

What is a good job?

The relationship between work/working
and improved health and wellbeing

Report submitted to the IOSH Research Committee

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Abstract

The research described in this report addressed the question of the relationship between work, wellbeing and health. Extensive research has examined the effects of negative job characteristics but recent approaches suggest that the question of what job characteristics are good for health should be addressed. Following this, it is then necessary to compare the importance of different factors and integrate this knowledge so that one can determine the relative balance of adverse versus beneficial effects of different types of work. The project used a variety of methods to address these issues. Throughout the different stages of the research a 'process' model was used that distinguished job characteristics (both positive and negative), appraisals of the impact of these characteristics (eg perceived stress at work or job satisfaction) and reports of negative and positive mental and physical health. A review of the literature showed that far less is known about positive aspects of work than about the effects of no work or unfavourable working conditions. Secondary analyses of large databases suggested that in many cases the absence of negative factors and the presence of positive factors were equivalent. However, there were exceptions to this, which suggested that further data collection was desirable. Studies of individual differences in coping styles suggested that positive coping (eg problem-focused coping) was more beneficial than negative coping (eg emotion-focused coping). The major new data collection involved a cross-sectional study of established workers and a small scale study of those starting work. The results from the established workers study showed that the best predictor of positive health outcomes was the total score of positive job characteristics and positive job appraisals. Further analyses identified a number of subcomponents (eg the direct effect of job characteristics that do not require positive appraisals) but none of the individual components had the same impact as the combined score. The data on new starters revealed consistent findings despite the small number of participants. Overall, the present results show that this is a tool that can identify whether the nature of a person's job is going to have a positive or negative impact on their health and wellbeing. The components of this measure can then be used to identify which factors need to be addressed in order to maximise the benefits and remove possible negative aspects of work.

Executive summary

Background

Long established job characteristic models of stress have shown clear links between adverse working conditions and poorer employee health and wellbeing. More recently, however, there has been a growing awareness that work, compared to worklessness, is generally good for health and wellbeing. The important provisos are that account must be taken of the nature and quality of the work.

Aims

This project took a holistic, multimethodology approach to work, health and wellbeing. It had three aims:

- to review scientific evidence on the effects of different types of work (or job characteristics) on health benefits and increased wellbeing
- to conduct secondary analyses of large existing databases to address issues that cannot be determined by reviews
- to conduct a longitudinal study of people starting work.

Method

The project took place in two phases. The first phase comprised a literature review, secondary analyses of existing datasets and examination of individual differences in coping and attributional style. The second phase involved new data collection. The literature review comprised a search of 10 databases during November 2007. Relevant publications were independently considered by two reviewers. The secondary analyses focused on the association, and nature of any associations, between both positive and negative measures of job characteristics and wellbeing, and gave some consideration to associated changes in job characteristics and wellbeing over time. Individual differences in coping and attributional style were also assessed by considering data from Mark,¹ which involved surveys of nurses and university staff. The new data collection comprised two surveys: a cross-sectional survey of established workers, and a longitudinal survey of people starting work taking measures immediately before and three months after they began their jobs.

Results

The literature review showed that research to date:

- has no clear conceptual background
- often fails to distinguish between the absence of negative effects and the presence of positive ones
- identifies the multifactorial nature of concepts of wellbeing
- largely involves cross-sectional studies
- rarely controls for other influential factors (such as job and individual characteristics)
- has not established a 'gold standard' for positive measures of job characteristics or wellbeing.

The project was able to consider, to some extent, the second of these points in the secondary analyses. Similarly, the effects of individual differences could be examined in studies conducted by Mark.¹ In addition, the longitudinal study addressed the fourth point directly, and included multiple positive measures which address the last issue. Moreover, both the secondary analyses and longitudinal study addressed the fifth point.

The secondary analyses showed strong, independent associations between both positive and negative measures of job characteristics and wellbeing. They also identified two distinct patterns of associations, showing that in some relationships the presence of positive effects and absence of negative effects had similar effect sizes, while in others either the presence of positive effects or the absence of negative effects had a significantly greater effect size than its opposite. Analyses considering change over time showed both strong associations between change in job characteristics and change in wellbeing over time, and the influential impact of initial levels of job characteristics, suggesting that previous experience has a significant effect.

The analyses of individual differences in coping and attributional styles showed that these had independent effects on wellbeing and health. This suggests that they can be added to any score based on job characteristics or appraisal of job characteristics.

The new data collection suggested that appraisals of the effects of job characteristics (eg perceived stress at work, job satisfaction) were more strongly associated with job characteristics than with demographic or other individual differences, and in turn that outcomes were more strongly associated with both job characteristics and appraisals of these than with individual characteristics. This is important because some researchers have suggested that occupational stress reflects characteristics of the person rather than job characteristics. It also suggests that a process approach to work and wellbeing, comprising job characteristics, appraisals and outcomes, is appropriate. Within this, a multifactorial approach of combined effects best describes the associations between work and wellbeing. The data also suggest that the extent to which work is good for health depends not only on workers' exposure levels (ie their job characteristics), but also on their appraisals of the effects of job characteristics. This has important implications for both interventions and prevention, in that it suggests that changes in both job characteristics and/or appraisals may be associated with changes in wellbeing outcomes.

Conclusions

The literature review, in conjunction with previous work on negative aspects of the work–health–wellbeing relationship, adds to the clear conclusion that health and wellbeing vary as a function of work. Although the existing literature is not currently strong enough for firm conclusions, the area clearly has the potential to make a significant contribution to our understanding of the relationship between work and health and wellbeing. The secondary analyses suggested that the nature of associations between job characteristics and wellbeing varies and that future work should consider them in more detail. In particular, studies should include more positive measures of job characteristics and wellbeing and should be carried out longitudinally. Analysis of the effects of coping style and attributions confirmed the importance of distinguishing between those which are positive and those which are associated with negative outcomes. The new data collection suggested that a multifactorial approach of combined effects best describes the associations between work and wellbeing, and hence that the extent to which work is good for health depends not only on workers' exposure levels (ie their job characteristics), but also on their appraisal of these job characteristics and how they cope with them.

1 An overview

1.1 Purpose of the report and this overview section

The final report describes all of the work involved in the project from its background, context and development through to its key findings and conclusions. This overview gives a summary of all of the work. It is followed by chapters which are intended as in-depth, detailed reports of each phase of the project.

1.2 Context of and background to the project

This project was developed from two main areas. The first, which is relatively new, has been recently reviewed² and provides evidence showing that work, compared to worklessness (not being engaged in any form of work), is generally good for health and wellbeing. The provisos are that account must be taken of the nature and quality of the work. The second area involves the long established job characteristic models of stress, which have shown clear links between adverse working conditions and employees' health and wellbeing. The project aimed to integrate these areas by considering the relationship between different aspects of work, improved health and wellbeing. In addition, it extended these two themes in several ways. First, it determined how wellbeing at work has been conceptualised, and the relevance of the concept to work–health relationships. In so doing, it began to bridge the gap between this recent work and the substantial existing knowledge base on stress at work^{3,4}. In addition, the project determined the relative importance, effect sizes, optimum combination and measures of the characteristics of jobs that are 'good' for health. Finally, the work considered the extent to which work is good for health, and the relative balance of adverse and beneficial effects of different elements of work. The research has led to a clearer understanding of how the relationship between work, health and wellbeing might be defined, supported and sustained, and as such has implications for occupational safety and health (OSH) practice.

1.3 Project objectives

The project aimed to take a holistic, multi-methodology approach to work, health and wellbeing. It had three broad main aims:

- to describe and assess the concept of wellbeing at work and its relevance to work–health relationships
- to determine the relative importance of job characteristics to wellbeing
- to consider the extent to which work is good for health.

The work was carried out in two phases. Phase 1 involved a literature review, secondary analyses of existing databases and consideration of individual differences. This phase was designed to address the project's first two aims. Phase 2 involved new data collection from two studies: a cross-sectional study of established workers, and a longitudinal study of people starting work. Together, these two studies were designed to address the project's third aim.

1.4 How these aims were met

The project met its aims and addressed these themes using a multimethodology approach (review, secondary analysis, and collection of new (cross-sectional and longitudinal) survey data) incorporating some of the approaches developed at the Cardiff Centre for Occupational and Health Psychology. Much of this research is based on aspects of traditional job characteristic models of stress, such as demands–control–support and effort–reward–imbalance, in combination with multifactor transactional stress models, which place emphasis on the inclusion of individual differences in the workplace–individual interaction.^{3,5} Most outcomes reflect several risk factors and combined effects of different factors are emphasised in our approach, as is benchmarking to compare the impact of different factors.⁶ It is also important to consider a range of outcomes, as the risk factors for one outcome may be very different from those for another.⁷ Most research to date has been cross-sectional and has focused on established workers. This has made it difficult to determine causal relationships, to disentangle the cumulative effects of working life from current job characteristics, and to generalise to other groups. Much of this research has also failed to examine other potentially influential factors such as personality and psychosocial factors. (Psychosocial factors cover those which might be defined as negative or positive stimuli (eg demands or rewards), those which might mediate or moderate the effects of these stimuli (eg control or support, coping and attributional style), appraisals (eg perceived stress or job satisfaction) and positive and negative outcomes.) A longitudinal study of young men and women starting work, which includes psychosocial and personality measures, would address these limitations and the present authors have recently piloted this approach.⁸

The different approaches taken by the project were not intended to be equal parts. The literature review for this project was different from other literature reviews in that it identified gaps in the literature and problems as opposed to narrowing the field. The aims of the secondary analyses were to show what can be addressed using existing databases and to provide some indication of their potential importance. In addition, these analyses resulted in the development of statistical methodology to compare presence and absence of effects. Overall, the aim of these first two parts was to get closer to best practice before beginning new data collection. Individual differences were examined in parallel research¹ which will allow future integration of this with the approaches based on job characteristics and appraisals of these. All parts of the project were integrated with one another; however, their individual weightings were not equal. Performing the literature review and the secondary analyses were necessary parts of the process, and have produced some interesting findings in their own right (see Section 1.6 below). Furthermore, findings from the literature review have contributed to the development of the secondary analyses, and findings from both of these approaches have contributed to aspects of the new data collection. The whole project is, therefore, an integrated, multifaceted approach to this relatively new area.

1.5 What the project involved

The first aim of the research was addressed by carrying out a review of the scientific evidence on the effects of different types of work (or job characteristics) on health benefits and increased wellbeing. This approach was similar to that taken by Waddell & Burton² to compare work and worklessness, and by Rick *et al.*^{9,10} to review psychosocial hazard measures and work-related stressors. The major difference from Waddell & Burton's review was that comparisons were made in a working sample. Similarly, the review differed from those looking at stress and ill health in that it considered beneficial effects rather than negative ones. The results are summarised below, and the full review is presented in Section 2.

