsbergis et al., 1994; Siegrist, 1996; Peter & Siegrist, 1997; Bosma et al., 1998; Stansfeld et al., 1998a&b; Theorell & Karasek, 1998; Tsutsumi et al., 2001a&b; Kivimäki et al., 2002; Kuper et al., 2002; Van Vegchel et al., 2002; Weyers et al., 2006). The negative health consequences of non-auditory noise exposure and irregular working hours are also well documented (e.g. Smith, 1991; Smith & Broadbent, 1992; Sparks, 1997; Borg & Kristensen, 1999; Butler et al., 1999; Knutsson, 2003; Schernhammer et al., 2003).

The combined effects of such stressors have tended to receive less attention within the literature: nonetheless, there is substantive evidence to suggest that job stress models may explain greater variance in health and well-being when considered in combination. A combination of the DCS and ERI models has been found to explain greater variance in mental distress and job satisfaction (Calnan et al., 2000), cardiovascular mortality risk (Peter et al., 2002) and mental strain (Rydstedt et al., 2007). It has also been suggested that particular job stress models, and components within models, may be selectively associated with particular health outcomes: for example, a number of studies have indicated that effort-reward imbalance better predicts physical health and chronic disease outcomes than high demands and low support and control (e.g. Bosma et al., 1998; de Jonge et al., 2000b; Peter et al., 2002; Ostry et al., 2003; Fillion et al., 2007). The findings presented in this thesis therefore add further weight to evidence that job stress models are both cumulatively and selectively associated with particular health outcomes.

However, it has been suggested that job stress models generally may not be as predictive of depression and anxiety as for other physical and psychological health outcomes (Calnan et al., 2004). When considered in a combined model, this was not found to be case in the current sample for clinical anxiety: however associations between NOF, and NOF components and probable clinical depression, were generally weaker than those observed for clinical anxiety, providing some support for this assertion. It has also been argued (Tsutsumi & Kawakami, 2004) that the ERI model may be a better predictor of health outcomes in predominantly female samples than the DCS model. The current results lend weight to this hypothesis, in that the ERI component of NOF was found to be more predictive of outcomes than the DCS in the predominantly female samples studied in this thesis: however, in a community working population sample (Smith et al., 2004) the DCS appeared to have a greater impact in terms of poor health.

9.3.2 Extension of existing job stress models: Combined and selective effects

Several studies have combined relatively large numbers of occupational stressors (e.g. Melamed, 1999; Smith et al., 2004) and demonstrated linear relationships between a composite stressor score and health and well-being outcomes. Further support for the combined additive effect of psychosocial and physical stressors in terms of predicting poor (musculoskeletal) health is presented by a number of authors (e.g. Devereux et al., 2002).

The potential merits of assessing situation-specific stressors in addition to components of either the DCS or ERI models, has also been examined. The addition of such stressors has been found to explain further variance in health outcomes than that accounted for by traditional job stress models alone (e.g. Akerboom & Maes, 2006; Fillion et al., 2007). The results presented in Chapter 7 of this thesis indicate however, that occupation-specific measures tend to be less predictive of health outcomes than more global measures (i.e. the NOF score). However, it may well be the case that the addition of particular situation-specific measures to existing job stress models or more generic composite stress measures, would explain additional variance in health outcomes. On the other hand, it has been argued that situational-specificity is an unnecessary component of job stress models, with the possible exception of studies within homogenous populations (Van Vegchel et al., 2005). Furthermore, previous research suggests that the effects of a global, generic composite measure of workplace stressors (NOF) are unlikely to be occupation-specific (Smith et al., 2004). This finding is supported by the current results, in that similar patterns of effect were observed across both heterogeneous and homogenous samples.

A number of nursing-specific stressors have been associated with poor health outcomes: unpredictable staffing and scheduling, lack of role clarity, lack of involvement in decision making, poor status (Williams et al., 1998), leadership style (McVicar, 2003), low control, high demands, shortage of resources, being moved between care units, shift rotation, poor organisational commitment (Chang et al., 1995), discrimination, uncertainty concerning treatment (French et al., 2000), low social support (Williams et al., 1998; Chang et al., 2005), professional conflict/poor relationships with colleagues/supervisors (French et al., 2000; McVicar, 2003; Chang et al., 2005), under-skilled staff/poor quality care (Chang et al., 2005; Glazer & Gyurak, 2008), lack of management support, job overspill, making decisions under time pressure, lack of organisational recognition (Bennett et al., 2000), workload, coping with death and dying, and patients and families (French et al., 2000; Chang et al., 2005). However, the analyses presented in Chapter 7 indicated that a global measure of workplace stressors was more predictive or poor health than an occupation-specific measure. Nonetheless, the impact of combining occupation-specific stressors within a more general model may merit further evaluation.

9.3.3 Independent effects of novel workplace stressors

Cox (1990) suggested that the following potential sources of work stress should be considered in addition to high demands and low control: organisational culture (e.g. non-supportive), role within the organisation (e.g. ambiguity/conflict), career development (e.g. uncertainty, poor status/pay), interpersonal relationships (e.g. conflict), the home/work interface (e.g. conflicting demands of work and home), work scheduling (e.g. shift work) and the physical environment (e.g. high levels of noise). It has also been suggested that interpersonal relationships and aspects of role should also be taken into account, again in addition to high demands, low control and low support (HSE, 2007).

The following additional measures were introduced as potential sources of stress in Chapter 4 of this thesis: Leader-Member Exchange (LMX), Team-Member Exchange (TMX), (un)supportive organisational culture, role conflict, role ambiguity and bullying at work. Little research has previously investigated the effects of these stressors on health outcomes with the exception of bullying. However, associations between LMX, burnout, physical health problems (Rose, 1998), work-related stress (Nelson et al., 1998) and (reduced) job satisfaction (Major et al., 1995) have been suggested. Organisational culture has also been found to predict job satisfaction in nurses (Tzeng et al., 2002) and work-related stress (Länsisalmi et al., 2000; Peterson & Wilson, 2002). Role ambiguity and conflict have also been linked to burnout (Duquette et al., 1994; Boyd, 1996; Peiro et al., 2001; Ortqvist and Wincent, 2006). Bullying at work has been suggested as a risk factor for cardiovascular disease and depression (Kivimäki et al., 2003), psychological and psychosomatic complaints (Mikkelsen & Einarsen, 2002), increased use of psychotropic medication (Vartia, 2001) as well as low job satisfaction and increased sickness absence (Kivimäki et al., 2000).

The current results provide support for previously established associations between bullying and poor health. Furthermore, these associations appear relatively robust, as they were often evident over and above those demonstrated by the NOF score. The potential for over-estimation of associations between bullying and health outcomes in Chapters 4-6 was addressed in Chapters 7-8, using a frequency-based measure of bullying: as Zapf (1999) states, behaviours must occur relatively frequently (at least once a week for 6 months) to be defined as bullying. Effects observed in Chapters 4-6 were found to hold up in Chapters 7-8. However, the remaining novel stressors considered in Chapters 4 and 5 added little in terms of predictive validity. It was not the aim of this thesis to determine the independent effects of these stressors: it is however likely that the majority of novel stressors would evidence significant associations with a range of negative health outcomes. The purpose of considering these potential sources of stress was rather to determine whether they would explain additional variance in health outcomes to that already accounted for by existing job stress models, and/or a composite score comprising existing job stress models. With the exception of bullying, this was not found to be the case.

9.3.4 Selective effects of workplace stressors: NOF components

The current results indicate that although stressors tend to exert more negative effects in combination, it is nonetheless apparent that particular stressors (components of the NOF score), and/or particular combinations of NOF components, tend to be more predictive of some outcomes than others. This finding is consistent with previous research suggesting that the ERI model is most predictive of physical health outcomes (e.g. Bosma et al., 1998; de Jonge et al., 2000b; Peter et al., 2002; Ostry et al., 2003; Fillion et al., 2007), and also the work described by Smith et al. (2004) in which it emerged that components of the NOF score were selectively associated with particular outcomes. The precise nature of these selective effects is broadly similar in the community and occupation-specific samples described by Smith et al. (2004) and in the current thesis respectively. Apparent discrepancies between the NOF component or components key in terms of risk of reporting a particular outcome are likely explained by differences between the two samples, as it has been suggested for example that the ERI model may be more predictive of poor health in predominantly female (Tsutsumi & Kawakami, 2004) and healthcare sector samples (Marmot et al., 1999; Calnan et al., 2004).

9.3.5 Patterns of association

The results presented in this thesis with regards the cumulative and selective pattern of association with the NOF score and health outcomes, is supportive of previous suggestions that relationships between stressors and health are curvilinear for some outcomes (Warr, 1994), whereas others likely demonstrate threshold effects (e.g. Landsbergis et al., 1992; Schnall et al., 1994). The analytic approach outlined in this thesis has concentrated on main effects of stressors and composite stressor scores. However, where interactions between stressors were specifically examined, no such evidence was found. This is consistent with previous research which has found little support for the interactive effects of job stress models (i.e. the 'buffering' effects of control, and social support as hypothesised in the DCS model, and the moderating effects of overcommitment, or intrinsic effort on (extrinsic) effort-reward imbalance: Van der Doef & Maes, 1998, 1999; Van Vegchel et al., 2005).

The role of individual differences in relationships between stressors and strain was examined in this thesis in a number of ways. The potentially independent effects of both negative affectivity and coping style (both emotion and problem-focused coping) were controlled for, for all outcomes (see Chapters 7 and 8). Coping style appeared to be independently related to outcomes: however, the suggestion that a problem-focused coping style would buffer negative associations between stressors and health was not supported by the current results. The general consensus within the coping literature also suggests that emotion-focused strategies are likely to be maladaptive: some support was found for this suggestion, in that emotion-focused coping was found to increase the association between NOF and clinical anxiety. However, it may be the case that some emotion-focused strategies are more adaptive than others (e.g. Carver et al., 1989; cited in Baker & Berenbaum, 2007), or that women tend to be more successful in their application of emotion-focused approaches (Gonzalez-Morales 2006; Baker & Berenbaum, 2007). Situational specificity may also go some way to explain the apparent disagreement within the literature as to the most effective coping styles. Furthermore, as Shimazu and Kosugi (2003) note, problem-focused approaches may actually have negative consequences for an individual where coping is prolonged and effortful. The authors suggest a combined style of emotion and problem-focused coping may therefore be beneficial.

9.3.6 Summary of findings within the context of the wider literature

The results presented in this thesis both support and extend previous research examining relationships between occupational sources of stress and health outcomes in a number of ways. Firstly, the results support suggestions that traditional job stress models likely explain more variance in health outcomes when considered in combination; current findings also shed further light on the selective nature of associations between model components and outcomes. Research has also argued that traditional models, even when considered in combination, fail to take account of aspects of the modern working environment, such as interpersonal relationships. The current studies therefore add to knowledge, in that the combined influence of such 'novel' stressors is highlighted. Furthermore, although associations between interpersonal stressors such as workplace bullying and poor health are relatively consistent within the wider literature, such relationships have not before been considered relative to the effects of other more established sources of work-related stress. Results presented in this thesis also extend previous work examining the combined and selective effects of occupational stressors (Smith et al., 2004), in that the influence of potentially novel sources of stress were examined in addition to established effects of a composite score and its' components. Moreover, patterns of association appear relatively robust, given they are replicable in heterogeneous and homogenous populations, and are to a large extent independent of measures of individual differences.

9.4 DIRECTIONS FOR FUTURE RESEARCH AND MECHANISMS UNDERLYING STRESSOR-STRAIN ASSOCATIONS

Possible directions for future research in this area are outlined in the following sections, with particular reference to types of stressor, and the nature of relationships between such stressors and poor health. Alternative experimental designs and analytical approaches are suggested. Theories explaining the mechanisms underlying associations discussed in this thesis are also outlined, and the importance of individual differences and physiological reactions in the stress process are discussed.

9.4.1 Criticisms of the current approach: Methodological weaknesses

The body of evidence presented in this thesis indicates that stressors are both cumulatively and selectively associated with health outcomes, and that such associations appear robust and transferable across different occupational groups. However, the results must be interpreted with some degree of caution due to a number of methodological weaknesses.

Firstly, both surveys detailed were cross-sectional in design, and therefore preclude conclusions as to the direction of the associations described. Stressors can only be considered to predict poor health in a statistical sense: it cannot be concluded that the Negative Occupational Factors measured are causal in determining poor health. It may be the case the some outcomes, for example chronic health problems (possibility associated with long-term sickness absence) might be predictive of poor interpersonal relationships and bullying. However, given the significant associations between bullying and relatively minor acute health complaints, it is likely that bullying predicts poor health, even if the reverse is also true in some circumstances. A further criticism of cross-sectional designs is that data are collected at a single isolated time-point. Study designs which enable measurement at multiple time points (for example stress studies which utilise daily diaries) or longitudinal designs would enable more robust conclusions to be drawn about the influence of chronic stressors on health outcomes.

Longitudinal study designs would be required to test causal hypotheses. Moreover, where relatively long-term or chronic health outcomes are the focus of interest, length of follow-up would need to allow a sufficient time period for change to be detected. Although fewer associations were observed in the studies described here than for acute and psychological health outcomes, associations between poor psychological well-being and chronic disease are well-established: longitudinal analyses are likely therefore to evidence significant associations between stressors and chronic disease.

For some outcomes, a 12-month follow-up period would likely be sufficient to detect change; for other more chronic disease outcomes, longer follow-up may be required. A longitudinal study design was not however practical for the purposes of the current study, given time constraints. A second potential criticism of the current research is over-reliance on self-report measures, both for independent and dependent variables. The exclusive use of self-report measures introduces a likely source of common method variance, which may lead to over-estimation of the strength of associations between stressors and health outcomes. Future research would benefit from the inclusion of more objective measurement of critical variables, preferably incorporated within a longitudinal design. It is perhaps more straightforward, intuitively at least, to objectively assess outcome measures. Such measures might include physiological markers of stress (e.g. salivary cortisol, plasma fibrinogen), sickness absence records, occupational accident/injury records, and more objective methods of assessing poor health outcomes such as medical records to verify diagnoses of chronic disease and psychological ill-health. Objective approaches to assessing work-related stress might however include measurement of physical stressors such as noise, heat and vibration if appropriate for particular occupational groups, and external assessment of working hours. Experimental studies of task demands and associations with e.g. physiological stress have also provided valuable insight into how particular types of (usually physical) job demands may combine to produce negative effects. However, effective methods for objective measurement of psychosocial workplace stressors remains problematic.

Main effects of stressors and combinations of stressors have been the focus of analyses detailed in this thesis. It could be argued that the potentially interactive effects of some stressors (e.g. demands and control) merit further consideration, as do the hypothesised buffering effects of social support and coping style. However, evidence of interactive and buffering effects are at best equivocal within the wider literature (e.g. O'Driscoll and Cooper, 1994; Van der Doef & Maes, 1998; Stansfeld, Head & Marmot, 2000). Furthermore, the current data provided little support for anything other than main effects. It should also be noted that all analyses described in the current thesis utilised quartile or median splits of independent measures. Although a valid approach within the context of the current aims (i.e. to compare health differences in terms of discrete levels of exposure to stressors) it is worth noting that had analyses employed continuous independent variables, observations with regards patterns of association would have been different. For example, use of a continuous independent variable may have shed further light on the linear or non-linear nature of associations between stressors and health outcomes.

It is also worth noting that a different analytical approach to that described here may provide a slightly different pattern of results. Binary logistic regression was chosen as the main analytical approach in the current thesis, given the majority of outcomes were either dichotomous or categorical (and therefore more appropriately re-categorised as dichotomies for the purposes of analysis). However, psychological well-being outcomes were continuous in nature, and it could be argued, better suited to a linear regression model in order to avoid any loss of sensitivity in the data. However, within the context of the current datasets, it was important to employ a consistent method of analyses for all outcomes. The stepwise approach taken in Chapter 4 has also received some criticism, in that stepwise techniques tend to 'over-fit' regression models. However, when used as an exploratory method as was the intention of analyses set out in Chapter 4, stepwise techniques can help to identify the best predictors of a particular outcome among a large number of independent variables, where no prior knowledge about the likely importance of each can be assumed.

However, associations between stressors and health outcomes described throughout this thesis may follow more complex patterns than the analytical approach allows for. For example, it has been suggested that organisational culture may be antecedent to the development of workplace bullying (e.g. Salin, 2003; Strandmark & Hallberg, 2007), and/or may act as a 'filter' through which bullying behaviours are perceived and tolerated within organisations (e.g. Einarsen et al., 1996). Culture is perhaps also best measured at an aggregated, organisational level, rather than at the individual level, which may better reflect organisational climate (Parker et al., 2003). Multi-level models that allow associations to be tested at both the organisational and individual level may therefore shed further light on patterns of association.

LMX and TMX may moderate or mediate relationships between bullying and health for example, given previous evidence highlighting the role of LMX and TMX as moderators or mediators of relationships between individual differences (e.g. locus of control) and work-related well-being (Epitropaki & Martin, 1999; Martin et al., 2005). It may also be the case that role stress (ambiguity, conflict, overload) influences relationships between other workplace stressors and health. More complex modelling techniques such as structural equation modelling may help to disentangle the precise nature of associations between workplace stressors and health outcomes, in terms of pathways.

9.4.2 The role of individual differences and occupation-specific stressors

In addition to negative affectivity, coping style and demographic characteristics, various individual difference variables have been implicated in the stress-strain relationship. For example, personality characteristics such as locus of control, hardiness and Type A behaviour are thought to be influential in the appraisal of situations as stressful, and subsequently employed coping strategies (Kobasa, Maddi & Courington, 1981; Baron and Kenny, 1986; Cox & Ferguson, 1991; Parkes, 1994; Spector, 2003). However, as for coping, there is a lack of consensus within the literature as to the mechanisms via which these individual difference measures influence well-being. The role of individual differences in the stress process therefore requires clarification, perhaps provided by the modelling techniques described above. In addition, it has been suggested that the literature on mood and emotion, may facilitate a deeper understanding of employees' affective states more generally (Carver & Scheier, 1990; cited in Briner & Reynolds, 1999). It has also been suggested that individual differences may actually be causal factors in the occurrence of negative life events, which may in turn influence psychological well-being (e.g. Shahar, Joiner, Zuroff & Blatt, 2004).

The current results also support previous assertions that detailed situational specificity in job stress models is unnecessary (Van Veldhoven et al., 2005). However, there is evidence to suggest that the addition of nursing-specific stressors to more established job stress models may explain greater variance in outcomes (Fillion et al., 2007), a proposition not tested in this thesis.

9.4.3 Associations between stressors and health: Underlying mechanisms

The purpose of this thesis was to describe associations between a broad set of occupational stressors and health outcomes, rather than to explain the mechanisms underlying such associations. However, such mechanisms are likely very complex and to some extent outcome-dependent, as suggested by the findings presented in this thesis. Delineating these relationships might therefore serve as an appropriate starting point for further research in this area.

Studies of the biological pathways and mechanisms through which stress affects health are now numerous, and cover a wide range of ever-increasing indicators. Theorell (2003) notes that such approaches are appealing because biological markers are objective, and therefore less sensitive to either exaggeration or denial, which may result in spuriously inflated, or underestimated effect sizes. Theorell (2003) also points out that assessment of biological markers should not be undertaken at a single time point, given the evidence that many such markers exhibit different patterns of association at different points in the stress process.

Approaches to assessment of biological stress markers can be broadly summarised under a number of categories. There is a body of literature that suggests (sympathetic) nervous system activation and neuroendocrine activity is a causal factor for chronic poor health (e.g. metabolic syndrome and cardiovascular disease: Brunner, Hemingway, Walker, Pate, Clarke, Juneja, Shipley, Kumari, Andrew, Seckl, Papadopoulos, Checkley, Rumley, Lowe, Stansfeld & Marmot, 2002). Salivary cortisol is a popular biological stress marker, and research has indicated that levels are raised on waking in individuals exposed to stressful life events (e.g. Steptoe & Marmot, 2002; cited in Theorell, 2003). The use of plasma fibrinogen as a stress marker is increasing in popularity in epidemiological research, and appears to be associated with psychological distress (high demand and low control: e.g. Brunner, Davey-Smith, Marmot, Canner, Beksinska & O'Brien, 1996; cited in Theorell, 2003). Immune function is also thought to be a key mechanism in terms of explaining associations between stress and poor health. As McEwen (2000) notes, acute stress enhances immune function, whereas chronic exposure to stressors appears to suppress it. Stress has also been associated with exacerbations of autoimmune disease and other conditions in which inflammation is key factor, such as coronary heart disease

(Harbuz, Chover-Gonzalez & Jessop, 2003; Appels, Bar, Bar, Bruggeman & de Bates, 2000; cited in Schneiderman, Ironson & Siegal, 2005). Furthermore, as Schneiderman et al. (2005) observe, animal models have proved very useful for advancing our understanding of the influence of stressors on disease processes, for example associations between social group structure and atherosclerosis in monkeys (Kaplan, Manuck, Clarkson, Lusso & Taub, 1982; cited in Schneiderman et al., 2005).

There are therefore numerous pathways through which stressors are likely to influence health, and a large literature describing these in detail. For example, in addition to the physiological, immunological and endocrinological associations outlined above, stressors may influence physical health more indirectly, through effects on health-related behaviours (increased alcohol use, and smoking behaviour), or via established associations between stressors and poor mental health, and between poor mental and physical health (Charney & Manji, 2004). A major finding of the current thesis is that stressors produce more negative health effects in combination. This finding is consistent with the definition of stress as demands exceeding an individual's capacity to cope: the more demands placed on an individual, the less likely they are to cope effectively, which may in turn impact negatively on health. In addition to the occupational literature already described, further support for this assertion can be found within the stress literature more widely. For example, those experiencing chronic life stress were found to respond more negatively to an additional source of acute psychological stress, as measured by subjective distress and levels of cortisol, epinephrine and norepinephrine (Pike, Smith, Hauger, Nicasso et al., 1997). Studies examining the cumulative effects of daily hassles also lend support to a combined effects approach, in that those simultaneously exposed to high levels of work and life stress have been found to be at greater risk of depression (Melchior, Berkman, Niedhammer, Zins & Goldberg, 2007). Daily hassles have also been associated with an increased risk of burnout in nurses: an effect still evident when life stressors only were included in the model (Matzelle, 2006). Daily hassles may also impact on physical health, either directly or indirectly via physiological stress responses such as increased cortisol excretion (Sher, 2003).

The second major finding highlighted throughout this thesis indicates that despite the combined influence of stressors, certain health outcomes may be associated with particular risk factors: stressors are therefore selectively, as well as cumulatively, associated with health outcomes. Support for this conclusion can also be found within the wider stress literature. Studies of the effects of physical stressors on physiological and endocrinological responses have indicated that different types of stressors likely affect health outcomes via different physiological (specifically neuroendocrine) pathways (e.g. Blair, Wing & Wald, 1991; Pacek, Palkovits, Yadid, Kvetnansky, Kopin & Goldstein, 1998). Studies of depression have also indicated that life stress affects multiple physiological systems associated with poor mental health. Certain genotypes, neuroplasticity, and abnormal serotonergic and noradrenergic function have all been implicated as casual factors for depression, and exposure/abnormal function across several pathways is associated with increased risk (Charney & Manji, 2004).

The findings that stressors are both cumulatively and selectively associated with health are not therefore contradictory, as might initially appear: furthermore, these results within an occupational setting are consistent with what is already known about the role of stress and health more generally. A combined effects approach is useful for determining individual levels of risk of ill-health. However, the idea that particular health outcomes are associated with specific risk factors also has significant implications for stress management policy and interventions.

9.5 IMPLICATIONS FOR POLICY AND PRACTICE

The results summarised thus far in this chapter have several implications for policy and practice relating to stress management, outlined in the following sections.

9.5.1 Assessment and management of occupational stress

The Management Standards Approach (HSE, 2007) identifies six key areas of work design that are associated with stress and poor health if incorrectly monitored and managed. These 6 areas are: demands (workload, work patterns, work environment), control (over pace/content of work), support (from the organisation, management and colleagues), relationships (promoting positive relationships to avoid conflict and bullying), role (ambiguity and conflict) and change (how organisational change is communicated and managed). The first three areas relate to job content, and the latter three to job context (MacKay, Cousins, Kelly, Lee & McCaig, 2004). Initially, the Management Standards comprised a measure of organisational culture: however, this was later excluded as it was felt to underlie the other 6 standards (MacKay et al., 2004). Within the context of the Management Standards, organisations should ideally seek to identify workplace stressors via risk assessment, with the aim that stress is reduced or controlled. According to the HSE (2007), stress management policies should also include provision for adequate managerial training, and counselling for employees suffering from stress.

The approach outlined in this thesis with regards delineating factors most likely associated with 'stress' and poor health, is similar in many ways to the approach set out in the Management Standards. Job demands, control and social support were represented in the composite NOF score, and the potentially detrimental effects of role stress (conflict and ambiguity) were also assessed. Measures of LMX, TMX, and bullying assessed working relationships: LMX and TMX could be thought of as representing the positive aspect of working relationships, whereas measures of bullying assessed the negative consequences of conflict. However, a number of fundamental differences between the two approaches are evident: firstly, (unsupportive) organisational culture was directly measured in the current thesis, whereas culture is assumed to underlie, or is inferred from, the Management Standards set out by HSE. The concept of organisational culture however, is difficult both to define and measure. There is confusion within the literature between the constructs of psychological climate, organisational climate and organisation culture. Terms are often used interchangeably, yet it has been argued that climate refers to individual perceptions, and culture to the aggregation of these perceptions at the group or organisational level (Parker et al., 2003). It is however likely that culture is may play a key role in creating effective stress management interventions (Peterson & Wilson, 2002), and also that it may act as a filter through which behaviours such as bullying are tolerated (e.g. Einarsen & Skogstad, 1996).

Other potential sources of work-related stress considered here, do not feature in the Management Standards, i.e. physical and environmental stressors (noise, physical hazards, unfavourable working patterns) and efforts and reward. Furthermore, organisational change is thought to be important in predicting work-related stress, yet was not assessed in either survey described in this thesis. The current approach is also fundamentally different, in that it is the combined effects of these categories of stressor that are the focus of interest. If an organisation wishes to identify all potential sources of stress affecting its employees, then it is important to have some degree of understanding of how these sources of stress may combine in terms of health effects. In order to identify those most at risk, it would be necessary to determine how stressors combine to produce individual levels of exposure. However, a potential criticism of the approach outlined in the Management Standards and in this thesis, relates to the risk assessment model employed: it has been argued that work-related stress should be viewed in the same way as any other potential occupational hazard and risk assessed (HSE, 2001; Cox and colleagues, 1993; 1996, cited in Cousins, MacKay, Clarke, Kelly, Kelly & McCaig, 2004). However, as Rick and Briner (2000) point out, it is difficult to objectively identify and measure sources of psychological harm and consequent health risks. Moreover, as is apparent both from previous research and the results outlined in the current thesis, a single questionnaire is not sufficient to capture all likely sources of work-related stress (Rick, Briner, Daniels, Perryman & Guppy, 2001; cited in Cousins et al., 2004). However, for practical reasons, assessment tools need to be concise, without sacrificing reliability and predictive validity.

9.5.2 Stress management interventions

Although it is relatively straightforward to envisage how the current results might contribute to assessment of occupational stress, it is more problematic to determine how the results might influence interventions aimed at reducing and managing such stress. Evidence regarding the effectiveness of stress management interventions in general is mixed, although negative effects are rarely reported (MacKay et al., 2004). In fact, positive benefits in terms of psychological well-being have been reported where job re-design has been the focus of interventions (MacKay et al., 2004). However, interventions based on modifying psychosocial factors at the individual level have been less successful. Irie et al. (2003; cited in Tsutsumi & Kawakami, 2004) reported mixed results following implementation of an intervention based on the ERI model. At 1 year, reductions in overcommitment, self-reported sleepiness and frequency of burnout symptoms were observed, yet there was no significant reduction in ERI in the intervention group, and physical health was generally worse. Similarly, Aust et al. (1997; cited in Tsutsumi & Kawakami, 2004) reported a significant reduction in overcommitment in the intervention group, yet no significant effects on mood or self-reported symptoms were found.

A number of reviews of the effectiveness of interventions have been carried out, although individual-level interventions (e.g. training in relaxation techniques, coping strategies, time management) have predominated (e.g. Semmer, 2003; cited in MacKay et al., 2004). However, as MacKay et al. (2004) note, organisational-level interventions are becoming increasingly popular. Such organisational-level interventions might comprise job-redesign, as well as larger scale organisational change. However, the likely success of such interventions is based on the assumption that organisational factors are causal in determining poor health outcomes: as Briner and Reynolds (1999) point out, methodological weaknesses inherent in much of the available literature make it difficult to determine the causes of poor health. The authors further note that theories which attempt to explain the mechanisms underlying relationships between stressors and strain (i.e. 'stress' and poor health) are required; longitudinal research comprising multiple self-report and objective measures of both stressors and outcomes is likely to shed further light on such mechanisms.

The current findings indicate that where it is not feasible to reduce or remove all potential workplace stressors, addressing the key risk factors for a particular outcome is nonetheless likely to have a significant impact. For example, if sickness absence due to depression was a particular problem for an organisation, targeting effort-reward imbalance would likely result in a reduced risk of depression for the majority of employees. Moreover, reduction in several areas of risk would also likely reduce the overall association between stressors and other negative health outcomes.

9.6 SUMMARY: DIRECTIONS FOR FUTURE RESEARCH

The results described in this thesis suggest that occupational stressors are both cumulatively and selectively associated with poor health. Such effects appear robust, and are replicable across both heterogeneous and homogenous occupational groups.

Furthermore, although individual differences are independently related to health outcomes, they do not generally appear to buffer negative associations between stressors and strains. These findings both support and extend previous research in several ways. Assertions that job stress models explain greater variance in health when considered in combination are confirmed; results also shed light on the selective nature of associations between stressors and health outcomes. Furthermore, the role of interpersonal factors in the stressor-strain relationship has received comparatively little attention in the literature, but is discussed in detail in the context of the current studies. The implications of these findings for policy and practice relating to stress management has also been discussed, with particular reference to the risk-assessment and Management Standards approach outlined by the HSE (2007). Implications for stress management interventions are more difficult to discern: however, given the difficulties in defining and assessing psychological risk, it is unsurprising that interventions aimed at targeting exclusively psychosocial factors have proved somewhat less successful than those in which the focus is more objective e.g. job-redesign. Nonetheless, the current findings indicate that interventions targeted at the key risk factors for a particular health outcome would likely have significant benefits.

Methodological criticisms of the current studies have also been outlined, in particular the disadvantages associated with cross-sectional designs, and over-reliance on self-report measures. Although evidence of interactive and buffering associations was limited within the context of the current analyses, it may well be the case that relationships between stressors, individual characteristics and health outcomes are more complex than the current analytical model allows for: future research may therefore wish to consider the use of multi-level, and/or structural equation modelling techniques in order to determine how these variables relate to each other. Similarly, future research which addresses the theory and mechanisms underlying these associations (including studies of biological and genetic factors), in other words, determining why certain relationships are observed, is an important next step in advancing knowledge in this area. It may also be possible to create a combined stressor model and score comprised of fewer individual items, which from a practical perspective would perhaps be a more feasible method of assessing risk. The Management Standards Approach (HSE, 2007) is consistent with a feasible and practical approach to measurement: however, the combined effects of shortened measures that reflect the same attributes as those comprised in the NOF score requires further study.

Although results presented were generally replicable across different occupational groups, particularly in terms of combined effects, precise patterns of association between particular risk factors were found to differ slightly between samples. This apparent discrepancy may well be due to underlying qualitative differences in terms the nature of a particular stressor, for example, the type of social support available. Perhaps a general criticism of a combined effects approach then, is that it may over-simplify relationships: assessment of trait, rather than state characteristics may therefore be more appropriate given levels of perceived stress will be variable.

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Appendix I:
Health & Safety at Work Survey (I)

Participant No:

HEALTH & SAFETY AT WORK SURVEY

CARDIFF UNIVERSITY
PRIFYSGOL CAERDYDD

The Centre for Occupational & Health Psychology, Cardiff University.
63 Park Place, Cardiff. CF10 3AS.

GENERAL INSTRUCTIONS

We are conducting research into the impact of working life on stress, health, accident and injury rates.

The questionnaire is strictly confidential. We are only interested in groups of workers and therefore no individual will be identified in connection with any of the research findings. Your identity and responses to the questionnaire will be completely protected.

Please read each question carefully and mark the response that BEST reflects your knowledge or feelings. Do not spend a lot of time on each one; your FIRST answer is usually the best. Please make sure you mark all answers in the space provided.

Once you have completed the questionnaire, please return it to us in the freepost envelope provided (no stamp required).

Please remember we are interested in your experiences of your work environment and our conclusions depend on your accuracy.

If you have any queries about the study or the questionnaire, please do not hesitate to contact:

Rachel McNamara
Research Associate
Tel: 029 20876583
E-mail: mcnamara@cardiff.ac.uk

THANK YOU FOR YOUR PARTICIPATION

SECTION 1: YOUR JOB

We would like to ask you some questions about you and work.
(Social class variables were calculated based on job title, description of tasks and industry sector).

1.1 a) What is your job title?

____

b) What do you mainly do in your job?

____

____

c) Which industry sector do you work in?

____

d) Is the job full-time or part-time? (Full-time: 30 hours per week or more, Part time: up to 30 hours per week)
Please tick ONE box.

Full-time ☐$_0$
Part-time ☐$_1$

e) Is your job permanent, temporary/casual, or fixed contract? Please tick ONE box.

Permanent ☐$_0$
Temporary/casual ☐$_1$
Fixed contract ☐$_2$

Self-employed (25+ employees*) ☐$_0$
Self-employed (less than 25 employees*) ☐$_1$
Self-employed (no employees*) ☐$_2$
Manager (25+ employees*) ☐$_3$
Manager (less than 25 employees*) ☐$_4$
Supervisor ☐$_5$
Employee ☐$_6$

f) Which one of the following best describes your current position at work. Please tick one box.
(* Total number in Company, not just those of whom you are in charge).

g) Please give the date you started this job. ______ / ______
month / year

h) In this job, how many hours per week do you work on average? ______

i) What is your work pattern?

Fixed hours ☐$_0$
Flexi-time ☐$_1$
Shift work ☐$_2$

SHIFTWORKERS <u>ONLY</u>

j) What is the length of your current shift?

6hrs ☐0
8hrs ☐1
12hrs ☐2
Other ______

k) How long have you worked shifts in this employment? ______ / ______
years / months

l) How long have you worked shifts in any previous employment? ______ / ______
years / months

m) Are you aware of any health implications for working shifts? Yes☐1 No ☐0

n) Do you get any health screening or advice from your employer about working shifts?
Yes☐1 No ☐0

ON CALL WORKERS <u>ONLY</u>

o) Are you on call out of normal working hours (i.e. 9-5)? Yes☐1 No ☐0

p) If yes, how often ____________________

(ALL)

q) Do you have any other paid jobs? Yes☐1 No☐0

The following questions are designed to give a quick overview of your job characteristics. There are two parts to each question. Please tick the most appropriate box in each case.

1.2a Do you work long or unsociable hours (shift work, night work, on call, unpredictable hours)?

Never	Rarely	Some-times	Often	Very often
☐0	☐1	☐2	☐3	☐4

1.2b Do you find your working hours stressful?

Not at all	To some extent	A great deal	Not applicable
☐0	☐1	☐2	☐3

1.3a Do you work in an environment where you are exposed to noise or fumes/dust or have to handle potentially harmful substances?

Never	Rarely	Some-times	Often	Very often
□$_0$	□$_1$	□$_2$	□$_3$	□$_4$

1.3b Do you find your work environment stressful?

Not at all	To some extent	A great deal	Not applicable
□$_0$	□$_1$	□$_2$	□$_3$

1.4a Do you have a demanding job (have to work fast, intensively etc)?

Never	Rarely	Some-times	Often	Very often
□$_0$	□$_1$	□$_2$	□$_3$	□$_4$

1.4b Do you find your job demands stressful?

Not at all	To some extent	A great deal	Not applicable
□$_0$	□$_1$	□$_2$	□$_3$

1.5a Do you have a choice in what you do or how you do your job?

Never	Rarely	Some-times	Often	Very often
□$_0$	□$_1$	□$_2$	□$_3$	□$_4$

1.5b Do you find your lack of choice in how you do your job stressful?

Not at all	To some extent	A great deal	Not applicable
□$_0$	□$_1$	□$_2$	□$_3$

1.6a Do you have a great deal of say in decisions at work?

Never	Rarely	Some-times	Often	Very often
□$_0$	□$_1$	□$_2$	□$_3$	□$_4$

1.6b Do you find your lack of involvement in decisions at work stressful?

Not at all	To some extent	A great deal	Not applicable
□$_0$	□$_1$	□$_2$	□$_3$

1.7a Do you have a lot of support at work (from colleagues and superiors)?

Never	Rarely	Some-times	Often	Very often
□$_0$	□$_1$	□$_2$	□$_3$	□$_4$

1.7b Do you find your lack of support at work stressful?

Not at all	To some extent	A great deal	Not applicable
□$_0$	□$_1$	□$_2$	□$_3$

1.8a Do you have constant pressure due to a heavy workload?

Never	Rarely	Some-times	Often	Very often
□$_0$	□$_1$	□$_2$	□$_3$	□$_4$

1.8b Do you find your workload stressful?

Not at all	To some extent	A great deal	Not applicable
□$_0$	□$_1$	□$_2$	□$_3$

1.9a Is work often 'on your mind' when you are at home?

Never	Rarely	Some-times	Often	Very often
□$_0$	□$_1$	□$_2$	□$_3$	□$_4$

1.9b Do you find constantly thinking about work to be stressful?

Not at all	To some extent	A great deal	Not applicable
□$_0$	□$_1$	□$_2$	□$_3$

1.10a Do you receive the respect you deserve from superiors and colleagues?

Never	Rarely	Some-times	Often	Very often
□$_0$	□$_1$	□$_2$	□$_3$	□$_4$

1.10b Do you find this lack of respect at work stressful?

Not at all	To some extent	A great deal	Not applicable
□$_0$	□$_1$	□$_2$	□$_3$

1.11a Do you feel your efforts and achievements at work are appropriately rewarded?

Never	Rarely	Some-times	Often	Very often
□$_0$	□$_1$	□$_2$	□$_3$	□$_4$

1.11b Do you find lack of reward for your efforts at work stressful?

Not at all	To some extent	A great deal	Not applicable
□$_0$	□$_1$	□$_2$	□$_3$

1.12a Are you satisfied with your job?

Never	Rarely	Some-times	Often	Very often
□0	□1	□2	□3	□4

1.12b Do you find lack of job satisfaction stressful?

Not at all	To some extent	A great deal	Not applicable
□0	□1	□2	□3

1.13a Do family matters (and other things outside work) interfere with your work?

Never	Rarely	Some-times	Often	Very often
□0	□1	□2	□3	□4

1.13b Do you find things outside work interfering with your job stressful?

Not at all	To some extent	A great deal	Not applicable
□0	□1	□2	□3

1.14a Does your job interfere with family life or other activities outside work?

Never	Rarely	Some-times	Often	Very often
□0	□1	□2	□3	□4

1.14b Do you find this interference stressful?

Not at all	To some extent	A great deal	Not applicable
□0	□1	□2	□3

The following questions refer to your employer's policies in relation to your well-being:

1.15 Does your employer have a stress policy in place?

Yes □1 No □0

1.16 Does your employer offer any stress management activities?

Yes □1 No □0

1.17 Does your employer encourage you to balance your work and home life?

Yes □1 No □0

1.18 Does your employer provide/support any childcare arrangements?

Yes □1 No □0

SECTION 2: YOUR GENERAL WELL-BEING

2.1 Approximately how many days sick leave have you had in the last 12 months? *(Please tick one box)*

None	1-5	6-10	11-15	>15
□$_0$	□$_1$	□$_2$	□$_3$	□$_4$

2.2 Thinking about the past year, have you suffered from any illness that you think was caused, or made worse by work?

Yes □$_1$ No □$_0$

If yes, please specify: ______________________________

2.3 **Please read each item and then tick the box next to the reply that comes closest to how you have been feeling in the past week. Try to give your first reaction. This will probably be more accurate than spending a long time thinking about an answer. Please answer all questions, and tick only ONE BOX per question.**
(Hospital Anxiety & Depression Scale: Zigmond & Snaith, 1983)

a) I feel tense or wound up *(A)
- Most of the time □$_0$
- A lot of the time □$_1$
- From time to time, occasionally □$_2$
- Not at all □$_3$

b) I feel as if I am slowed down *(D)
- Nearly all the time □$_0$
- Very often □$_1$
- Sometimes □$_2$
- Not at all □$_3$

c) I still enjoy the things I used to enjoy (D)
- Definitely as much □$_0$
- Not quite so much □$_1$
- Only a little □$_2$
- Hardly at all □$_3$

d) I get a sort of frightened feeling like "butterflies" in the stomach (A)
- Not at all □$_0$
- Occasionally □$_1$
- Quite often □$_2$
- Very often □$_3$

e) I get a sort of frightened feeling as if something awful is about to happen *(A)
- Very definitely and quite badly □$_0$
- Yes, but not too badly □$_1$
- A little, but it doesn't worry me □$_2$
- Not at all □$_3$

f) I have lost interest in my appearance *(D)
- Definitely □$_0$
- I don't take as much care as I should □$_1$
- I may not take quite as much care □$_2$
- I take just as much care as ever □$_3$

g) I can laugh and see the funny side of things (D)
- As much as I always could □$_0$
- Not quite so much now □$_1$
- Definitely not so much now □$_2$
- Not at all □$_3$

h) I feel restless as if I have to be on the move *(A)
- Very much indeed □$_0$
- Quite a lot □$_1$
- Not very much □$_2$
- Not at all □$_3$

i) **Worrying thoughts go through my head** *(A)

A great deal of the time	□0
A lot of the time	□1
From time to time but not too often	□2
Only occasionally	□3

j) **I look forward with enjoyment to things** (D)

As much as I ever did	□0
Rather less than I used to	□1
Definitely less than I used to	□2
Hardly at all	□3

k) **I feel cheerful** *(D)

Not at all	□0
Not often	□1
Sometimes	□2
Most of the time	□3

l) **I get sudden feelings of panic** *(A)

Very often indeed	□0
Quite often	□1
Not very often	□2
Not at all	□3

m) **I can sit at ease and feel relaxed** (A)

Definitely	□0
Usually	□1
Not often	□2
Not at all	□3

n) **I can enjoy a good book or radio or TV programme** (D)

Often	□0
Sometimes	□1
Not often	□2
Very seldom	□3

2.4 Please answer Yes or No to the following questions:
(3 items from the Eysenck Personality Inventory Neuroticism Scale: Eysenck, 1968)

		YES	NO
a)	Are your feelings rather easily hurt?	□1	□0
b)	Would you call yourself 'tense' or 'highly-strung'?	□1	□0
c)	Do you worry about awful things that might happen?	□1	□0

2.5 Over the past 12 months, how would you say your health in general has been?

Very good	Good	Fair	Bad	Very Bad
□0	□1	□2	□3	□4

2.6 In general, how do you find your job? (single item work stress measure)

Not at all stressful	Mildly stressful	Moderately stressful	Very stressful	Extremely stressful
□0	□1	□2	□3	□4

2.7 How do you find life in general? Please tick one box only.

Not at all stressful	Mildly stressful	Moderately stressful	Very stressful	Extremely stressful
□0	□1	□2	□3	□4

2.8 **Have you ever been told by the doctor that you have, or have had any of the following? Please tick Yes or No for EACH of the categories in the following list.** (Lifetime prevalence of disease checklist)

	Yes	No
Angina	□1	□0
High cholesterol level	□1	□0
Diabetes	□1	□0
Stroke	□1	□0
Heart attack (coronary thrombosis, myocardial infarction)	□1	□0
High blood pressure	□1	□0
Nervous trouble or depression	□1	□0
Asthma	□1	□0
Emphysema	□1	□0
Bronchitis	□1	□0
Breast cancer	□1	□0
Other cancer	□1	□0

2.9 **If you have had cancer which part of the body did it affect?**

____

2.10 **There are some kinds of health problems that keep recurring and some that people have all the time. In the last 12 months have you suffered from any of the following health problems?** (12-month symptom checklist)

Please tick Yes or No for EACH of the categories in the following list.

	Yes	No
Bronchitis	□1	□0
Arthritis or rheumatism	□1	□0
Sciatica, lumbago or recurring backache	□1	□0
Persistent skin trouble (e.g. eczema)	□1	□0
Asthma	□1	□0
Hay fever	□1	□0
Recurring stomach trouble or indigestion	□1	□0
Being constipated all or most of the time	□1	□0
Piles	□1	□0
Persistent foot trouble (e.g. bunions, in-growing toenails)	□1	□0
Trouble with varicose veins	□1	□0
Nervous trouble or persistent depression	□1	□0
Persistent trouble with your gums or mouth	□1	□0
Any other recurring health problem *Please specify*↓	□1	□0

____

2.11 **Have you had any of the following symptoms in the last 14 days?**
(14-day symptom checklist)
Please tick Yes or No for EACH of the categories in the following list.

	Yes	No
A cough, catarrh or phlegm	□1	□0
Diarrhoea	□1	□0

Heartburn, wind or indigestion	□1	□0
Shortness of breath	□1	□0
Dizziness or giddiness	□1	□0
Earache or discomfort in the ears	□1	□0
Swollen ankles	□1	□0
Nervy, tense or depressed	□1	□0
A cold or flu	□1	□0
A sore throat	□1	□0
Difficulty sleeping	□1	□0
Pains in the chest	□1	□0
Backache or pains in the back	□1	□0
Nausea or vomiting	□1	□0
Feeling tired for no apparent reason	□1	□0
Rashes, itches or other skin trouble	□1	□0
Blocked or runny nose	□1	□0
Headache	□1	□0
Wheeziness	□1	□0
Toothache or trouble with gums	□1	□0
Any other complaints in the last 14 days?	□1	□0

Please specify ↓

2.12 Have you taken any of the following medicines prescribed by a doctor? Please tick one box in each column to indicate whether you have taken each medicine in the LAST 14 DAYS, in the LAST MONTH, and in the LAST YEAR.
(Prescribed medication use in the last year, 12 months and 14 days)

	In the last 14 days	In the last month	In the last year
Pain killers	Yes □1 No□0	Yes □1 No□0	Yes □1 No□0
Medicines for indigestion	Yes □1 No□0	Yes □1 No□0	Yes □1 No□0
Blood pressure tablets	Yes □1 No□0	Yes □1 No□0	Yes □1 No□0
Sleeping pills	Yes □1 No□0	Yes □1 No□0	Yes □1 No□0
Antidepressants	Yes □1 No□0	Yes □1 No□0	Yes □1 No□0
Medicines for stress or anxiety	Yes □1 No□0	Yes □1 No□0	Yes □1 No□0
Laxatives (bowel opening medicine)	Yes □1 No□0	Yes □1 No□0	Yes □1 No□0
Other medicine	Yes □1 No□0	Yes □1 No□0	Yes □1 No□0

2.13 How likely are you to fall asleep or 'doze off' when:

Situation	**Chance of dozing**			
	Never	**Slight**	**Moderate**	**High**
Sitting and reading	□0	□1	□2	□3
Watching TV	□0	□1	□2	□3
Sitting inactive in a public place (e.g. a theatre or a meeting)	□0	□1	□2	□3
As a passenger in a car for an hour without a break	□0	□1	□2	□3
Lying down to rest in the afternoon when circumstances permit	□0	□1	□2	□3
Sitting and talking to someone	□0	□1	□2	□3
Sitting quietly after a lunch without alcohol	□0	□1	□2	□3
In a car, while stopped for a few minutes in traffic	□0	□1	□2	□3

SECTION 3: ACCIDENTS AND INJURIES

3.1 Thinking about the last 12 months, have you had any accidents WHILE YOU WERE WORKING that required medical attention from someone else (e.g. a first aider, GP, nurse or hospital doctor)?

None	1	2	3	4	5	6	More than 6
□0	□1	□2	□3	□4	□5	□6	□7 Please specify ______

If you have had more than one accident at work in the last 12 months, please answer the following questions for the most recent accident ONLY.

3.2a) In which month did the accident happen?

____

3.2b) What day of the week was your accident?

Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday	Don't know
□0	□1	□2	□3	□4	□5	□6	□7

3.2c) What time of day did the accident happen?

____

3.2d) When you were injured, were you doing the job you have now?

Yes ☐1 No ☐0

What was your job title at the time? ______________________________

What did you mainly do in your job? ______________________________

____

Were you: An employee ☐0
Self-employed ☐1

3.2e) What kind of accident did you have?

Did it involve: ***Please tick all that apply***

Being in contact with moving machinery ☐1

Being struck by a moving object (including flying or falling) ☐1

Being struck by a moving vehicle ☐1

Striking against something fixed / stationary ☐1

Being injured while handling, lifting or carrying ☐1

A slip, trip or fall on the same level ☐1

A fall from a height up to and including 2 meters ☐1

A fall from a height more than 2 meters ☐1

A fall from a height but do not know how high ☐1

Being trapped by something collapsing or overturning ☐1

Drowning or asphyxiation ☐1

Exposure to or contact with a harmful substance ☐1

Exposure to fire ☐1

Exposure to an explosion ☐1

Being in contact with electricity or an electrical discharge ☐1

Being injured by an animal ☐1

An act or acts of violence ☐1

Other please specify↓ ☐1

3.2f) Where were you injured?

Please tick all that apply

Eye	☐1	Finger or thumb (1 or more)	☐1
Ear	☐1	Hand	☐1
Other part of face	☐1	Wrist	☐1
Head (excluding face)	☐1	Rest of the arm	☐1
Several locations of the head	☐1	Several locations of the arm	☐1
Neck	☐1	Toe (1 or more)	☐1
Back	☐1	Foot	☐1
Trunk	☐1	Ankle	☐1
Several locations of the torso	☐1	Rest of the leg	☐1
Other Please specify↓	☐1	Several locations of the leg	☐1

3.2g) What sort of injury or injuries did you sustain?

Please tick all that apply

Amputation ☐1

Loss of sight of eye :
Temporary ☐1

Permanent ☐1

Chemical or hot metal burn to the eye ☐1

Penetrating injury to the eye ☐1

Fracture (broken bone) of the :
Arm or wrist ☐1

Leg or ankle ☐1

Finger, thumb or toe ☐1

Hand ☐1

Foot ☐1

Rib ☐1

Skull ☐1

Jaw ☐1

Other please specify↓ ☐1

Dislocation of the :
Finger, thumb or toe ☐1

Ankle ☐1

Knee ☐1

Hip ☐1

Wrist ☐1

Elbow ☐1

Shoulder ☐1

Neck ☐1

Spine ☐1

Jaw ☐1

Other please specify↓ ☐1

Concussion ☐1

Internal injuries ☐1

Lacerations (cuts) or open wounds ☐1

Contusions (bruises) ☐1

Burns ☐1
Poisoning or gassing ☐1

Sprain or strain ☐1

Injuries caused by contact with electricity ☐1

Injury leading to unconsciousness or requiring resuscitation ☐1

Don't know ☐1

Other please specify↓ ☐1

3.2h) What medical attention did you require?

Please tick all that apply

Treated by GP ☐1

Treated by nurse at the GP surgery ☐1

Attended Accident and Emergency (Casualty) ☐1

Admitted to hospital for LESS than 24 hours ☐1

Admitted to hospital for MORE than 24 hours ☐1

Other please specify↓ ☐1

3.2i) How soon were you able to start work again after the accident?

Same day	☐0	Still off work	☐6
Day after the accident	☐1	Do not expect to work again	☐7
On the 2nd day after the accident	☐2	Don't know	☐8
On the 3rd day after the accident	☐3		
On the 4th day after the accident	☐4		
On the 5th day or longer after the accident	☐5		

3.3 How many accidents requiring medical attention have you had OUTSIDE work in the last 12 months?

None	1	2	3	4	5	6	More than 6
☐0	☐1	☐2	☐3	☐4	☐5	☐6	☐7 Please specify

3.4 In the last 12 months how frequently have you had minor injuries (e.g. cuts and bruises) that did not require medical attention?

a) at work

Not at all	Rarely	Occasionally	Quite frequently	Very frequently
☐0	☐1	☐2	☐3	☐4

b) **outside of work**

Not at all	Rarely	Occasionally	Quite frequently	Very frequently
☐0	☐1	☐2	☐3	☐4

3.5 How frequently do you find that you have problems of memory (e.g. forgetting where you put things), attention (e.g. failures of concentration), or action (e.g. doing the wrong thing)?

a) **at work**

Not at all	Rarely	Occasionally	Quite frequently	Very frequently
☐0	☐1	☐2	☐3	☐4

b) **outside of work**

Not at all	Rarely	Occasionally	Quite frequently	Very frequently
☐0	☐1	☐2	☐3	☐4

3.6 How frequently do you take risks?

a) **at work**

Not at all	Rarely	Occasionally	Quite frequently	Very frequently
☐0	☐1	☐2	☐3	☐4

b) **outside of work**

Not at all	Rarely	Occasionally	Quite frequently	Very frequently
☐0	☐1	☐2	☐3	☐4

SECTION 4: LIFESTYLE

In this section, we are interested in finding out about how you live your life. In particular, we are interested in how much (or little) you drink or smoke.

4.1 Do you smoke cigarettes now (i.e. NOT cigars/pipe)? (Currently smoking measure)

Yes ☐1 No ☐0

4.2 How many cigarettes do you smoke per day?

Manufactured ______ Handrolled ______

4.3 On average how often do you drink during the week, that is weekdays. Please tick ONE BOX only.

Never	1 - 2 Days	3 Days	4 Days
□0	□1	□2	□3

4.4 **How many units do you drink during an average week? ______ units**
(1 unit = half a pint of beer/glass of wine/1 measure of spirits)

4.5 **On average how often do you drink at the Weekends. Please tick ONE BOX only.**

Never	1 - 2 Days	All 3 Days
□0	□1	□2

4.6 **How many units do you drink on an average weekend? ______ units**
(Alcohol above recommended levels calculated from average units per wk/weekend)

4.7 **At what age did you start to drink alcohol regularly, that is, more than once a month?**

______________ **Years**

4.8 **Do you maintain a desired body weight?**

Almost all of the time	Sometimes	Almost never
□0	□1	□2

4.9 **Do you take any planned exercise?**

Always	Usually	When possible	Occasionally	Not usually	Never
□0	□1	□2	□3	□4	□5

4.10 **Do you find time to 'relax and wind down'?**

Always	Usually	When possible	Not usually
□0	□1	□2	□3

SECTION 5: YOUR WORK ENVIRONMENT

5.1 Now we would like to ask you about where you work. For each question please tick ONE answer that best describes your work.
(Shiftwork, working hours and physical hazards)

		Often	Some-times	Seldom	Never/ almost never
a)	Do you work at night? *	□0	□1	□2	□3
b)	Do you do shift work? *	□0	□1	□2	□3
c)	Do you have to work long or unsociable hours? *	□0	□1	□2	□3
d)	Do you have to be "on call" for work? (item not included)	□0	□1	□2	□3
e)	Do you have unpredictable working hours? *	□0	□1	□2	□3
f)	Does your job ever expose you to breathing fumes, dusts or other potentially harmful substances? *	□0	□1	□2	□3
g)	Does your job ever require you to handle or touch potentially harmful substances or materials? *	□0	□1	□2	□3
h)	Do you ever have work tasks that leave you with a ringing in your ears or a temporary feeling of deafness? *	□0	□1	□2	□3
i)	Do you work in an environment where the level of background noise disturbs your concentration? *	□0	□1	□2	□3

5.2

Do you find yourself easily annoyed by noise?

Not at all annoyed	Rarely annoyed	Somewhat annoyed	Rather annoyed	Extremely annoyed
□0	□1	□2	□3	□4

5.3

How frequently are you exposed to loud noise?

a) **At work**

Not at all	Rarely	Occasionally	Quite frequently	Very frequently	Not applicable
□0	□1	□2	□3	□4	□5

b) **Outside work**

Not at all	Rarely	Occasionally	Quite frequently	Very frequently
□0	□1	□2	□3	□4

5.4

How frequently do you suffer from insomnia (not being able to sleep)?

Not at all	Rarely	Occasionally	Quite frequently	Very frequently
□0	□1	□2	□3	□4

5.5 Now we'd like to ask you about your work and the sorts of things you have to do. For each question please tick the answer that best describes your job or the way you deal with problems at work.

(The job demand-control-support model: Karasek, 1979; Johnson & Hall, 1988 (5.5-5.9)

		Often	Some-times	Seldom	Never/ almost never	Not applicable
a)	Do you have to work very fast? *(JD)	□0	□1	□2	□3	□4
b)	Do you have to work very intensively? *(JD)	□0	□1	□2	□3	□4
c)	Do you have enough time to do everything? (JD)	□0	□1	□2	□3	□4
d)	Are your tasks such that others can help you if you do not have enough time?	□0	□1	□2	□3	□4
e)	Do you have the possibility of learning new things through your work? *(SD)	□0	□1	□2	□3	□4
f)	Does your work demand a high level of skill or expertise? *(SD)	□0	□1	□2	□3	□4
g)	Does your job require you to take the initiative? *(SD)	□0	□1	□2	□3	□4
h)	Do you have to do the same thing over and over again? (SD)	□0	□1	□2	□3	□4

i)	Do you have a choice in deciding HOW you do your work? *(DA)	□0	□1	□2	□3	□4
j)	Do you have a choice in deciding WHAT you do at work? *(DA)	□0	□1	□2	□3	□4

5.6 This section is about your position at work - how often do the following statements apply? Please tick ONE box only.

		Often	Some-times	Seldom	Never/ almost never	Not appli-cable
a)	Others take decisions concerning my work. (DA)	□0	□1	□2	□3	□4
b)	I have a great deal of say in decisions about work. *(DA)	□0	□1	□2	□3	□4
c)	I have a say in my work speed. *(DA)	□0	□1	□2	□3	□4
d)	My working time can be flexible. *(DA)	□0	□1	□2	□3	□4
e)	I can decide when to take a break. *(DA)	□0	□1	□2	□3	□4
f)	I can take my holidays more or less when I wish.	□0	□1	□2	□3	□4
g)	I have a say in choosing who I work with. *(DA)	□0	□1	□2	□3	□4
h)	I have a great deal of say in planning my work environment. *(DA)	□0	□1	□2	□3	□4

5.7 This section is about consistency and clarity at work - how often do the following statements apply? Please tick ONE box only.

		Often	Some-times	Seldom	Never/ almost never	Not appli-cable
a)	Do different groups at work demand things from you that you think are hard to combine? *(JD)	□0	□1	□2	□3	□4
b)	Do you get sufficient information from line management (your superiors)? *(SS)	□0	□1	□2	□3	□4
c)	Do you get consistent information from line management (your superiors)? *(SS)	□0	□1	□2	□3	□4

5.8 **These questions are about your job involvement. Please tick ONE box only.**

		Often	Some-times	Seldom	Never/ almost never	Not appli-cable
a)	Does your job provide you with a variety of interesting things to do? *(SD)	□0	□1	□2	□3	□4
b)	Is your job boring? (SD)	□0	□1	□2	□3	□4

5.9 **Now we would like to ask you about when you are having difficulties at work. Please tick ONE box only.**

		Often	Some-times	Seldom	Never/ almost never	Not appli-cable
a)	How often do you get help and support from your colleagues? *(SS)	□0	□1	□2	□3	□4
b)	How often are your colleagues willing to listen to your work related problems? *(SS)	□0	□1	□2	□3	□4
c)	How often do you get help and support from your immediate superior? *(SS)	□0	□1	□2	□3	□4
d)	How often is your immediate superior willing to listen to your problems? *(SS)	□0	□1	□2	□3	□4

5.10 Do you agree or disagree with the following statements about your work?
(The effort-reward imbalance model: Siegrist, 1996 (5.10-5.12)

		Agree	Some-what agree	Some-what disagree	Disagree
a)	If a task has to be done well I'd better take care of it myself. *(IE)	□0	□1	□2	□3
b)	I can get very upset when someone hinders me in my duties. *(IE)	□0	□1	□2	□3
c)	As soon as I get up in the morning, I start thinking about work problems. *(IE)	□0	□1	□2	□3
d)	When I come home, I can easily relax and 'switch off' from work. (IE)	□0	□1	□2	□3
e)	People close to me say I sacrifice too much for my job. *(IE)	□0	□1	□2	□3
f)	For me, family or private life comes first, then work.	□0	□1	□2	□3
g)	Work rarely lets me go, it is still on my mind when I go to bed. *(IE)	□0	□1	□2	□3
h)	Every once in a while I like it when others hold me back from working. *(IE)	□0	□1	□2	□3
i)	If I postpone something that I was supposed to do today, I will have trouble sleeping at night. *(IE)	□0	□1	□2	□3

In these next questions we would like to know whether or not you agree with some statements about your work. If you DON'T agree with a statement tick the box marked No, as in this example. Then move on to the next statement.

If you agree, to what extent are you distressed by it?

EXAMPLE : Don't agree

		No	Yes	Not at all	Some-what	Rather	Very dis-tressed
a)	I have constant time pressure due to a heavy workload.	✔□	□	□	□	□	□

If you DO agree with a statement tick the box marked Yes AND tick one box to show how much it distresses you, as in this example. Then move on to the next statement.

If you <u>agree</u>, to what extent are you distressed by it?		*EXAMPLE : Agree*		Not at all	Some-what	Rather	Very dis-tressed
a)	I have constant time pressure due to a heavy workload.	<u>No</u> ☐	<u>Yes</u> ✔☐	☐	✔☐	☐	☐

Do you agree with the following statements?
If you <u>agree</u>, to what extent are you distressed by it?

5.11

				Not at all	Some-what	Rather	Very dis-tressed
a)	I have constant time pressure due to a heavy workload. (EE)	<u>No</u> ☐0	<u>Yes</u> ☐1	☐0	☐1	☐2	☐3
b)	I have many interruptions and disturbances in my job. (EE)	<u>No</u> ☐0	<u>Yes</u> ☐1	☐0	☐1	☐2	☐3
c)	I have a lot of responsibility in my job. (EE)	<u>No</u> ☐0	<u>Yes</u> ☐1	☐0	☐1	☐2	☐3
d)	I am often under pressure to work overtime. (EE)	<u>No</u> ☐0	<u>Yes</u> ☐1	☐0	☐1	☐2	☐3
e)	I have experienced or expect to experience an undesirable change in my work situation. (IR)	<u>No</u> ☐0	<u>Yes</u> ☐1	☐0	☐1	☐2	☐3
f)	My job promotion prospects are poor. (IR)	<u>No</u> ☐0	<u>Yes</u> ☐1	☐0	☐1	☐2	☐3
g)	My job security is poor. (IR)	<u>No</u> ☐0	<u>Yes</u> ☐1	☐0	☐1	☐2	☐3
h)	I am treated unfairly at work. (IR)	<u>No</u> ☐0	<u>Yes</u> ☐1	☐0	☐1	☐2	☐3

5.12 In these next questions we would again like to know whether or not you agree with some statements about your work. This time, though, the order of 'Yes' and 'No' is changed. So, if you DO agree with a statement tick the box marked Yes. Then move on to the next statement. If you DON'T agree with a statement tick the box marked No AND tick one box to show how much it distresses you. Then move on to the next statement.

Do you agree with the following statements?
(Please note the order of 'Yes', 'No' is changed)

If you <u>disagree</u>, to what extent are you distressed by it?