The second aim of the research was addressed by conducting secondary analyses of large existing databases (the Bristol Stress at Work survey and Cardiff Health and Safety at Work survey; $n > 10,000$). These analyses allowed the project to address issues that cannot be determined by reviews. Comparative approaches are relatively rare in this area and analyses were designed to determine the relative importance, effect sizes, optimum combination and measures of the characteristics of jobs that are 'good' for health and wellbeing. Emphasis was placed on the combined effects of factors and individual differences. Again the results are summarised below, and described in full in Section 3.

In parallel with the present project, other research has examined the effects of individual differences. This was done by conducting surveys of nurses and university staff. As well as job characteristics, these studies examined individual differences in coping and attributional styles. The aim was to determine whether these factors were related to health and wellbeing outcomes and to determine whether any effects were independent of job characteristics or made an impact by modifying the effects of job type on health. These studies are described in detail in Section 4.

The final aim was addressed by conducting both a cross-sectional study of established workers and a longitudinal study of people starting work. The established workers study provided important comparison data, including data collected using a range of relatively new measures of positive job characteristics, perceptions and outcomes. The longitudinal study allowed three other key issues to be addressed. First, cause and effect relationships are difficult to determine in this area because of the widespread use of cross-sectional designs. Second, in addition to studying features of work environments, the research included key individual difference characteristics, which background research has suggested are very important in the work–wellbeing process. This allowed pre-work measures to be taken to control for non-work-related factors. Third, the impact of past employment was eliminated, allowing a clearer view of the causal effects of work on wellbeing and health. The results, therefore, provide a good initial basis for planning appropriate training and interventions aimed at promoting positive work–health associations and preventing or managing possible negative effects of work. The results of both studies involving new data collection are summarised below, and described in full in Section 5.

1.6 Results

1.6.1 Key findings of the literature review

A literature review was carried out in the first three months of the project. The review examined the literature to determine 'what is a good job?' and what evidence is present about work improving

health and wellbeing. It was predicted that the review would also identify many gaps in knowledge. There is an extensive literature on risk factors for stress at work, the scale of occupational stress and the health outcomes associated with negative job characteristics and perceived stress. In contrast, there have been few reviews of positive job characteristics and wellbeing at work, and only a small number of relevant articles were identified. In addition, it was apparent that most of the literature had no clear philosophical background, grounding or standpoint.

One exception is Warr's¹¹ account of happiness at work. He outlines several main issues, including recommendations to:

- consider multiple aspects as there are different aspects of happiness – context-free, domain-specific and facet-specific – which need to be distinguished from each other
- examine a wide range of environmental sources
- look for non-linear patterns as some desirable environmental sources become undesirable at high levels
- look at how such job characteristics should be considered in combination – he suggests that the combined effect of variables may be interactive and not just additive
- explore mental processes as well as environmental features; these influential mental processes can be explored in terms of the judgments made when appraising a situation
- recognise the importance of personal baselines, as people are consistent in their behaviours and mental processes across time and settings
- acknowledge that unhappiness is essential to happiness; in many settings people can only experience happiness in the presence of its opposite; one is dependent on the other.

Generally, most researchers have suggested that there are many key factors which lead to a 'good or healthy workplace or job'. However, a problem with much of the research is that it is unclear whether it is the presence of positive characteristics or the absence of negative ones that is important. Measures of wellbeing also appear to be multifactorial (this applies to happiness, job satisfaction and quality of working life). Both direct and indirect pathways between healthy workplace practices and wellbeing have been proposed, although there is little research on factors that might mediate or moderate such effects.

In general, the literature on this topic often appears very focused on specific issues and frequently fails to control or consider the range of variables that are clearly important. Indeed, many of the issues that emerge from the literature were addressed by secondary analyses of existing data (eg examining both the positive and negative ends of job characteristics while controlling for other job characteristics). Other issues, such as the restricted use of measures of positive job characteristics, perceptions and wellbeing, were addressed in the new data collection.

1.6.2 Key findings of the secondary analyses

Many of the gaps in knowledge identified by the literature review were then addressed by secondary analyses of the existing data. In particular, much of the work seemed to make the implicit assumption that the absence of negative work characteristics is the same as the presence of positive ones; and very little research considered whether changes in work characteristics were associated with corresponding changes in the outcome measures over time. This involved multivariate analyses of job characteristics (controlling for other factors such as demographics) with multiple health outcomes. Work characteristics were subdivided into tertiles or quintiles so that it was possible to identify the thresholds for significant associations between work and possible outcomes. It was possible, therefore, to examine dose-response and to determine whether it was the presence of positive characteristics or the absence of negative characteristics that had the larger effect. Analyses including multiple factors were also conducted so that confounding influences of other variables were removed. This approach has been used in the present authors' previous research on the combined effects of occupational health hazards^{6,7} and can now be applied to identifying the profile of positive associations between work and health.

The analyses considering the presence or absence issue found strong associations between both negative outcome and predictor measures and positive outcome and predictor measures. These associations were independent of other potentially confounding factors. The nature of these associations fell broadly into two groups, suggesting either a dose-response-type association or a greater presence effect. The analyses considering the changes over time issue showed strong associations between change in job characteristics and change in wellbeing over time. However, these analyses also showed the influential impact of levels of job characteristics at baseline, suggesting a significant impact of previous experience.

These analyses contributed to the development of a comparative approach. They also support the literature review conclusion identifying a relative lack of positive measures.

1.6.3 Key findings about individual differences in coping and attributional styles

The aim of this research was to examine the effects of individual differences in coping and attributional style on positive and negative outcomes in sectors where wellbeing issues have been identified. The first study investigated the relationships between job demands, control, social support, efforts, rewards, coping and attributional style in predicting anxiety, depression and job satisfaction in a sample of 307 university employees from the UK. The results were compared to those from a sample of 120 members of the general population. Hypotheses predicted that workplace demands, intrinsic and extrinsic effort, and negative coping and attributional behaviours would be associated with high levels of depression and anxiety, and low job satisfaction in university employees. It was also predicted that rewards, social support, job control and positive coping and attributional behaviours would be significantly associated with lower levels of depression and anxiety, and high job satisfaction. These hypotheses were supported by the research, with social support, intrinsic effort, rewards, self-blame and escape/avoidance coping being particularly important in predicting outcomes.

The purpose of the second study was to investigate the relationships between job characteristics and coping in predicting levels of anxiety and depression in nurses. The participants were 870 nurses from the south of England. Independent variables included job demands, social support, job control, efforts, rewards and ways of coping. It was hypothesised that job demands, intrinsic and extrinsic effort, and negative coping would be significantly associated with higher levels of depression and anxiety, and that social support, rewards, job control and positive coping would be associated with lower levels of depression and anxiety. All hypotheses were fully or partially supported. Positive coping behaviours had direct effects and did not just modify the effects of negative job characteristics. It was shown that coping behaviours significantly added to the prediction of anxiety and depression outcomes. This suggests that an approach that uses these measures has benefits over those that use only job characteristics. This indicated the importance of coping factors in wellbeing and health research, in accordance with the multifactorial premise of transactional models.

1.6.4 Key findings of the new data collection

The aim of the new data collection phase of the project was to consider the extent to which work is good for health. Within this framework, it was also possible to begin to address issues identified by the literature review and secondary analyses, namely the relative lack of use of positive measures, the frequent failure to control for potentially influential variables and the need for a multifactorial approach to work and wellbeing.

The new data collection comprised two studies. The first was a cross-sectional survey of established workers, and the second was a longitudinal survey of young people starting work, in which participants completed questionnaires before beginning their first job and again three months later. Both studies included both positive and negative measures of job characteristics, perceptions and outcomes, as well as further measures of potentially influential individual characteristics.

The findings from both studies suggested that appraisals of job characteristics (e.g. perceived stress at work, job satisfaction) were more strongly associated with job characteristics than with individual characteristics (e.g. demographics or personality), and in turn that outcomes (positive and negative mental and physical health) were more strongly associated with both job characteristics and appraisals of these than with individual characteristics. This suggests that a process approach to work and wellbeing, comprising job characteristics, appraisals of characteristics and outcomes, is appropriate. The data from the established workers study suggested that, on the whole, the relatively new positive measures of job characteristics, appraisals and outcomes were both appropriate and effective. In addition, these data suggested that positive and negative measures of job characteristics, perceptions and outcomes were measuring different concepts as opposed to opposite ends of the same spectra. A combined effects, or multifactorial, approach to work and wellbeing was also shown to be particularly appropriate. Comparisons between the established workers and starting work group showed strong similarities, suggesting that models and measures are appropriate for both groups. Data from the group of new starters showed no significant change in negative outcomes over time. The relatively short follow-up period and small sample size may both be responsible for this finding.

The new data collection suggests that a process approach to work and wellbeing, comprising job characteristics, perceptions and outcomes, is appropriate. Within this, a multifactorial approach of combined effects best describes the associations between work and wellbeing. The data also suggest

that the extent to which work is good for health depends not only on workers' exposure levels (ie their job characteristics), but also on their appraisal of their work. This has important implications for both interventions and prevention, in that it suggests that changes in both job characteristics and/or appraisals of work may be associated with changes in wellbeing outcomes.

1.7 Key findings – summary

1.7.1 Literature review

Existing research to date:

- has no clear conceptual background
- often fails to distinguish between the absence of negative effects and the presence of positive ones
- identifies the multifactorial nature of concepts of wellbeing
- largely involves cross-sectional studies
- rarely controls for other influential factors (such as job and individual characteristics)
- has not established a 'gold standard' for positive measures of job characteristics or wellbeing
- rarely makes use of positive measures of job characteristics and wellbeing

1.7.2 Secondary analyses

- There are strong, independent associations between positive and negative job characteristics and wellbeing.
- The nature of these associations varies.
- There are strong associations between change in job characteristics and change in wellbeing over time.
- Baseline levels of job characteristics have a strong influence over these associations.
- The existing datasets contained relatively few positive measures of job characteristics and wellbeing.
- A comparative approach is important, as different factors have different associations with different outcomes.

1.7.3 Individual differences

- Negative coping and attributional behaviours were associated with high levels of depression and anxiety and low job satisfaction.
- Positive coping and attributional behaviours were significantly associated with lower levels of depression and anxiety and high job satisfaction.

1.7.4 New data collection

- Job characteristics were more strongly associated with appraisals of work than with individual characteristics.
- Appraisals of work and job characteristics are more strongly associated with outcomes than with individual characteristics.
- A process approach, involving job characteristics, appraisals and outcomes, is appropriate.
- A similar pattern of associations and findings was observed among established workers and those starting work.
- A multifactorial, combined-effects approach best describes the association between work and wellbeing.
- Positive and negative measures assess different concepts rather than opposite ends of the same spectra.
- Mixed (positive and negative) associations are less common than non-mixed ones.