		Yes	*No*	Not at all	Some-what	Rather	Very dis-tressed
a)	Considering all my efforts and achievements, my work prospects are adequate. (IR)	□1	□0	□0	□1	□2	□3
b)	I receive the respect I deserve from my superiors and colleagues. (IR)	□1	□0	□0	□1	□2	□3
c)	I experience adequate support in difficult situations. (IR)	□1	□0	□0	□1	□2	□3
d)	Considering all my efforts and achievements, I receive the respect and prestige I deserve at work. (IR)	□1	□0	□0	□1	□2	□3

5.13 **Please indicate to what extent the following are characteristic of your organisation.** (The organisational culture profile: O'Reilly, Chatman & Caldwell, 1991)

		Extremely Characteristic				Not at all Characteristic
1.	Flexibility (SU)	□0	□1	□2	□3	□4
2.	Adaptability (SU)	□0	□1	□2	□3	□4
3.	Stability (TR)	□0	□1	□2	□3	□4
4.	Predictability (TR)	□0	□1	□2	□3	□4
5.	Being innovative	□0	□1	□2	□3	□4
6.	Quick to take advantage of opportunities (PD)	□0	□1	□2	□3	□4
7.	Willing to experiment (EN)	□0	□1	□2	□3	□4
8.	Risk taking (PD)	□0	□1	□2	□3	□4
9.	Being careful	□0	□1	□2	□3	□4
10.	Autonomy	□0	□1	□2	□3	□4
11.	Being rule oriented	□0	□1	□2	□3	□4
12.	Being analytical (PD)	□0	□1	□2	□3	□4
13.	Paying attention to detail (PD)	□0	□1	□2	□3	□4
14.	Being precise (PD)	□0	□1	□2	□3	□4
15.	Being team oriented (SU)	□0	□1	□2	□3	□4
16.	Sharing information freely (SU)	□0	□1	□2	□3	□4
17.	Emphasising a single culture throughout the organisation	□0	□1	□2	□3	□4
18.	Being people oriented (SU)	□0	□1	□2	□3	□4
19.	Fairness (SU)	□0	□1	□2	□3	□4
20.	Respect for the individuals right (SU)	□0	□1	□2	□3	□4
21.	Tolerance (SU)	□0	□1	□2	□3	□4
22.	Informality (SU)	□0	□1	□2	□3	□4
23.	Being easy going (SU)	□0	□1	□2	□3	□4
24.	Being calm (SU)	□0	□1	□2	□3	□4

		Extremely Characteristic			Not at all Characteristic	
25.	Being supportive (SU)	□0	□1	□2	□3	□4
26.	Being aggressive *(SU)	□0	□1	□2	□3	□4
27.	Decisiveness (SU)	□0	□1	□2	□3	□4
28.	Action oriented (PD)	□0	□1	□2	□3	□4
29.	Takes initiative (SU)	□0	□1	□2	□3	□4
30.	Reflective (SU)	□0	□1	□2	□3	□4
31.	Achievement oriented (PD)	□0	□1	□2	□3	□4
32.	Demanding (PD)	□0	□1	□2	□3	□4
33.	Emphasises taking individual responsibility (PD)	□0	□1	□2	□3	□4
34.	Having high expectations of performance (PD)	□0	□1	□2	□3	□4
35.	Provides opportunities for professional growth (SU)	□0	□1	□2	□3	□4
36.	Rewards good performance with high pay (PD)	□0	□1	□2	□3	□4
37.	Security of employment (TR)	□0	□1	□2	□3	□4
38.	Offers praise for good performance (SU)	□0	□1	□2	□3	□4
39.	Low level of conflict	□0	□1	□2	□3	□4
40.	Confronts conflict directly	□0	□1	□2	□3	□4
41.	Opportunity for making friends at work	□0	□1	□2	□3	□4
42.	Easy to fit in	□0	□1	□2	□3	□4
43.	Emphasises working in collaboration with others (SU)	□0	□1	□2	□3	□4
44.	Expects enthusiasm for job (PD)	□0	□1	□2	□3	□4
45.	Working long hours	□0	□1	□2	□3	□4
46.	Not constrained by many rules	□0	□1	□2	□3	□4
47.	Emphasises quality (PD)	□0	□1	□2	□3	□4
48.	Being distinctive-different from others	□0	□1	□2	□3	□4

		Extremely Characteristic				Not at all Characteristi
49.	Having a good reputation	$\square_0$	$\square_1$	$\square_2$	$\square_3$	$\square_4$
50.	Being socially responsible	$\square_0$	$\square_1$	$\square_2$	$\square_3$	$\square_4$
51.	Being results oriented (PD)	$\square_0$	$\square_1$	$\square_2$	$\square_3$	$\square_4$
52.	Having a clear guiding philosophy	$\square_0$	$\square_1$	$\square_2$	$\square_3$	$\square_4$
53.	Being competitive	$\square_0$	$\square_1$	$\square_2$	$\square_3$	$\square_4$
54	Being highly organized	$\square_0$	$\square_1$	$\square_2$	$\square_3$	$\square_4$

5.14 The following section asks you to respond to a series of questions about your relationship with your manager. Please answer all questions by ticking the appropriate box. (Leader-member exchange, 7-item version: Scandura & Graen, 1984)

a) Do you usually feel that you know where you stand…do you usually know how satisfied your manager is with you? *

Rarely	Occasionally	Sometimes	Fairly Often	Very Often
$\square_0$	$\square_1$	$\square_2$	$\square_3$	$\square_4$

b) How well do you feel that your manager understands your problems and needs? *

Not a bit	A little	A fair amount	Quite a bit	A great deal
$\square_0$	$\square_1$	$\square_2$	$\square_3$	$\square_4$

c) How well does your manager recognise your potential? *

Not a bit	A little	A fair amount	Quite a bit	A great deal
$\square_0$	$\square_1$	$\square_2$	$\square_3$	$\square_4$

d) Regardless of how much formal authority he/she has built into his/her position, what are the chances that your manager would use his/her power to help you solve problems in your work? *

None	Small	Moderate	High	Very High
$\square_0$	$\square_1$	$\square_2$	$\square_3$	$\square_4$

e) Again, regardless of the amount of formal authority your manager has, what are the chances that he/she would "bail you out" at his/her expense? *

None	Small	Moderate	High	Very High
$\square_0$	$\square_1$	$\square_2$	$\square_3$	$\square_4$

f) I have enough confidence in my manager that I would defend and justify his/her decisions if he/she were not present to do so. *

Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
□$_0$	□$_1$	□$_2$	□$_3$	□$_4$

g) How would you characterise your working relationship with your manager? *

Extremely Ineffective	Worse than Average	Average	Better than Average	Extremely Effective
□$_0$	□$_1$	□$_2$	□$_3$	□$_4$

5.15 The following section asks you to respond to a series of questions about your relationship with your immediate colleagues, or members of your work "team". Please answer all questions by ticking the appropriate box.
(Team-member exchange: Seers, 1989)

a) How often do you make suggestions about better work methods to other team members? *

Rarely	Occasionally	Sometimes	Fairly Often	Very Often
□$_0$	□$_1$	□$_2$	□$_3$	□$_4$

b) Do other members of your team usually let you know when you do something that makes their job easier (or harder)? *

Rarely	Occasionally	Sometimes	Fairly Often	Very Often
□$_0$	□$_1$	□$_2$	□$_3$	□$_4$

c) How often do you let other team members know when they have done something that makes your job easier (or harder)? *

Rarely	Occasionally	Sometimes	Fairly Often	Very Often
□$_0$	□$_1$	□$_2$	□$_3$	□$_4$

d) How well do other members of your team recognise your potential? *

Not a bit	A little	A fair amount	Quite a bit	A great deal
□$_0$	□$_1$	□$_2$	□$_3$	□$_4$

e) How well do other members of your team understand your problems and needs? *

Not a bit	A little	A fair amount	Quite a bit	A great deal
□$_0$	□$_1$	□$_2$	□$_3$	□$_4$

f) How flexible are you about switching job responsibilities to make things easier for other team members? *

Not a bit	A little	A fair amount	Quite a bit	A great deal
□$_0$	□$_1$	□$_2$	□$_3$	□$_4$

g) In busy situations, how often do other team members ask you to help out? *

Not a bit	A little	A fair amount	Quite a bit	A great deal
□0	□1	□2	□3	□4

h) In busy situations, how often do you volunteer your efforts to help others on your team? *

Not a bit	A little	A fair amount	Quite a bit	A great deal
□0	□1	□2	□3	□4

i) How willing are you to help finish work that had been assigned to others? *

Not a bit	A little	A fair amount	Quite a bit	A great deal
□0	□1	□2	□3	□4

j) How willing are other members of your team to help finish work that was assigned to you? *

Not a bit	A little	A fair amount	Quite a bit	A great deal
□0	□1	□2	□3	□4

5.16 The following questions refer to your treatment in the workplace, by your organisation, superiors and/or colleagues. Please indicate whether you are, or have been exposed to the following within the last 6 months:
(Bullying behaviour: Quine, 1991)

		YES	NO
a)	Persistent attempts to undermine your work.	□1	□0
b)	Persistent and unjustified criticism and monitoring of your work.	□1	□0
c)	Persistent attempts to humiliate you in front of colleagues.	□1	□0
d)	Intimidatory use of discipline or competence procedures.	□1	□0
e)	Undermining your personal integrity.	□1	□0
f)	Destructive innuendo and sarcasm.	□1	□0
g)	Verbal and non-verbal threats.	□1	□0
h)	Inappropriate jokes.	□1	□0
i)	Persistent teasing.	□1	□0
j)	Physical violence.	□1	□0
k)	Violence to property.	□1	□0

l)	Witholding of necessary information.	□$_1$	□$_0$
m)	Freezing out, ignoring or exclusion.	□$_1$	□$_0$
n)	Unreasonable refusal of applications for leave, training or promotion.	□$_1$	□$_0$
o)	Undue pressure to produce work.	□$_1$	□$_0$
p)	Setting of impossible deadlines.	□$_1$	□$_0$
q)	Shifting of goal posts without telling you.	□$_1$	□$_0$
s)	Constant undervaluation of your efforts.	□$_1$	□$_0$
t)	Persistent attempts to demoralise you.	□$_1$	□$_0$
u)	Removal of areas of responsibility without consultation.	□$_1$	□$_0$

5.17 **The following questions refer to how you cope with sources of stress in your job. Please circle the appropriate answer.**

		Never	Very rarely	Some-times	Often	Always
a)	Get together with my supervisor to discuss things.	□0	□1	□2	□3	□4
b)	Try to be very organised, so that I can keep on top of things.	□0	□1	□2	□3	□4
c)	Talk with people (other than my supervisor) who are involved.	□0	□1	□2	□3	□4
d)	Try to see the situation as an opportunity to learn and develop new skills.	□0	□1	□2	□3	□4
e)	Put extra attention on planning and scheduling.	□0	□1	□2	□3	□4
f)	Try to think of myself as a winner, someone who always comes through.	□0	□1	□2	□3	□4
g)	Tell myself that I can probably work things out to my advantage.	□0	□1	□2	□3	□4
h)	Devote more time and energy to doing my job.	□0	□1	□2	□3	□4
g)	Try to get additional people involved in the situation.	□0	□1	□2	□3	□4
i)	Think about the challenge that I can find in the situation.	□0	□1	□2	□3	□4
j)	Try to work faster and more efficiently.	□0	□1	□2	□3	□4
k)	Decide what should be done and explain this to people who are affected.	□0	□1	□2	□3	□4

5.18 The following questions refer to your perception of your role within your working environment. Please circle the appropriate answer.
(Role conflict and role ambiguity; Rizzo, House & Lirtzman, 1970)

		Never	Very rarely	Some-times	Often	Always
1.	I have enough time to complete my work. *(RC)	□0	□1	□2	□3	□4
2.	I feel certain about how much authority I have. *(RA)	□0	□1	□2	□3	□4
3.	I perform tasks that are too easy or too boring. (RC)	□0	□1	□2	□3	□4
4.	I have clear, planned goals and objectives for my job. *(RA)	□0	□1	□2	□3	□4
5.	I have to do things that should be done differently. (RC)	□0	□1	□2	□3	□4
6.	There is a lack of policies and guidelines to help me. (RA)	□0	□1	□2	□3	□4
7.	I am able to act the same, regardless of the group I am with. *(RC)	□0	□1	□2	□3	□4
8.	I am corrected or rewarded when I don't really expect it. (RA)	□0	□1	□2	□3	□4
9.	I work under incompatible policies and guidelines. (RC)	□0	□1	□2	□3	□4
10.	I know that I have divided my time properly. *(RA)	□0	□1	□2	□3	□4
11.	I receive an assignment without the manpower to complete it. (RC)	□0	□1	□2	□3	□4
12.	I know what my responsibilities are. *(RA)	□0	□1	□2	□3	□4
13.	I have to bend a rule or policy in order to carry out an assignment. (RC)	□0	□1	□2	□3	□4
14.	I have to 'feel my way' in performing my duties. (RA)	□0	□1	□2	□3	□4
15.	I receive assignments that are within my training and capability. *(RC)	□0	□1	□2	□3	□4
16.	I feel certain how I will be evaluated for a raise or promotion. *(RA)	□0	□1	□2	□3	□4
17.	I have just the right amount of work to do. *(RC)	□0	□1	□2	□3	□4

18.	I work with 2 or more groups who operate quite differently. (RC)	$\square_0$	$\square_1$	$\square_2$	$\square_3$	$\square_4$
19.	I know exactly what is expected of me. *(RA)	$\square_0$	$\square_1$	$\square_2$	$\square_3$	$\square_4$
20.	I receive incompatible requests from two or more people. (RC)	$\square_0$	$\square_1$	$\square_2$	$\square_3$	$\square_4$
21.	I am uncertain as to how my job fits in with the organisation as a whole. (RA)	$\square_0$	$\square_1$	$\square_2$	$\square_3$	$\square_4$
22.	I do things that are likely to be accepted by one person, but not by others. (RC)	$\square_0$	$\square_1$	$\square_2$	$\square_3$	$\square_4$
23.	I am told how well I am doing my job. *(RA)	$\square_0$	$\square_1$	$\square_2$	$\square_3$	$\square_4$
24.	I receive an assignment without adequate resources and materials to carry it out. (RC)	$\square_0$	$\square_1$	$\square_2$	$\square_3$	$\square_4$
25.	Explanation of what has to be done is often unclear. (RA)	$\square_0$	$\square_1$	$\square_2$	$\square_3$	$\square_4$
26.	I work on unnecessary things. (RC)	$\square_0$	$\square_1$	$\square_2$	$\square_3$	$\square_4$
27.	I have to work under vague directives or orders. (RA)	$\square_0$	$\square_1$	$\square_2$	$\square_3$	$\square_4$
28.	I perform work that suits my values. *(RC)	$\square_0$	$\square_1$	$\square_2$	$\square_3$	$\square_4$
29.	I do not know if my work will be acceptable to my boss. (RA)	$\square_0$	$\square_1$	$\square_2$	$\square_3$	$\square_4$

5.19 These questions are about your job in general. Please tick ONE box only. How satisfied have you been with the following:

		Very satisfied	Satisfied	Dis-satisfied	Very dis-satisfied	Not appli-cable
a)	Your usual take home pay.	$\square_0$	$\square_1$	$\square_2$	$\square_3$	$\square_4$
b)	Your work prospects.	$\square_0$	$\square_1$	$\square_2$	$\square_3$	$\square_4$
c)	The people you work with.	$\square_0$	$\square_1$	$\square_2$	$\square_3$	$\square_4$
d)	Physical working conditions.	$\square_0$	$\square_1$	$\square_2$	$\square_3$	$\square_4$
e)	The way your section is run.	$\square_0$	$\square_1$	$\square_2$	$\square_3$	$\square_4$
f)	The way your abilities are used.	$\square_0$	$\square_1$	$\square_2$	$\square_3$	$\square_4$
g)	The interest and skill involved in your job.	$\square_0$	$\square_1$	$\square_2$	$\square_3$	$\square_4$

5.20 Do your family life and family responsibilities interfere with your performance in your job in any of the following ways? Please tick ONE box only.

Would you say:	Not at all	To some extent	A great deal	Not applic-able
a) Family matters reduce the time you can devote to your job.	□0	□1	□2	□3
b) Family worries or problems distract you from your work.	□0	□1	□2	□3
c) Family activities stop you getting the amount of sleep you need to do your job well.	□0	□1	□2	□3
d) Family obligations reduce the time you need to relax or be by yourself.	□0	□1	□2	□3

5.21 To what extent do your job responsibilities interfere with your family life? Please tick ONE box only.

Would you say:	Not at all	To some extent	A great deal	Not applic-able
a) Your job reduces the amount of time you can spend with the family.	□0	□1	□2	□3
b) Problems at work make you irritable at home.	□0	□1	□2	□3
c) Your job involves a lot of travel away from home.	□0	□1	□2	□3
d) Your job takes so much energy you don't feel up to doing things that need attention at home.	□0	□1	□2	□3

SECTION 6: DEMOGRAPHICS

6.1 **Age:** .... **yrs**

6.2 **Sex:** □0 **M** □1 **F**

6.3 Current Status: (Please tick one box only)

Single	□0	Separated	□3
Living with partner	□1	Divorced	□4
Married	□2	Widowed	□5

6.4 Education Completed: (Please tick one box only)

None	□0	City & Guilds/national diploma	□3
GCSE/ 'O' Level	□1	BA/BSc	□4
AS Level/SCE Higher/Matriculation	□2	Higher degree/professional qualification	□5

6.5 How would you describe yourself?

White	□0	Black Caribbean	□1
Black African	□2	Black neither Caribbean or African	□2
Indian	□4	Pakistani	□3
Bangladeshi	□6	Chinese	□7
		None of these (Please specify)	□8

____

6.6 What is the total current yearly amount you receive from your wage, pension, benefit allowance or annual salary (before tax is deducted)? Please indicate one category.

less than £2,500	□0	£2,500-£4,999	□1	£5,000-£9,999	□2
£10,000-£15,999	□3	£16,000-£19,999	□4	£20,000-£24,999	□5
£25,000-£29,999	□6	£30,000-39,999	□7	£40,000-49,999	□8
£50,000 or more	□9				

THANK YOU FOR YOUR PARTICIPATION

If you would be interested in taking part in any further research, please enter you details in the space provided. If you DO NOT wish to receive any further correspondence from the University, please leave this section blank.

Title: **Mr/Mrs/Miss/Ms/Dr** **Other**...........**(please circle)**

Surname: ....

First name: ....

Address: ....

....

....

....

Tel: ....

E-mail: ....

Occupation: ....

Key:

A	HADS anxiety
D	HADS depression
JD	JDCS job demand
SS	JDCS social support
SD	JDCS skill discretion
DA	JDCS decision authority
EE	ERI extrinsic effort
IE	ERI intrinsic effort
IR	ERI reward
SU	Culture: Supportive
PD	Culture: Performance driven
EN	Culture: Enterprising
TR	Culture: Traditional

Appendix II:
Exploratory factor analyses

Table 1: Factor loadings for physical and psychological symptoms checklist items (Survey I)

Factor	Loading
14-day upper respiratory tract symptoms	
(Have you had one or more of the following symptoms in the last 14-days: colds/flu, cough, sore throat, blocked nose)	
Cold/flu	.850
Cough/catarrh/phlegm	.732
Sore throat	.731
Blocked/runny nose	.766
14-day depression/fatigue	
(Have you had one or more of the following symptoms in the last 14-days: depression, tiredness, difficulty sleeping, headache)	
Nervy/tense/depression	.590
Tired for no apparent reason	.692
Difficulty sleeping	.706
Headache	.499
14-day respiratory symptoms	
(Have you experienced wheeziness and/or shortness of breath in the last 14-days)	
Wheeziness	.784
Shortness of breath	.846
14-day gastrointestinal symptoms	
(Have you experienced diarrhoea and/or nausea/vomiting in the last 14-days)	
Diarrhoea	.713
Nausea/vomiting	.713
14-day back pain/swollen ankles	
(Have you experienced back pain and/or swollen ankles in the last 14-days)	
Backache	.516
Swollen ankles	.785
14-day tooth/earache	
(Have you experienced tooth and/or earache in the last 14-days)	
Toothache/gum problems	.593
Earache/discomfort in the ears	.679

Table 2: Factor loadings for physical and psychological symptoms checklist items (Survey II)

Factor	Loading
14-day upper respiratory tract symptoms	
(Have you had one or more of the following symptoms in the last 14-days: colds/flu, cough, sore throat, blocked nose)	
Cold/flu	.839
Cough/catarrh/phlegm	.707
Sore throat	.728
Blocked/runny nose	.691
14-day depression/fatigue	
(Have you had one or more of the following symptoms in the last 14-days: depression, tiredness, difficulty sleeping, back pain)	
Nervy/tense/depression	.631
Tired for no apparent reason	.582
Difficulty sleeping	.534
Back pain	.560
14-day respiratory symptoms	
(Have you experienced wheeziness and/or shortness of breath in the last 14-days)	
Wheeziness	.782
Shortness of breath	.782
14-day gastrointestinal symptoms	
(Have you experienced diarrhoea and/or wind/indigestion/heartburn in the last 14-days)	
Diarrhoea	.633
Wind/indigestion/heartburn	.475
14-day dizziness/earache/nausea	
(Have you experienced dizziness/earache/nausea in the last 14-days)	
Dizziness	.548
Earache	.667
Nausea	.627
14-day toothache/skin problems/rashes	
(Have you experienced toothache and/or skin problems/rashes in the last 14-days)	
Toothache/gum problems	.670
Skin problems/rashes	.519

Table 3: Factor loadings for prescribed medication checklist items (Survey I)

Factor	Loading
Use of pain killers and/or indigestion medication in last 12-months	
Pain killers	.653
Medicines for indigestion	.629
Use of psychotropic medication in last 12-months (1 or more)	
Anti-depressants	.831
Stress/anxiety medication	.815
Use of pain killers and/or indigestion medication in last 14-days	
Pain killers	.732
Medicines for indigestion	.733
Use of psychotropic medication in last 14-days (1 or more)	
Anti-depressants	.811
Stress/anxiety medication	.833

Table 4: Factor loadings for prescribed medication checklist items (Survey II)

Factor	Loading
Use of pain killers and/or indigestion medication in last 12-months	
Pain killers	.712
Medicines for indigestion	.702
Use of psychotropic medication in last 12-months (1 or more)	
Anti-depressants	.867
Stress/anxiety medication	.838
Use of pain killers and/or indigestion medication in last 14-days	
Pain killers	.764
Medicines for indigestion	.683
Use of psychotropic medication in last 14-days (1 or more)	
Anti-depressants	.863
Stress/anxiety medication	.861

Table 5: Factor loadings for organisational culture profile items (Survey I: forced 4-factor solution)

Scale item	Factor loading
	Factor 1 (19 items)
Flexibility	.525
Adaptability	.574
Being team oriented	.652
Sharing information freely	.706
Being people oriented	.773
Fairness	.813
Respect for individual's right	.812
Tolerance	.784
Informality	.602
Being easy going	.682
Being calm	.693
Being supportive	.791
Being aggressive	-.559
Decisiveness	.513
Takes initiative	.579
Reflective	.604
Provides opportunities for professional growth	.498
Offers praise for good performance	.568
Emphasises working in collaboration with others	.527
	Factor 2 (11 items)
Being analytical	.552
Paying attention to detail	.534
Being precise	.557
Action oriented	.512
Achievement oriented	.495
Demanding	.582
Emphasises taking individual responsibility	.570
Having high expectations of performance	.678
Expects enthusiasm for job	.524
Emphasises quality	.505
Being results oriented	.590
	Factor 3 (4 items)
Quick to take advantage of opportunities	.549
Willing to experiment	.581
Risk taking	.576
Rewards good performance with high pay	.515
	Factor 4 (3 items)
Stability	.569
Predictability	.626
Security of employment	.597

Table 6: Factor loadings for bullying scale items (Survey I)

Scale item	Factor loading
	Factor 1 (9 items)
Persistent attempts to undermine your work	.730
Persistent and unjustified criticism and monitoring of your work	.701
Persistent attempts to humiliate you in front of colleagues	.657
Intimidatory use of discipline or competence procedures	.505
Undermining personal integrity	.734
Destructive innuendo and sarcasm	.591
Freezing out, ignoring or exclusion	.591
Constant undervaluation of your efforts	.598
Persistent attempts to demoralise you	.711
	Factor 2 (5 items)
Withholding necessary information	.512
Undue pressure to produce work	.651
Setting impossible deadlines	.743
Shifting of goal posts without telling you	.679
Removal of areas of responsibility without telling you	.516
	Factor 3 (2 items)
Inappropriate jokes	.773
Persistent teasing	.780
	Factor 4 (2 items)
Physical violence	.856
Violence to property	.583

Appendix III:
Bivariate (Spearman's rho) correlations between dependent variables (Survey I)

	Work stress (N)	Clinical anxiety (N)	Clinical depression (N)	Lifetime symptoms (N)	12-month symptoms (N)	12-month sciatica (N)	14-day symptoms (N)	14-day URTS (N)	14-day depression /fatigue (N)	14-day respiratory symptoms (N)
Work stress	-	-	-	-	-	-	-	-	-	-
Clinical anxiety	.439** (1053)	-	-	-	-	-	-	-	-	-
Clinical depression	.243** (10490	.359** (1039)	-	-	-	-	-	-	-	-
Lifetime symptoms	.170** (1016)	.179** (992)	.117** (989)	-	-	-	-	-	-	-
12-month symptoms	.148** (957)	.222** (933)	.105** (932)	.292** (956)	-	-	-	-	-	-
12-month sciatica	.099** (1035)	.143** (1009)	.004** (1006)	.093** (1020)	.603** (968)	-	-	-	-	-
14-day symptoms	.212** (951)	.271** (928)	.127** (925)	.212** (951)	.424** (919)	.255** (958)	-	-	-	-
14-day URTS	.072* (1021)	.068* (996)	.003 (992)	.119** (1016)	.183** (965)	.087** (1028)	.501** (962)	-	-	-
14-day depression /fatigue	.156** (1021)	.222** (996)	.111** (993)	.129** (1017)	.283** (963)	.180** (1027)	.481** (962)	.211** (1025)	-	-

* Correlation significant at 0.05 level (2-tailed).
** Correlation significant at 0.01 level (2-tailed).

	Work stress (N)	Clinical anxiety (N)	Clinical depression (N)	Lifetime symptoms (N)	12-month symptoms (N)	12-month sciatica (N)	14-day symptoms (N)	14-day URTS (N)	14-day depression /fatigue (N)	14-day respiratory symptoms (N)
14-day respiratory symptoms	.070* (1020)	.112** (995)	.065* (992)	.203** (1017)	.239** (963)	.128** (1027)	.328** (962)	.194** (1024)	.151** (1025)	-
14-day gastro symptoms	.151** (1019)	.183** (995)	.088** (992)	.089** (1015)	.181** (964)	.081** (1024)	.287** (960)	.170** (1023)	.139** (1025)	.089** (1024)
14-day back pain/ ankles	.071* (1026)	.110** (1001)	.056 (998)	.075* (1021)	.430** (967)	.567** (1033)	.098** (1021)	.109** (1029)	.206** (1031)	.160** (1030)
14-day back pain	.083** (1033)	.129** (1007)	.050 (1004)	.063* (1023)	.427** (967)	.618** (1038)	.311** (962)	.087** (1029)	.189** (1032)	.145** (1031)
14-day tooth/ear ache	.094** (1022)	.145** (997)	.034 (994)	.051 (1019)	.217** (967)	.127** (1027)	.284** (962)	.125** (1026)	.136** (1027)	.108** (1027)
12-month meds	.092** (872)	.141** (853)	.044 (853)	.318** (864)	.311** (821)	.175** (873)	.254** (820)	.092** (869)	.158** (869)	.161** (869)
12-month pain/ind meds	.081* (896)	.104** (876)	-.038 (876)	.120** (884)	.241** (836)	.181** (894)	.181** (836)	.060 (888)	.136** (890)	.090** (889)
12-month psychotro-pic meds	.100** (965)	.121** (943)	.043 (943)	.253** (949)	.160** (900)	.073* (964)	.158** (893)	.070* (956)	.103** (957)	.112** (956)
14-day meds	.104** (898)	.136** (878)	.080* (876)	.289** (890)	.285** (849)	.160** (900)	.307** (839)	.164** (894)	.201** (894)	.199** (894)
14-day pain/ind meds	.140** (941)	.182** (920)	.056 (918)	.144** (926)	.284** (877)	.169** (938)	.304** (870)	.170** (930)	.209** (932)	.143** (930)

* Correlation significant at 0.05 level (2-tailed).
** Correlation significant at 0.01 level (2-tailed).

	14-day gastro symptoms (N)	14-day back pain/ ankles (N)	14-day back pain (N)	14-day tooth/ear ache (N)	12-month meds (N)	12-month pain/ind meds (N)	12-month psychotro-pic meds (N)	14-day meds (N)	14-day pain/ind meds (N)
14-day gastro symptoms	-	-	-	-	-	-	-	-	-
14-day back pain/ ankles	.107** (1028)	-	-	-	-	-	-	-	-
14-day back pain	.076* (1029)	.911** (1037)	-	-	-	-	-	-	-
14-day tooth/ear ache	.103** (1026)	.108** (1031)	.116** (1032)	-	-	-	-	-	-
12-month meds	.140** (867)	.144** (872)	.141** (875)	.073* (872)	-	-	-	-	-
12-month pain/ind meds	.114** (887)	.130** (893)	.135** (896)	.063 (892)	.595** (881)	-	-	-	-
12-month psychotro-pic meds	.094** (955)	.040 (961)	.028 (965)	.080* (959)	.261** (881)	.117** (899)	-	-	-
14-day meds	.162** (892)	.154** (898)	.140** (901)	.039 (896)	.531** (843)	.448** (850)	.187** (876)	-	-
14-day pain/ind meds	.109** (928)	.192** (936)	.178** (939)	.076* (932)	.481** (856)	.549** (871)	.173** (906)	.749** (908)	-

* Correlation significant at 0.05 level (2-tailed).
** Correlation significant at 0.01 level (2-tailed).

Survey II

	Work stress (N)	Clinical anxiety (N)	Clinical depression (N)	Lifetime symptoms (N)	12-month symptoms (N)	12-month sciatica (N)	14-day symptoms (N)	14-day URTS (N)	14-day depression /fatigue [1][1] (N)	14-day depression /fatigue [2][2] (N)
Work stress	-	-	-	-	-	-	-	-	-	-
Clinical anxiety	.381** (792)	-	-	-	-	-	-	-	-	-
Clinical depression	.180** (795)	.306** (789)	-	-	-	-	-	-	-	-
Lifetime symptoms	.147** (816)	.191** (794)	.182** (787)	-	-	-	-	-	-	-
12-month symptoms	.115** (790)	.140** (758)	.096** (761)	.209** (787)	-	-	-	-	-	-
12-month sciatica	.093** (817)	.094** (785)	.068 (788)	.103** (812)	.390** (793)	-	-	-	-	-
14-day symptoms	.089* (791)	.100** (762)	.064 (764)	.064 (785)	.241** (771)	.111** (791)	-	-	-	-
14-day URTS	0.62 (817)	.098** (785)	.084* (788)	.079* (810)	.062 (789)	.040 (816)	.251** (794)	-	-	-
14-day depression /fatigue[1]	.126** (816)	.159** (784)	.076* (787)	.115** (808)	.179** (787)	.065 (814)	.612** (794)	.196** (818)	-	-

* Correlation significant at 0.05 level (2-tailed).
** Correlation significant at 0.01 level (2-tailed).

[1] Depression, fatigue, difficulty sleeping, headache
[2] Depression, fatigue, difficulty sleeping, back pain

	Work stress (N)	Clinical anxiety (N)	Clinical depression (N)	Lifetime symptoms (N)	12-month symptoms (N)	12-month sciatica (N)	14-day symptoms (N)	14-day URTS (N)	14-day depression /fatigue [1] (N)	14-day depression /fatigue [2] (N)
14-day depression fatigue [2]	.150** (814)	.128** (782)	.089** (785)	.061 (806)	.236** (786)	.186** (812)	.535** (794)	.176** (816)	.571** (817)	-
14-day respiratory symptoms	.142** (817)	.147** (785)	.135** (788)	.160** (810)	.128** (789)	.117** (816)	.109** (794)	.242** (819)	.153** (818)	.154** (816)
14d gastro symptoms [1][3]	.104** (814)	.192** (782)	.149** (.785)	.078* (807)	.096** (787)	.067 (813)	.138** (794)	.142** (817)	.195** (816)	.183** (815)
14d gastro symptoms [2][4]	.121** (815)	.194** (783)	.093** (786)	.132** (808)	.142** (788)	.129** (815)	.241** (794)	.088* (818)	.225** (817)	.211** (815)
14-day earache/ dizziness	.152** (814)	.154** (782)	.081* (785)	.080* (807)	.059 (787)	.122* (813)	.178** (794)	.209** (817)	.259** (816)	.216** (815)
14-day back pain/ ankles	.081* (814)	.078* (782)	.051 (785)	.026 (807)	.181** (787)	.393** (813)	.264** (794)	.141** (817)	.162** (816)	.436** (816)
14-day back pain	.083* (816)	.082* (784)	.013 (787)	.008 (808)	.160** (788)	.380** (814)	.237** (794)	.142** (818)	.141** (817)	.440** (817)
14-day tooth/ear ache	-.004 (816)	.097** (784)	.030 (787)	.048 (809)	.070* (788)	.103** (815)	.150** (794)	.169** (819)	.186** (818)	.176** (816)
14-day toothache/ rashes	-.032 (816)	.089* (784)	.055 (787)	.056 (809)	.133** (788)	.111** (815)	.150** (794)	.078* (819)	.119** (818)	.157** (816)

* Correlation significant at 0.05 level (2-tailed).
** Correlation significant at 0.01 level (2-tailed).

[3] Diarrhoea/vomiting
[4] Diarrhoea/indigestion/heartburn

	Work stress (N)	Clinical anxiety (N)	Clinical depression (N)	Lifetime symptoms (N)	12-month symptoms (N)	12-month sciatica (N)	14-day symptoms (N)	14-day URTS (N)	14-day depression /fatigue [1] (N)	14-day depression /fatigue [2] (N)
12-month meds	.082* (754)	.128** (725)	.059 (728)	.158** (747)	.199** (727)	.125** (753)	.192** (735)	.060 (755)	.215** (755)	.246** (753)
12-month pain/ind meds	.075* (761)	.107** (732)	.015 (735)	.108** (754)	.180** (734)	1.55** (760)	.153** (741)	.029 (762)	.166** (762)	.195** (760)
12-month psychotr-pic meds	.030 (792)	.171** (760)	.219** (763)	.230** (785)	.063 (765)	.001 (791)	.064 (772)	.097** (792)	.125** (792)	.134** (790)
14-day meds	.108** (760)	.143** (731)	.063 (734)	.229* (792)	.155** (732)	.050 (758)	.232** (740)	.049 (760)	.243** (760)	.239** (758)
14-day pain/ind meds	.080* (777)	.109** (748)	.046 (751)	.160** (769)	.146** (749)	.042 (775)	.200** (756)	.012 (777)	.182** (777)	.181** (775)
14-day psychotro-pic meds	.034 (772)	.168** (742)	.204** (745)	.176** (764)	.051 (744)	.013 (770)	.062 (751)	.105** (772)	.120** (772)	.141** (770)

* Correlation significant at 0.05 level (2-tailed).
** Correlation significant at 0.01 level (2-tailed).

	14-day respiratory symptoms (N)	14d gastro symptoms [1] (N)	14d gastro symptoms [2] (N)	14-day earache/ dizziness (N)	14-day back pain/ ankles (N)	14-day back pain (N)	14-day tooth/ear ache (N)	14-day toothache/ rashes (N)	12-month meds (N)	12-month pain/ind meds (N)
14d gastro symptoms [1]	.090* (817)	-	-	-	-	-	-	-	-	-
14d gastro symptoms [2]	.182** (818)	.443** (816)	-	-	-	-	-	-	-	-
14-day earache/ dizziness	.216** (817)	.360** (817)	.187** (816)	-	-	-	-	-	-	-
14-day back pain/ ankles	.165** (817)	.155** (816)	.234** (816)	.145** (816)	-	-	-	-	-	-
14-day back pain	.110** (817)	.149** (816)	.215** (816)	.138** (816)	.893** (817)	-	-	-	-	-
14-day tooth/ear ache	.133** (819)	.167** (817)	.126** (818)	.473** (817)	.134** (817)	.109** (817)	-	-	-	-
14-day toothache/ rashes	.130** (189)	.123** (817)	.166** (818)	.127** (817)	.173** (817)	.143** (817)	.484** (819)	-	-	-
12-month meds	.176** (755)	.166** (754)	.185** (754)	.123** (754)	.183** (753)	.197** (754)	.102** (755)	.085* (755)	-	-
12-month pain/ind meds	.113** (762)	.079* (761)	.196** (761)	.120** (761)	.204** (760)	.197** (761)	.051 (792)	.071* (762)	.750** (757)	-
12-month psychotr-pic meds	.024 (793)	.150** (791)	.071* (791)	.050 (791)	.081* (790)	.091* (791)	.051 (792)	.047 (792)	.226** (757)	.086* (761)

* Correlation significant at 0.05 level (2-tailed).

** Correlation significant at 0.01 level (2-tailed).

	14-day respiratory symptoms (N)	14d gastro symptoms [1] (N)	14d gastro symptoms [2] (N)	14-day earache/ dizziness (N)	14-day back pain/ ankles (N)	14-day back pain (N)	14-day tooth/ear ache (N)	14-day toothache/ rashes (N)	12-month meds (N)	12-month pain/ind meds (N)
14-day meds	.207** (761)	.176** (759)	.242** (759)	.124** (759)	.104** (758)	.131** (759)	.112** (760)	.076* (760)	.612** (742)	.474** (744)
14-day pain/ind meds	.146** (778)	.113** (776)	.252** (776)	.154** (776)	.157** (775)	.161** (776)	.142** (777)	.077* (777)	.397** (744)	.562** (748)
14-day psychotropic meds	.007 (773)	.143** (770)	.075* (771)	.035 (770)	.081* (770)	.081* (771)	.073* (772)	.081* (772)	.192** (745)	.108** (749)

* Correlation significant at 0.05 level (2-tailed).
** Correlation significant at 0.01 level (2-tailed).

	12-month psychotropic meds (N)	14-day meds (N)	14-day pain/ind meds (N)	14-day psychotropic meds (N)
14-day meds	.186** (753)	-	-	-
14-day pain/ind meds	.053 (765)	.696** (763)	-	-
14-day psychotropic meds	.682** (760)	.245** (763)	.083* (768)	-

* Correlation significant at 0.05 level (2-tailed).

** Correlation significant at 0.01 level (2-tailed).

Appendix IV:
Survey I: Additional stressors and health & well-being (backward step logistic regression models)[5]

		N	OR	95% CI
Work stress	Bullying	501	1.00	
	(Wald = 7.36, p<.007)	423	1.68	1.16-2.33
	Role conflict	472	1.00	
	(Wald = 13.55, p<.0001)	452	2.04	1.40-2.99
	Unsupportive culture	472	1.00	
	(Wald = 5.02, p<.03)	452	1.54	1.06-2.25
Clinical anxiety	Bullying	505	1.00	
	(Wald = 28.24, p<.0001)	415	2.70	1.87-3.89
	Role conflict	473	1.00	
	(Wald = 15.49, p<.0001)	447	2.07	1.44-2.98
	LMX	425	1.00	
	(Wald = 3.86, p<.05)	495	1.45	1.05-2.19
Clinical depression	Bullying	504	1.00	
	(Wald = 3.96, p<.05)	414	1.84	1.01-3.35
	Role conflict	471	1.00	
	(Wald = 5.72, p<.02)	447	2.17	1.15-4.09
Lifetime prevalence of disease	Bullying	478	1.00	
	(Wald = 11.09, p<.001)	395	1.62	1.22-2.15
12-month symptoms	Bullying	456	1.00	
	(Wald = 10.81, p<.001)	368	1.75	1.25-2.43
	Role ambiguity	373	1.00	
	(Wald = 5.29, p<.02)	453	1.52	1.07-2.20
12-month sciatica	Role conflict	453	1.00	
	(Wald = 8.31, p<.004)	434	1.58	1.16-2.15
14-day symptoms	Bullying	461	1.00	
	(Wald = 30.91, p<.0001)	366	2.43	1.78-3.32
	Role ambiguity	379	1.40	
	(Wald = 4.51, p<.03)	448		1.03-1.92
14-day upper respiratory tract symptoms	Bullying	481	1.00	
	(Wald = 6.32, p<.01)	396	1.46	1.09-1.95
14-day depression/fatigue	Bullying	483	1.00	
	(Wald = 10.73, p<.001)	397	1.96	1.31-2.92
	Role conflict	454	1.00	
	(Wald = 10.02, p<.002)	426	1.88	1.27-2.79
14-day respiratory symptoms	Bullying	480	1.00	
	(Wald = 14.93, p<.0001)	397	2.25	1.49-3.40
14-day gastrointestinal symptoms	Bullying	480	1.00	
	(Wald = 8.79, p<.003)	396	1.77	1.21-2.57
	Role ambiguity	399	1.00	
	(Wald = 3.88, p<.05)	477	1.48	1.00-2.20

[5] Negative affectivity was not included as a covariate where clinical anxiety and depression served as dependent measures.

		N	OR	95% CI
14-day back pain/swollen ankles	Role conflict	456	1.00	
	(Wald = 10.60, p<.001)	425	1.68	1.23-2.30
14-day back pain	Role conflict	456	1.00	
	(Wald = 17.49, p<.0001)	431	1.90	1.41-2.56
14-day tooth/earache	Bullying	482	1.00	
	(Wald = 4.66, p<.03)	396	1.44	1.03-2.02
Prescribed medication in last 12 months	Bullying	410	1.00	
	(Wald = 17,13, p<.0001)	348	1.90	1.40-2.58
Prescribed pain/indigestion meds in last 12 months	Bullying	420	1.00	
	(Wald = 3.82, p<.05)	355	1.35	1.00-1.81
Prescribed psychotropic meds in last 12 months	Bullying	455	1.00	
	(Wald = 5.27, p<.02)	377	1.94	1.10-3.42
Prescribed medication in last 14 days	Bullying	426	1.00	
	(Wald = 7.16, p<.007)	356	1.56	1.13-2.16
Prescribed pain/indigestion meds in last 14 days	Bullying	444	1.00	
	(Wald = 8.30, p<.004)	373	1.53	1.14-2.03

Appendix V:
Relative effects of demographic characteristics and negative affectivity on health outcomes

Table 1: Survey I

			N	OR	95% CI
Work stress	Negative affectivity	Low	631	1.00	
	(Wald = 52.13, p<.0001)	High	389	3.02	2.24-4.08
Clinical	Full/part-time	Full-time	754	1.00	
anxiety[6]	(Wald = 3.60, p<.05)	Part-time	258	0.70	0.49-1.01
Clinical	Age	19-30	114	1.00	
depression	(Wald = 8.57, p<.04)	31-40	309	2.53	0.73-8.81
		41-50	337	3.00	0.89-10.19
		51-65	249	4.73	1.40-15.98
	Full/part-time	Full-time	753	1.00	
	(Wald = 4.17, p<.04)	Part-time	256	0.48	0.24-0.97
	Gender	Male	158	1.00	
	(Wald = 3.94, p<.05)	Female	851	0.56	0.32-0.99
Lifetime	Age	19-30	113	1.00	
prevalence of	(Wald = 16.75, p<.001)	31-40	304	1.58	0.98-2.54
disease		41-50	320	1.88	1.17-3.01
		51-65	229	2.69	1.63-4.45
	Marital status	Married/cohabiting	764	1.00	
	(Wald = 3.75, p<.05)	Single/divorced/widowed	202	1.38	1.00-1.92
	Negative affectivity	Low	601	1.00	
	(Wald = 9.92, p<.0001)	High	365	1.85	1.41-2.42
12-month	Negative affectivity	Low	576	1.00	
symptoms	(Wald = 22.50, p<.0001)	High	334	1.95	1.48-2.58
14-day	Full/part-time	Full-time	679	1.00	
symptoms	(Wald = 3.57, p<.05)	Part-time	228	0.74	0.54-1.01
	Negative affectivity	Low	574	1.00	
	(Wald = 52.79, p<.0001)	High	333	2.86	2.15-3.80

[6] Negative affectivity was not included as a covariate for clinical anxiety and depression.

Table 2: Survey II[7]

			N	OR	95% CI
Work stress	Full/part-time	Full-time	280	1.00	
	(Wald = 27.04, p<.0001)	Part-time	489	2.62	1.82-3.77
	Emotion-focused coping	Low	393	1.00	
	(Wald = 8.46, p<.004)	High	376	1.66	1.18-2.33
	Negative affectivity	Low	415	1.00	
	(Wald = 43.02, p<.0001)	High	354	3.13	2.23-4.41
Clinical anxiety[8]	Full/part-time	Full-time	473	1.00	
	(Wald = 7.61, p<.006)	Part-time	274	0.59	0.41-0.86
	Emotion-focused coping	Low	379	1.00	
	(Wald = 66.22, p<.0001)	High	368	4.59	3.18-6.62
Clinical depression	Emotion-focused coping	Low	382	1.00	
	(Wald = 13.83, p<.0001)	High	367	4.47	2.03-9.83
Lifetime prevalence of disease	Age	19-30	53	1.00	
	(Wald = 7.65, p<.05)	31-40	187	1.33	0.70-2.50
		41-50	311	1.34	0.72-2.46
		51-65	210	2.03	1.07-3.85
	Marital status	Married/cohabiting	591	1.00	
	(Wald = 6.66, p<.01)	Single/divorced/widowed	170	1.61	1.12-2.32
	Negative affectivity	Low	410	1.00	1.23-2.30
	(Wald = 10.52, p<.001)	High	351	1.68	
12-month symptoms	Negative affectivity	Low	406	1.00	
	(Wald = 11.59, p<.001)	High	337	2.22	1.40-3.52

[7] 14-day upper respiratory tract symptoms were not significantly predicted by any demographic or individual characteristics.

[8] Negative affectivity was not included as a covariate for clinical anxiety and depression.

Appendix VI:
Survey I: NOF Components and health & well-being:
Public sector[9] & community sample[10] data

		N	OR	95% CI
Work stress				
Public sector sample	Demand-control-support	437	1.00	
	(Wald = 23.52, p<.0001)	430	2.94	1.90–4.55
	Effort-reward imbalance	449	1.00	
	(Wald = 54.53, p<.0001)	418	5.92	3.69-9.48
	Working hrs/hazards	433	1.00	
	(Wald = 6.16, p<.01)	434	1.68	1.12-2.54
Community sample	Demand-control-support	3532	1.00	
	(Wald = 82.67, p<.0001)	3304	1.98	1.71 – 2.29
	Effort-reward imbalance	3438	1.00	
	(Wald = 263.29, p<.0001)	3398	4.39	3.67 – 5.25
	Working hrs/hazards	3267	1.00	
	(Wald = 55.39, p<.0001)	6569	1.76	1.52 – 2.04
	Bullying	6249	1.00	
	(Wald = 24.52, p<.0001)	587	1.67	1.36 – 2.05
Clinical anxiety[11]				
Public sector sample	Demand-control-support	439	1.00	
	(Wald = 13.60, p<.0001)	424	2.19	1.44-3.33
	Effort-reward imbalance	452	1.00	
	(Wald = 67.62, p<.0001)	411	6.73	4.27-10.59
	Bullying	475	1.00	
	(Wald = 11.24, p<.001)	388	1.98	1.33-2.95
Community sample	Demand-control-support	4344	1.00	
	(Wald = 64.43, p<.0001)	2177	1.69	1.49-1.92
	Effort-reward imbalance	3344	1.00	
	(Wald =349.88, p<.0001)	3177	3.82	3.32-4.39
	Working hrs/hazards	3618	1.00	
	(Wald = 5.25, p<.02)	2903	1.17	1.02-1.33
	Bullying	5936	1.00	
	(Wald = 19.10, p<.0001)	585	1.53	1.26-1.85
Clinical depression				
Public sector sample	Effort-reward imbalance	451	1.00	
	(Wald = 11.28, p<.001)	411	4.21	1.82-9.74
	Working hrs/hazards	431	1.00	
	(Wald = 5.87, p<.02)	431	2.37	1.18-4.75
Community sample	Effort-reward imbalance	3325	1.00	
	(Wald = 60.81, p<.0001)	3160	3.03	2.30-4.01
	Demand-control-support	4327	1.00	
	(Wald = 52.32, p<.0001)	2158	2.40	1.90-3.05
Lifetime symptom prevalence				
Public sector sample	Effort-reward imbalance	435	1.00	
	(Wald = 4.22, p<.04)	395	1.43	1.02-2.01
	Bullying	454	1.00	
	(Wald = 4.43, p<.04)	376	1.42	1.03-1.97

[9] Data presented in Chapters 2-5

[10] Re-analysis of the Smith et al. (2004) data (see Smith et al., 2004 for sample descriptives).

[11] Negative affectivity was not included as a covariate were clinical anxiety and depression comprised dependent measures.

Community sample	Demand-control-support	3437	1.00	
	(Wald = 3.94, p<.05)	3234	1.15	1.00-1.24
	Effort-reward imbalance	3370	1.00	
	(Wald = 14.70, p<.0001)	3301	1.26	1.12-1.42
	Bullying	6103	1.00	
	(Wald = 7.99, p<.005)	568	1.30	1.08-1.57
12-month symptoms				
Public sector sample	Effort-reward imbalance	413	1.00	
	(Wald = 13.80, p<.0001)	370	1.95	1.37-2.78
	Bullying	434	1.00	
	(Wald = 11.59, p<.001)	349	1.81	1.29-2.54
	Working hrs/hazards	386	1.00	
	(Wald = 4.96, p<.03)	397	1.46	1.05-2.04
Community sample	Effort-reward imbalance	3241	1.00	
	(Wald = 16.08, p<.0001)	3148	1.30	1.14-1.47
12-month sciatica/back pain *				
Public sector sample	Effort-reward imbalance	428	1.00	
	(Wald = 6.56, p<.01)	397	1.58	1.11–2.23
	Working hrs/hazards	409	1.00	
	(Wald = 7.63, p<.006)	416	1.57	1.14–2.15
14-day symptoms				
Public sector sample	Effort-reward imbalance	419	1.00	
	(Wald = 11.84, p<.001)	367	1.85	1.30-2.62
	Bullying	439	1.00	
	(Wald = 16.13, p<.0001)	347	2.00	1.43-2.80
Community sample	Effort-reward imbalance	3381	1.00	
	(Wald = 66.63, p<.0001)	3293	2.28	1.87-2.78
14-day depression/fatigue				
Public sector sample	Effort-reward imbalance	438	1.00	
	(Wald = 13.55, p<.0001)	394	2.27	1.47-3.50
Community sample	Effort-reward imbalance	3423	1.00	
	(Wald = 82.26, p<.0001)	3348	1.83	1.61-2.09
14-day upper respiratory tract symptoms **				
Community sample	Effort-reward imbalance	3417	1.00	
	(Wald = 8.98, p<.003)	3346	1.19	1.06-1.34
	Bullying	6182	1.00	
	(Wald = 13.88, p<.0001)	581	1.41	1.18-1.69
14-day lower respiratory symptoms				
Public sector sample	Bullying	456	1.00	
	(Wald = 10.57, p<.001)	377	2.18	1.36-3.49
Community sample	Effort-reward imbalance	3435	1.00	
	(Wald = 16.08, p<.0001)	3362	1.40	1.19-1.66
	Working hrs/hazards	3257	1.00	
	(Wald = 11.60, p<.001)	3540	1.30	1.12-1.52
	Bullying	6210	1.00	
	(Wald = 14.23, p<.0001)	587	1.52	1.22-1.90
14-day gastrointestinal symptoms **				
Community sample	Effort-reward imbalance	3429	1.00	
	(Wald = 13.34, p<.0001)	3356	1.36	1.15-1.60
14-day back pain				
Public sector sample	Working hrs/hazards	406	1.00	

	(Wald = 9.60, p<.002)	419	1.66	1.20–2.29
Community sample	Demand-control-support	3509	1.00	
	(Wald = 5.60, p<.02)	3324	1.14	1.07-1.36
	Effort-reward imbalance	3442	1.00	
	(Wald = 9.72, p<.002)	3391	1.21	1.02-1.28
14-day back pain/swollen ankles *				
Public sector sample	Working hrs/hazards	404	1.00	
	(Wald = 8.95, p<.003)	417	1.62	1.18–2.23
Prescribed medication in last 12 months +				
Public sector sample	Bullying	391	1.00	
	(Wald = 13.64, p<.0001)	324	1.95	1.37-2.78
Prescribed psychotropic meds in last 12 months +				
Public sector sample	Bullying	433	1.00	
	(Wald = 4..49, p<.03)	354	1.91	1.05-3.49
Prescribed medication in last 14 days **				
Community sample	Effort-reward imbalance	3350	1.00	
	(Wald = 8.82, p<.003)	3253	1.23	1.07-1.41
	Working hrs/hazards	3179	1.00	
	(Wald = 7.59, p<.006)	3424	1.20	1.05-1.36
Prescribed pain/indigestion meds in last 14 days				
Public sector sample	Effort-reward imbalance	398	1.00	
	(Wald = 4.81, p<.03)	373	1.48	1.04-2.11
Community sample	Effort-reward imbalance	3356	1.00	
	(Wald = 13.64, p<.0001)	3263	1.32	1.14-1.53
	Working hrs/hazards	3189	1.00	
	(Wald = 6.34, p<.01)	3430	1.19	1.04-1.37

* No significant effects were observed for the community sample.
** No significant effects were observed for the public sector sample.
\+ This outcome was not included in the community sample analyses.

Participant No:

Appendix VII:
Health & Safety at Work Survey (II)

HEALTH & SAFETY AT WORK SURVEY

CARDIFF UNIVERSITY
PRIFYSGOL CAERDYDD

The Centre for Occupational & Health Psychology, Cardiff University.
63 Park Place, Cardiff. CF10 3AS.

GENERAL INSTRUCTIONS

We are conducting research into the impact of working life on stress, health, accident and injury rates.

The questionnaire is strictly anonymous. We are only interested in groups of workers and therefore no individual will be identified in connection with any of the research findings. Your identity and responses to the questionnaire will be completely protected. In carrying out this survey, we hope to identify critical areas of concern within the modern profession, and will provide general feedback with regards the findings to the RCN. However, if on completion of the questionnaire, you would like more detailed information regarding the purpose of the study and critical findings, please contact the research team (details provided below).

Please read each question carefully and mark the response that BEST reflects your knowledge or feelings. Do not spend a lot of time on each one; your FIRST answer is usually the best. Please make sure you mark all answers in the space provided. The questionnaire may take up to 1 hour to complete.

Once you have completed the questionnaire, please return it to us in the FREEPOST envelope provided (no stamp required). Please remember we are interested in your experiences of your work environment and our conclusions depend on your accuracy.

If you experience any distress as a result of participating in the study, or are concerned about any responses to items relating to your mental well-being, please contact your GP for advice. If you require any advice about issues related to your job highlighted in the survey, we would advise you to contact your RCN representative. Alternatively, please do not hesitate to contact the research team if you would like more information about the study or require clarification of any of the questions.

Katherine Chaplin	E-mail: chaplink1@cardiff.ac.uk	**Tel:** 029 20876455
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The Centre for Occupational & Health Psychology, Cardiff University.
63 Park Place, Cardiff. CF10 3AS.

THANK YOU FOR YOUR PARTICIPATION

SECTION 1: YOUR JOB

We would like to ask you some questions about you and work.

1.1 a) What is your job title?

____

b) What do you mainly do in your job?

____

____

c) Which industry sector do you work in?

____

d) Is the job full-time or part-time? (Full-time: 30 hours per week or more, Part time: up to 30 hours per week)
Please tick ONE box.

Full-time □0
Part-time □1

e) Is your job permanent, temporary/casual, or fixed contract? Please tick ONE box.

Permanent □0
Temporary/casual □1
Fixed contract □2

f) Which one of the following best describes your current position at work.

Self-employed (25+ employees*) □0
Self-employed (less than 25 employees*) □1
Self-employed (no employees*) □2
Manager (25+ employees*) □3
Manager (less than 25 employees*) □4
Supervisor □5
Employee □6

Please tick one box.
(* Total number in Company, not just those of whom you are in charge).

g) Please give the date you started this job. _____ / _____
month / year

h) In this job, how many hours per week do you work on average? _____

i) What is your work pattern?

Fixed hours □0
Flexi-time □1
Shift work □2

SHIFTWORKERS <u>ONLY</u>

j) What is the length of your current shift?

6hrs ☐$_0$
8hrs ☐$_1$
12hrs ☐$_2$
Other

______

k) How long have you worked shifts in this employment? _____ / _____
years / months

l) How long have you worked shifts in any previous employment?_____ /_____
years /
months

m) Are you aware of any health implications for working shifts? Yes☐$_1$ No ☐$_0$

n) Do you get any health screening or advice from your employer about working shifts?
Yes☐$_1$ No ☐$_0$

ON CALL WORKERS <u>ONLY</u>

o) Are you on call out of normal working hours (i.e. 9-5)? Yes☐$_1$ No ☐$_0$

p) If yes, how often ________________________

(ALL)

q) Do you have any other paid jobs? Yes☐$_1$ No☐$_0$

SECTION 2: YOUR GENERAL WELL-BEING

2.1 Approximately how many days sick leave have you had in the last 12 months? ***(Please tick one box)***

None	1-5	6-10	11-15	>15
☐$_0$	☐$_1$	☐$_2$	☐$_3$	☐$_4$

2.2 Thinking about the past year, have you suffered from any illness that you think was caused, or made worse by work?

Yes ☐$_1$ No ☐$_0$

If yes, please specify:

____

2.3 Please read each item and then tick the box next to the reply that comes closest to how you have been feeling in the past week. Try to give your first reaction. This will probably be more accurate than spending a long time thinking about an answer. Please answer all questions, and tick only ONE BOX per question.
(Hospital Anxiety & Depression Scale: Zigmond & Snaith, 1983)

a) I feel tense or wound up *(A)
- Most of the time □0
- A lot of the time □1
- From time to time, occasionally □2
- Not at all □3

b) I feel as if I am slowed down *(D)
- Nearly all the time □0
- Very often □1
- Sometimes □2
- Not at all □3

c) I still enjoy the things I used to enjoy (D)
- Definitely as much □0
- Not quite so much □1
- Only a little □2
- Hardly at all □3

d) I get a sort of frightened feeling like "butterflies" in the stomach (A)
- Not at all □0
- Occasionally □1
- Quite often □2
- Very often □3

e) I get a sort of frightened feeling as if something awful is about to happen *(A)
- Very definitely and quite badly □0
- Yes, but not too badly □1
- A little, but it doesn't worry me □2
- Not at all □3

f) I have lost interest in my appearance *(D)
- Definitely □0
- I don't take as much care as I should □1
- I may not take quite as much care □2
- I take just as much care as ever □3

g) I can laugh and see the funny side of things (D)
- As much as I always could □0
- Not quite so much now □1
- Definitely not so much now □2
- Not at all □3

h) I feel restless as if I have to be on the move *(A)
- Very much indeed □0
- Quite a lot □1
- Not very much □2
- Not at all □3

i) Worrying thoughts go through my head *(A)
- A great deal of the time □0
- A lot of the time □1
- From time to time but not too often □2
- Only occasionally □3

j) I look forward with enjoyment to things (D)
- As much as I ever did □0
- Rather less than I used to □1
- Definitely less than I used to □2
- Hardly at all □3

k) I feel cheerful *(D)
- Not at all □0
- Not often □1
- Sometimes □2
- Most of the time □3

l) I get sudden feelings of panic *(A)
- Very often indeed □0
- Quite often □1
- Not very often □2
- Not at all □3

m) **I can sit at ease and feel relaxed** (A)

Definitely	☐$_0$
Usually	☐$_1$
Not often	☐$_2$
Not at all	☐$_3$

n) **I can enjoy a good book or radio or TV programme** (D)

Often	☐$_0$
Sometimes	☐$_1$
Not often	☐$_2$
Very seldom	☐$_3$

2.4 Please answer Yes or No to the following questions:

(Eysenck Personality Inventory Neuroticism Scale: Eysenck, 1968)

		YES	NO
1.	Do you often need understanding friends to cheer you up?	☐$_1$	☐$_0$
2.	Do you find it very hard to take no for an answer?	☐$_1$	☐$_0$
3.	Does your mood go up and down?	☐$_1$	☐$_0$
4.	Do you ever feel just miserable for no good reason?	☐$_1$	☐$_0$
5.	Do you feel suddenly shy when you want to talk to an attractive stranger?	☐$_1$	☐$_0$
6.	Do you often worry about things you should not have done or said?	☐$_1$	☐$_0$
7.	Are your feelings rather easily hurt?	☐$_1$	☐$_0$
8.	Are you sometimes bubbling over with energy and sometimes sluggish?	☐$_1$	☐$_0$
9.	Do you daydream a lot?	☐$_1$	☐$_0$
10.	Are you troubled about feelings of guilt?	☐$_1$	☐$_0$
11.	Would you call yourself 'tense' or 'highly-strung'?	☐$_1$	☐$_0$
12.	After you have done something important, do you often come away feeling you could have done better?	☐$_1$	☐$_0$
13.	Do ideas run through your head so that you cannot sleep?	☐$_1$	☐$_0$
14.	Do you get palpitations or thumping in your heart?	☐$_1$	☐$_0$
15.	Do you get attacks of shaking and trembling?	☐$_1$	☐$_0$
16.	Are you an irritable person?	☐$_1$	☐$_0$
17.	Do you worry about awful things that might happen?	☐$_1$	☐$_0$
18.	Do you have many nightmares?	☐$_1$	☐$_0$
19.	Are you troubled by aches and pains?	☐$_1$	☐$_0$
20.	Would you call yourself a nervous person?	☐$_1$	☐$_0$
21.	Are you easily hurt when people find fault with your work?	☐$_1$	☐$_0$
22.	Are you troubled with feelings of inferiority?	☐$_1$	☐$_0$

		YES	NO
23.	Do you worry about your health?	□1	□0
24.	Do you suffer from sleeplessness?	□1	□0

2.5 Over the past 12 months, how would you say your health in general has been?

Very good	Good	Fair	Bad	Very bad
□0	□1	□2	□3	□4

2.6 In general, how do you find your job? (single item work stress measure)

Not at all stressful	Mildly stressful	Moderately stressful	Very stressful	Extremely stressful
□0	□1	□2	□3	□4

2.7 How do you find life in general? Please tick one box only.

Not at all stressful	Mildly stressful	Moderately stressful	Very stressful	Extremely stressful
□0	□1	□2	□3	□4

2.8 Have you ever been told by the doctor that you have, or have had any of the following? Please tick Yes or No for EACH of the categories in the following list.
(Lifetime prevalence of disease checklist)

	Yes	No
Angina	□1	□0
High cholesterol level	□1	□0
Diabetes	□1	□0
Stroke	□1	□0
Heart attack (coronary thrombosis, myocardial infarction)	□1	□0
High blood pressure	□1	□0
Nervous trouble or depression	□1	□0
Asthma	□1	□0
Emphysema	□1	□0
Bronchitis	□1	□0
Breast cancer	□1	□0
Other cancer	□1	□0

2.9 If you have had cancer which part of the body did it affect?

____

2.10 There are some kinds of health problems that keep recurring and some that people have all the time. In the last 12 months have you suffered from any of the following health problems? (12-month symptom checklist)

Please tick Yes or No for EACH of the categories in the following list.