1.8 Conclusions

1.8.1 Differences in health and wellbeing as a function of work characteristics

- The literature review, secondary analyses and new data collection all support the conclusion that health and wellbeing vary as a function of work.
- This is consistent with previous research on adverse job characteristics.
- Similarly, all three point to the multifactorial nature of concepts of job characteristics, perceptions and wellbeing.
- The nature of the relationships between particular aspects of work and measures of wellbeing varies.
- The relative importance of different beneficial and negative job characteristics on different wellbeing measures also varies.

- This suggests that there are several underlying mechanisms determining the work–health–wellbeing relationship.

1.8.2 Key individual difference characteristics which affect the work–wellbeing process

- The existing literature is not strong enough to positively identify influential individual difference characteristics.
- Similarly, the existing databases did not contain sufficient positive measures of job characteristics or wellbeing to allow positive identification of such characteristics.
- Studies of coping and attributional style show that they have direct effects on health and wellbeing rather than modifying the effects of job characteristics.
- The new data collection pointed to differences, such as non-work-related stress and potentially influential individual characteristics.

1.8.3 Gaps in knowledge

- There is no clear conceptual background to much existing work.
- Previous research often fails to distinguish between the absence of negative effects and the presence of positive ones – i.e. the relative importance of beneficial and negative effects.
- There is no ‘gold standard’ for positive measures of job characteristics or wellbeing.

1.8.4 The extent to which work is good for health

- The extent to which work is good for health is dependent not only on the characteristics of work and but also on workers’ perceptions.
- A combination of exposure to job characteristics (both the presence of positive features and the absence of negative ones) and appraisals of these provides a useful measure of a ‘good job’.
- This ‘good job’ measure and the inclusion of coping and attributional styles is a useful predictor of reported health outcomes.

2 Literature review

2.1 Introduction

In the last two to three decades there has been a large body of research on work characteristics and their association with both negative job outcomes, such as stress and dissatisfaction, and with physical and mental health.^{3,12,13} Indeed, Cooper¹⁴ concludes that the global recession is likely to lead to even more examples of stress-related illnesses and adverse occupational health outcomes. However, there has also been a growing awareness and acknowledgment that unemployment is harmful to physical and mental health, and that work is beneficial and may be an effective way to improve health and wellbeing.² There is also a large body of literature describing the well-established associations between negative psychological states and psychosocial factors, and mortality and health outcomes,^{15,16} much of it carried out in an occupational setting.¹⁷ More recently, however, research has focused on the association between positive psychological states, such as positive affect and happiness, and health,¹⁸ though relatively little has been carried out in an occupational setting and/or using occupational outcomes.

Cooper¹⁹ has argued that bringing together research on the negative effects of stress with the positive psychology of wellbeing²⁰ will improve the emotional capital and wellbeing of people in society. He states that we must understand what enhances our mental capital as well as what depletes it (see also Cooper *et al.*²¹). There has been considerable discussion at a policy level on the association between good work and good health (eg the Black report, *Working for a healthier tomorrow*²²). A focus on good work can also be linked with positive organisational behaviours and also positive organisational scholarship, which looks at the ways in which employees and organisations flourish.

A recent meta-analytic review concluded that the psychosocial work environment is important for mental health.²³ In addition, longitudinal research has shown that work stressors are an important source of preventable psychiatric diagnoses in midlife.²⁴ The relatively new focus on positive aspects of work considers whether the consistent evidence that particular (combinations of) negative job characteristics are prospective risk factors for common mental disorders²³ is mirrored by a positive impact of positive job characteristics.

Beddington *et al.*²⁵ have reviewed the Foresight Project on Mental Capital and Wellbeing.²⁶ Mental capital encompasses cognitive and emotional resources and is a key dimension that predicts how an individual contributes to society and experiences a high quality of life. In contrast, mental wellbeing refers to the person's ability to develop their potential, work productively and creatively and to have positive relationships with others. The two concepts are intimately linked, a fact which has contributed to the problems in defining wellbeing. Indeed, the terms 'wellbeing', 'quality of life', 'life satisfaction' and 'welfare' are often used interchangeably. However, it is frequently suggested that wellbeing is a positive physical, social and mental state and not just an absence of pain, discomfort and incapacity.²⁷ Despite the frequent distinction between the presence of positive factors and the absence of negative ones, there is a tendency still to infer one from the other. For example, Waddell & Burton² clearly demonstrate that the absence of work is bad but do not provide much evidence about the positive aspects of different types of work. Similarly, Constable *et al.*²⁸ suggest that there is a good consensus about the characteristics which define 'good jobs' and then cite factors that are largely based on the stress literature (eg demands, discretion and support; effort–reward imbalance). Pickvance²⁹ argues that to achieve wellbeing at work, the same aspects of work that characterise 'good work' have to be addressed. This, again, shows that it is important to address the question of what is a good job, and to do this by examining the work–wellbeing process. Studies of stress at work have shown that it is important to consider job characteristics, perceptions of stress, coping and health outcomes (see Mark & Smith³⁰ for a review of this approach). It is argued here that a similar approach can be used to give an overview of current perspectives on work and its associations with improved health and wellbeing. Following a review of the literature, it was felt that three main themes emerged from this material, and these are described below (see also Wadsworth *et al.*³¹). This is, therefore, not an exhaustive account of the area but an initial integration of research that can form the basis for further work.

2.2 Literature search details

2.2.1 How the literature review was carried out

The following databases were searched between 15 and 25 November 2007:

- Pubmed
- PsychINFO
- EMBASE
- CINAHL
- OTSeeker
- JSTOR
- Google Scholar
- Nioshtic
- ISI Web of Knowledge
- Scopus.

These search terms were used:

(Work* OR Occupat* OR Employ* OR Job) AND (Good* OR Benefi* OR Positiv* OR Improv* OR Quality) AND (Health OR well-be* OR Happ* OR Satis* OR Content* OR safe* OR Culture OR Climate)

Where possible, searches were restricted to the title, English language, publication since 2000, human, adult subjects and review articles.

2.3 Definitions of key terms

The constitution of the World Health Organization defines health as ‘a state of complete physical, mental and social well being and not merely the absence of disease or infirmity’; while wellbeing is defined as ‘the subjective state of being healthy, happy, contented, comfortable and satisfied with one’s quality of life’ and ‘includes physical, material, social, emotional (‘happiness’), and development and activity dimensions’.³² Broadly, these are the definitions used in the context of this review.

In addition to health and wellbeing, safety was originally included in the project title, hence the search terms used. However, in consultation with IOSH, it was subsequently agreed that this term should be removed from the project title, and it is therefore not the focus of the sections below. It should, in fact, be noted that this reflects the relative dearth of literature on positive aspects of work and safety.

2.4 Literature search results

After removing duplicates, 128 articles were found. The titles were scanned by two reviewers. Each reviewer identified articles to be obtained in full if, from their titles, they appeared to be about a positive aspect of work (job characteristic, outcome, measurement, intervention and so on). If this was not clear from the title, the article was also selected. Where the two reviewers disagreed over a title, both reviewed their decision and agreement was reached in discussion with the project management board. In total, 74 articles were selected to be obtained in full.

Of these 74, 11 were not obtained: five were found to be wrongly referenced and/or duplicates (1–5*); three were conference abstracts only (6–8); two were not in English (9, 10); and one could not be obtained by the library (11).

A further six articles (12–17) were identified from those found in the search.

In total, 69 articles were obtained. Of these, 41 were reviewed by two readers and two by one reader (17, 18). The remaining 26 articles were found to be either relevant but focused entirely on negative aspects of work ($n=9$) (19–27), not relevant (ie not about the relationship between work and health and wellbeing at all) ($n=14$) (28–41), or abstracts only ($n=3$) (42–44). It should be noted that very few of the articles actually proved to be reviews. Given the extensive nature of the existing literature and knowledge base on the relationship between negative aspects of work and health and wellbeing, the aim of the literature review was to focus entirely on positive aspects of this relationship, and the search was designed accordingly. It was therefore felt that including any articles such as these which had been identified in error would be wholly unrepresentative of the vast existing literature on this issue and so potentially misleading.

The 43 relevant articles were split into three relevance groups. Again this was done by two reviewers, with any disagreements resolved as described above. An iterative process was used to consider the

* The numbers in brackets refer to the literature review reference list on pages 85–88.

strength of the evidence in each article. Relevance to the research question was the major factor for inclusion, with reviews intended to form the primary material, and with the greatest weight given to systematic reviews. Papers in the most relevant group, therefore, directly addressed a positive aspect of the relationship between work, health and wellbeing and, as either reviews or methodologically strong articles, represented the best evidence. In total, 10 (17, 18, 45–52) were allocated to this group. Those in the moderately relevant group also directly addressed the issue but either were not review articles or were less methodologically strong. Fourteen articles (14, 53–65) were allocated to this group. The remaining 19 articles (12, 13, 15, 16, 66–80) were identified as not directly relevant as they addressed a related but tangential aspect of the relationship between work, health and wellbeing (for example by looking at the promotion of employment for those being treated for particular mental health conditions). All 43 articles in their relevance groups are summarised in Appendix 1. Further summaries focusing on different jobs and work characteristics were not possible because of the relatively small and limited existing literature.

2.5 Issues covered by the review

2.5.1 The concept of a good job

The title ‘What makes a good job?’ covers a number of different areas. The first was concerned with the conceptualisation of the topic. Indeed, the answer to the question ‘What makes a good job?’ depends very much on the context (cultural, physical, political, geographical, social, economic and so on) in which it is asked. Similarly, this question can be interpreted in several ways. For example, it may consider what is perceived from the outside as a good job – perhaps one with a good salary, good career prospects and so on. Alternatively, it may reflect the individual’s perceptions of what, for him or her in his or her current situation, is a good job – perhaps one which suits his or her childcare arrangements. Indeed, others³³ suggest that the focus should be on the family unit rather than the individual. It has also been observed that the same work characteristics can have different effects depending on the context and a range of other factors, so the question should, perhaps, be ‘Under what circumstances does work become beneficial?’

2.5.2 Why is it important to address this question?

There are usually implicit assumptions that a good job is associated with a variety of health outcomes. Indeed, some suggest that the impact of work extends to many other aspects of life. Researchers have found that a good job is an important predictor of life satisfaction in most EU countries.^{34–36} In contrast, others find that no single aspect of the job is important in itself – rather it is the presence or absence of a job that is crucial, since unemployment adversely affects life satisfaction.^{36–38} Other research has examined associations between job satisfaction and life satisfaction using multivariate analysis, and results suggest that neither sociodemographic variables nor those for employment setting (such as occupation, working hours, type of contract) affect subjective life satisfaction to any great extent. Among the most influential predictors of life satisfaction are job security and intrinsic and extrinsic reward.³⁹ Job satisfaction in particular has been found to be related to a number of different outcomes outside the work environment. Job characteristics and work culture can positively or negatively affect work–life balance and overall life satisfaction as well as wellbeing and health. Other research shows that, as well as acknowledging the human benefit of addressing employee wellness, it is important to consider effects on work performance. Much of the evidence reflects performance impairments in those workers who become ‘disengaged’, and less is known about possible positive effects of increasing engagement.

2.5.3 Work, happiness and unhappiness

The literature consulted for this review does not, generally, seem to have an acknowledged philosophical background, grounding or standpoint (compare the extensive literature on models or theories of stress). However, a background is often implicit in what is written (eg any work is better than none; or quality of work, in particular perception of working conditions, is significant in determining level of job satisfaction). One exception that examines such issues within a clear framework is the approach of Warr^{11,40} to happiness at work. The next section outlines the main features of his approach.

In *Work, happiness and unhappiness*,¹¹ Warr deconstructs a number of key concepts to make them more meaningful and measurable. For example, he draws a distinction between two types of happiness: ‘wellbeing’, which relates to feelings, pleasure and excitement, and ‘self-validation’, which looks beyond pleasure to concepts of self-realisation and being true to oneself.

In a separately published summary of the book,⁴⁰ Warr argues that the nature, sources and consequences of workers’ happiness are becoming defined.^{41,42} He makes several recommendations for examining the topic and designing future research:

- consider multiple aspects as there are different aspects of happiness – context-free, domain-specific and facet-specific – which need to be distinguished from each other
- examine a wide range of environmental sources
- look for non-linear patterns as some desirable environmental sources become undesirable at high levels
- look at how such job characteristics should be considered in combination – he suggests that the combined effect of variables may be interactive and not just additive
- explore mental processes as well as environmental features; these influential mental processes can be explored in terms of the judgments made when appraising a situation
- recognise the importance of personal baselines, as people are consistent in their behaviours and mental processes across time and settings
- acknowledge that unhappiness is essential to happiness; in many settings people can only experience happiness in the presence of its opposite; one is dependent on the other.

A key contribution is Warr's 'vitamin analogy', which likens positive work environment features to vitamins: increased vitamin intake is beneficial, but at a certain point greater intake will make no further difference. Most of the literature in this area fails to include personality. Warr is an exception, as are Hochwarter & Kiewitz,⁴³ who suggest that positive affectivity is associated with job satisfaction.

The next section addresses the issue of what the characteristics of good and healthy workplaces and jobs are and what should be measured to address this issue.

2.5.4 What makes a good and healthy workplace or a good and healthy job, and how can this be measured?

The literature review identified studies which suggest that there are key elements that must be in place in an organisation to foster a culture of wellness at work. These included conducive, welcoming and supportive environments that enable staff to form social networks, but more important is the creation of trusting relationships and a sense of control over one's own working practices.⁴⁴ The authors conclude that a job should be much more than simply a way of earning a living. It provides identity, contact and friendship with other people, a way of putting structure in your life and an opportunity to meet goals and contribute.

Grawitch *et al.*⁴⁵ identify five general categories of healthy workplace practices:

- work-life balance
- employee growth and development
- health and safety
- recognition
- employee involvement.

Sauter *et al.*⁴⁶ define a healthy workplace as any organisation that 'maximises the integration of worker goals for wellbeing and company objectives for profitability and productivity'.

Warr^{11,40} suggests a list of 12 key characteristics of any job:

- opportunity for personal control
- opportunity for skill use
- externally generated goals
- variety
- environmental clarity
- contact with others
- availability of money
- physical security
- valued social position
- supportive supervision
- career outlook
- equity.

Other researchers have proposed a similar multifactorial approach, although there is often an emphasis on the absence of negative influences. For example, Hillier *et al.*⁴⁴ suggest that factors that affect wellness in the workplace are many and include, for example, poor working environment (air quality, noise, crowding, lack of personal space), organisational culture and bullying.

A problem with much of the research on work and job characteristics is that it is unclear whether it is the presence of positive characteristics (absence of negative characteristics) that is good, or whether it is the absence of positive characteristics (presence of negative characteristics) that is bad. To address this, it is necessary to conduct analyses that consider dose response and compare the effect sizes of the difference between mid-range categories and the two extremes. In addition, factors seem to be considered in isolation without adjusting for other confounding job characteristics or individual factors that may bias perceptions (positive or negative affectivity).

2.5.5 Improving wellness at work and the characteristics of a good job

Some literature starts from the standpoint of how a job can be improved, such as Hillier *et al.*,⁴⁴ which is a literature review of ways of improving wellness at work with the aim of improving health, absenteeism and performance. This body of work seems to assume implicitly that removing (or the absence of) negative factors is the same as positive factors (though see Warr,^{11,40} who suggests that 'it may be that an absence of the primary environmental characteristics leads to unhappiness, but that their presence beyond a certain level does not further increase happiness'). In contrast, other research starts from the premise that an aspect of 'goodness' (such as job satisfaction) can be measured and that some people's jobs have more of it than others. This seems to assume that some characteristics of work are associated with 'goodness' – though again this can mean the absence of negative factors and/or the presence of positive factors.

2.5.6 Measures of employee wellbeing

Wellbeing has usually been derived from two general perspectives: the hedonic approach, which focuses on happiness and defines wellbeing in terms of pleasure attainment and pain avoidance; and the eudemonic approach, which focuses on meaning and self-realisation and defines wellbeing in terms of the degree to which a person is fully functioning.⁴⁴ However, other approaches use the term 'wellbeing' to cover wide-ranging outcomes (eg general physical health, general mental health, job satisfaction, employee morale, stress, motivation, organisational commitment and climate;⁴⁵ and work-related stress scores, happiness, physical energy level, disability and pessimism level about personal health⁴⁷).

Warr¹¹ makes the distinction between two types of happiness:

1. '**wellbeing**' relates to feelings, pleasure and excitement
2. '**self-validation**', in which 'happiness should not only be viewed in terms of pleasure. It also involves worthwhile activities or a realisation of the self, somehow meeting a standard of fittingness in relation to what one should be.'

He also discusses the relationship between happiness and unhappiness, starting with an acknowledgment that unhappiness is essential to happiness: in many settings people can only experience happiness in the presence of its converse; one is dependent on the other. Similarly, it may be that an absence of the primary environmental characteristics leads to unhappiness, but that their presence beyond a certain level does not further increase happiness. Most people have to struggle through difficult activities of some kind to meet their needs and sustain happiness. This has two implications for work. Firstly, there is a need to obtain a better understanding of the sources and nature of ambivalence. Secondly, it is unrealistic to divorce experiences of happiness from task-orientated activities in a role. Rather than restricting attention to either happiness or performance on its own, the two should be studied simultaneously.

A wide range of factors have been considered when measuring wellbeing at work. Wellbeing and job satisfaction (see the next section) often overlap, with job satisfaction being used as a measure of a good job and employee wellbeing. Differences between the studies in the use of terms, and the measurement of them, often make it impossible to make any realistic comparisons and draw any firm conclusions. Distinctions also need to be made between mental health, wellbeing and happiness, and it is often unclear whether these are used as outcomes or mediating factors.

2.5.7 Job satisfaction

Job satisfaction is often described as a key concept relating to wellbeing at work. Rose⁴⁷ reviews evidence showing that job satisfaction is related to staff turnover,^{48,49} absenteeism and lateness,^{50,51} trade union involvement,⁵² levels of stress at the individual level,⁵³ satisfaction with life in general⁵⁴ and longevity,⁵⁵ as well as with gender,^{56,57} general employee wellbeing⁵⁸ and employee commitment.⁵⁹

Job satisfaction has been measured in a number of different ways. In some studies (see Krueger *et al.*⁶⁰ for a review) job satisfaction was measured using a single item – 'Overall, how satisfied are you with

your job?’ – with responses being split into a dichotomous variable – ‘satisfied’ (covering ‘very satisfied’ and ‘satisfied’) or ‘not satisfied’ (covering ‘not sure’, ‘dissatisfied’ and ‘very dissatisfied’). In contrast, the Work Psychology Unit (WPU) argues that a 15-item composite measure of job satisfaction produces a more reliable and valid summary score than a single item. A four-item composite (total pay, job security, the work itself and hours worked), which was developed later, has shown high levels of correlation with the 15-item version, and this has been used in recent studies.⁴⁷

Other studies argue that many dimensions need to be assessed. For example, Krueger *et al.*⁶⁰ found 12 principal factors were associated with job satisfaction. These were:

- belief the organisation carries out its mission statement
- good communication
- being asked infrequently to do excessive amounts of work
- good decision latitude
- being satisfied with pay level
- being satisfied with recognition by the organisation of employee contributions
- being female
- good role clarity
- being satisfied that the organisation keeps the employee informed
- good teamwork
- being given enough time to get the job done
- good organisation–staff relations.

Their measure of job satisfaction also included:

- good decision authority
- satisfaction with patient or resident care
- good social support from supervisors
- hours per week spent on job-related activities
- job classification
- support by the organisation for training and development.

Job satisfaction has also been found to be strongly associated with reward. Overall, people who perceive their work as being both intrinsically and extrinsically rewarding have higher levels of job satisfaction than those who do not. In a study by Wallace *et al.*,³⁹ intrinsic rewards positively influenced job satisfaction in Western Europe to a greater extent than extrinsic rewards. In their model, having an interesting job, financial rewards and career opportunities were associated with people feeling more satisfied with their work. The strongest influence was having an interesting job (coefficient of 0.29). The analyses conclude that quality of work, whether in the form of employment setting or perceived working conditions, plays a significant role in determining levels of job satisfaction. Generally, perceptions of working conditions are the most influential. Other research uses other factors as proxy measures of reward. For example, several studies use intention to leave one’s current employment as a measure of job dissatisfaction without really investigating reasons for this intention (which may be, for example, career progression rather than dissatisfaction).

Rose⁴⁷ also suggests that job satisfaction should also cover extrinsic factors, such as employment contract, skill and finance, and thus be distinct from work satisfaction, which is related to intrinsic factors, such as employee involvement, empowerment and self-actualisation. Rose⁴⁷ found that job satisfaction appears to be influenced by five different factors:

- the terms and conditions of the employment contract
- hours of work
- financial rewards
- the work situation
- employees’ work orientations and career aims.