	Yes	No
Bronchitis	☐1	☐0
Arthritis or rheumatism	☐1	☐0
Sciatica, lumbago or recurring backache	☐1	☐0
Persistent skin trouble (e.g. eczema)	☐1	☐0
Asthma	☐1	☐0
Hay fever	☐1	☐0
Recurring stomach trouble or indigestion	☐1	☐0
Being constipated all or most of the time	☐1	☐0
Piles	☐1	☐0
Persistent foot trouble (e.g. bunions, in-growing toenails)	☐1	☐0
Trouble with varicose veins	☐1	☐0
Nervous trouble or persistent depression	☐1	☐0
Persistent trouble with your gums or mouth	☐1	☐0
Any other recurring health problem *Please specify*↓	☐1	☐0

____

2.11 Have you had any of the following symptoms in the last 14 days?
Please tick Yes or No for EACH of the categories in the following list.
(14-day symptom checklist)

	Yes	No
A cough, catarrh or phlegm	☐1	☐0
Diarrhoea	☐1	☐0
Heartburn, wind or indigestion	☐1	☐0
Shortness of breath	☐1	☐0
Dizziness or giddiness	☐1	☐0
Earache or discomfort in the ears	☐1	☐0
Swollen ankles	☐1	☐0
Nervy, tense or depressed	☐1	☐0
A cold or flu	☐1	☐0
A sore throat	☐1	☐0
Difficulty sleeping	☐1	☐0
Pains in the chest	☐1	☐0
Backache or pains in the back	☐1	☐0
Nausea or vomiting	☐1	☐0
Feeling tired for no apparent reason	☐1	☐0
Rashes, itches or other skin trouble	☐1	☐0
Blocked or runny nose	☐1	☐0
Headache	☐1	☐0
Wheeziness	☐1	☐0
Toothache or trouble with gums	☐1	☐0
Any other complaints in the last 14 days? *Please specify* ↓	☐1	☐0

____

2.12 **Have you taken any of the following medicines prescribed by a doctor? Please tick one box in each column to indicate whether you have taken each medicine in the LAST 14 DAYS, in the LAST MONTH, and in the LAST YEAR.**
(Prescribed medication use in the last year, 12 months and 14 days)

	In the last 14 days	In the last month	In the last year
Pain killers	Yes □$_1$ No□$_0$	Yes □$_1$ No□$_0$	Yes □$_1$ No□$_0$
Medicines for indigestion	Yes □$_1$ No□$_0$	Yes □$_1$ No□$_0$	Yes □$_1$ No□$_0$
Blood pressure tablets	Yes □$_1$ No□$_0$	Yes □$_1$ No□$_0$	Yes □$_1$ No□$_0$
Sleeping pills	Yes □$_1$ No□$_0$	Yes □$_1$ No□$_0$	Yes □$_1$ No□$_0$
Anti-depressants	Yes □$_1$ No□$_0$	Yes □$_1$ No□$_0$	Yes □$_1$ No□$_0$
Medicines for stress or anxiety	Yes □$_1$ No□$_0$	Yes □$_1$ No□$_0$	Yes □$_1$ No□$_0$
Laxatives (bowel opening medicine)	Yes □$_1$ No□$_0$	Yes □$_1$ No□$_0$	Yes □$_1$ No□$_0$
Other medicine	Yes □$_1$ No□$_0$	Yes □$_1$ No□$_0$	Yes □$_1$ No□$_0$

SECTION 3: ACCIDENTS AND INJURIES

3.1 **Thinking about the last 12 months, have you had any accidents WHILE YOU WERE WORKING that required medical attention from someone else (e.g. a first aider, GP, nurse or hospital doctor)?**

None	1	2	3	4	5	6	More than 6
□$_0$	□$_1$	□$_2$	□$_3$	□$_4$	□$_5$	□$_6$	□$_7$ Please specify ______

3.2 **How many accidents requiring medical attention have you had OUTSIDE work in the last 12 months?**

None	1	2	3	4	5	6	More than 6
□$_0$	□$_1$	□$_2$	□$_3$	□$_4$	□$_5$	□$_6$	□$_7$ Please specify ______

3.3 In the last 12 months how frequently have you had minor injuries (e.g. cuts and bruises) that did not require medical attention?

a) at work

Not at all	Rarely	Occasionally	Quite frequently	Very frequently
□$_0$	□$_1$	□$_2$	□$_3$	□$_4$

b) outside of work

Not at all	Rarely	Occasionally	Quite frequently	Very frequently
□$_0$	□$_1$	□$_2$	□$_3$	□$_4$

3.4 How frequently do you find that you have problems of memory (e.g. forgetting where you put things), attention (e.g. failures of concentration), or action (e.g. doing the wrong thing)?

a) at work

Not at all	Rarely	Occasionally	Quite frequently	Very frequently
□$_0$	□$_1$	□$_2$	□$_3$	□$_4$

b) outside of work

Not at all	Rarely	Occasionally	Quite frequently	Very frequently
□$_0$	□$_1$	□$_2$	□$_3$	□$_4$

SECTION 4: LIFESTYLE

In this section, we are interested in finding out about how you live your life. In particular, we are interested in how much (or little) you drink or smoke.

4.1 Do you smoke cigarettes now (i.e. NOT cigars/pipe)? (Currently smoking measure)

Yes □$_1$ No □$_0$

4.2 How many cigarettes do you smoke per day?

Manufactured ______ Handrolled ______

4.3 On average how often do you drink during the week, that is weekdays. Please tick ONE BOX only.

Never	1 - 2 Days	3 Days	4 Days
□$_0$	□$_1$	□$_2$	□$_3$

4.4 **How many units do you drink during an average week? ______ units**
(1 unit = half a pint of beer/glass of wine/1 measure of spirits)

4.5 **On average how often do you drink at the weekends. Please tick ONE BOX only.**

Never	1 - 2 Days	All 3 Days
□0	□1	□2

4.6 **How many units do you drink on an average weekend? ______ units**
(Alcohol above recommended levels calculated from average units per week and weekend)

The following questions refer to attitudes to snacks and snacking amongst the general population as well as individual snacking habits and preferences for different snack foods.

4.7 How often do you eat breakfast?

Every day	Most days (3-6)	Once or twice a week	Less than once a week	Never
□4	□3	□2	□1	□0

4.8 What do you normally eat for breakfast (please tick ONE box)?

Nothing	□0	Fruit	□4
Toast	□1	Cooked breakfast	□5
Cereal	□2	Combination	□6
Muesli/porridge	□3	Other	□7

4.9 What do you usually eat for lunch (please tick ONE box)?

Nothing	□0	Sandwich + crisps/ fruit/ yoghurt	□3
Fruit/yoghurt/cereal	□1	Cooked lunch	□4
Sandwich	□2	Other	□5

4.10 What do you usually eat for your evening meal (please tick ONE box)?

Nothing	□0	Heavy cooked	□4
Fruit	□1	Heavy cooked + dessert	□5
Light cooked	□2	Combination	□6
Light cooked + dessert	□3	Other	□7

4.11 **How often do you have a snack or something to eat between meals or before going to bed?**

Every day	Most days (3-6)	Once or twice a week	Less than once a week	Never
□4	□3	□2	□1	□0

4.12 **How many meals did you eat yesterday?** ....

4.13 **How many times did you have a snack yesterday?** ....

4.14 **What snacks did you eat yesterday (Please give quantities e.g. 2 digestive biscuits, 1 apple etc)?**

___

4.15 **Was your snacking yesterday typical of a normal day?**

Less than usual	Same as usual	More than usual
□0	□1	□2

4.16 **Which of the following definitions do you think best describes a snack?**

	Tick one box
Food or drink eaten on the move	□0
Food or drink eaten between main meals	□1
Small quantities of food (5 mouthfuls or less)	□2
Food eaten more than once a day	□3
Food that is quick to eat	□4
Food that is easy to eat	□5
Food that doesn't fill you up	□6
Food or drink eaten after the evening meal	□7
Food accompanying a hot drink	□8

4.17 **Which of the following foods have you eaten in the last week as a snack?**

	Twice or more a day	**Once a day**	**5-6 times a week**	**3-4 times a week**	**Twice a week**	**Once a week**	**Not at all**
Fresh fruit	□1	□2	□3	□4	□5	□6	□7
Crisps	□1	□2	□3	□4	□5	□6	□7
Chocolate confectionary	□1	□2	□3	□4	□5	□6	□7
Yoghurt	□1	□2	□3	□4	□5	□6	□7
Dried fruit	□1	□2	□3	□4	□5	□6	□7
Cereal bar	□1	□2	□3	□4	□5	□6	□7
Biscuits	□1	□2	□3	□4	□5	□6	□7
Breakfast cereal	□1	□2	□3	□4	□5	□6	□7
Nuts	□1	□2	□3	□4	□5	□6	□7
Cake / cake bars	□1	□2	□3	□4	□5	□6	□7
Toast / bread with spread	□1	□2	□3	□4	□5	□6	□7

4.18 Do you consider any of the following drinks to be snacks?

	Yes	No		Yes	No
Hot drinks	□1	□0	Water	□1	□0
Soup	□1	□0	Squash	□1	□0
Fizzy drinks	□1	□0	Milk	□1	□0
Fruit juice	□1	□0	Alcoholic drinks	□1	□0

4.19 Do you drink tea? Yes□1 No □0
What type of tea do you usually drink?

Caffeinated	□0	**Fruit / Herbal**	□2
Decaffeinated	□1	**Other ....**	□3

On average how many cups of tea do you drink per day? ....

4.20 Do you drink coffee? Yes□1 No □0
What type of coffee do you usually drink?

Caffeinated	□0	**Other ....**	□2
Decaffeinated	□1		

On average how many cups of coffee do you drink per day? ....

Please indicate using the following scale how much you agree/disagree with the statements listed below.

1 – Strongly agree; 2 – Agree; 3 – Neither agree nor disagree;

4 – Disagree; 5 – Strongly disagree.

4.21 A grazing (snacking) pattern of eating is less healthy than eating three meals a day. ....

4.22 Snack foods are generally less healthy foods. ....

4.23 Increased snacking by the population in general is a major contributor to the current increase in obesity in the UK. ....

4.24 I avoid eating snack foods because I think they are unhealthy. ....

4.25 I depend a lot on snack foods because I have a busy lifestyle and don't have time to prepare meals. ....

4.26 Some snack foods are healthy but these are not tasty. ....

SECTION 5: YOUR WORK ENVIRONMENT

5.1 Now we would like to ask you about where you work. For each question please tick ONE answer that best describes your work.
(Shiftwork, working hours and physical hazards)

		Often	Some-times	Seldom	Never/ almost never
a)	Do you work at night? *	□0	□1	□2	□3
b)	Do you do shift work? *	□0	□1	□2	□3
c)	Do you have to work long or unsociable hours? *	□0	□1	□2	□3
d)	Do you have to be "on call" for work? (item not included)	□0	□1	□2	□3
e)	Do you have unpredictable working hours?*	□0	□1	□2	□3
f)	Does your job ever expose you to breathing fumes, dusts or other potentially harmful substances? *	□0	□1	□2	□3
g)	Does your job ever require you to handle or touch potentially harmful substances or materials?*	□0	□1	□2	□3
h)	Do you ever have work tasks that leave you with a ringing in your ears or a temporary feeling of deafness? *	□0	□1	□2	□3
i)	Do you work in an environment where the level of background noise disturbs your concentration? *	□0	□1	□2	□3

5.2 Now we'd like to ask you about your work and the sorts of things you have to do. For each question please tick the answer that best describes your job or the way you deal with problems at work.

(Job demand-control-support model: Karasek, 1979; Johnson & Hall, 1988 (5.2-5.6)

		Often	Some-times	Seldom	Never/ almost never	Not appli-cable
a)	Do you have to work very fast? *(JD)	□0	□1	□2	□3	□4
b)	Do you have to work very intensively? *(JD)	□0	□1	□2	□3	□4
c)	Do you have enough time to do everything? (JD)	□0	□1	□2	□3	□4
d)	Are your tasks such that others can help you if you do not have enough time?	□0	□1	□2	□3	□4
e)	Do you have the possibility of learning new things through your work? *(SD)	□0	□1	□2	□3	□4
f)	Does your work demand a high level of skill or expertise? *(SD)	□0	□1	□2	□3	□4
g)	Does your job require you to take the initiative? *(SD)	□0	□1	□2	□3	□4
h)	Do you have to do the same thing over and over again? (SD)	□0	□1	□2	□3	□4
i)	Do you have a choice in deciding HOW you do your work? *(DA)	□0	□1	□2	□3	□4
j)	Do you have a choice in deciding WHAT you do at work? *(DA)	□0	□1	□2	□3	□4

5.3 This section is about your position at work - how often do the following statements apply? Please tick ONE box only.

		Often	Some-times	Seldom	Never/ almost never	Not appli-cable
a)	Others take decisions concerning my work. (DA)	□0	□1	□2	□3	□4
b)	I have a great deal of say in decisions about work. *(DA)	□0	□1	□2	□3	□4
c)	I have a say in my work speed. *(DA)	□0	□1	□2	□3	□4
d)	My working time can be flexible. *(DA)	□0	□1	□2	□3	□4
e)	I can decide when to take a break. *(DA)	□0	□1	□2	□3	□4
f)	I can take my holidays more or less when I wish.	□0	□1	□2	□3	□4
g)	I have a say in choosing who I work with. *(DA)	□0	□1	□2	□3	□4
h)	I have a great deal of say in planning my work environment. *(DA)	□0	□1	□2	□3	□4

5.4 This section is about consistency and clarity at work - how often do the following statements apply? Please tick ONE box only.

		Often	Some-times	Seldom	Never/ almost never	Not appli-cable
a)	Do different groups at work demand things from you that you think are hard to combine? *(JD)	□0	□1	□2	□3	□4
b)	Do you get sufficient information from line management (your superiors)? *(SS)	□0	□1	□2	□3	□4
c)	Do you get consistent information from line management (your superiors)? *(SS)	□0	□1	□2	□3	□4

5.5 **These questions are about your job involvement. Please tick ONE box only.**

		Often	Some-times	Seldom	Never/ almost never	Not appli-cable
a)	Does your job provide you with a variety of interesting things to do? *(SD)	□0	□1	□2	□3	□4
b)	Is your job boring? (SD)	□0	□1	□2	□3	□4

5.6 **Now we would like to ask you about when you are having difficulties at work. Please tick ONE box only.**

		Often	Some-times	Seldom	Never/ almost never	Not appli-cable
a)	How often do you get help and support from your colleagues? *(SS)	□0	□1	□2	□3	□4
b)	How often are your colleagues willing to listen to your work related problems? *(SS)	□0	□1	□2	□3	□4
c)	How often do you get help and support from your immediate superior? *(SS)	□0	□1	□2	□3	□4
d)	How often is your immediate superior willing to listen to your problems? *(SS)	□0	□1	□2	□3	□4

5.7 **Do you agree or disagree with the following statements about your work?**
(The effort-reward imbalance model: Siegrist, 1996 (5.7-5.9)

		Agree	Some-what agree	Some-what disagree	Disagree
a)	If a task has to be done well I'd better take care of it myself. *(IE)	□0	□1	□2	□3
b)	I can get very upset when someone hinders me in my duties. *(IE)	□0	□1	□2	□3
c)	As soon as I get up in the morning, I start thinking about work problems. *(IE)	□0	□1	□2	□3
d)	When I come home, I can easily relax and 'switch off' from work. (IE)	□0	□1	□2	□3
e)	People close to me say I sacrifice too much for my job. *(IE)	□0	□1	□2	□3
f)	For me, family or private life comes first, then work.	□0	□1	□2	□3
g)	Work rarely lets me go, it is still on my mind when I go to bed. *(IE)	□0	□1	□2	□3
h)	Every once in a while I like it when others hold me back from working. *(IE)	□0	□1	□2	□3
i)	If I postpone something that I was supposed to do today, I will have trouble sleeping at night. *(IE)	□0	□1	□2	□3

In these next questions we would like to know whether or not you agree with some statements about your work. If you DON'T agree with a statement tick the box marked No, as in this example. Then move on to the next statement.

If you agree, to what extent are you distressed by it?

EXAMPLE : Don't agree

		No	*Yes*	Not at all	Some-what	Rather	Very dis-tressed
a)	I have constant time pressure due to a heavy workload.	✔□	□	□	□	□	□

If you DO agree with a statement tick the box marked Yes AND tick one box to show how much it distresses you, as in this example. Then move on to the next statement.

If you agree, to what extent are you distressed by it?

EXAMPLE : Agree

		No	Yes	Not at all	Some-what	Rather	Very dis-tressed
a)	I have constant time pressure due to a heavy workload.	□	✔□ ⇨	□	✔□	□	□

5.8 Do you agree with the following statements?

If you agree, to what extent are you distressed by it?

		No	Yes	Not at all	Some-what	Rather	Very dis-tressed
a)	I have constant time pressure due to a heavy workload. (EE)	□0	□1	□0	□1	□2	□3
b)	I have many interruptions and disturbances in my job. (EE)	□0	□1	□0	□1	□2	□3
c)	I have a lot of responsibility in my job. (EE)	□0	□1	□0	□1	□2	□3
d)	I am often under pressure to work overtime. (EE)	□0	□1	□0	□1	□2	□3
e)	I have experienced or expect to experience an undesirable change in my work situation. (IR)	□0	□1	□0	□1	□2	□3
f)	My job promotion prospects are poor. (IR)	□0	□1	□0	□1	□2	□3
g)	My job security is poor. (IR)	□0	□1	□0	□1	□2	□3
h)	I am treated unfairly at work. (IR)	□0	□1	□0	□1	□2	□3

5.9 In these next questions we would again like to know whether or not you agree with some statements about your work. This time, though, the order of 'Yes' and 'No' is changed. So, if you DO agree with a statement tick the box marked Yes. Then move on to the next statement. If you DON'T agree with a statement tick the box marked No AND tick one box to show how much it distresses you. Then move on to the next statement.

Do you agree with the following statements?

(Please note the order of 'Yes', 'No' is changed)

If you disagree, to what extent are you distressed by it?

		Yes	No	Not at all	Some-what	Rather	Very dis-tressed
a)	Considering all my efforts and achievements, my work prospects are adequate. (IR)	□1	□0	□0	□1	□2	□3
b)	I receive the respect I deserve from my superiors and colleagues. (IR)	□1	□0	□0	□1	□2	□3
c)	I experience adequate support in difficult situations. (IR)	□1	□0	□0	□1	□2	□3
d)	Considering all my efforts and achievements, I receive the respect and prestige I deserve at work. (IR)	□1	□0	□0	□1	□2	□3

5.10 The following questions refer to your treatment in the workplace, by your organisation, superiors and/or colleagues. Please indicate to what extent you have been exposed to the following within the last 6 months:
(Bullying behaviour: adapted from Quine, 1999)

		Not at all	Seldom	Occasion-ally	Approx. 1 per week	More than 1 per week
1.	Persistent attempts to undermine your work.	□0	□1	□2	□3	□4
2.	Persistent and unjustified criticism and monitoring of your work.	□0	□1	□2	□3	□4
3.	Persistent attempts to humiliate you in front of colleagues.	□0	□1	□2	□3	□4
4.	Intimidatory use of discipline or competence procedures.	□0	□1	□2	□3	□4
5.	Undermining your personal integrity.	□0	□1	□2	□3	□4
6.	Destructive innuendo and sarcasm.	□0	□1	□2	□3	□4
7.	Verbal and non-verbal threats.	□0	□1	□2	□3	□4

		Not at all	Seldom	Occasion-ally	Approx. 1 per week	More than 1 per week
8.	Inappropriate jokes.	□0	□1	□2	□3	□4
9.	Persistent teasing.	□0	□1	□2	□3	□4
10.	Physical violence.	□0	□1	□2	□3	□4
11.	Violence to property.	□0	□1	□2	□3	□4
12.	Withholding of necessary information.	□0	□1	□2	□3	□4
13.	Freezing out, ignoring or exclusion.	□0	□1	□2	□3	□4
14.	Unreasonable refusal of applications for leave, training or promotion.	□0	□1	□2	□3	□4
15.	Undue pressure to produce work.	□0	□1	□2	□3	□4
16.	Setting of impossible deadlines.	□0	□1	□2	□3	□4
17.	Shifting of goal posts without telling you.	□0	□1	□2	□3	□4
18.	Constant undervaluation of your efforts.	□0	□1	□2	□3	□4
19.	Persistent attempts to demoralise you.	□0	□1	□2	□3	□4
20.	Removal of areas of responsibility without consultation.	□0	□1	□2	□3	□4

5.11 Have you been subjected to bullying in the workplace in the last 6 months?

No	Seldom	Now and then	About once a week	More than once a week
□0	□1	□2	□3	□4

5.12 Have you seen others being subjected to bullying at your workplace during the last 6 months?

Yes ☐1 No ☐0

5.13 Please indicate the extent to which you agree or disagree with the following statements:
(The Bergen Bullying Index: Einarsen et al. 1994)

		Disagree strongly			Agree strongly
a)	Bullying is a serious strain in my daily work.	☐0	☐1	☐2	☐3
b)	Bullying at my workplace reduces my well-being.	☐0	☐1	☐2	☐3
c)	Bullying is a serious problem at my workplace.	☐0	☐1	☐2	☐3
d)	Bullying at my workplace reduces my work motivation.	☐0	☐1	☐2	☐3

5.14 Please try to imagine yourself in the following situations. Then look at the example causes given in part a) and circle a number on the scale that represents how much you agree with the suggested cause (1= totally agree with the left side comment, 7 = totally with the right, 4 = both equally likely, or any number in between that matches your feeling). Then for that same cause answer parts b) and c) circling the appropriate number.

1a) A friend at work compliments you on your appearance. Is the cause likely to be due to:

(Your friend being polite) or (You looking good)

1 2 3 4 5 6 7

b) In similar situations in the future how likely is it that this explanation will again be true:

(Will rarely be true) or (Will often be true)

1 2 3 4 5 6 7

c) Does this explanation have an influence on just this situation, or does it affect other situations:

(Influences just this situation) or (Influences many other situations)

1 2 3 4 5 6 7

2a) You have been looking for a job unsuccessfully for some time. Is this likely to be due to:

(A bad job market) or (You needing more skills/experience)

1 2 3 4 5 6 7

b) In similar situations in the future how likely is it that this explanation will again be true:

(Will rarely be true) or (Will often be true)

1 2 3 4 5 6 7

c) Does this explanation have an influence on just this situation, or does it affect other situations:

(Influences just this situation) or (Influences many other situations)

1 2 3 4 5 6 7

3a) You become very successful and well-paid. Is this likely to be due to:

(You having good luck) or (Hard work and determination)

1 2 3 4 5 6 7

b) In similar situations in the future how likely is it that this explanation will again be true:

(Will rarely be true) or (Will often be true)

1 2 3 4 5 6 7

c) Does this explanation have an influence on just this situation, or does it affect other situations:

(Influences just this situation) or (Influences many other situations)

1 2 3 4 5 6 7

4a) You go to a colleague for help but they don't help you. Is this likely to be due to:

(Them being too busy) or (You not being a good enough friend)

1 2 3 4 5 6 7

b) In similar situations in the future how likely is it that this explanation will again be true:

(Will rarely be true) or (Will often be true)

1 2 3 4 5 6 7

c) Does this explanation have an influence on just this situation, or does it affect other situations:

(Influences just this situation) or (Influences many other situations)

1 2 3 4 5 6 7

5a) You give a talk in front of co-workers but they react negatively. Is this likely to be due to:

(Them being impatient and busy) or (You being poorly prepared)

1 2 3 4 5 6 7

b) In similar situations in the future how likely is it that this explanation will again be true:

(Will rarely be true) or (Will often be true)

1 2 3 4 5 6 7

c) Does this explanation have an influence on just this situation, or does it affect other situations:

(Influences just this situation) or (Influences many other situations)

1 2 3 4 5 6 7

6a) You do something at work which is highly praised. Is this likely to be due to:

(The work being easy) or (Your hard work and effort)

1 2 3 4 5 6 7

b) In similar situations in the future how likely is it that this explanation will again be true:

(Will rarely be true) or (Will often be true)

1 2 3 4 5 6 7

c) Does this explanation have an influence on just this situation, or does it affect other situations:

(Influences just this situation)			or			(Influences many other situations)
1	2	3	4	5	6	7

7a) A colleague you like acts in a hostile way towards you. Is this likely to be due to:

(Them being in a bad mood)			or			(You annoying them)
1	2	3	4	5	6	7

b) In similar situations in the future how likely is it that this explanation will again be true:

(Will rarely be true)			or			(Will often be true)
1	2	3	4	5	6	7

c) Does this explanation have an influence on just this situation, or does it affect other situations:

(Influences just this situation)			or			(Influences many other situations)
1	2	3	4	5	6	7

8a) You can't get all the work done that others expect of you. Is this likely to be due to:

(You being given too much work)			or			(Your lack of time planning)
1	2	3	4	5	6	7

b) In similar situations in the future how likely is it that this explanation will again be true:

(Will rarely be true)			or			(Will often be true)
1	2	3	4	5	6	7

c) Does this explanation have an influence on just this situation, or does it affect other situations:

(Influences just this situation)			or			(Influences many other situations)
1	2	3	4	5	6	7

9a) A colleague buys you a present. Is this likely to be due to:

(Him/Her being in a good mood)			or			(You having been extra nice to them)
1	2	3	4	5	6	7

b) In similar situations in the future how likely is it that this explanation will again be true:

(Will rarely be true)			or			(Will often be true)
1	2	3	4	5	6	7

c) Does this explanation have an influence on just this situation, or does it affect other situations:

(Influences just this situation)			or			(Influences many other situations)
1	2	3	4	5	6	7

10a) You apply for a promotion that you want and you get it. Is this likely to be due to:

(Lack of other qualified applicants)			or			(The strength of your application/CV)
1	2	3	4	5	6	7

b) In similar situations in the future how likely is it that this explanation will again be true:

(Will rarely be true)			or			(Will often be true)
1	2	3	4	5	6	7

c) Does this explanation have an influence on just this situation, or does it affect other situations:

(Influences just this situation)			or			(Influences many other situations)
1	2	3	4	5	6	7

11a) A meeting goes badly with a superior you wanted to impress. Is this likely to be due to:

(The other person having a bad day)			or			(Them being unimpressed with you)
1	2	3	4	5	6	7

b) In similar situations in the future how likely is it that this explanation will again be true:

(Will rarely be true)			or			(Will often be true)
1	2	3	4	5	6	7

c) Does this explanation have an influence on just this situation, or does it affect other situations:

(Influences just this situation)			or			(Influences many other situations)
1	2	3	4	5	6	7

12a) You get a raise. Is this likely to be due to:

(Everyone getting a raise)			or			(Your hard work and commitment)
1	2	3	4	5	6	7

b) In similar situations in the future how likely is it that this explanation will again be true:

(Will rarely be true)			or			(Will often be true)
1	2	3	4	5	6	7

c) Does this explanation have an influence on just this situation, or does it affect other situations:

(Influences just this situation)			or			(Influences many other situations)
1	2	3	4	5	6	7

5.15 The following statements refer to potential sources of stress in your job. Please indicate the frequency with which you experience these at work.
(ENSS: French et al. 2000)

		Never	Occas-ionally	Frequently	Very Frequently
1.	Performing procedures that patients experience as painful.	□$_0$	□$_1$	□$_2$	□$_3$
2.	Criticism by a physician.	□$_0$	□$_1$	□$_2$	□$_3$
3.	Feeling inadequately prepared to help with the emotional needs of a patient's family.	□$_0$	□$_1$	□$_2$	□$_3$
4.	Lack of opportunity to talk openly with other personnel about problems in the work setting.	□$_0$	□$_1$	□$_2$	□$_3$

		Never	Occas-ionally	Frequently	Very Frequently
5.	Conflict with a supervisor.	□0	□1	□2	□3
6.	Inadequate information from a physician regarding the medical condition of a patient.	□0	□1	□2	□3
7.	Patients making unreasonable demands.	□0	□1	□2	□3
8.	Being sexually harassed.	□0	□1	□2	□3
9.	Feeling helpless in the case of a patient who fails to improve.	□0	□1	□2	□3
10.	Conflict with a physician.	□0	□1	□2	□3
11.	Being asked a question by a patient for which I do not have a satisfactory answer.	□0	□1	□2	□3
12.	Lack of opportunity to share experiences and feelings with other personnel in the work setting.	□0	□1	□2	□3
13.	Unpredictable staffing and scheduling.	□0	□1	□2	□3
14.	A physician ordering what appears to be inappropriate treatment for a patient.	□0	□1	□2	□3
15.	Patients' families making unreasonable demands.	□0	□1	□2	□3
16.	Experiencing discrimination because of race or ethnicity.	□0	□1	□2	□3
17.	Listening or talking to a patient about his/her approaching death.	□0	□1	□2	□3
18.	Fear of making a mistake in treating a patient.	□0	□1	□2	□3
19.	Feeling inadequately prepared to help with the emotional needs of a patient.	□0	□1	□2	□3
20.	Lack of an opportunity to express to other personnel on the unit my negative feelings towards patients.	□0	□1	□2	□3
21.	Difficulty in working with a particular nurse (or nurses) in my immediate work setting.	□0	□1	□2	□3
22.	Difficulty in working with a particular nurse (or nurses) outside my immediate work setting.	□0	□1	□2	□3
23.	Not enough time to provide emotional support to the patient.	□0	□1	□2	□3

		Never	Occas-ionally	Frequently	Very Frequently
24.	A physician not being present in a medical emergency.	□0	□1	□2	□3
25.	Being blamed for anything that goes wrong.	□0	□1	□2	□3
26.	Experiencing discrimination on the basis of sex.	□0	□1	□2	□3
27.	The death of a patient.	□0	□1	□2	□3
28.	Disagreement concerning the treatment of a patient.	□0	□1	□2	□3
29.	Feeling inadequately trained for what I have to do.	□0	□1	□2	□3
30.	Lack of support from my immediate supervisor.	□0	□1	□2	□3
31.	Criticism by a supervisor.	□0	□1	□2	□3
32.	Not enough time to complete all of my nursing tasks.	□0	□1	□2	□3
33.	Not knowing what a patient or a patient's family ought to be told about the patient's condition and its treatment.	□0	□1	□2	□3
34.	Being the one that has to deal with patients' families.	□0	□1	□2	□3
35.	Having to deal with violent patients.	□0	□1	□2	□3
36.	Being exposed to health and safety hazards.	□0	□1	□2	□3
37.	The death of a patient with whom you developed a close relationship.	□0	□1	□2	□3
38.	Making a decision concerning a patient when the physician is unavailable.	□0	□1	□2	□3
39.	Being in charge with inadequate experience.	□0	□1	□2	□3
40.	Lack of support by nursing administrators.	□0	□1	□2	□3
41.	Too many non-nursing tasks required, such as clerical work.	□0	□1	□2	□3
42.	Not enough staff to adequately cover the unit.	□0	□1	□2	□3
43.	Uncertainty regarding the operation and functioning of specialised equipment.	□0	□1	□2	□3
44.	Having to deal with abusive patients.	□0	□1	□2	□3

		Never	Occas-ionally	Frequently	Very Frequently
45.	Not enough time to respond to the needs of patients' families.	□0	□1	□2	□3
46.	Being accountable for things over which I have no control.	□0	□1	□2	□3
47.	Physician (s) not being present when a patient dies.	□0	□1	□2	□3
48.	Having to organize doctors' work.	□0	□1	□2	□3
49.	Lack of support from other healthcare administrators.	□0	□1	□2	□3
50.	Difficulty in working with nurses of the opposite sex.	□0	□1	□2	□3
51.	Demands of patient classification system.	□0	□1	□2	□3
52.	Having to deal with abuse from patients' families.	□0	□1	□2	□3
53.	Watching a patient suffer.	□0	□1	□2	□3
54.	Criticism by nursing administration.	□0	□1	□2	□3
55.	Having to work through breaks.	□0	□1	□2	□3
56.	Not knowing whether patients' families will report you for inadequate care.	□0	□1	□2	□3
57.	Having to make decisions under pressure.	□0	□1	□2	□3

5.16 Please try and remember a stressful situation that you have experienced at work in the last two months. If you can't think of a work situation please think of another situation. Now please read each of the following items and tick the appropriate box on the scale from 0 to 3, to show how much you used each approach to try and deal with the stress and to make yourself feel better.
Ways of Coping Checklist (Vitaliano et al. 1985).