There was little evidence that variables bearing on the socio-psychological environment of a job exert the primary influence on job satisfaction scores. It was also argued that job satisfaction is complex, usually measured by satisfaction with a range of aspects of the job – such as with rewards or working hours. In conclusion, it is clear that job satisfaction is a multidimensional construct. However, it is not possible to know which definition people are using when completing the questionnaire. It therefore seems important to measure a range of constructs and other factors which are likely to be

associated with job satisfaction. This research suggests that this is an ideal area to examine combined effects. In addition, while there are some commonalities, some predictors of job satisfaction seem to be organisation- and context-specific⁶⁰ and, although multi-factorial approaches examine many aspects, they do not consider them in combination. Warr¹¹ also discusses how job characteristics should be considered in combination and he suggests that the combined effect of variables may be interactive and not just additive.

2.5.8 Problems with the concepts of job satisfaction and happiness

The term 'satisfaction' is related semantically to the word 'satisfactory', which implies that things are as good as they can be while not being exceptionally outstanding. If someone said that they were 'satisfied' after a meal, it would imply that they were as full as they would like or expect to be. Job satisfaction might therefore be interpreted as having a job which is acceptable, but in the literature a more positive interpretation is normally implied. Where job satisfaction is used to imply happiness, confusion can therefore arise. The term 'satisfaction' in itself embodies a relational disposition between expectation and outcome. Happiness is a simpler, single directional construct. One may not feel a definite state of happiness at work, but at the same time the fact that one is earning a living may make one very satisfied. Considering these two terms as interchangeable therefore has the potential to cause a great deal of confusion.

Where job satisfaction is used as an outcome variable, the danger is that only half of the picture is considered. The research reviewed is all focused on what people actually experience but this is never compared with what they expect to experience, which ties into a wider social and cultural context. If people accept and expect their job to be hard work (eg miners), then they may be entirely satisfied in conditions which other workers would simply not accept. Without tackling the essential definition of 'job satisfaction', it is therefore perhaps unsurprising that most of the studies fail to develop this topic.

Other areas of research may also fail to reflect what actually occurs. For example, the title of Warr's⁴⁰ article, 'Searching for happiness at work', may also be misleading. Do people search for happiness at work? Most likely not. It is more probable that they search for a working situation which is as good as it can be when all things are considered. And it's the 'all things considered' which have been frequently overlooked in the papers reviewed for this study.

2.5.9 Quality of working life

The literature review shows that quality of working life is a multi-dimensional concept. When considering quality of working life, it is necessary to consider features such as policies and procedures, leadership style, operations, and other general contextual factors of the setting. Research needs to consider a range of job characteristics and staff perceptions.⁶⁰ Studies investigating quality of working life have used a variety of different measures. For example, Wallace *et al.*³⁹ used three dimensions: working conditions, overall satisfaction with work, and perceptions of work-life balance. Other research⁶¹ has used the World Health Organization Quality of Life questionnaire (brief version), which has four dimensions: physical health (eg pain, energy, sleep and mobility), psychological wellbeing (eg positive feelings, self-esteem and body image), social relationships (eg personal relations, sex and social support) and the environment (eg physical safety, transport, home environment and access to health and social care). These measures of quality of working life often include both risk factors that may lead to impairments, and outcome measures. The variation in measures across studies makes it difficult to provide an integrated overview of the area. The implicit assumption is often that profitable, productive workplaces are those in which attention is given to the quality of life of employees while they are at work.⁴⁴ Evaluations of this are, however, generally lacking, as is the specific form that possible interventions might take.

2.5.10 Mediating and moderating effects

Research suggests that the link between potentially beneficial workplace practices and employee and organisational outcomes is contingent on the effectiveness of communication in the organisation and the alignment of the practices with the organisational context. Results suggest a direct pathway from healthy workplace practices to organisational improvements and also an indirect pathway from healthy workplace practices to organisational improvements through employee wellbeing.⁴⁵ Other analyses have shown that the relationship between working conditions and life satisfaction is strongly mediated by job satisfaction. Working conditions influence job satisfaction, which in turn influences life satisfaction.³⁹ However, job satisfaction is a complex concept and, while it is assumed that having a good job leads to job satisfaction, this is not necessarily the case. People can be satisfied with their jobs because they have views other than those merely related to the content of the work itself. Various external components can also compensate for the lack of job quality.³⁹

2.5.11 Other observations during the review process

One strong impression from the literature is that it tends to be focused on specific issues and often ignores factors that may be crucial in the bigger picture (eg the fact that, in Western Europe and the US at least, most people have chosen the jobs they are in is largely ignored). The overriding impression from the literature is that, however ‘goodness’ is measured, it is multifactorial.⁶⁰ It is, therefore, virtually impossible to measure everything that may be important, and most of the work acknowledges some of its own gaps. However, very few, if any, studies look at the combined effects of different factors or control for possible confounding influences. Quite often, single outcome measures have been used in these papers, such as job satisfaction, quality of work life and so on (though see Krueger *et al.*⁶⁰ and Grawitch *et al.*,⁴⁵ which use and compare more than one measure). It is often not clear whether any one of these measures is more appropriate or meaningful than any other.

Although issues of reward do come up, the concept of work as essential to having enough resources to participate in (Western European) society at a basic level, eg access to decent housing (as opposed to social standing on the basis of job title), is not really touched on (except by Waddell & Burton²). This comes back to the issue of working *per se* being better than not working (so here things like the level of the minimum wage and problems with loss of benefits are important), and the question of what makes one job ‘better’ than another once someone is working and earning enough to participate in society. Indeed, using Warr’s¹¹ terminology, it is possible to suggest that a large part of the negative effects of unemployment reflect poor self-validation rather than low happiness.

Certain themes or characteristics associated with job satisfaction and/or wellbeing and/or quality of work life do come up more than once:

- good organisation–employee communication^{45,60,62}
- decision latitude, autonomy and control^{11,60,62–64}
- low stress^{45,47,62}
- working hours – particularly distribution and pattern^{33,47}
- recognition and fairness^{11,60,62}
- social support.^{11,63}

None of the work looks at job characteristics and ‘goodness’ from a ‘dose–response’ perspective (though see Warr¹¹ for the necessity of adopting such an approach).

Perhaps not surprisingly, organisational improvements receive more attention than employee wellbeing. There is some evidence that there is a bidirectional relationship between them; organisational improvements may lead to a better working environment, and in addition a happier workforce may work more efficiently and thus improve the performance of the organisation.

Many papers focus on one occupational group only, making generalisations difficult, but they are often supportive of general themes which emerge.^{63,64} Similarly, there is little attempt to examine these issues at different stages of a person’s career – looking back at a career may give a different perspective than that produced by most of the published research, which focuses on people’s perceptions of their current job.

There are a number of covariates which need to be considered in studies of this type:

- earnings
- job demands
- gender
- job conditions
- job flexibility
- how good a fit work hours are with personal commitments
- flexibility of work hours
- reasons for working a given schedule.

Most research focuses on the individual, but most employees live in dyads. Therefore, the couple should be the unit of analysis. In addition, most studies consider only direct effects and ignore possible moderating or mediating effects.³³

There are several factors which have been identified in the studies reviewed here (and in other studies) showing associations between demographics and individual differences and health outcomes. It is,

therefore, crucial that any research should try to control for the effects of these variables or at least adjust for their effects. The papers reviewed provided little evidence that appropriate adjustment of confounding effects had been carried out.

2.6 Positive affect literature

There is also a large body of literature describing the well-established associations between negative psychological states and psychosocial factors, and mortality and health outcomes.^{15,16} More recently, however, research has focused on the association between positive psychological states, such as positive affect and happiness, and health.¹⁸ This area was not covered by the formal literature review, but is described briefly below.

In the short term, positive affect has been associated with lower salivary cortisol, heart rate, fibrinogen stress responses⁶⁵ and blood pressure,⁶⁶ as well as other potentially protective biological responses.⁶⁷⁻⁷¹ In the longer term, positive affect has been shown to predict disability, stroke and mortality.⁷²⁻⁷⁴

There is also some evidence that positive affect is associated with the psychosocial factors already shown to have well-established links with health and mortality. Social support and larger social networks, for example, have been associated with improved health and wellbeing,^{75,76} and recent work has shown strong associations between positive affect and social connectedness and satisfaction with social relationships.⁷⁷⁻⁸¹ Similarly, there is clear evidence of a relationship between socio-economic status and mortality and illness.^{82,83} In this case, though, the results of work considering positive affect and socio-economic status have been mixed,^{65,77,84,85} with some studies suggesting an association and others finding none.

Much of the research into negative factors has been carried out in an occupational setting, often with occupational as well as health outcomes.¹⁷ To date, however, relatively little of the positive affect research has been carried out in an occupational setting and/or using occupational outcomes. Research considering positive affect and factors such as stress and coping, for example, has tended to focus instead on the role of positive affect in personal resilience in relation to health outcomes.⁸⁵⁻⁸⁸

Furthermore, with the exception of some longitudinal studies,⁷²⁻⁷⁴ relatively little of the positive affect research controls for negative affect. This is an important omission, making it impossible to tell whether associations between positive affect and morbidity and mortality are in fact simply reflections of the well-established associations between negative psychological states and psychosocial factors and illness. However, if positive affect is associated with health independently of negative affect, then this work would add explanatory power to our existing understanding of the relationships between psychological states and mental and physical wellbeing. Very recent research is beginning to address this area. Burgdorf & Panskepp⁸⁹ have shown distinct neurobiological substrates for positive and negative affect. In addition, Steptoe *et al.*,⁹⁰ hypothesising that positive affect is protective because it is part of a larger cluster of favourable psychosocial attributes, have considered associations between positive affect and a range of factors while controlling for negative affect, and *vice versa*.

2.7 Discussion

Many of the articles in this area identify key factors associated with a 'good' job or workplace and/or present measures of (work-related) wellbeing. The emphasis of both these strands of work is often on the multifactorial or multifaceted nature of both wellbeing and positive job characteristics. The overriding impression obtained from this material is that, however 'goodness' is measured, it is multifactorial. However, the present authors also felt that much of the work actually focuses on specific issues and often ignores factors that may be crucial in the bigger picture. It is, of course, virtually impossible to measure everything that may be important, and most of the work acknowledges some of its own gaps. However, very few studies look at the combined effects of different factors. Quite often single outcome measures, such as job satisfaction, quality of work life and so on, have been used, and it is often not clear whether any one of these measures is more appropriate or meaningful than any other.

Although issues of reward do come up, the concept of work as being essential to having enough resources to participate in (Western European) society is not really touched on. This comes back to the issue of working being per se better than not working (and so here things like minimum wage and loss of benefits are important); only once working *and* earning enough to participate in society does one ask what makes one job 'better' than another. Indeed, using Warr's¹ terminology, it is possible to

suggest that a large part of the negative effects of unemployment reflect poor self-validation rather than low happiness.