		Not at all	Some-times	Often	All the time
1.	Bargained or compromised to get something positive from the situation.	□0	□1	□2	□3
2.	Concentrated on something good that could come out of the whole thing.	□0	□1	□2	□3
3.	Tried not to burn my bridges behind me, tried to leave things open.	□0	□1	□2	□3
4.	Changed myself to be a better person.	□0	□1	□2	□3

		Not at all	Some-times	Often	All the time
5.	Made a plan of action and followed it.	□0	□1	□2	□3
6.	Accepted the next best thing to what I wanted.	□0	□1	□2	□3
7.	Came out of the experience a better person than when I went in.	□0	□1	□2	□3
8.	Tried not to act too hastily.	□0	□1	□2	□3
9.	Changed something so that things would turn out alright.	□0	□1	□2	□3
10.	Just took things one step at a time.	□0	□1	□2	□3
11.	I knew what had to be done, so I tried harder to make things work.	□0	□1	□2	□3
12.	Came up with a couple of different solutions to the problem.	□0	□1	□2	□3
13.	Accepted my strong feelings, but didn't let them interfere with other things too much.	□0	□1	□2	□3
14.	Changed something about myself so I could deal with the situation better.	□0	□1	□2	□3
15.	Stood my ground and fought for what I wanted.	□0	□1	□2	□3
16.	Talked to someone to find out more about the situation.	□0	□1	□2	□3
17.	Accepted sympathy and understanding from someone.	□0	□1	□2	□3
18.	Got professional help and did what they recommended.	□0	□1	□2	□3
19.	Talked to someone who could do something about the problem.	□0	□1	□2	□3
20.	Asked someone I respected for advice and followed it.	□0	□1	□2	□3
21.	Talked to someone about how I was feeling.	□0	□1	□2	□3
22.	Blamed myself.	□0	□1	□2	□3
23.	Criticized or lectured myself.	□0	□1	□2	□3
24.	Realised I brought the problem on myself.	□0	□1	□2	□3
25.	Hoped a miracle would happen.	□0	□1	□2	□3
26.	Wished I was a stronger person – more optimistic and forceful.	□0	□1	□2	□3
27.	Wished that I could change what had happened.	□0	□1	□2	□3
28.	Wished I could change the way that I felt.	□0	□1	□2	□3

		Not at all	Some-times	Often	All the time
29.	Daydreamed or imagined a better time or place than the one I was in.	□0	□1	□2	□3
30.	Had fantasies or wished about how things might turn out.	□0	□1	□2	□3
31.	Thought about fantastic things to make myself feel better (like finding a million pounds).	□0	□1	□2	□3
32.	Wished the situation would go away or somehow be finished.	□0	□1	□2	□3
33.	Went on as if nothing had happened.	□0	□1	□2	□3
34.	Felt bad that I couldn't avoid the problem.	□0	□1	□2	□3
35.	Kept my feelings to myself.	□0	□1	□2	□3
36.	Slept more than usual.	□0	□1	□2	□3
37.	Got angry at the people or things that caused the problem.	□0	□1	□2	□3
38.	Tried to forget the whole thing.	□0	□1	□2	□3
39.	Tried to make myself feel better by eating, drinking, smoking or taking medications.	□0	□1	□2	□3
40.	Avoided being with other people.	□0	□1	□2	□3
41.	Didn't tell others how bad things were.	□0	□1	□2	□3
42.	Refused to believe it had happened.	□0	□1	□2	□3

SECTION 6: DEMOGRAPHICS

6.1 Age: .... **yrs**

6.2 Sex: □0 **M** □1 **F**

6.3 Current Status: (Please tick one box only)

Single	□0	Separated	□3
Living with partner	□1	Divorced	□4
Married	□2	Widowed	□5

6.4 Education Completed: (Please tick one box only)

None	□0	City & Guilds/national diploma	□3
GCSE/ 'O' Level	□1	BA/BSc	□4
AS Level/SCE Higher/Matriculation	□2	Higher degree/professional qualification	□5

6.5 How would you describe yourself?

White	□0	Black Caribbean	□1
Black African	□2	Black neither Caribbean or African	□3
Indian	□4	Pakistani	□5
Bangladeshi	□6	Chinese	□7
		None of these (Please specify) ____________	□8

6.6 What is the total current yearly amount you receive from your wage, pension, benefit allowance or annual salary (before tax is deducted)? Please indicate one category.

less than £2,500	□0	£2,500-£4,999	□1	£5,000-£9,999	□2
£10,000-£15,999	□3	£16,000-£19,999	□4	£20,000-£24,999	□5
£25,000-£29,999	□6	£30,000-39,999	□7	£40,000-49,999	□8
£50,000 or more	□9				

THANK YOU FOR YOUR PARTICIPATION

If having completed this survey you would be interested in receiving information about any future studies, please get in touch (contact details provided on inside cover).

Key:

A	HADS anxiety
D	HADS depression
JD	JDCS job demand
SS	JDCS social support
SD	JDCS skill discretion
DA	JDCS decision authority
EE	ERI extrinsic effort
IE	ERI intrinsic effort
IR	ERI reward

Appendix VIII:

Survey II: Non-parametric (Spearman's rho) correlations between independent measures

	Job demand (N)	Social support (N)	Decision latitude (N)	Demand-control-support (N)	Extrinsic effort (N)	Intrinsic effort (N)	Reward (N)	Effort-reward-imbalance (N)	Work hrs/ Hazards (N)	Bullying cont-inuous (N)	Bullying dichot-omous (N)	Bergen Bullying Index (N)	NOF (N)	NOF cont. bullying (N)	NOF dich. bullying (N)	ENSS (N)
Job demand	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Social support	.217** (806)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Decision latitude	.031 (805)	.217** (806)	-	-	-	-	-		-	-	-	-	-	-	-	-
Demand-control-support	.454** (846)	.631** (846)	.393** (846)	-	-	-	-	-	-	-	-	-	-	-	-	-
Extrinsic effort	.302** (782)	.187** (789)	.014 (780)	.246** (818)	-	-	-	-	-	-	-	-	-	-	-	-
Intrinsic effort	.216** (804)	.149** (811)	.041 (802)	.218** (841)	.388** (787)	-	-	-	-	-	-	-	-	-	-	-
Reward	.195** (770)	.397** (777)	.224** (769)	.445** (806)	.287** (773)	.276** (777)	-	-	-	-	-	-	-	-	-	-
Effort-reward imbalance	.296** (794)	.303** (802)	.117** (793)	.371** (790)	.681** (805)	.623** (805)	.541** (805)	-	-	-	-	-	-	-	-	-
Work hrs/hazards	.109** (808)	.075* (809)	.268** (805)	.226** (843)	.084* (790)	.025 (806)	.088* (778)	0.91* (795)	-	-	-	-	-	-	-	-
Bullying continuous	.196** (801)	.341** (808)	180** (798)	.419** (837)	.290** (789)	.303** (806)	.458** (779)	.469** (799)	.162** (809)	-	-	-	-	-	-	-
Bullying dichotomous	.188** (801)	.332** (808)	.148** (798)	.388** (837)	.267** (789)	.283** (806)	.455** (779)	.444** (799)	.159** (809)	.851** (817)	-	-	-	-	-	-

Bergen Bullying Index	.113**	.246**	.126**	.261**	.118**	.116**	.277**	.235**	.177**	.406**	.401**					
	(802)	(809)	(800)	(839)	(791)	(808)	(780)	(799)	(811)	(812)	(812)	-	-	-	-	-
NOF	.427**	.469**	.339**	.663**	.489**	.439**	.571**	.649**	.315**	.449**	.414**	.260**				
	(810)	(817)	(807)	(846)	(798)	(814)	(786)	(805)	(819)	(817)	(817)	(819)	-	-	-	-
NOF (inc. continuous bullying)	.388**	.479**	.322**	.643**	.492**	.408**	.573**	.656**	.321**	.588**	.533**	.315**	.864**			
	(810)	(817)	(807)	(846)	(798)	(814)	(786)	(805)	(819)	(817)	(817)	(819)	(827)	-	-	-
NOF (inc. dichotomous bullying)	.385**	.471**	.319**	.639**	.490**	.420**	.573**	.658**	.329**	.571**	.540**	.303**	.876**	.978**		
	(810)	(817)	(807)	(846)	(798)	(814)	(786)	(805)	(819)	(817)	(817)	(819)	(827)	(827)	-	-
ENSS	.313**	.217**	.169**	.352**	.312**	.259**	.268**	.391**	.354**	.310**	.325**	.248**	.448**	.462**	.464**	
	(777)	(784)	(777)	(815)	(767)	(783)	(755)	(776)	(784)	(783)	(783)	(787)	(791)	(791)	(791)	-

* Correlation significant at 0.05 level (2-tailed).
** Correlation significant at 0.01 level (2-tailed).

Appendix IX: Survey II: NOF & coping only[12]

		N	OR	95% CI
Work-related stress (pfc)	1st quartile	202	1.00	
	2nd quartile	237	2.49**	1.39-4.46
Wald = 121.37, p<.0001	3rd quartile	162	7.98***	4.44-14.35
	4th quartile	182	18.38***	10.15-33.28
Work-related stress (efc)	1st quartile	199	1.00	
	2nd quartile	241	2.38**	1.33-4.26
Wald = 107.97, p<.0001	3rd quartile	164	7.73***	4.28-13.96
	4th quartile	183	16.29**	8.89-29.83
Work-related stress (pfc/efc)	1st quartile	198	1.00	
	2nd quartile	236	2.36*	1.31-4.25
Wald = 103.69, p<.0001	3rd quartile	161	7.25***	4.00-13.15
	4th quartile	180	15.96**	8.69-29.34
Clinical anxiety (pfc)	1st quartile	193	1.00	
	2nd quartile	227	5.06***	2.18-11.76
Wald = 111.56, p<.0001	3rd quartile	155	17.36***	7.53-40.02
	4th quartile	179	39.08***	16.96-90.05
Clinical anxiety (efc)	1st quartile	190	1.00	
	2nd quartile	231	5.53***	2.24-13.61
Wald = 83.43, p<.0001	3rd quartile	157	16.13***	6.58-39.55
	4th quartile	180	31.96**	13.04-78.39
Clinical depression (pfc)	1st quartile	194	1.00	
	2nd quartile	227	0.62	0.14-2.82
Wald = 19.45, p<.0001	3rd quartile	155	4.42**	1.39-14.05
	4th quartile	181	6.09	1.97-18.87
Clinical depression (efc)	1st quartile	191	1.00	
	2nd quartile	230	0.71	0.17-2.92
Wald = 11.46, p<.009	3rd quartile	157	3.12**	0.97-10.11
	4th quartile	182	3.75	1.17-11.99
Lifetime prevalence of	1st quartile	200	1.00	
disease (pfc)	2nd quartile	234	0.92	0.63-1.36
	3rd quartile	160	1.48+	0.96-2.28
Wald = 14.07, p<.003	4th quartile	181	1.89	1.22-2.91
Lifetime prevalence of	1st quartile	197	1.00	
disease (efc)	2nd quartile	238	0.90	0.61-1.33
	3rd quartile	162	1.35	0.87-2.10
Wald = 9.30, p<.03	4th quartile	182	1.66	1.06-2.60
Lifetime prevalence of	1st quartile	196	1.00	
disease (pfc/efc)	2nd quartile	233	0.89	0.60-1.32
	3rd quartile	159	1.35	0.86-2.10
Wald = 9.48, p<.02	4th quartile	179	1.66	1.05-2.62

[12] Gender, age, income, education, marital status, work pattern (full/part time) and occupational setting (i.e. community/ outpatient-based and hospital/ward-based) were included in all models as covariates.

		N	OR	95% CI
12-month symptoms (pfc)	1st quartile	197	1.00	
	2nd quartile	230	1.87+	1.12-3.11
Wald = 27.65, p<.0001	3rd quartile	155	4.00*	2.01-7.95
	4th quartile	173	5.08	2.50-10.34
12-month symptoms (efc)	1st quartile	194	1.00	
	2nd quartile	234	1.99*	1.18-3.35
Wald = 23.17, p<.0001	3rd quartile	156	3.66	1.84-7.29
	4th quartile	175	4.63	2.25-9.55
12-month symptoms (pfc/efc)	1st quartile	193	1.00	
	2nd quartile	229	1.94*	1.15-3.27
	3rd quartile	154	3.97+	1.96-8.04
Wald = 24.83, p<.0001	4th quartile	172	5.07	2.41-10.66
12-month sciatica/back pain (pfc)	1st quartile	199	1.00	
	2nd quartile	236	1.47	0.99-2.18
	3rd quartile	161	2.00	1.29-3.10
Wald = 19.19, p<.0001	4th quartile	182	2.51	1.62-3.88
12-month sciatica/back pain (efc)	1st quartile	196	1.00	
	2nd quartile	240	1.41	0.95-2.09
	3rd quartile	163	1.80	1.16-2.81
Wald = 12.95, p<.005	4th quartile	183	2.21	1.41-3.47
12-month sciatica/back pain (pfc/efc)	1st quartile	195	1.00	
	2nd quartile	235	1.41	0.95-2.10
	3rd quartile	160	1.85	1.18-2.90
Wald = 13.88, p<.003	4th quartile	180	2.29	1.45-3.60
14-day symptoms (pfc)	1st quartile	195	1.00	
	2nd quartile	229	1.84	0.90-3.74
Wald = 14.37, p<.002	3rd quartile	157	4.60	1.64-12.90
	4th quartile	175	4.68	1.76-12.44
14-day symptoms (efc)	1st quartile	192	1.00	
	2nd quartile	232	1.93	0.94-3.95
Wald = 12.92, p<.005	3rd quartile	159	4.56	1.60-12.97
	4th quartile	176	4.52	1.63-12.53
14-day symptoms (pfc/efc)	1st quartile	191	1.00	
	2nd quartile	228	1.83	0.89-3.75
Wald = 12.00, p<.007	3rd quartile	156	4.37	1.53-12.48
	4th quartile	174	4.25	1.54-11.77
14-day back pain (pfc)	1st quartile	199	1.00	
	2nd quartile	234	1.42	0.96-2.11
Wald = 10.50, p<.02	3rd quartile	162	1.60	1.03-2.47
	4th quartile	181	2.02	1.31-3.11
14-day URTIs (pfc)	1st quartile	200	1.00	
	2nd quartile	234	1.01	0.68-1.49
Wald = 10.49, p<.02	3rd quartile	161	1.51	0.98-2.33
	4th quartile	182	1.76	1.15-2.70
14-day URTIs (efc)	1st quartile	197	1.00	
	2nd quartile	238	1.02	0.69-1.50
Wald = 8.86, p<.03	3rd quartile	163	1.50	0.97-2.33
	4th quartile	184	1.72	1.10-2.69

		N	OR	95% CI
14-day URTIs (pfc/efc)	1st quartile	196	1.00	
	2nd quartile	233	0.96	0.65-1.43
Wald = 8.75, p<.03	3rd quartile	160	1.46	0.94-2.28
	4th quartile	180	1.67	1.06-2.61
14-day	1st quartile	198	1.00	
depression/fatigue/difficulty	2nd quartile	234	1.88*	1.16-3.05
sleeping/headache (pfc)	3rd quartile	162	3.22	1.75-5.95
	4th quartile	182	4.40	2.31-8.38
Wald = 26.43, p<.0001				
14-day	1st quartile	195	1.00	
depression/fatigue/difficulty	2nd quartile	238	1.92*	1.18-3.12
sleeping/headache (efc)	3rd quartile	164	2.99	1.60-5.58
Wald = 21.18, p<.0001	4th quartile	184	3.85	1.98-7.48
14-day	1st quartile	194	1.00	
depression/fatigue/difficulty	2nd quartile	233	1.79*	1.09-2.91
sleeping/headache (pfc/efc)	3rd quartile	161	2.83	1.51-5.30
	4th quartile	180	3.59	1.84-7.00
Wald = 18.63, p<.0001				
14-day	1st quartile	197	1.00	
depression/fatigue/difficulty	2nd quartile	234	2.21**	1.38-3.52
sleeping/back pain (pfc)	3rd quartile	162	2.67	1.55-4.60
	4th quartile	181	4.36	2.44-7.82
Wald = 28.81, p<.0001				
14-day	1st quartile	194	1.00	
depression/fatigue/difficulty	2nd quartile	238	2.30**	1.44-3.68
sleeping/back pain (efc)	3rd quartile	164	2.66	1.53-4.64
	4th quartile	184	4.07	2.24-7.41
Wald = .25.70, p<.0001				
14-day	1st quartile	193	1.00	
depression/fatigue/difficulty	2nd quartile	233	2.20**	1.37-3.53
sleeping/back pain (pfc/efc)	3rd quartile	161	2.57	1.47-4.49
	4th quartile	180	4.15	2.25-7.63
Wald = 24.61, p<.0001				
14-day lower respiratory	1st quartile	200	1.00	
symptoms (pfc)	2nd quartile	234	1.96+	1.04-3.71
	3rd quartile	161	2.69	1.39-5.19
Wald = 10.54, p<.01	4th quartile	182	2.65	1.38-5.08
14-day lower respiratory	1st quartile	197	1.00	
symptoms (efc)	2nd quartile	238	1.93+	1.02-3.65
	3rd quartile	163	2.45	1.26-4.77
Wald = 7.78, p<.05	4th quartile	184	2.31	1.18-4.51
14-day lower respiratory	1st quartile	196	1.00	
symptoms (pfc/efc)	2nd quartile	233	1.80	0.94-3.42
	3rd quartile	160	2.46	1.26-4.81
Wald = 8.02, p<.05	4th quartile	180	2.38	1.21-4.67
14-day gastrointestinal	1st quartile	199	1.00	
symptoms (pfc)	2nd quartile	233	0.99	0.58-1.69
	3rd quartile	161	2.44***	1.44-4.13
Wald = 23.18, p<.0001	4th quartile	181	2.48	1.47-4.19
14-day gastrointestinal	1st quartile	196	1.00	
symptoms (efc)	2nd quartile	237	0.93	0.54-1.58
	3rd quartile	163	2.20**	1.29-3.75
Wald = 18.06, p<.0001	4th quartile	184	2.17	1.26-3.74

		N	OR	95% CI
14-day gastrointestinal	1st quartile	195	1.00	
symptoms (pfc/efc)	2nd quartile	232	0.95	0.56-1.62
	3rd quartile	160	2.26**	1.32-3.86
Wald = 18.15, p<.0001	4th quartile	180	2.20	1.27-3.81
14-day dizziness/	1st quartile	199	1.00	
earache/nausea (pfc)	2nd quartile	233	1.19	0.76-1.87
	3rd quartile	161	1.80	1.12-2.90
Wald = 18.42, p<.0001	4th quartile	181	2.47	1.56-3.93
14-day dizziness/	1st quartile	196	1.00	
earache/nausea (efc)	2nd quartile	237	1.12	0.72-1.76
	3rd quartile	163	1.72	1.06-2.78
Wald = 15.48, p<.001	4th quartile	184	2.31	1.43-3.74
14-day dizziness/	1st quartile	195	1.00	
earache/nausea (pfc/efc)	2nd quartile	232	1.11	0.70-1.74
	3rd quartile	160	1.59	0.98-2.59
Wald = 13.06, p<.005	4th quartile	180	2.19	1.35-3.56
14-day back pain/swollen	1st quartile	198	1.00	
ankles (pfc)	2nd quartile	234	1.53+	1.04-2.27
	3rd quartile	161	1.69	1.10-2.60
Wald = 13.43, p<.004	4th quartile	181	2.21	1.43-3.40
14-day back pain/swollen	1st quartile	195	1.00	
ankles (efc)	2nd quartile	238	1.47	0.99-2.17
	3rd quartile	163	1.52	0.98-2.35
Wald = 9.19, p<.03	4th quartile	184	1.98	1.27-3.10
14-day back pain/swollen	1st quartile	194	1.00	
ankles (pfc/efc)	2nd quartile	233	1.45	0.98-2.15
	3rd quartile	160	1.56	1.00-2.43
Wald = 9.58, p<.02	4th quartile	180	2.02	1.29-3.18
12-month prescribed	1st quartile	187	1.00	
medication use (pfc)	2nd quartile	215	1.93**	1.26-2.96
	3rd quartile	149	1.46	0.92-2.34
Wald = 10.72, p<.01	4th quartile	170	1.84	1.15-2.95
12-month prescribed	1st quartile	184	1.00	
medication use (efc)	2nd quartile	216	1.91**	1.24-2.95
	3rd quartile	150	1.41	0.87-2.29
Wald = 9.14, p<.03	4th quartile	172	1.66	1.01-2.72
12-month prescribed	1st quartile	183	1.00	
medication use (pfc/efc)	2nd quartile	214	1.94**	1.25-3.00
	3rd quartile	148	1.41	0.87-2.29
Wald = 9.28, p<.03	4th quartile	168	1.64	0.99-2.71

Note: repeated contrasts + (p<.05) * (p<.01) ** (p<.001) *** (p<.0001)
Pfc = problem-focused coping
Efc = emotion-focused coping

Appendix X:
Survey II: ENSS & coping only[13]

		N	OR	95% CI
Work-related stress (pfc)	1st quartile	176	1.00	
	2nd quartile	207	2.69**	1.49-4.87
Wald = 86.18, p<.0001	3rd quartile	185	4.54*	2.53-8.14
	4th quartile	190	13.46***	
Work-related stress (efc)	1st quartile	176	1.00	
	2nd quartile	205	2.61**	1.44-4.73
Wald = 68.41, p<.0001	3rd quartile	186	3.81	2.12-6.86
	4th quartile	194	10.58***	5.78-19.37
Work-related stress (pfc/efc)	1st quartile	174	1.00	
	2nd quartile	203	2.58**	1.42-4.69
Wald = 69.94, p<.0001	3rd quartile	185	3.99	2.21-7.23
	4th quartile	189	11.27***	6.09-20.84
Clinical anxiety (pfc)	1st quartile	169	1.00	
	2nd quartile	200	1.85+	1.01-3.38
Wald = 57.06, p<.0001	3rd quartile	179	2.94	1.63-5.30
	4th quartile	183	7.42***	4.12-13.36
Clinical anxiety (efc)	1st quartile	169	1.00	
	2nd quartile	198	1.57	0.84-2.92
Wald = 31.86, p<.0001	3rd quartile	180	2.04	1.11-3.76
	4th quartile	188	4.59**	2.50-8.44
Clinical depression (pfc)	1st quartile	168	1.00	
	2nd quartile	201	0.90	0.26-3.06
Wald = 8.66, p<.03	3rd quartile	180	1.42	0.45-4.44
	4th quartile	184	3.04	1.05-8.82
12-month symptoms (pfc)	1st quartile	175	1.00	
	2nd quartile	203	1.20	0.78-1.83
Wald = 8.14, p<.04	3rd quartile	184	1.45	0.94-2.25
	4th quartile	188	1.86	1.18-2.91
12-month symptoms (efc)	1st quartile	172	1.00	
	2nd quartile	199	1.67	0.93-3.02
Wald = 9.31, p<.03	3rd quartile	179	1.77	0.95-3.29
	4th quartile	184	3.01	1.47-6.18
12-month symptoms	1st quartile	169	1.00	
(pfc/efc)	2nd quartile	197	1.69	0.94-3.05
	3rd quartile	178	1.80	0.96-3.36
Wald = 10.70, p<.01	4th quartile	181	3.38	1.62-7.06
12-month sciatica/back pain	1st quartile	175	1.00	
(pfc)	2nd quartile	205	1.00	0.65-1.52
	3rd quartile	185	1.54+	1.00-2.37
Wald = 10.31, p<.02	4th quartile	188	1.73	1.11-2.69

[13] Gender, age, income, education, marital status, work pattern (full/part time) and occupational setting (i.e. community/ outpatient-based and hospital/ward-based) were included in all models as covariates.

		N	OR	95% CI
12-month sciatica/back pain	1st quartile	175	1.00	
(efc)	2nd quartile	203	0.87	0.57-1.33
	3rd quartile	186	1.36+	0.87-2.13
Wald = 10.95, p<.01	4th quartile	191	1.72	1.07-2.75
14-day URTIs (pfc)	1st quartile	175	1.00	
	2nd quartile	205	1.09	0.72-1.66
Wald = 16.64, p<.001	3rd quartile	184	0.97	0.63-1.51
	4th quartile	188	2.12***	1.36-3.32
14-day URTIs (efc)	1st quartile	176	1.00	
	2nd quartile	203	1.08	0.71-1.66
Wald = 16.77, p<.001	3rd quartile	185	0.96	0.61-1.49
	4th quartile	192	2.13***	1.34-3.38
14-day URTIs (pfc/efc)	1st quartile	173	1.00	
	2nd quartile	201	1.04	0.68-1.59
Wald = 15.04, p<.002	3rd quartile	184	0.91	0.58-1.43
	4th quartile	187	1.99***	1.25-3.19
14-day depression/fatigue/	1st quartile	175	1.00	
difficulty sleeping/headache	2nd quartile	204	1.01	0.60-1.70
(pfc)	3rd quartile	184	1.66	0.93-2.93
	4th quartile	189	3.48+	1.77-6.84
Wald = 17.04, p<.001				
14-day depression/fatigue/	1st quartile	176	1.00	
difficulty sleeping/headache	2nd quartile	202	1.00	0.59-1.68
(efc)	3rd quartile	185	1.46	0.81-2.60
	4th quartile	193	2.77	1.39-5.53
Wald = 10.89, p<.01				
14-day depression/fatigue/	1st quartile	173	1.00	
difficulty sleeping/headache	2nd quartile	200	0.97	0.57-1.64
(pfc/efc)	3rd quartile	184	1.47	0.82-2.65
	4th quartile	188	2.85	1.42-5.73
Wald = 11.77, p<.008				
14-day depression/fatigue/	1st quartile	175	1.00	
difficulty sleeping/back pain	2nd quartile	203	1.55	0.94-2.55
(pfc)	3rd quartile	184	2.23	1.29-3.85
	4th quartile	189	2.66	1.51-4.68
Wald = 13.82, p<.003				
14-day depression/fatigue/	1st quartile	176	1.00	
difficulty sleeping/back pain	2nd quartile	201	1.57	0.95-2.59
(efc)	3rd quartile	185	2.14	1.23-3.73
	4th quartile	193	2.46	1.37-4.40
Wald = 11.14, p<.01				
14-day depression/fatigue/	1st quartile	173	1.00	
difficulty sleeping/back pain	2nd quartile	199	1.54	0.92-2.55
(pfc/efc)	3rd quartile	184	2.15	1.23-3.76
	4th quartile	188	2.46	1.36-4.44
Wald = 10.99, p<.01				
14-day lower respiratory	1st quartile	175	1.00	
symptoms (pfc)	2nd quartile	205	1.56	0.77-3.16
	3rd quartile	184	2.34	1.18-4.64
Wald = 10.65, p<.01	4th quartile	188	2.81	1.42-5.55
14-day lower respiratory	1st quartile	176	1.00	
symptoms (efc)	2nd quartile	203	1.43	0.70-2.91
	3rd quartile	185	2.20	1.10-4.39
Wald = 9.35, p<.03	4th quartile	192	2.63	1.31-5.28

		N	OR	95% CI
14-day gastrointestinal	1st quartile	175	1.00	
symptoms (pfc)	2nd quartile	203	0.90	0.51-1.58
	3rd quartile	184	1.60+	0.94-2.73
Wald = 16.59, p<.001	4th quartile	188	2.30	1.35-3.91
14-day gastrointestinal	1st quartile	176	1.00	
symptoms (efc)	2nd quartile	201	0.88	0.50-1.54
	3rd quartile	185	1.43	0.83-2.47
Wald = 11.12, p<.01	4th quartile	192	1.96	1.13-3.40
14-day gastrointestinal	1st quartile	173	1.00	
symptoms (both)	2nd quartile	199	0.87	0.50-1.53
	3rd quartile	184	1.44	0.83-2.48
Wald = q11.43, p<.01	4th quartile	187	1.99	1.14-3.47
14-day dizziness/	1st quartile	175	1.00	
earache/nausea (pfc)	2nd quartile	203	1.00	0.62-1.61
	3rd quartile	184	1.48	0.92-2.38
Wald = 11.04, p<.p01	4th quartile	188	1.90	1.18-3.06
14-day dizziness/	1st quartile	176	1.00	
earache/nausea (efc)	2nd quartile	201	0.95	0.59-1.54
	3rd quartile	185	1.33	0.82-2.16
Wald = 8.46, p<.04	4th quartile	192	1.74	1.06-2.85
14-day back pain/swollen	1st quartile	175	1.00	
ankles (pfc)	2nd quartile	203	1.29	0.85-1.96
	3rd quartile	184	1.89	1.22-2.91
Wald = 11.07, p<.01	4th quartile	188	1.84	1.18-2.86
14-day back pain/swollen	1st quartile	176	1.00	
ankles (efc)	2nd quartile	201	1.26	0.83-1.92
	3rd quartile	185	1.82	1.17-2.83
Wald = 8.44, p<.04	4th quartile	192	1.67	1.06-2.64
14-day back pain/swollen	1st quartile	173	1.00	
ankles (pfc/efc)	2nd quartile	199	1.23	0.81-1.89
	3rd quartile	184	1.77	1.14-2.76
Wald = 8.05, p<.05	4th quartile	187	1.68	1.06-2.67
12-month prescribed	1st quartile	162	1.00	
medication use (pfc)	2nd quartile	190	1.64+	1.04-2.58
	3rd quartile	170	2.11	1.30-3.43
Wald = 12.20, p<.007	4th quartile	179	2.11	1.30-3.44
12-month prescribed	1st quartile	162	1.00	
medication use (efc)	2nd quartile	187	1.66*	1.05-2.63
	3rd quartile	171	1.95	1.19-3.19
Wald = 9.03, p<.03	4th quartile	181	1.94	1.16-3.22
12-month prescribed	1st quartile	160	1.00	
medication use (pfc/efc)	2nd quartile	186	1.72*	1.08-2.75
	3rd quartile	170	2.07	1.26-3.42
Wald = 10.35, p<.02	4th quartile	178	2.03	1.21-3.39

		N	OR	95% CI
12-month pain/ind meds	1st quartile	163	1.00	
(pfc)	2nd quartile	190	1.49	0.96-2.30
	3rd quartile	173	1.94	1.24-3.05
Wald = 13.35, p<.004	4th quartile	180	2.21	1.40-3.50
12-month pain/ind meds	1st quartile	163	1.00	
(efc)	2nd quartile	187	1.55+	1.00-2.41
	3rd quartile	174	1.93	1.21-3.05
Wald = 11.29, p<.01	4th quartile	182	2.15	1.33-3.48
12-month pain/ind meds	1st quartile	161	1.00	
(both)	2nd quartile	186	1.56	1.00-2.43
	3rd quartile	173	1.94	1.22-3.10
Wald = 11.32, p<.01	4th quartile	179	2.17	1.33-3.52

Note: repeated contrasts + (p<.05) * (p<.01) ** (p<.001) *** (p<.0001)
Pfc = problem-focused coping
Efc = emotion-focused coping

Appendix XI:
Survey II: Bullying & NOF (with/without coping style)

Table 1: NOF, bullying (Bergen Index) & health outcomes[15]

		N	OR	95% CI
Work-related stress				
NOF	Lower median	446	1.00	
Wald = 91.60, p<.0001	Upper median	352	6.04	4.18-8.72
Clinical anxiety[14]				
NOF	Lower median	429	1.00	
Wald = 102.46, p<.0001	Upper median	343	8.15	5.43-12.23
Clinical depression				
Bullying	Lower median	433	1.00	
Wald = 6.67, p<.01	Upper median	341	2.55	1.25-5.19
NOF	Lower median	429	1.00	
Wald = 14.16, p<.0001	Upper median	345	4.81	2.12-10.89
Lifetime prevalence of disease				
NOF	Lower median	439	1.00	
Wald = 4.97, p<.03	Upper median	346	1.45	1.05-2.01
12-month symptoms				
NOF	Lower median	432	1.00	
Wald = 12.25, p<.0001	Upper median	332	2.57	1.52-4.37
12-month sciatica/back pain				
NOF	Lower median	441	1.00	
Wald = 7.84, p<.005	Upper median	347	1.59	1.15-2.20
14-day upper respiratory tract symptoms				
NOF	Lower median	439	1.00	
Wald = 9.27, p<.002	Upper median	347	1.65	1.20-2.28
14-day depression/fatigue/difficulty sleeping/headache				
NOF	Lower median	437	1.00	
Wald = 7.06, p<.008	Upper median	348	1.94	1.19-3.16
14-day depression/fatigue/difficulty sleeping/back pain				
NOF	Lower median	436	1.00	
Wald = 5.12, p<.02	Upper median	347	1.65	1.07-2.53
14-day lower respiratory symptoms				
NOF	Lower median	439	1.00	
Wald = 3.91, p<.05	Upper median	347	1.57	1.00-2.44
14-day gastrointestinal symptoms				
NOF	Lower median	437	1.00	
Wald = 10.20, p<.001	Upper median	346	1.91	1.28-2.83
14-day dizziness/earache				
NOF	Lower median	437	1.00	
Wald = 8.89, p<.003	Upper median	346	1.69	1.20-2.40

[14] Negative affectivity was not included as a covariate for clinical anxiety and depression.
[15] Gender, age, income, education, marital status, work pattern, occupational setting & negative affectivity (24-item version) were included in all models as covariates.

Table 2: NOF, bullying (Bergen Index) & health outcomes[16]

		N	OR	95% CI
Work stress				
NOF	Lower median	426	1.00	
Wald = 65.79, p<.0001	Upper median	338	4.95	3.36-7.29
Clinical anxiety[17]				
NOF	Lower median	411	1.00	
Wald = 74.51, p<.0001	Upper median	331	6.56	4.28-10.06
Clinical depression				
NOF	Lower median	412	1.00	
Wald = 10.66, p<.001	Upper median	332	4.36	1.80-10.56
12-month symptoms				
NOF	Lower median	415	1.00	
Wald = 12.28, p<.0001	Upper median	323	2.69	1.55-4.68
12-month sciatica/back pain				
NOF	Lower median	423	1.00	
Wald = 6.84, p<.009	Upper median	336	1.57	1.12-2.20
14-day symptoms				
NOF	Lower median	411	1.00	
Wald = 4.45, p<.04	Upper median	326	2.34	1.06-5.16
14-day upper respiratory tract symptoms				
NOF	Lower median	421	1.00	
Wald = 9.54, p<.002	Upper median	336	1.70	1.22-2.39
14-day depression/fatigue/difficulty sleeping/headache				
NOF	Lower median	419	1.00	
Wald = 5.82, p<.02	Upper median	337	1.86	1.12-3.09
14-day depression/fatigue/difficulty sleeping/back pain				
NOF	Lower median	418	1.00	
Wald = 4.71, p<.03	Upper median	337	1.65	1.05-2.59
14-day respiratory symptoms				
NOF	Lower median	421	1.00	
Wald = 4.91, p<.03	Upper median	336	1.69	1.06-2.69
14-day gastrointestinal symptoms				
NOF	Lower median	419	1.00	
Wald = 9.81, p<.002	Upper median	336	1.93	1.28-2.90
14-day dizziness/earache				
NOF	Lower median	419	1.00	
Wald = 6.15, p<.01	Upper median	336	1.58	1.10-2.27

[16] Gender, age, income, education, marital status, work pattern (full/part time) occupational setting (i.e. community/outpatient-based and hospital/ward-based), negative affectivity (24-item version) and coping style (problem and emotion-focused) were included in all models a covariate.
[17] Negative affectivity was not included as a covariate for clinical anxiety and depression.

Table 3: NOF, bullying (dichotomous items) & health outcomes[18]

		N	OR	95% CI
Work-related stress				
Bullying	Lower median	403	1.00	
Wald = 7.28, p<.007	Upper median	393	1.52	1.05-2.21
NOF	Lower median	448	1.00	
Wald = 77.02, p<.0001	Upper median	348	5.59	3.81-8.21
Clinical anxiety				
Bullying	Lower median	387	1.00	
Wald = 15.96, p<.0001	Upper median	382	2.30	1.53-3.46
NOF	Lower median	431	1.00	
Wald = 78.95, p<.0001	Upper median	338	6.72	4.41-10.22
Clinical depression				
Bullying	Lower median	390	1.00	
Wald = 5.48, p<.02	Upper median	382	2.73	1.18-6.31
NOF	Lower median	431	1.00	
Wald = 11.24, p<.001	Upper median	341	4.21	1.82-9.74
Lifetime prevalence of disease				
Bullying	Lower median	398	1.00	
Wald = 5.33, p<.002	Upper median	386	1.47	1.06-2.04
12-month symptoms				
NOF	Lower median	434	1.00	
Wald = 8.90, p<.003	Upper median	330	2.28	1.33-3.92
12-month sciatica/back pain				
NOF	Lower median	443	1.00	
Wald = 5.34, p<.02	Upper median	344	1.49	1.06-2.09
14-day symptoms				
NOF	Lower median	429	1.00	
Wald = 5.96, p<.02	Upper median	332	2.68	1.22-5.91
14-day upper respiratory tract symptoms				
NOF	Lower median	441	1.00	
Wald = 7.52, p<.006	Upper median	344	1.60	1.14-2.25
14-day depression/fatigue/difficulty sleeping/headache				
NOF	Lower median	439	1.00	
Wald = 8.53, p<.003	Upper median	345	2.14	1.29-3.58
14-day depression/fatigue/difficulty sleeping/back pain				
NOF	Lower median	438	1.00	
Wald = 5.25, p<.02	Upper median	344	1.70	1.08-2.67
14-day respiratory symptoms				
NOF	Lower median	441	1.00	
Wald = 3.95, p<.05	Upper median	344	1.61	1.01-2.57

[18] Gender, age, income, education, marital status, work pattern (full/part time) occupational setting & negative affectivity (24-item version: except for anxiety and depression) were included as covariates.

14-day gastrointestinal symptoms				
NOF	Lower median	439	1.00	
Wald = 8.96, p<.003	Upper median	343	1.88	1.24-2.85

14-day dizziness/earache				
NOF	Lower median	439	1.00	
Wald = 8.37, p<.004	Upper median	343	1.71	1.19-2.45

Table 4: NOF, bullying (continuous item) & health outcomes[19]

		N	OR	95% CI
Work-related stress				
Bullying	Lower median	411	1.00	
Wald = 13.30, p<.0001	Upper median	385	2.01	1.38-2.93
NOF	Lower median	448	1.00	
Wald = 66.28, p<.0001	Upper median	348	5.00	3.39-7.36
Clinical anxiety				
Bullying	Lower median	418	1.00	
Wald = 17.92, p<.0001	Upper median	351	2.39	1.60-3.57
NOF	Lower median	431	1.00	
Wald = 73.87, p<.0001	Upper median	338	6.43	4.21-9.83
Clinical depression				
Bullying	Lower median	420	1.00	
Wald = 5.57, p<.02	Upper median	352	2.67	1.18-6.05
NOF	Lower median	431	1.00	
Wald = 10.04, p<.002	Upper median	341	3.99	1.69-9.38
Lifetime symptom prevalence				
Bullying	Lower median	406	1.00	
Wald = 6.75, p<.009	Upper median	382	1.54	1.11-2.14
12-month symptoms				
NOF	Lower median	436	1.00	
Wald = 9.69, p<.002	Upper median	331	2.36	1.37-4.04
12-month sciatica/back pain				
NOF	Lower median	445	1.00	
Wald = 8.21, p<.004	Upper median	346	1.64	1.17-2.31
14-day symptoms				
NOF	Lower median	431	1.00	
Wald = 5.93, p<.02	Upper median	334	2.72	1.22-6.07
14-day upper respiratory tract symptoms				
NOF	Lower median	443	1.00	
Wald = 6.50, p<.01	Upper median	346	1.55	1.11-2.18
14-day depression/fatigue/difficulty sleeping/headache				
NOF	Lower median	441	1.00	
Wald = 9.31, p<.002	Upper median	347	2.23	1.33-3.73
14-day depression/fatigue/difficulty sleeping/back pain				
NOF	Lower median	440	1.00	
Wald = 5.88, p<.02	Upper median	346	1.75	1.11-2.74
14-day lower respiratory symptoms				
NOF	Lower median	443	1.00	
Wald = 4.16, p<.04	Upper median	346	1.63	1.02-2.60

[19] Gender, age, income, education, marital status, work pattern (full/part time) occupational setting & negative affectivity (24-item version: except for anxiety and depression) were included as covariates.

14-day gastrointestinal symptoms				
NOF	Lower median	441	1.00	
Wald = 12.34, p<.0001	Upper median	345	2.10	1.39-3.17
14-day dizziness/earache				
NOF	Lower median	441	1.00	
Wald = 9.78, p<.002	Upper median	345	1.78	1.24-2.55
12-month medication				
Bullying	Lower median	370	1.00	
Wald = 5.84, p<.02	Upper median	357	1.58	1.09-2.28

Appendix XII:
Survey II: NOF inclusive of bullying & health outcomes

Table 1: NOF inclusive of bullying (dichotomous measure) & health outcomes[20]

		N	OR	95% CI
Work-related stress	1st quartile	215	1.00	
(EPIN: 3 items)	2nd quartile	206	2.23*	1.25-3.99
	3rd quartile	185	5.50***	3.14-9.63
Wald = 109.62, p<.0001	4th quartile	199	16.02***	8.97-28.60
Work-related stress	1st quartile	214	1.00	
(EPIN: 24 items)	2nd quartile	205	2.03*	1.13-3.65
	3rd quartile	184	4.78***	2.71-8.45
Wald = 91.31, p<.0001	4th quartile	197	12.97***	7.18-23.43
Clinical anxiety	1st quartile	205	1.00	
	2nd quartile	201	5.25***	2.23-12.35
Wald = 121.44, p<.0001	3rd quartile	176	13.69***	5.97-31.36
	4th quartile	196	45.96***	20.02-105.51
Clinical depression	1st quartile	206	1.00	
	2nd quartile	201	0.47	0.08-2.62
Wald = 24.21, p<.0001	3rd quartile	176	2.90*	0.89-9.42
	4th quartile	198	7.31*	2.43-21.97
Lifetime prevalence of	1st quartile	213	1.00	
disease	2nd quartile	203	1.01	0.68-1.50
(EPIN: 3 items)	3rd quartile	185	1.39	0.92-2.11
	4th quartile	196	1.98	1.28-3.08
Wald = 12.32, p<.006				
Lifetime prevalence of	1st quartile	212	1.00	
disease	2nd quartile	202	0.97	0.65-1.45
(EPIN: 24 items)	3rd quartile	184	1.27	0.83-1.94
	4th quartile	194	1.75	1.11-2.75
Wald = 8.25, p<.04				
12-month symptoms	1st quartile	209	1.00	
(EPIN: 3 items)	2nd quartile	201	1.70+	1.00-2.88
	3rd quartile	177	2.29	1.26-4.15
Wald = 18.27, p<.0001	4th quartile	186	4.43	2.15-9.13
12-month symptoms	1st quartile	208	1.00	
(EPIN: 24 items)	2nd quartile	200	1.67	0.98-2.86
	3rd quartile	177	2.14	1.17-3.93
Wald = 14.39, p<.002	4th quartile	185	3.94	1.86-8.33
12-month sciatica/back pain	1st quartile	213	1.00	
(EPIN: 3 items)	2nd quartile	206	1.24	0.83-1.85
	3rd quartile	184	1.30	0.86-1.97
Wald = 12.61, p<.006	4th quartile	196	2.15*	1.39-3.32
12-month sciatica/back pain	1st quartile	212	1.00	
(EPIN: 24 items)	2nd quartile	205	1.19	0.80-1.78
	3rd quartile	183	1.20	0.79-1.84
Wald = 8.21, p<.04	4th quartile	195	1.88+	1.20-2.95

[20] Gender, age, income, education, marital status, work pattern (full/part time) occupational setting (i.e. community/outpatient-based and hospital/ward-based) and negative affectivity (3 or 24-item versions: except for clinical anxiety & depression) were included in all models as covariates.

14-day upper respiratory tract symptoms (EPIN: 3 items)	1st quartile	212	1.00	
	2nd quartile	206	0.95	0.64-1.42
	3rd quartile	183	1.50+	0.99-2.28
	4th quartile	197	1.74	1.13-2.68
Wald = 11.11, p<.01				
14-day upper respiratory tract symptoms (EPIN: 24 items)	1st quartile	211	1.00	
	2nd quartile	205	0.96	0.64-1.44
	3rd quartile	182	1.53+	1.00-2.34
	4th quartile	195	1.76	1.12-2.75
Wald = 10.60, p<.01				
14-day depression/fatigue/ difficulty sleeping/headache (EPIN: 3 items)	1st quartile	210	1.00	
	2nd quartile	206	1.81*	1.10-3.00
	3rd quartile	183	3.04	1.67-5.54
	4th quartile	198	2.96	1.58-5.53
Wald = 18.80, p<.0001				
14-day depression/fatigue/ difficulty sleeping/back pain (EPIN: 24 items)	1st quartile	209	1.00	
	2nd quartile	205	1.69+	1.02-2.81
	3rd quartile	182	2.70	1.47-4.95
	4th quartile	196	2.37	1.24-4.54
Wald = 13.03, p<.005				
14-day psychological symptoms 2 (EPIN: 3 items)	1st quartile	209	1.00	
	2nd quartile	206	1.64+	1.03-2.63
	3rd quartile	183	3.02+	1.72-5.27
	4th quartile	197	2.33	1.34-4.06
Wald = 17.80, p<.0001				
14-day psychological symptoms 2 (EPIN: 24 items)	1st quartile	208	1.00	
	2nd quartile	205	1.55	0.96-2.49
	3rd quartile	182	2.86+	1.61-5.08
	4th quartile	195	1.85	1.04-3.30
Wald = 13.54, p<.004				
14-day lower respiratory symptoms (EPIN: 3 items)	1st quartile	212	1.00	
	2nd quartile	206	1.79	0.96-3.35
	3rd quartile	183	1.91	1.01-3.60
	4th quartile	197	3.03	1.63-5.66
Wald = 12.32, p<.006				
14-day gastrointestinal symptoms (EPIN: 3 items)	1st quartile	210	1.00	
	2nd quartile	206	0.98	0.58-1.67
	3rd quartile	183	1.45	0.86-2.44
	4th quartile	196	1.92	1.14-3.25
Wald = 8.93, p<.03				
14-day dizziness/earache/nausea (EPIN: 3 items)	1st quartile	210	1.00	
	2nd quartile	206	1.20	0.76-1.90
	3rd quartile	83	1.60	1.01-2.54
	4th quartile	196	2.05	1.28-3.27
Wald = 10.51, p<.02				
Prescribed pain/ind meds in last month (EPIN: 3 items)	1st quartile	196	1.00	
	2nd quartile	188	1.23	0.80-1.88
	3rd quartile	166	1.66	1.07-2.58
	4th quartile	180	1.97	1.25-3.10
Wald = 10.09, p<.02				
Prescribed pain/ind meds in last 14 days (EPIN: 3 items)	1st quartile	202	1.00	
	2nd quartile	196	1.08	0.72-1.64
	3rd quartile	173	1.26	0.82-1.93
	4th quartile	188	1.82	1.17-2.83
Wald = 8.22, p<.04				

Note: repeated contrasts + (p<.05) * (p<.01) ** (p<.001) *** (p<.0001)

Table 2: NOF inclusive of bullying (continuous measure) & health outcomes[21]

		N	OR	95% CI
Work-related stress	1st quartile	225	1.00	
(EPIN: 3 items)	2nd quartile	195	2.34**	1.32-4.16
	3rd quartile	186	5.65***	3.27-9.79
	4th quartile	199	15.11***	8.57-26.65
Wald = 105.86, p<.0001				
Work-related stress	1st quartile	224	1.00	
(EPIN: 24 items)	2nd quartile	194	2.11*	1.18-3.78
	3rd quartile	185	4.92***	2.82-8.58
Wald = 88.93, p<.0001	4th quartile	197	12.31***	6.91-21.94
Clinical anxiety	1st quartile	215	1.00	
	2nd quartile	190	6.15***	2.62-14.42
Wald = 113.44, p<.0001	3rd quartile	176	14.41**	6.31-32.88
	4th quartile	197	44.47***	19.48-101.53
Clinical depression	1st quartile	216	1.00	
	2nd quartile	190	0.26	0.03-2.35
Wald = 25.11, p<.0001	3rd quartile	177	3.08*	0.95-9.98
	4th quartile	198	8.22*	2.75-24.59
Lifetime prevalence of	1st quartile	223	1.00	
disease	2nd quartile	192	1.14	0.76-1.69
(EPIN: 3 items)	3rd quartile	186	1.49	0.99-2.24
	4th quartile	196	2.03	1.32-3.13
Wald = 11.68, p<.009				
Lifetime prevalence of	1st quartile	222	1.00	
disease	2nd quartile	191	1.09	0.73-1.63
(EPIN: 24 items)	3rd quartile	185	1.36	0.89-2.06
	4th quartile	194	1.80	1.15-2.82
Wald = 7.73, p<.05				
12-month symptoms	1st quartile	219	1.00	
(EPIN: 3 items)	2nd quartile	191	2.26**	1.31-3.89
	3rd quartile	177	2.47	1.38-4.42
Wald = 23.45, p<.0001	4th quartile	186	4.91	2.40-10.05
12-month symptoms	1st quartile	218	1.00	
(EPIN: 24 items)	2nd quartile	190	2.25**	1.29-3.92
	3rd quartile	177	2.33	1.29-4.22
Wald = 19.52, p<.0001	4th quartile	185	4.43	2.12-9.28
12-month sciatica/back pain	1st quartile	223	1.00	
(EPIN: 3 items)	2nd quartile	195	1.44	0.97-2.14
	3rd quartile	185	1.35	0.89-2.03
Wald = 14.55, p<.002	4th quartile	196	2.29*	1.49-3.53
12-month sciatica/back pain	1st quartile	222	1.00	
(EPIN: 24 items)	2nd quartile	194	1.38	0.92-2.06
	3rd quartile	184	1.25	0.82-1.90
Wald = 10.10, p<.02	4th quartile	195	2.01+	1.29-3.14
14-day symptoms	1st quartile	214	1.00	
(EPIN: 3 items)	2nd quartile	191	2.95*	1.27-6.85
	3rd quartile	179	3.21	1.30-7.92
Wald = 11.20, p<.01	4th quartile	189	2.58	1.05-6.34

[21] Gender, age, income, education, marital status, work pattern (full/part time) occupational setting (i.e. community/outpatient-based and hospital/ward-based) and negative affectivity (3 or 24-item versions: except for clinical anxiety & depression) were included in all models as covariates.

14-day symptoms	1st quartile	213	1.00	
(EPIN: 24 items)	2nd quartile	190	2.91*	1.25-6.74
	3rd quartile	178	3.17	1.28-7.88
Wald = 10.49, p<.02	4th quartile	188	2.49	0.98-6.33
14-day upper respiratory	1st quartile	222	1.00	
tract symptoms	2nd quartile	195	1.03	0.69-1.54
(EPIN: 3 items)	3rd quartile	184	1.47	0.98-2.22
	4th quartile	197	1.72	1.12-2.63
Wald = 8.82, p<.03				
14-day upper respiratory	1st quartile	221	1.00	
tract symptoms	2nd quartile	194	1.04	0.70-1.56
(EPIN: 24 items)	3rd quartile	183	1.49	0.99-2.27
	4th quartile	195	1.72	1.11-2.68
Wald = 8.37, p<.04				
14-day depression/fatigue/	1st quartile	220	1.00	
difficulty sleeping/headache	2nd quartile	195	2.36**	1.40-3.96
(EPIN: 3 items)	3rd quartile	184	3.58	1.97-6.52
	4th quartile	198	3.28	1.77-6.08
Wald = 26.33, p<.0001				
14-day depression/fatigue/	1st quartile	219	1.00	
difficulty sleeping/headache	2nd quartile	194	2.21**	1.31-3.73
(EPIN: 24 items)	3rd quartile	183	3.18	1.73-5.85
	4th quartile	196	2.70	1.43-5.09
Wald = 19.86, p<.0001				
14-day depression/fatigue/	1st quartile	219	1.00	
difficulty sleeping/back pain	2nd quartile	195	2.08**	1.29-3.37
(EPIN: 3 items)	3rd quartile	184	3.49	2.00-6.09
	4th quartile	197	2.59	1.50-4.46
Wald = 24.59, p<.0001				
14-day depression/fatigue/	1st quartile	218	1.00	
difficulty sleeping/back pain	2nd quartile	194	1.96*	1.21-3.18
(EPIN: 24 items)	3rd quartile	183	3.33	1.88-5.90
	4th quartile	195	2.11	1.20-3.72
Wald = 19.66, p<.0001				
14-day lower respiratory	1st quartile	222	1.00	
symptoms	2nd quartile	195	1.92+	1.03-3.60
(EPIN: 3 items)	3rd quartile	184	2.17	1.16-4.06
	4th quartile	197	3.05	1.64-5.68
Wald = 12.49, p<.006				
14-day gastrointestinal	1st quartile	220	1.00	
symptoms	2nd quartile	195	0.97	0.57-1.64
(EPIN: 3 items)	3rd quartile	184	1.41	0.84-2.35
	4th quartile	196	1.89	1.13-3.17
Wald = 8.72, p<.03				
14-day	1st quartile	220	1.00	
dizziness/earache/nausea	2nd quartile	195	1.46	0.92-2.30
(EPIN: 3 items)	3rd quartile	184	1.80	1.14-2.85
	4th quartile	196	2.29	1.44-3.65
Wald = 12.80, p<.005				
Prescribed medication in last	1st quartile	207	1.00	
12 months	2nd quartile	179	1.84*	1.19-2.85
(EPIN: 3 items)	3rd quartile	165	1.43	0.91-2.23
	4th quartile	184	1.86	1.16-3.01
Wald = 9.84, p<.02				
Prescribed pain/ind meds in	1st quartile	208	1.00	
last 12 months	2nd quartile	182	1.61+	1.07-2.43
(EPIN: 3 items)	3rd quartile	168	1.52	0.99-2.32
	4th quartile	184	1.92	1.23-3.00
Wald = 9.49, p<.02				

Prescribed pain/ind meds in	1st quartile	206	1.00	
last month	2nd quartile	177	1.40	0.91-2.13
(EPIN: 3 items)	3rd quartile	167	1.83	1.18-2.81
Wald = 11.67, p<.009	4th quartile	180	2.06	1.31-3.23
Prescribed pain/ind meds in	1st quartile	212	1.00	
last 14 days	2nd quartile	185	1.15	0.76-1.74
(EPIN: 3 items)	3rd quartile	174	1.31	0.86-2.00
Wald = 8.73, p<.03	4th quartile	188	1.89	1.22-2.92

Note: repeated contrasts + (p<.05) * (p<.01) ** (p<.001) *** (p<.0001)

Table 3: NOF inclusive of bullying (dichotomous measure) & health outcomes[22]

		N	OR	95% CI
Work-related stress (pfc)	1st quartile	208	1.00	
	2nd quartile	203	2.34*	1.30-4.23
Wald = 123.33, p<.0001	3rd quartile	177	5.69***	3.21-10.06
	4th quartile	195	18.53***	10.41-32.99
Work-related stress (efc)	1st quartile	206	1.00	
	2nd quartile	204	2.24*	1.24-4.04
Wald = 108.25, p<.0001	3rd quartile	183	5.55***	3.13-9.85
	4th quartile	194	16.51***	9.15-29.80
Work-related stress (pfc/efc)	1st quartile	205	1.00	
	2nd quartile	201	2.26*	1.25-4.09
Wald = 105.57, p<.0001	3rd quartile	176	5.21**	2.92-9.29
	4th quartile	193	16.34***	9.03-29.55
Clinical anxiety (pfc)	1st quartile	198	1.00	
	2nd quartile	196	5.14***	2.18-12.09
Wald = 116.35, p<.0001	3rd quartile	168	12.88**	5.60-29.63
	4th quartile	192	42.99***	18.73-98.68
Clinical anxiety (efc)	1st quartile	196	1.00	
	2nd quartile	197	5.43***	2.17-13.56
Wald = 89.43, p<.0001	3rd quartile	173	11.67*	4.77-28.52
	4th quartile	192	35.66***	14.57-87.26
Clinical depression (pfc)	1st quartile	199	1.00	
	2nd quartile	196	0.48	0.09-2.67
Wald = 22.96, p<.0001	3rd quartile	168	2.69*	0.81-8.92
	4th quartile	194	7.04*	2.32-21.35
Clinical depression (efc)	1st quartile	197	1.00	
	2nd quartile	197	0.40	0.07-2.23
Wald = 15.10, p<.002	3rd quartile	173	2.05+	0.61-6.87
	4th quartile	193	4.42	1.41-13.89
Lifetime prevalence of	1st quartile	206	1.00	
disease (pfc)	2nd quartile	200	1.04	0.70-1.55
	3rd quartile	177	1.43	0.94-2.17
Wald = 15.90, p<.001	4th quartile	192	2.17	1.42-3.32
Lifetime prevalence of	1st quartile	204	1.00	
disease (efc)	2nd quartile	201	0.98	0.65-1.46
	3rd quartile	183	1.31	0.86-2.00
Wald = 11.32, p<.01	4th quartile	191	1.92	1.23-2.99
Lifetime prevalence of	1st quartile	203	1.00	
disease (pfc/efc)	2nd quartile	198	0.99	0.66-1.48
	3rd quartile	176	1.30	0.84-1.99
Wald = 10.83, p<.01	4th quartile	190	1.91*	1.22-2.98

[22] Gender, age, income, education, marital status, work pattern (full/part time) occupational setting (i.e. community/outpatient-based and hospital/ward-based) and coping style (either problem and/or emotion-focused) were included in all models as covariates.

12-month symptoms (pfc)	1st quartile	203	1.00	
	2nd quartile	198	1.64	0.96-2.78
Wald = 21.52, p<.00011	3rd quartile	170	2.52	1.37-4.63
	4th quartile	187	4.77	2.35-9.67
12-month symptoms (efc)	1st quartile	201	1.00	
	2nd quartile	199	1.70	0.99-2.92
Wald = 17.77, p<.0001	3rd quartile	175	2.24	1.21-4.12
	4th quartile	184	4.60	2.20-9.61
12-month symptoms pfc/efc)	1st quartile	200	1.00	
	2nd quartile	196	1.66	0.97-2.85
Wald = 18.28, p<.0001	3rd quartile	169	2.42	1.29-4.54
	4th quartile	183	4.59	2.20-9.59
12-month sciatica/back pain (pfc)	1st quartile	205	1.00	
	2nd quartile	203	1.26	0.84-1.89
	3rd quartile	176	1.48	0.98-2.26
Wald = 16.37, p<.001	4th quartile	194	2.33+	1.53-3.56
12-month sciatica/back pain (efc)	1st quartile	203	1.00	
	2nd quartile	204	1.26	0.84-1.89
	3rd quartile	182	1.29	0.84-1.98
Wald = 11.96, p<.008	4th quartile	193	2.13+	1.37-3.31
12-month sciatica/back pain (pfc/efc)	1st quartile	202	1.00	
	2nd quartile	201	1.23	0.82-1.85
	3rd quartile	175	1.37	0.89-2.11
Wald = 11.74, p<.008	4th quartile	192	2.12+	1.36-3.30
14-day symptoms (pfc)	1st quartile	198	1.00	
	2nd quartile	200	1.92	0.89-4.13
Wald = 11.35, p<.01	3rd quartile	171	2.55	1.09-5.97
	4th quartile	187	4.71	1.77-12.49
14-day symptoms (efc)	1st quartile	196	1.00	
	2nd quartile	200	1.91	0.88-4.12
Wald = 9.37, p<.03	3rd quartile	176	2.46	1.03-5.87
	4th quartile	187	4.38	1.58-12.20
14-day symptoms (pfc/efc)	1st quartile	195	1.00	
	2nd quartile	198	1.83	0.84-3.97
Wald = 8.65, p<.03	3rd quartile	170	2.36	0.98-5.66
	4th quartile	186	4.15	1.50-11.50
14-day back pain (pfc)	1st quartile	204	1.00	
	2nd quartile	203	1.29	0.86-1.92
Wald = 9.49, p<.02	3rd quartile	175	1.35	0.89-2.06
	4th quartile	194	1.93	1.27-2.93
14-day upper respiratory tract symptoms (pfc)	1st quartile	205	1.00	
	2nd quartile	203	0.90	0.60-1.34
	3rd quartile	175	1.39+	0.91-2.10
Wald = 11.47, p<.009	4th quartile	194	1.71	1.12-2.59
14-day upper respiratory tract symptoms (efc)	1st quartile	203	1.00	
	2nd quartile	204	0.90	0.60-1.35
	3rd quartile	181	1.46+	0.95-2.23
Wald = 10.29, p<.02	4th quartile	194	1.66	1.07-2.57

14-day upper respiratory tract symptoms (pfc/efc)	1st quartile	212	1.00	
	2nd quartile	190	0.87	0.58-1.31
	3rd quartile	175	1.35+	0.88-2.08
Wald = 9.80, p<.02	4th quartile	192	1.64	1.06-2.54
14-day depression/fatigue/ difficulty sleeping/headache (pfc)	1st quartile	203	1.00	
	2nd quartile	203	1.90*	1.15-3.14
	3rd quartile	175	3.19	1.77-5.75
	4th quartile	195	4.13	2.23-7.65
Wald = 26.83, p<.0001				
14-day depression/fatigue/ difficulty sleeping/headache (efc)	1st quartile	201	1.00	
	2nd quartile	204	1.87*	1.13-3.09
	3rd quartile	181	2.95	1.62-5.37
	4th quartile	195	3.50	1.85-6.64
Wald = 20.36, p<.0001				
14-day depression/fatigue/ difficulty sleeping/headache (pfc/efc)	1st quartile	200	1.00	
	2nd quartile	201	1.76+	1.06-2.92
	3rd quartile	174	2.77	1.51-5.06
	4th quartile	193	3.33	1.75-6.33
Wald = 18.14, p<.0001				
14-day depression/fatigue/ difficulty sleeping/back pain (pfc)	1st quartile	202	1.00	
	2nd quartile	203	1.70*	1.06-2.72
	3rd quartile	175	3.43*	1.95-6.05
	4th quartile	194	3.19	1.86-5.49
Wald = 26.19, p<.0001				
14-day depression/fatigue/ difficulty sleeping/back pain (efc)	1st quartile	200	1.00	
	2nd quartile	204	1.72+	1.07-2.76
	3rd quartile	181	3.26+	1.84-5.78
	4th quartile	195	3.07	1.74-5.42
Wald = 22.30, p<.0001				
14-day depression/fatigue/ difficulty sleeping/back pain (pfc/efc)	1st quartile	199	1.00	
	2nd quartile	201	1.64+	1.02-2.64
	3rd quartile	174	3.24*	1.81-5.80
	4th quartile	193	2.98	1.68-5.26
Wald = 21.32, p<.0001				
14-day lower respiratory symptoms (pfc)	1st quartile	205	1.00	
	2nd quartile	203	1.70	0.91-3.18
	3rd quartile	175	1.59	0.84-3.04
Wald = 10.04, p<.02	4th quartile	194	2.61	1.43-4.77
14-day gastrointestinal symptoms (pfc)	1st quartile	203	1.00	
	2nd quartile	203	1.19	0.70-2.03
	3rd quartile	175	1.90	1.12-3.22
Wald = 16.34, p<.001	4th quartile	193	2.56	1.53-4.28
14-day gastrointestinal symptoms (efc)	1st quartile	201	1.00	
	2nd quartile	204	1.13	0.66-1.93
	3rd quartile	181	1.65	0.96-2.81
Wald = 11.63, p<.009	4th quartile	194	2.29	1.34-3.91
14-day gastrointestinal symptoms (pfc/efc)	1st quartile	200	1.00	
	2nd quartile	201	1.14	0.67-1.96
	3rd quartile	174	1.75	1.02-3.00
Wald = 11.45, p<.01	4th quartile	192	2.26	1.32-3.88

14-day dizziness/earache/nausea (pfc)	1st quartile	203	1.00	
	2nd quartile	203	1.25	0.79-1.97
	3rd quartile	175	1.59	1.00-2.54
	4th quartile	193	2.46+	1.57-3.88
Wald = 17.24, p<.001				
14-day dizziness/earache/nausea (efc)	1st quartile	201	1.00	
	2nd quartile	204	1.19	0.75-1.88
	3rd quartile	181	1.54	0.96-2.46
	4th quartile	194	2.24	1.40-3.60
Wald = 12.88, p<.005				
14-day dizziness/earache/nausea (pfc/efc)	1st quartile	200	1.00	
	2nd quartile	201	1.17	0.74-1.85
	3rd quartile	174	1.41	0.88-2.28
	4th quartile	192	2.20+	1.36-3.53
Wald = 12.29, p<.006				
14-day back pain/swollen ankles (pfc)	1st quartile	203	1.00	
	2nd quartile	203	1.40	0.94-2.08
	3rd quartile	175	1.45	0.95-2.19
Wald = 10.12, p<.02	4th quartile	193	1.97	1.30-3.00
12-month prescribed medication use (pfc)	1st quartile	191	1.00	
	2nd quartile	190	1.69*	1.09-2.61
	3rd quartile	159	1.36	0.87-2.14
Wald = 10.10, p<.02	4th quartile	181	2.02	1.26-3.23
12-month prescribed medication use (efc)	1st quartile	189	1.00	
	2nd quartile	188	1.67+	1.07-2.60
	3rd quartile	164	1.28	0.80-2.03
Wald = 8.01, p<.05	4th quartile	181	1.85	1.13-3.04
12-month pain/ind meds (pfc)	1st quartile	192	1.00	
	2nd quartile	193	1.44	0.95-2.16
	3rd quartile	161	1.48	0.96-2.28
Wald = 9.16, p<.03	4th quartile	182	1.94	1.26-2.99
14-day meds (pfc)	1st quartile	192	1.00	
	2nd quartile	190	1.15	0.76-1.75
Wald = 9.45, p<.02	3rd quartile	164	1.13	0.73-1.75
	4th quartile	180	1.95*	1.24-3.05
14-day meds (efc)	1st quartile	189	1.00	
	2nd quartile	190	1.17	0.77-1.79
Wald = 8.12, p<.04	3rd quartile	170	1.12	0.72-1.75
	4th quartile	180	1.90+	1.18-3.05
14-day pain meds (pfc)	1st quartile	195	1.00	
	2nd quartile	195	1.08	0.71-1.64
Wald = 10.79, p<.01	3rd quartile	166	1.28	0.83-1.97
	4th quartile	186	1.93	1.26-2.96

Note: repeated contrasts + (p<.05) * (p<.01) ** (p<.001) *** (p<.0001)
Pfc = problem-focused coping
Efc = emotion-focused coping

Table 4: NOF inclusive of bullying (continuous measure) & health outcomes[23]

		N	OR	95% CI
Work-related stress (pfc)	1st quartile	218	1.00	
	2nd quartile	192	2.47**	1.38-4.44
Wald = 119.04, p<.0001	3rd quartile	178	5.88***	3.37-10.27
	4th quartile	195	17.47***	9.94-30.71
Work-related stress (efc)	1st quartile	216	1.00	
	2nd quartile	193	2.36**	1.31-4.23
Wald = 104.13, p<.0001	3rd quartile	184	5.78***	3.30-10.11
	4th quartile	194	15.57***	8.74-27.74
Work-related stress (pfc/efc)	1st quartile	215	1.00	
	2nd quartile	190	2.39**	1.33-4.31
Wald = 101.20, p<.0001	3rd quartile	177	5.41**	3.08-9.53
	4th quartile	193	15.40***	8.62-27.51
Clinical anxiety (pfc)	1st quartile	208	1.00	
	2nd quartile	185	6.06***	2.58-14.23
Wald = 108.80, p<.0001	3rd quartile	168	13.59**	5.93-31.14
	4th quartile	193	41.80***	18.30-95.44
Clinical anxiety (efc)	1st quartile	206	1.00	
	2nd quartile	186	6.47***	2.60-16.11
Wald = 82.28, p<.0001	3rd quartile	173	12.49*	5.13-30.40
	4th quartile	193	34.68***	14.25-84.41
Clinical anxiety (pfc/efc)	1st quartile	205	1.00	
	2nd quartile	183	6.47***	2.60-16.12
Wald = 82.02, p<.0001	3rd quartile	167	12.45*	5.10-30.40
	4th quartile	192	34.68***	14.24-84.48
Clinical depression (pfc)	1st quartile	209	1.00	
	2nd quartile	185	0.27	0.03-2.42
Wald = 24.23, p<.0001	3rd quartile	169	2.87*	0.87-9.47
	4th quartile	194	8.04*	2.66-24.33
Clinical depression (efc)	1st quartile	207	1.00	
	2nd quartile	186	0.22	0.02-2.03
Wald = 16.53, p<.001	3rd quartile	174	2.22+	0.67-7.40
	4th quartile	193	5.13+	1.64-16.00
Clinical depression (pfc/efc)	1st quartile	206	1.00	
	2nd quartile	183	0.23	0.03-2.06
Wald = 17.54, p<.001	3rd quartile	168	2.09	0.62-7.10
	4th quartile	192	5.39*	1.72-16.92
Lifetime prevalence of	1st quartile	213	1.00	
disease (pfc)	2nd quartile	187	1.12	0.75-1.68
	3rd quartile	177	1.39	0.91-2.12
Wald = 9.93, p<.02	4th quartile	190	1.95	1.26-3.04
Lifetime prevalence of	1st quartile	214	1.00	
disease (efc)	2nd quartile	190	1.11	0.74-1.66
	3rd quartile	184	1.42	0.93-2.15
Wald = 10.47, p<.02	4th quartile	191	1.97	1.27-3.05

[23] Gender, age, income, education, marital status, work pattern, occupational setting and coping style (either problem and/or emotion-focused) were included as covariates.