Certain themes or characteristics associated with job satisfaction and/or wellbeing and/or quality of work life do come up quite frequently but none of the research looks at job characteristics and 'goodness' from a 'dose-response' perspective. Such an approach would also address the issue of whether the absence of negative job characteristics is equivalent to the presence of positive ones. Many papers focus on one occupational group only, making generalisations difficult, but they are often supportive of general themes which emerge. Similarly, there is little attempt to examine these issues at different stages of a person's career; looking back at a career may give a different perspective from that produced by most of the published research, which focuses on perceptions of someone's current job. There are a number of covariates which need to be considered in studies of this type. Most research focuses on the individual but most employees do not live alone, so perhaps the household or family should be the unit of analysis. In addition, most only consider direct effects and ignore possible moderating or mediating effects.

Similarly, there are several factors which have been identified in the studies reviewed here (and in other studies) showing associations between demographics and individual differences and health outcomes. It is, therefore, crucial that any research should try to control for the effects of these variables or at least adjust for their effects. The papers reviewed provided little evidence that appropriate adjustment of confounding effects had been carried out. Most of the literature in this area, for example, fails to include personality. In addition, factors seem to be considered in isolation without adjusting for other confounding job characteristics or individual factors that may bias perceptions (positive/negative affectivity).

Job satisfaction may be interpreted as having a job which is 'acceptable', but in the literature, a more positive interpretation is normally implied. Where job satisfaction is used to imply happiness, confusion can therefore arise. The term 'satisfaction' in itself embodies a relational disposition between expectation and outcome. Job satisfaction is a complex concept and, while it is assumed that having a good job leads to job satisfaction, this is not necessarily the case. People can be satisfied with their jobs because they have views other than those merely related to the content of the work itself. Various external components can also compensate for the lack of job quality. Happiness is a simpler, single directional construct. One might not feel as if one is in a definite state of happiness at work, but at the same time the fact that one is earning a living may make one very satisfied. Considering these two terms as interchangeable therefore has the potential to cause a great deal of confusion. Where job satisfaction is used as an outcome variable, the danger is that only half the picture is considered. The research reviewed is all focused on what people actually experience, but this is never compared with what they expect to experience, which ties into a wider social and cultural context. If people accept and expect their job to be hard work, then they may be entirely satisfied in conditions which other workers would simply not accept. Without tackling the essential definition of 'job satisfaction', it is therefore perhaps unsurprising that most of the studies fail to develop this topic.

Other areas of research may also fail to reflect what actually occurs. Relatively little of the work has a clear philosophical background or grounding, and much of it fails to consider the wide range of other potentially influential factors. In this respect at least, there are similarities with the also relatively new area of positive affect, in which, with the exception of some longitudinal studies, there is relatively little control for negative affect. This makes it impossible to tell whether associations between positive affect and morbidity and mortality are in fact simply reflections of the well-established associations between negative psychological states and psychosocial factors and illness. However, if positive affect is associated with health independently of negative affect, then this work would add explanatory power to our existing understanding of the relationships between psychological states and mental and physical wellbeing. Most of the literature reviewed has been concerned with subjective reports of health outcomes. Further research must examine objectively confirmed health and safety outcomes. However, it is now apparent that reduced wellbeing, as indicated by mental health problems, is a major risk factor for chronic disease and any effects of the job and workplace on wellbeing are likely to lead to a greater risk of subsequent health problems.

2.8 Conclusions

Despite its current limitations, the concept of a 'good' job clearly has the potential to make as influential a contribution as its negative counterpart. At present, however, our understanding of what makes a good job, and how we should conceptualise, study, and help workplaces provide it, is incomplete.

The next section describes secondary analyses of existing databases that were carried out to address the issues of the presence or absence of positive *vs* negative job characteristics, appraisals and outcomes.

3 Secondary analyses

3.1 Background to the secondary analyses

In the last two to three decades there has been a large body of research on work characteristics and their association with both negative job outcomes, such as stress and dissatisfaction, and with physical and mental ill health.^{3,12,13} However, more recently, there has been a growing awareness and acknowledgment that unemployment is harmful to physical and mental health, and that work is beneficial and may be an effective way to improve health and wellbeing.²

The literature review of the existing research considering work and health and wellbeing identified several gaps in the existing literature. In particular, previous research has often failed to distinguish between the absence of negative effects and the presence of positive ones, has largely involved cross-sectional studies, and has rarely controlled for other potentially influential factors (such as job and individual characteristics). These conclusions from the literature review, identifying gaps in knowledge, contributed to the development of the secondary analyses, during which it was possible to give some preliminary consideration to presence or absence of negative and positive effects and changes over time. In both cases, other potentially influential factors were included in the analyses.

3.2 Presence or absence

A significant proportion of the existing literature focuses on how work can be improved.⁴⁴ The implicit assumption behind some of this work seems to be that the absence or removal of negative factors is the same as the presence or addition of positive factors. Warr's work^{11,40} is a notable exception to this, suggesting that 'an absence of the primary environmental characteristics leads to unhappiness, but [that] their presence beyond a certain level does not further increase happiness'. Similarly, another significant body of work considers that a job's 'goodness' is multifactorial,⁶⁰ and that various aspects of this goodness (such as job satisfaction) can be measured,⁴⁵ with some jobs having more of it than others. Here the implicit assumption seems to be that some work characteristics are associated with 'goodness'. However, again, this can mean the absence of negative factors and/or the presence of positive factors.

From the existing literature, it was not possible to determine whether the absence of negative work factors is in fact the same as the presence of positive ones. So, a set of secondary analyses of existing datasets was planned to consider this issue. Specifically, the analyses were designed to assess whether associations between a range of dependent (or outcome) and independent (or predictor) variables represented the presence or absence of the independent (predictor) variable. For example, does an association between anxiety and job demand reflect:

- high job demand associated with high anxiety?
- low job demand associated with low anxiety?
- both of these?

3.3 Changes over time

A corollary of the assumption that particular work characteristics are associated with particular work outcomes is that changes in those characteristics should produce corresponding changes in those outcomes. Most of the work in this area, however, is cross-sectional⁶⁰ and so it is not able to consider changes over time. This also means that very little of the existing work is able to look at causation or underlying mechanisms. During the Bristol Stress and Health Study,³ however, a group of respondents were followed up about a year after the original survey. A second set of secondary analyses was therefore planned using this dataset. These analyses were designed to assess whether changes in the independent variables between the two time points were associated with corresponding changes in the dependent variables.

3.4 Other influences

It is also clear from many studies^{3,5,91,92} that a wide range of other demographic and occupational characteristics also influence wellbeing and health. It was therefore important that all the secondary analyses controlled for these potentially confounding factors, so that independent associations between the variables of interest could be considered. This methodological feature is especially important when considering samples that are not necessarily representative of the general working population.

3.5 Methods

3.5.1 Presence or absence

Datasets

Most of the analyses were carried out in the combined dataset of the Bristol and Cardiff Community Studies,^{3,91,92} which comprised 8,755 workers. Additional analyses were carried out in the Culture, Advice and Performance study dataset⁹³ (2,246 workers) and the Nursing Study dataset¹ (870 workers). Detailed information on these samples are given in the original articles.

Variables of interest

The variables of interest for the analyses focusing on presence or absence included both positive and negative dependent (or outcome) variables and independent (or predictor) variables.

Negative dependent variables covered mental health (anxiety, depression and psychological distress), physical health (general health in the last year and work-related illness) and work (stress, dissatisfaction and not enjoying the job). Positive dependent variables covered work only (satisfaction and enjoying the job).

Similarly, negative independent variables covered job characteristics (job demand, extrinsic effort and intrinsic effort) and job perceptions (stress), while positive independent variables covered job characteristics (social support, control and reward). In addition, other independent variables included

Table 1
Independent (or predictor) variables used in the presence or absence analyses

Variable	Description	Mean	SD	Min	Max
Negative – job characteristics					
Job demand	Job Content Questionnaire, score 0–100, high score = high demand	55.75	23.10	0	100
Extrinsic effort	Effort–Reward Imbalance, score 0–100, high score = high effort	21.99	20.51	0	100
Intrinsic effort	Effort–Reward Imbalance, score 0–100, high score = high effort	45.44	21.66	0	100
Negative – job perceptions					
Perceived stress	Single item, five points scored 0 (not at all) to 4 (extremely stressful)	1.75	0.93	0	4
Positive – job characteristics					
Social support	Job Content Questionnaire, score 0–100, high score = high support	64.93	26.34	0	100
Control	Job Content Questionnaire, score 0–100, high score = high control	58.94	19.50	0	100
Reward	Effort–Reward Imbalance, score 0–100, high score = low reward	14.21	17.48	0	100
Other – coping					
Positive attribution style*	Attributional style questionnaire, score 1–7, high score = high positive attributional style	4.85	0.70	2	7
Negative attribution style*	Attributional style questionnaire, score 1–7, high score = high negative attributional style	3.99	0.69	1.5	7
Problem-focused coping*	Ways of Coping Checklist, score 0–3, high score = high problem-focused coping	1.16	0.33	0	2.5
Emotion-focused coping*	Ways of Coping Checklist, score 0–3, high score = high emotion-focused coping	1.01	0.40	0	2.5

* Variables in Nurses study only

measures of coping. All the independent variables except perceived stress were used in two forms: tertiles and quintiles. Perceived stress was used in its original (five-point) form, and was categorised into three groups: not at all and mildly stressful; moderately stressful; very and extremely stressful. Categorising the variables in this way made it possible to compare those with low or high levels of a particular measure, such as job demand, with those in the middle.

All the variables of interest are defined and summarised in detail in Tables 1 and 2.

Analyses

Analyses focused first on considering associations between negative dependent and independent factors, next on associations between positive dependent and independent factors, and finally on other combinations of positive, negative and other factors.

Variable	Description	Score				Above cut-point	
		Mean	SD	Min	Max	<i>n</i>	%
Negative – mental health							
Anxiety	HADS, score 0–21, clinical cut-point 11 or more	6.84	4.01	0	21	1576	18
Depression	HADS, score 0–21, clinical cut-point 11 or more	3.73	3.18	0	21	310	4
Psychological distress	GHQ, score 0–12, clinical cut-point 5 or more	2.73	3.45	0	12	2128	25
Negative – physical health							
General health in the last year	Single five-point item scored 0 (very good) to 4 (very bad), cut-point 3 or more (bad or very bad)	0.96	0.82	0	4	330	4
Work-related illness	Single item dichotomy, illness caused or made worse by work in the last year	n/a				1714	20
Negative – job outcomes							
Negative job satisfaction	Seven four-point items scored 0 (very satisfied) to 3 (very dissatisfied), each recoded so 1 indicated dissatisfied or very dissatisfied, summed. Cut-point dissatisfied on 4 or more items	1.78	1.86	0	7	1661	19
Negative job enjoyment*	Single five-point item scored 1 (really don't enjoy) to 5 (really do enjoy), cut-point 2 or less (don't or really don't)	3.68	1.15	1	5	341	16
Perceived stress	Single five-point item scored 0 (not at all) to 4 (extremely stressful), cut-point 3 or more (very or extremely)	1.75	0.93	0	4	1669	19
Positive – job outcomes							
Positive job satisfaction	Seven four-point items scored 0 (very satisfied) to 3 (very dissatisfied), each recoded so 1 indicated satisfied or very satisfied, summed. Cut-point satisfied on 7 items	5.09	1.89	0	7	2665	31
Positive job enjoyment*	Single five-point item scored 1 (really don't enjoy) to 5 (really do enjoy), cut-point 4 or more (do or really do)	3.68	1.15	1	5	1377	62

Table 2
Dependent (or outcome) variables used in the presence or absence analyses

* Variables in Culture, Advice and Performance study only.

Logistic regression analyses were used to consider the association between the dependent and independent variables of interest. These were carried out in two stages. First, univariate associations between the dependent and independent variables were assessed; and second, these analyses were repeated including demographic (sex, age, marital status, education and income), occupational (social class, full-time or part-time) and job characteristics (all other positive and negative job characteristics). This allowed the association between the dependent and independent variables of interest to be considered independently of these potentially confounding factors. Only the results of the second stage analyses are presented here.

3.5.2 Changes over time

Analyses were carried out among the 1,790 workers who completed the Bristol Stress and Health Study³ questionnaires at times 1 and 2.

Variables of interest

The analyses presented in this report focused on the association between one independent variable (extrinsic effort, ie situational factors which make work more demanding) and one dependent variable (psychological distress). Again, these variables are summarised and defined in Appendix 2 (Table 26). This is used as an example set of analyses. Similar models were run for other associations and the pattern of results was very similar.

Analyses

Spearman's rho was used to consider correlations between measures of extrinsic effort and psychological distress at times 1 and 2, and paired sample t-tests were used to assess changes in extrinsic effort and psychological distress scores over time. Logistic regression analyses were used to consider the association between changes in extrinsic effort and changes in psychological distress between the two time points. These analyses were carried out in two stages. First, associations between the dependent and independent variables were assessed using models which also including demographic (sex, age, marital status, education and income), occupational (social class, full-time or part-time) and job characteristics (all other positive and negative job characteristics). Second, these models were repeated including the extrinsic effort score from time 1. This allowed consideration of the effect of the baseline measure of extrinsic effort. The results of both stages are presented below.

3.6 Results

3.6.1 Presence or absence – summary

Negative dependent and independent variables

Of the 28 associations between a negative dependent (outcome) and a negative independent (predictor) variable, six (21 per cent) were not significant after controlling for the potentially confounding factors. The remaining analyses fell into two distinct categories:

- dose–response association: $n = 12$ (55 per cent, or 43 per cent of all 28 associations considered) – this implies a comparable impact for both the presence and absence of the independent variable
- presence effect: $n = 10$ (45 per cent, or 36 per cent of all 28 associations considered) – this implies a significantly greater impact for the presence (rather than the absence) of the independent variable.

Positive dependent and independent variables

Only six associations were between a positive dependent and a positive independent variable. All were significant after controlling for the potentially confounding factors:

- dose–response: $n = 4$ (67 per cent)
- presence: $n = 1$ (17 per cent)
- absence: $n = 1$ (17 per cent) – this implies a significantly greater impact for the absence (rather than the presence) of the independent variable.

Other combinations of dependent and independent variables

The remaining 46 associations were between other combinations of variables:

- negative dependent variables and positive independent variables: $n = 24$ (5 no association; 17 dose–response; 2 presence)

- negative dependent variables and other independent variables: $n = 16$ (10 no association; 5 dose-response; 1 other)
- positive dependent variables and negative independent variables: $n = 6$ (5 no association; 1 presence).

The complete set of analyses is summarised in Appendix 2 (Table 27). Detailed examples of the associations between negative dependent and independent variables, and between positive dependent and independent variables, are presented below. Analyses from other combinations of dependent and independent variables are detailed in Appendix 2.

3.6.2 Examples: negative dependent and independent variables

No association

An example of no significant association after controlling for the potentially confounding factors is job demand and clinical anxiety. At the univariate level (ie before controlling for the effect of the potentially confounding factors), job demand was strongly associated with clinical anxiety: those with high levels of job demand (in the top third) were over one and a half times as likely as those with moderate levels of job demand (in the middle third) to meet the clinical cut-off point for anxiety; while those with low levels of job demand (in the bottom third) were about two-thirds as likely as those with moderate levels of job demand to meet this clinical cut-off point ($p < 0.0001$). However, there was no significant difference between these three groups after controlling for the effect of the potentially confounding factors, suggesting that the association between job demand and anxiety was explained by these other factors. These analyses are shown in Appendix 2 (Table 28).

Similar results were found for depression and job demand; psychological distress and job demand; negative job satisfaction and both extrinsic and intrinsic effort; and negative job enjoyment and job demand.

Dose-response

The analyses for stress and depression show a clear example of a dose-response relationship. After controlling for the potentially confounding factors, stress was strongly independently associated with depression ($p = 0.004$). In fact, those in the high stress group were almost half as likely again as those in the middle group to meet the clinical cut-off point for depression, while those in the middle group were about half as likely again as those in the low stress group to meet this clinical cut-off point. This suggests that the likelihood of being depressed is greater as the level of stress increases. Comparison of the sizes of the presence and absence effects (that is comparisons between the effect sizes for high stress (ie the presence of stress) and for low stress (ie the absence of stress)) showed that they were equal, indicating a dose-response relationship. This is illustrated in Figure 1, which shows clear, equal-sized 'steps' in the increase in likelihood of clinical depression associated with low, middle, and high stress. The differences between the presence of stress (shown in pale grey) and the absence of stress (shown in dark grey) and the middle (shown in black) are equal. (These analyses are described and presented in full in Appendix 2, Tables 29 and 30).

A similar pattern of results was found for most of the analyses, including:

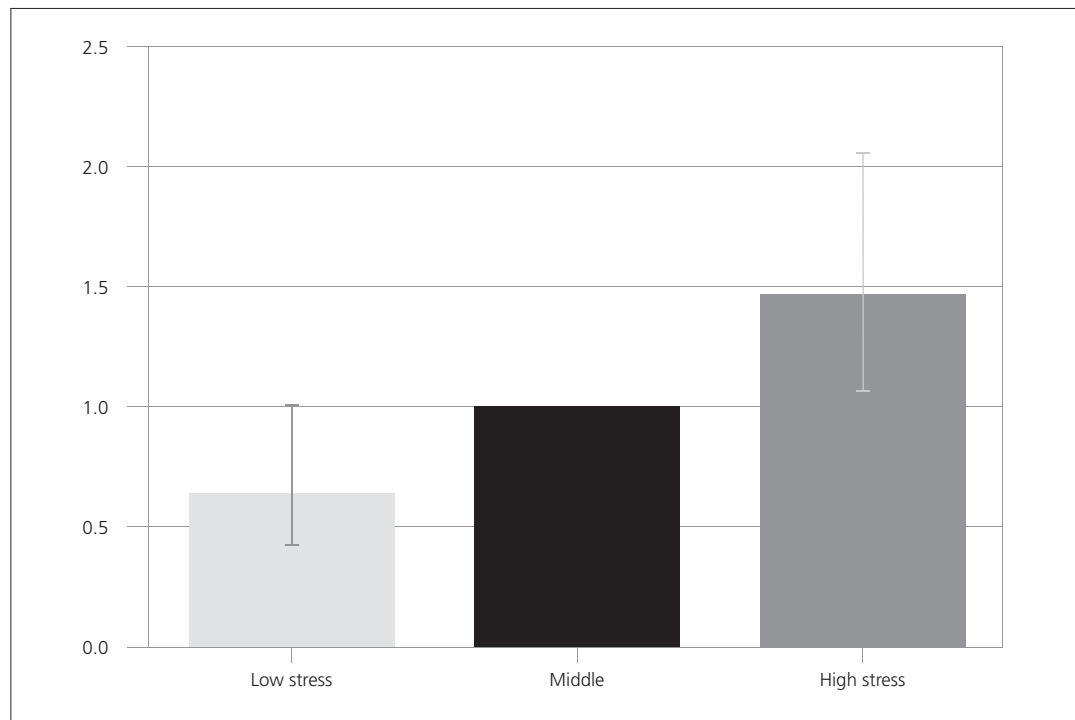
- depression and intrinsic effort
- psychological distress and extrinsic effort
- general health and intrinsic effort
- work-related illness and job demand, extrinsic effort and intrinsic effort
- negative job satisfaction and stress
- negative job enjoyment and both intrinsic and extrinsic effort
- stress and both extrinsic and intrinsic effort (see Appendix 2).

These analyses suggest that a little under half of the significant associations between negative dependent and independent factors reflected both a presence and an absence effect.