Lifetime prevalence of disease (pfc/efc)	1st quartile	216	1.00	
	2nd quartile	189	1.18	0.79-1.75
	3rd quartile	178	1.52	1.01-2.30
Wald = 15.19, p<.002	4th quartile	192	2.21	1.45-3.36
12-month symptoms (pfc)	1st quartile	213	1.00	
	2nd quartile	188	2.20*	1.27-3.79
Wald = 26.76, p<.0001	3rd quartile	170	2.70	1.49-4.90
	4th quartile	184	5.29	2.63-10.63
12-month symptoms (efc)	1st quartile	211	1.00	
	2nd quartile	189	2.31**	1.32-4.05
Wald = 23.37, p<.0001	3rd quartile	175	2.43	1.34-4.41
	4th quartile	184	5.18	2.50-1.72
12-month symptoms (pfc/efc)	1st quartile	210	1.00	
	2nd quartile	186	2.26**	1.29-3.95
	3rd quartile	169	2.62	1.42-4.84
Wald = 23.57, p<.0001	4th quartile	183	5.16	2.49-10.70
12-month sciatica/back pain (pfc)	1st quartile	215	1.00	
	2nd quartile	192	1.46	0.98-2.19
	3rd quartile	177	1.54	1.02-2.32
Wald = 18.16, p<.0001	4th quartile	194	2.48+	1.63-3.76
12-month sciatica/back pain (efc)	1st quartile	213	1.00	
	2nd quartile	193	1.48	0.99-2.21
	3rd quartile	183	1.35	0.89-2.05
Wald = 14.13, p<.003	4th quartile	193	2.28*	1.47-3.53
12-month sciatica/back pain (pfc/efc)	1st quartile	212	1.00	
	2nd quartile	190	1.44	0.96-2.16
	3rd quartile	176	1.43	0.94-2.19
Wald = 13.56, p<.004	4th quartile	192	2.27+	1.47-3.52
14-day symptoms (pfc)	1st quartile	208	1.00	
	2nd quartile	189	3.28*	1.42-7.56
Wald = 18.64, p<.0001	3rd quartile	172	3.92	1.60-9.57
	4th quartile	187	4.75	1.92-11.74
14-day symptoms (efc)	1st quartile	206	1.00	
	2nd quartile	189	3.28*	1.42-7.59
Wald = 16.48, p<.001	3rd quartile	177	3.86	1.55-9.59
	4th quartile	187	4.51	1.74-11.68
14-day symptoms (pfc/efc)	1st quartile	205	1.00	
	2nd quartile	187	3.13*	1.35-7.27
Wald = 15.23, p,<.002	3rd quartile	171	3.68	1.48-9.18
	4th quartile	186	4.28	1.65-11.07
14-day back pain (pfc)	1st quartile	214	1.00	
	2nd quartile	192	1.36	0.91-2.04
Wald = 10.28, p<.02	3rd quartile	176	1.41	0.93-2.13
	4th quartile	194	1.97	1.30-2.98
14-day upper respiratory tract symptoms (pfc)	1st quartile	215	1.00	
	2nd quartile	192	0.98	0.65-1.46
	3rd quartile	176	1.36	0.90-2.05
Wald = 9.04, p<.03	4th quartile	194	1.69	1.12-2.55

14-day upper respiratory tract symptoms (efc)	1st quartile	213	1.00	
	2nd quartile	193	0.99	0.66-1.47
	3rd quartile	182	1.43	0.94-2.16
Wald = 7.82, p<.05	4th quartile	194	1.64	1.07-2.53
14-day depression/fatigue/ difficulty sleeping/headache (pfc)	1st quartile	213	1.00	
	2nd quartile	192	2.48**	1.48-4.17
	3rd quartile	176	3.73	2.07-6.70
Wald = 35.15, p<.0001	4th quartile	195	4.53	2.47-8.33
14-day depression/fatigue/ difficulty sleeping/headache (efc)	1st quartile	211	1.00	
	2nd quartile	193	2.46**	1.46-4.14
	3rd quartile	182	3.51	1.94-6.37
	4th quartile	195	3.90	2.08-7.34
Wald = 28.73, p<.0001				
14-day depression/fatigue/ difficulty sleeping/headache (pfc/efc)	1st quartile	210	1.00	
	2nd quartile	190	2.31**	1.37-3.91
	3rd quartile	175	3.29	1.81-5.99
	4th quartile	193	3.72	1.98-7.01
Wald = 25.72, p<.0001				
14-day depression/fatigue/ difficulty sleeping/back pain (pfc)	1st quartile	212	1.00	
	2nd quartile	192	2.18**	1.35-3.52
	3rd quartile	176	3.98	2.26-7.00
	4th quartile	194	3.52	2.07-6.01
Wald = 33.84, p<.0001				
14-day depression/fatigue/ difficulty sleeping/back pain (efc)	1st quartile	210	1.00	
	2nd quartile	193	2.22**	1.37-3.59
	3rd quartile	182	3.82	2.17-6.74
	4th quartile	195	3.42	1.96-5.99
Wald = 30.10, p<.0001				
14-day depression/fatigue/ difficulty sleeping/back pain (pfc/efc)	1st quartile	209	1.00	
	2nd quartile	190	2.12**	1.31-3.45
	3rd quartile	175	3.81	2.14-6.78
	4th quartile	193	3.33	1.90-5.84
Wald = 28.63, p<.0001				
14-day lower respiratory symptoms (pfc)	1st quartile	215	1.00	
	2nd quartile	192	1.84	0.98-3.43
	3rd quartile	176	1.83	0.97-3.46
Wald = 9.98, p<.02	4th quartile	194	2.64	1.45-4.83
14-day gastrointestinal symptoms (pfc)	1st quartile	213	1.00	
	2nd quartile	192	1.16	0.68-1.98
	3rd quartile	176	1.83	1.09-3.06
Wald = 15.94, p<.001	4th quartile	193	2.50	1.51-4.14
14-day gastrointestinal symptoms (efc)	1st quartile	211	1.00	
	2nd quartile	193	1.11	0.65-1.89
	3rd quartile	182	1.59	0.94-2.69
Wald = 11.34, p<.01	4th quartile	194	2.24	1.33-3.79
14-day gastrointestinal symptoms (pfc/efc)	1st quartile	210	1.00	
	2nd quartile	190	1.12	0.65-1.91
	3rd quartile	175	1.69	0.99-2.85
Wald = 11.06, p<.01	4th quartile	192	2.21	1.31-3.75
14-day dizziness/earache/nausea (pfc)	1st quartile	213	1.00	
	2nd quartile	192	1.52	0.96-2.40
	3rd quartile	176	1.79	1.13-2.84
	4th quartile	193	2.74	1.74-4.30
Wald = 19.62, p<.001				

14-day	1st quartile	211	1.00	
dizziness/earache/nausea	2nd quartile	193	1.46	0.92-2.31
(efc)	3rd quartile	182	1.75	1.10-2.80
	4th quartile	194	2.52	1.57-4.04
Wald = 15.13, p<.002				
14-day	1st quartile	210	1.00	
dizziness/earache/nausea	2nd quartile	190	1.43	0.90-2.28
(pfc/efc)	3rd quartile	175	1.61	1.00-2.59
	4th quartile	192	2.47	1.54-3.97
Wald = 14.27, p<.0003				
14-day back pain/swollen	1st quartile	213	1.00	
ankles (pfc)	2nd quartile	192	1.48	0.99-2.20
	3rd quartile	176	1.54	1.02-2.32
Wald = 11.56, p<.009	4th quartile	193	2.03	1.34-3.07
14-day back pain/swollen	1st quartile	211	1.00	
ankles (efc)	2nd quartile	193	1.45	0.97-2.16
	3rd quartile	182	1.40	0.92-2.11
Wald = 8.05, p<.05	4th quartile	194	1.85	1.20-2.84
14-day back pain/swollen	1st quartile	210	1.00	
ankles (pfc/efc)	2nd quartile	190	1.42	0.95-2.13
	3rd quartile	175	1.43	0.94-2.18
Wald = 8.26, p<.04	4th quartile	192	1.88	1.22-2.90
14-day tooth/earache (pfc)	1st quartile	214	1.00	
	2nd quartile	192	1.90*	1.19-3.04
Wald = 8.13, p<.04	3rd quartile	176	1.34	0.82-2.21
	4th quartile	194	1.67	1.03-2.72
12-month prescribed	1st quartile	201	1.00	
medication use (pfc)	2nd quartile	179	1.93**	1.24-2.99
	3rd quartile	159	1.51	0.96-2.36
Wald = 13.19, p<.004	4th quartile	182	2.11	1.33-3.34
12-month prescribed	1st quartile	199	1.00	
medication use (efc)	2nd quartile	177	1.93**	1.23-3.02
	3rd quartile	163	1.44	0.91-2.27
Wald = 10.99, p<.01	4th quartile	182	1.96	1.20-3.19
12-month prescribed	1st quartile	198	1.00	
medication use (pfc/efc)	2nd quartile	177	1.91*	1.22-2.99
	3rd quartile	158	1.47	0.93-2.33
Wald = 10.35, p<.02	4th quartile	180	1.90	1.17-3.10
12-month pain/ind meds	1st quartile	202	1.00	
(pfc)	2nd quartile	182	1.60+	1.06-2.42
	3rd quartile	162	1.56	1.02-2.39
Wald = 11.63, p<.009	4th quartile	182	2.05	1.34-3.15
12-month pain/ind meds	1st quartile	200	1.00	
(efc)	2nd quartile	180	1.60+	1.05-2.42
	3rd quartile	167	1.53	0.99-2.35
Wald = 8.69, p<.03	4th quartile	182	1.89	1.20-2.97

12-month pain/ind meds	1st quartile	199	1.00	
(pfc/efc)	2nd quartile	180	1.59+	1.05-2.42
	3rd quartile	161	1.54	0.99-2.38
Wald = 9.06, p<.03	4th quartile	180	1.93	1.23-3.05
14-day meds (pfc)	1st quartile	202	1.00	
	2nd quartile	179	1.27	0.84-1.93
Wald = 8.56, p<.04	3rd quartile	165	1.24	0.81-1.91
	4th quartile	180	1.92	1.24-2.99
14-day pain meds (pfc)	1st quartile	205	1.00	
	2nd quartile	184	1.16	0.76-1.75
Wald = 11.38, p<.01	3rd quartile	167	1.34	0.87-2.05
	4th quartile	186	2.00	1.31-3.06

Note: repeated contrasts + (p<.05) * (p<.01) ** (p<.001) *** (p<.0001)
Pfc = problem-focused coping
Efc = emotion-focused coping

Appendix XIII:
Survey II: NOF components & health outcomes

Table 1: NOF components (continuous bullying measure) & health outcomes[24]

		N	OR	95% CI
Work stress	Demand-control-support	362	1.00	
	(Wald = 17.74, p<.0001)	363	2.26	1.49-3.42
	Effort-reward imbalance	339	1.00	
	(Wald = 43.29, p<.0001)	386	4.38	2.82-6.80
	Bullying	378	1.00	
	(Wald = 4.45, p<.04)	347	1.56	1.03-2.37
Clinical anxiety	Demand-control-support	347	1.00	
	(Wald = 10.20, p<.001)	355	2.21	1.36-3.59
	Effort-reward imbalance	328	1.00	
	(Wald = 27.84, p<.0001)	374	4.12	2.44-6.98
Clinical depression	Demand-control-support	347	1.00	
	(Wald = 7.02, p<.008)	357	4.68	1.49-14.64
Lifetime prevalence of disease	Working hours/hazards	360	1.00	
	(Wald = 7.56, p<.006)	358	1.65	1.16-2.36
12-month symptoms	Effort-reward imbalance	330	1.00	
	(Wald = 5.02, p<.03)	367	1.84	1.08-3.13
12-month sciatica/back pain	Effort-reward imbalance	336	1.00	
	(Wald = 11.32, p<.001)	384	1.85	1.29-2.64
14-day symptoms	Effort-reward imbalance	329	1.00	
	(Wald = 3.93, p<.05)	372	2.19	1.01-4.76
14-day depression/ fatigue/difficulty sleeping/headache	Effort-reward imbalance	360	1.00	
	(Wald = 11.22, p<.001)	359	2.40	1.44-4.01
	Working hours/hazards	334	1.00	
	(Wald = 4.77, p<.03)	385	1.72	1.06-2.81
14-day depression/ fatigue/difficulty sleeping/back pain	Demand-control-support	357	1.00	
	(Wald = 5.12, p<.02)	361	1.68	1.07-2.65
	Effort-reward imbalance	334	1.00	
	(Wald = 7.40, p<.007)	384	1.90	1.20-3.01
14-day lower respiratory symptoms	Effort-reward imbalance	335	1.00	
	(Wald = 5.02, p<.03)	384	1.81	1.08-3.04
14-day dizziness/earache	Effort-reward imbalance	333	1.00	
	(Wald = 4.00, p<.05)	383	1.48	1.01-2.19
	Working hours/hazards	359	1.00	
	(Wald = 12.07, p<.001)	357	1.96	1.34-2.86
12-month psychotropic medication	Demand-control-support	346	1.00	
	(Wald = 4.55, p<.03)	353	1.97	1.06-3.67

[24]Gender, age, income, education, marital status, work pattern (full/part time) occupational setting (i.e. community/outpatient-based and hospital/ward-based) and negative affectivity (24-item version) were included in all models as covariates.

Table 2: NOF components (dichotomous bullying measure) & health outcomes[25]

		N	OR	95% CI
Work stress	Demand-control-support	362	1.00	
	(Wald = 19.14, p<.0001)	363	2.49	1.66-3.75
	Effort-reward imbalance	339	1.00	
	(Wald = 48.83, p<.0001)	386	4.82	3.10-7.49
Clinical anxiety	Demand-control-support	347	1.00	
	(Wald = 10.92, p<.001)	355	2.23	1.39-3.59
	Effort-reward imbalance	328	1.00	
	(Wald = 27.38, p<.0001)	374	4.05	2.40-6.84
	Bullying	355	1.00	
	(Wald = 4.82, p<.03)	347	1.71	1.06-2.76
Clinical depression	Demand-control-support	347	1.00	
	(Wald = 7.87, p<.005)	357	4.97	1.62-15.23
Lifetime prevalence of disease	Working hours/hazards	360	1.00	
	(Wald =7.77, p<.005)	358	1.66	1.16-2.38
12-month symptoms	Demand-control-support	349	1.00	
	(Wald = 4.55, p<.03)	348	1.76	1.05-2.97
	Effort-reward imbalance	330	1.00	
	(Wald = 5.81, p<.02)	367	1.93	1.13-3.31
12-month sciatica/back pain	Effort-reward imbalance	336	1.00	
	(Wald =10.69, p<.001)	384	1.81	1.27-2.59
14-day symptoms	Effort-reward imbalance	329	1.00	
	(Wald = 4.67, p<.03)	372	2.35	1.08-5.10
14-day upper respiratory symptoms	Demand-control-support	358	1.00	
	(Wald = 4.17, p<.04)	361	1.43	1.01-2.02
14-day depression/ fatigue/difficulty sleeping/headache	Effort-reward imbalance	334	1.00	
	(Wald = 13.26, p<.0001)	385	2.59	1.55-4.33
	Working hours/hazards	360	1.00	
	(Wald = 4.99, p<.03)	359	1.74	1.07-2.84
14-day depression/ fatigue/difficulty sleeping/back pain	Demand-control-support	357	1.00	
	(Wald = 5.33, p<.02)	361	1.69	1.08-2.65
	Effort-reward imbalance	334	1.00	
	(Wald = 8.00, p<.005)	384	1.94	1.23-3.08
14-day lower respiratory symptoms	Effort-reward imbalance	335	1.00	
	(Wald = 6.62, p<.01)	384	1.97	1.18-3.30
14-day dizziness/earache	Effort-reward imbalance	333	1.00	
	(Wald = 5.03, p<.03)	383	1.56	1.06-2.29
14-day tooth/earache	Bullying	364	1.00	
	(Wald = 4.44, p<.04)	354	1.56	1.03-2.35
12-month psychotropic medication	Demand-control-support	346	1.00	
	(Wald =5.13, p<.02)	353	2.04	1.10-3.77

[25]Gender, age, income, education, marital status, work pattern (full/part time) occupational setting (i.e. community/outpatient-based and hospital/ward-based) and negative affectivity (24-item version) were included in all models as covariates.

Table 3: NOF components (Bergen Bullying Index) & health outcomes[26]

		N	OR	95% CI
Work stress	Demand-control-support	362	1.00	
	(Wald = 20.43, p<.0001)	363	2.52	1.69-3.76
	Effort-reward imbalance	338	1.00	
	(Wald = 53.06, p<.0001)	387	4.79	3.14-7.31
Clinical anxiety	Demand-control-support	347	1.00	
	(Wald = 15.64, p<.0001)	355	2.56	1.61-4.08
	Effort-reward imbalance	327	1.00	
	(Wald = 35.89, p<.0001)	375	4.74	2.85-7.89
Clinical depression	Demand-control-support	347	1.00	
	(Wald = 8.74, p<.003)	357	5.33	1.76-16.15
	Effort-reward imbalance	328	1.00	
	(Wald = 4.60, p<.03)	376	3.39	1.11-10.36
Lifetime prevalence of disease	Working hours/hazards	358	1.00	
	(Wald =7.82, p<.005)	360	1.67	1.17-2.39
12-month symptoms	Demand-control-support	349	1.00	
	(Wald = 5.78, p<.02)	348	1.90	1.13-3.19
	Effort-reward imbalance	330	1.00	
	(Wald = 7.30, p<.007)	367	2.05	1.22-3.45
12-month sciatica/back pain	Effort-reward imbalance	335	1.00	
	(Wald = 13.47, p<.0001)	385	1.90	1.35-2.68
	Bullying	402	1.00	
	(Wald = 4.44, p<.04)	318	0.71	0.51-0.98
14-day upper respiratory symptoms	Demand-control-support	358	1.00	
	(Wald = 4.28, p<.04)	361	1.43	1.02-2.00
14-day depression/ fatigue/difficulty sleeping/headache	Effort-reward imbalance	333	1.00	
	(Wald = 12.05, p<.001)	386	2.37	1.46-3.85
	Working hours/hazards	358	1.00	
	(Wald = 4.24, p<.04)	361	1.67	1.03-2.73
14-day depression/ fatigue/difficulty sleeping/back pain	Demand-control-support	357	1.00	
	(Wald = 4.06, p<.04)	361	1.57	1.01-2.43
	Effort-reward imbalance	333	1.00	
	(Wald = 6.47, p<.01)	385	1.76	1.14-2.73
14-day lower respiratory symptoms	Effort-reward imbalance	334	1.00	
	(Wald = 5.33, p<.02)	385	1.79	1.09-2.94
14-day dizziness/earache	Effort-reward imbalance	332	1.00	
	(Wald = 5.38, p<.02)	384	1.56	1.07-2.26

[26]Gender, age, income, education, marital status, work pattern (full/part time) occupational setting (i.e. community/outpatient-based and hospital/ward-based) and negative affectivity (24-item version) were included in all models as covariates.

Table 4: NOF components (dichotomous bullying measure) & health outcomes[27]

		N	OR	95% CI
Work stress	Demand-control-support	347	1.00	
	(Wald = 15.78, p<.0001)	353	2.34	1.54-3.57
	Effort-reward imbalance	327	1.00	
	(Wald = 36.34, p<.0001)	373	4.14	2.61-6.56
Clinical anxiety	Demand-control-support	333	1.00	
	(Wald = 9.77, p<.002)	346	2.25	1.35-3.74
	Effort-reward imbalance	317	1.00	
	(Wald = 13.25, p<.0001)	362	2.87	1.63-5.06
Clinical depression	Demand-control-support	333	1.00	
	(Wald = 8.34, p<.004)	347	6.59	1.83-23.69
Lifetime prevalence of disease	Working hours/hazards	348	1.00	
	(Wald = 7.86, p<.005)	345	1.70	1.17-2.45
12-month symptoms	Demand-control-support	334	1.00	
	(Wald = 5.97, p<.02)	341	1.97	1.14-3.38
12-month sciatica/back pain	Effort-reward imbalance	324	1.00	
	(Wald = 7.30, p<.007)	371	1.68	1.15-2.45
14-day symptoms	Effort-reward imbalance	318	1.00	
	(Wald = 4.68, p<.03)	360	2.44	1.09-5.46
14-day depression/ fatigue/difficulty sleeping/headache	Effort-reward imbalance	322	1.00	
	(Wald = 8.86, p<.003)	372	2.27	1.32-3.89
	Working hours/hazards	348	1.00	
	(Wald = 4.73, p<.03)	346	1.77	1.06-2.95
14-day depression/ fatigue/difficulty sleeping/back pain	Demand-control-support	342	1.00	
	(Wald = 5.64, p<.02)	352	1.75	1.10-2.28
	Effort-reward imbalance	322	1.00	
	(Wald = 4.06, p<.04)	372	1.64	1.01-2.66
14-day lower respiratory symptoms	Effort-reward imbalance	323	1.00	
	(Wald = 5.04, p<.03)	371	1.87	1.08-3.22
14-day gastrointestinal symptoms	Working hours/hazards	347	1.00	
	(Wald = 3.96, p<.05	345	1.55	1.01-2.39
14-day dizziness/earache	Working hours/hazards	347	1.00	
	(Wald = 12.79, p<.0001)	345	2.04	1.38-3.02
14-day tooth/earache	Effort-reward imbalance	322	1.00	
	(Wald = 5.42, p<.02)	371	0.59	0.38-0.92
	Bullying	349	1.00	
	(Wald = 6.54, p<.01)	344	1.75	1.14-2.70

[27]Gender, age, income, education, marital status, work pattern (full/part time) occupational setting (i.e. community/outpatient-based and hospital/ward-based), negative affectivity (24-item version) and coping style (problem and emotion-focused) were included in all models as covariates.

Table 5: NOF components (Bergen Bullying Index) & health outcomes[28]

		N	OR	95% CI
Work stress	Demand-control-support	347	1.00	
	(Wald = 15.83, p<.0001)	354	2.31	1.53-3.49
	Effort-reward imbalance	327	1.00	
	(Wald = 38.18, p<.0001)	374	4.07	2.61-6.35
Clinical anxiety	Demand-control-support	333	1.00	
	(Wald = 11.86, p<.001)	347	2.42	1.46-4.00
	Effort-reward imbalance	317	1.00	
	(Wald = 17.06, p<.0001)	363	3.20	1.84-5.56
Clinical depression	Demand-control-support	333	1.00	
	(Wald = 8.54, p<.003)	348	6.69	1.87-23.90
Lifetime prevalence of disease	Working hours/hazards	347	1.00	
	(Wald = 7.29, p<.007)	347	1.66	1.15-2.40
12-month symptoms	Demand-control-support	334	1.00	
	(Wald = 7.08, p<.008)	341	2.08	1.21-3.57
	Effort-reward imbalance	319	1.00	
	(Wald = 4.41, p<.04)	356	1.82	1.04-3.17
12-month sciatica/back pain	Effort-reward imbalance	324	1.00	
	(Wald = 8.99, p<.003)	372	1.75	1.21-2.53
	Bullying	388	1.00	
	(Wald = 4.79, p<.03)	308	0.69	0.50-0.96
14-day upper respiratory tract symptoms	Demand-control-support	343	1.00	
	(Wald = 4.03, p<.05)	352	1.43	1.01-2.01
14-day depression/ fatigue/difficulty sleeping/headache	Effort-reward imbalance	322	1.00	
	(Wald =7.58, p<.006)	373	2.07	1.23-3.47
	Working hours/hazards	347	1.00	
	(Wald = 3.96, p<.05)	348	1.68	1.01-2.81
14-day depression/ fatigue/difficulty sleeping/back pain	Demand-control-support	342	1.00	
	(Wald = 4.41, p<.04)	353	1.62	1.03-2.53
14-day lower respiratory symptoms	Effort-reward imbalance	323	1.00	
	(Wald = 3.89, p<.05)	372	1.70	1.00-2.88
14-day gastrointestinal symptoms	Working hours/hazards	346	1.00	
	(Wald = 4.52, p<.03)	374	1.60	1.04-2.48
14-day dizziness/earache	Working hours/hazards	346	1.00	
	(Wald = 13.62, p<.0001)	347	2.10	1.42-3.11

[28]Gender, age, income, education, marital status, work pattern (full/part time) occupational setting (i.e. community/outpatient-based and hospital/ward-based), negative affectivity (24-item version) and coping style (problem and emotion-focused) were included in all models as covariates.

Appendix XIV:
Survey II: Further analysis of NOF components & health outcomes

Table 1: NOF components & health outcomes[29]

		N	OR	95% CI
Work stress				
Demand-control-support (Wald = 20.68, p<.004)	High SS/high DL/low JD	120	0.58	0.33-1.01
	High SS/high DL/high JD	97	0.94	0.57-1.54
	Low SS/high DL/low JD	54	0.68	0.36-1.31
	Low SS/high DL/high JD	74	1.25	0.75-2.09
	High SS/low DL/low JD	88	0.68	0.38-1.21
	High SS/low DL/high JD	64	2.43**	1.40-5.43
	Low SS/low DL/low JD	95	0.76	0.45-1.27
	Low SS/low DL/high JD	135	1.72*	1.13-2.62
Effort-reward imbalance (Wald = 55.68, p<.0001)	Low IE/low EE/high REW	174	0.35***	0.20-0.61
	Low IE/low EE/low REW	41	0.77	0.35-1.70
	High IE/low EE/high REW	94	0.79	0.46-1.36
	High IE/low EE/low REW	58	1.86+	1.06-3.26
	Low IE/high EE/high REW	46	0.51	0.23-1.12
	Low IE/high EE/low REW	26	0.73	0.30-1.76
	High IE/high EE/high REW	111	1.99**	1.28-3.08
	High IE/high EE/low REW	177	3.47***	2.33-5.17
Clinical anxiety				
Demand-control-support (Wald = 35.91, p<.0001)	High SS/high DL/low JD	114	0.22**	0.09-0.52
	High SS/high DL/high JD	93	0.84	0.48-1.46
	Low SS/high DL/low JD	55	0.57	0.27-1.18
	Low SS/high DL/high JD	74	1.16	0.68-1.98
	High SS/low DL/low JD	86	0.97	0.52-1.78
	High SS/low DL/high JD	61	2.39**	1.33-4.28
	Low SS/low DL/low JD	95	1.18	0.70-2.00
	Low SS/low DL/high JD	132	3.02***	1.95-4.68
Effort-reward imbalance (Wald = 73.62, p<.p0001)	Low IE/low EE/high REW	170	0.23***	0.11-0.47
	Low IE/low EE/low REW	39	0.45	0.17-1.20
	High IE/low EE/high REW	88	0.36*	0.16-0.80
	High IE/low EE/low REW	60	0.86	0.46-1.60
	Low IE/high EE/high REW	46	1.51	0.73-3.10
	Low IE/high EE/low REW	26	2.10	0.96-4.55
	High IE/high EE/high REW	107	2.64***	1.67-4.16
	High IE/high EE/low REW	174	3.72***	2.51-5.51
12-month symptoms				
Effort-reward imbalance (Wald = 15.20, p<.03)	Low IE/low EE/high REW	171	0.53*	0.34-0.84
	Low IE/low EE/low REW	44	0.95	0.42-2.15
	High IE/low EE/high REW	91	1.05	0.55-1.98
	High IE/low EE/low REW	59	2.29	0.89-5.89
	Low IE/high EE/high REW	47	0.48+	0.24-0.96
	Low IE/high EE/low REW	24	1.49	0.40-5.51
	High IE/high EE/high REW	108	0.82	0.46-1.47
	High IE/high EE/low REW	172	1.42	0.80-2.54
14-day depression/fatigue				
Effort-reward imbalance (Wald = 19.26, p<.007)	Low IE/low EE/high REW	172	0.49*	0.30-0.79
	Low IE/low EE/low REW	43	2.14	0.72-6.33
	High IE/low EE/high REW	93	0.43*	0.25-0.75

[29]Gender, age, income, education, marital status, work pattern (full/part time) occupational setting (i.e. community/outpatient-based and hospital/ward-based) and negative affectivity (24-item version: except for clinical anxiety) were included in all models as covariates.

	High IE/low EE/low REW	61	0.65	0.33-1.30
	Low IE/high EE/high REW	46	0.96	0.42-2.24
	Low IE/high EE/low REW	25	3.08	0.52-18.38
	High IE/high EE/high REW	113	0.75	0.42-1.33
	High IE/high EE/low REW	178	1.52	0.83-2.78
14-day dizziness/earache				
Working hrs/hazards (Wald = 8.93, p<.03	Low work hrs/low hazards	237	0.65*	0.49-0.88
	Low work hrs/high hazards	143	0.97	0.70-1.33
	High work hrs/low hazards	129	1.24	0.90-1.71
	High work hrs/high hazards	220	1.28	0.96-1.69