Presence effect

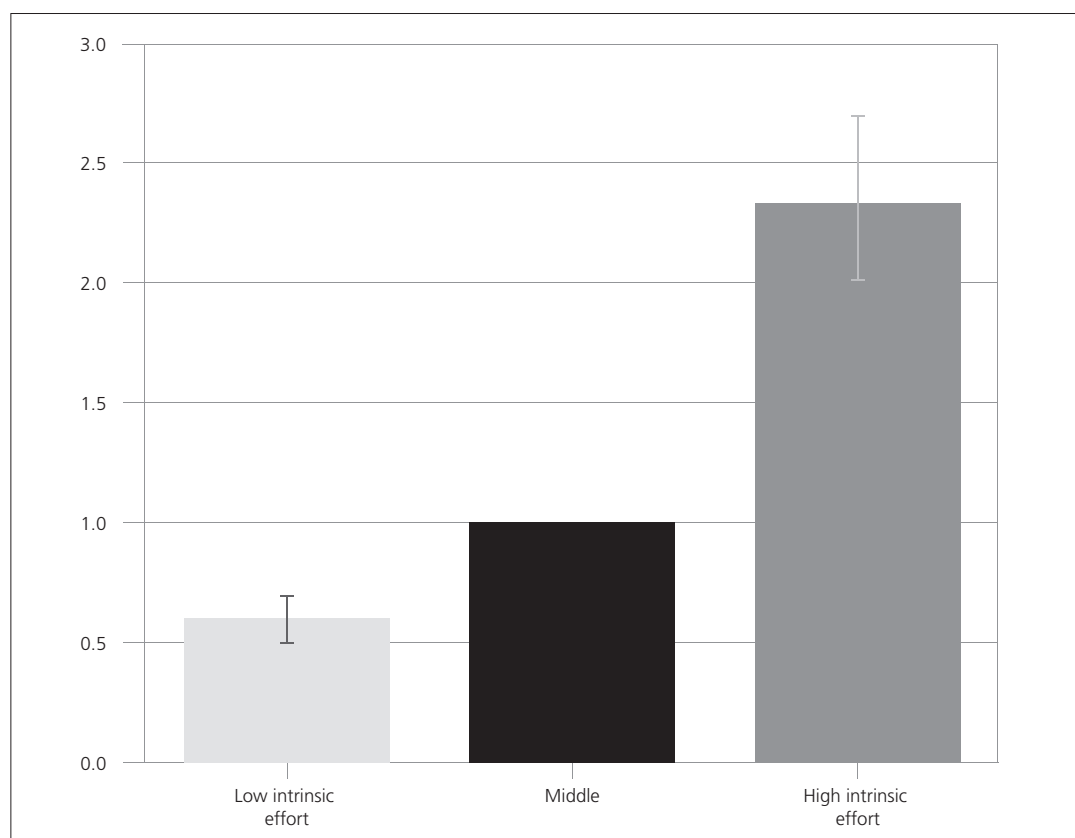
The association between intrinsic effort (personal factors such as motivation and commitment to work) and psychological distress is presented as an example of a presence effect. Again, the analyses showed a strong independent association between intrinsic effort and psychological distress ($p < 0.0001$). In this case, however, comparing the effects of high (presence of) and low (absence of) intrinsic effort showed that those in the high intrinsic effort group were over twice as likely as those

Figure 1
Example of a
dose-response
association: stress
and depression



in the middle group to be distressed, while those in the middle group were about two-thirds as likely again as those in the low intrinsic effort group to be distressed. The presence effect size was significantly greater than the absence effect size ($p=0.01$). This is illustrated in Figure 2, with the analyses presented in Appendix 2 (Tables 31 and 32). Here, therefore, the presence effect (ie the difference between dark grey and black) is larger than the absence effect (ie the difference between pale grey and black).

Figure 2
Example of a
presence effect:
intrinsic effort and
psychological
distress



A similar pattern of results was found for:

- anxiety and extrinsic effort, intrinsic effort and stress
- depression and extrinsic effort
- psychological distress and stress
- general health and both job demand and extrinsic effort
- negative job satisfaction and job demand
- stress and job demand (see Appendix 2).

Half of the presence effect results were similar to the example, in that they showed a significant difference between the middle and both low (absence) and high (presence) levels, with the presence effect being significantly greater than the absence effect. However, in some cases the presence effect reflected no significant difference between the middle and low (absence) levels. These included job demand and both stress and negative job satisfaction; and extrinsic effort and anxiety (see Appendix 2, Table 33), depression and general health.

These analyses suggest that a little over half of the associations between negative dependent and independent variables reflected a presence effect. In addition, these split about equally into two groups: those where the presence effect was greater than the (also significant) absence effect; and those where the presence effect was significant and the absence effect was not.

3.6.3 Positive dependent and independent variables

Dose-response

Most of the associations between positive dependent and independent variables followed the dose-response type pattern described above. Such associations were found between positive job enjoyment and both social support and reward; and between positive job satisfaction and control (see Appendix 2).

Presence effect

The only presence effect found between positive dependent and independent variables was between positive job satisfaction and reward.

Absence effect

The only association which showed an absence effect was that between positive job satisfaction and social support. Again, the analyses showed a strong independent association between positive job satisfaction and social support ($p < 0.0001$). Comparing high and low social support (in quintiles) showed that those in the very high social support group were over twice as likely as those in the middle group to report positive job satisfaction, but that those in the middle group were just over three and a half times as likely as those in the very low social support group to report positive job satisfaction. The effect of the absence of social support, therefore, was greater than the effect of the presence of social support ($p < 0.02$). This is illustrated in Figure 3, and shown in Appendix 2 (Tables 34 and 35), where the absence effect (ie the difference between palest and medium grey) is greatest.

3.6.4 Changes over time

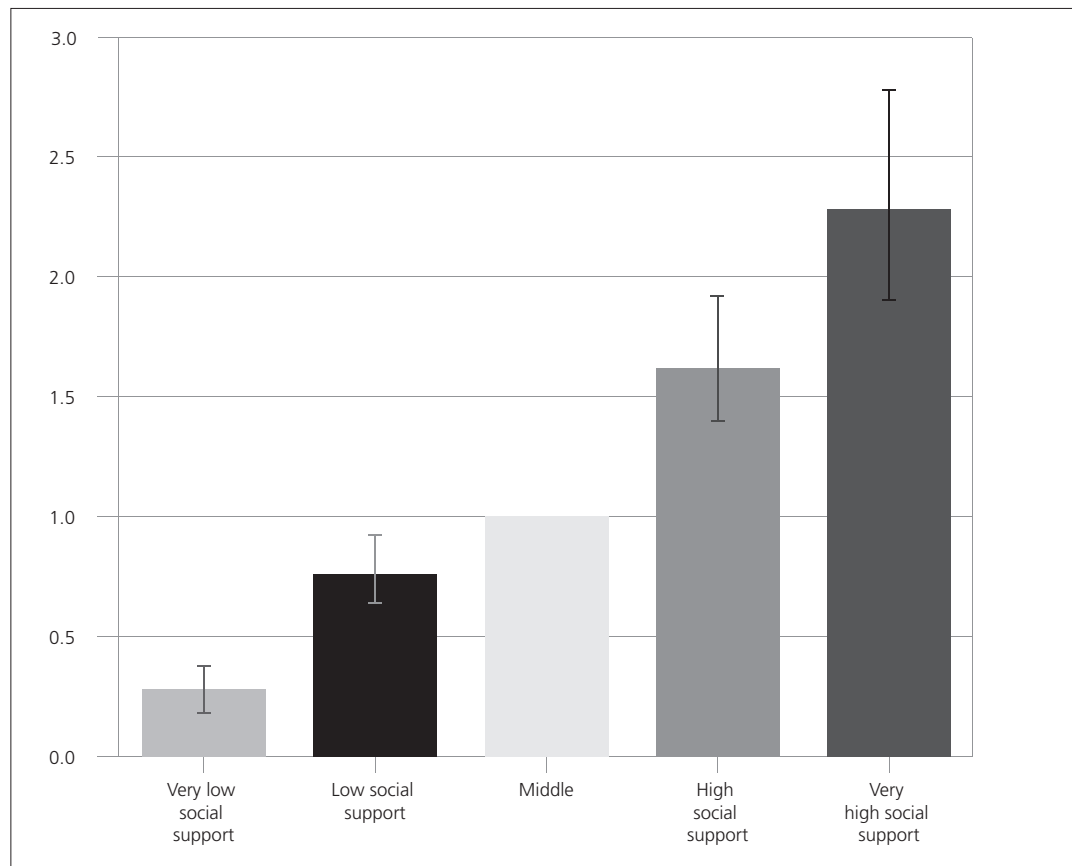
Time 1 and time 2 scores for both extrinsic effort and psychological distress were highly correlated ($\rho = 0.59$, $p < 0.0001$ and $\rho = 0.50$, $p < 0.0001$ respectively). Extrinsic effort scores were significantly lower at time 2 ($t = 2.20$, 1669 df (23.18 (sd = 20.92) compared with 22.19 (sd = 19.73), $p = 0.03$), as were psychological distress scores ($t = 3.29$, 1733 df (2.67 (sd = 3.42) compared with 2.40 (sd = 3.25), $p = 0.001$)). Changes over time in both variables are summarised in Appendix 2 (Table 36).

The associations between changes in extrinsic effort and changes in psychological distress are summarised in Appendix 2 (Table 36). These suggest strong associations between the variables. However, they also show a significant effect of baseline extrinsic effort scores, and after this baseline score was included in the analyses only three associations remained significant. This suggests that the associations between changes in extrinsic effort and changes in psychological distress over time are largely explained by baseline levels of extrinsic effort.

3.7 Discussion

Negative job characteristics were strongly associated with negative outcome measures, and these associations were independent of other potentially confounding factors. However, the analyses also show that in a little over half of the cases considered here this reflected a dose-response type effect,

Figure 3
Example of an
absence effect:
social support and
positive job
satisfaction



while in a little under half of the cases it reflected primarily a larger presence effect. Furthermore, consideration of just the presence effects showed that they also fell into two equal groups: one with a smaller but still significant absence effect, and one with no significant absence effect.

Positive job characteristics were also strongly and independently associated with the positive outcome measures. However, here most of the associations suggested dose–response type effects.

There were considerably fewer significant associations between other combinations of dependent and independent variables, and of those that were significant, the great majority were of the dose–response type.

These findings showing strong independent associations between negative job characteristics and negative outcome measures are consistent with the literature. However, they also extend existing work in several ways. First, they show similar strong independent associations between positive job characteristics and positive outcome measures, but relatively fewer between other combinations of outcome and predictor variable. Second, they suggest that these associations can reflect either an equal presence and absence effect (a dose–response association) or a presence effect, with very few absence or other type effects. And third, they point to the possibility that presence effects may be more common among associations between negative job characteristics and negative outcome measures. These three suggestions all require further exploration and research, particularly because of the relative lack of positive measures in the datasets.

When changes over time were considered, the analyses also showed strong, independent associations between the example factors (extrinsic effort and psychological distress). This suggested that changes in extrinsic effort over time (either improvements or deteriorations) were associated with corresponding changes in psychological distress. However, levels of extrinsic effort (and, indeed, psychological distress) at times 1 and 2 were highly correlated. In addition, many of the associations between changes in extrinsic effort and changes in psychological distress were explained by including baseline (or time 1) extrinsic effort scores in the models. This suggests that prior experience at work may be influential and that confounding factors involving these kinds of ‘baggage’ may be difficult to tease apart.

It should be noted that results obtained from the present samples may not apply to all groups of workers. Indeed, the present analyses provide the basis for future research rather than conclusive information about the area. Overall, the analyses have shown that future research should consider the nature of the associations of job and individual characteristics with health and job outcomes in more detail. In addition, work in this area should include more positive measures of both job characteristics and outcomes. Finally, they show that a longitudinal approach to the area is very important, and could shed valuable light on the issue of causation. In addition, if this work was carried out on a range of samples, including one of young people starting work, then the confounding influence of prior experience could be considered and taken into account.

4 Individual differences in wellbeing and health

4.1 Introduction

This chapter describes two studies carried out in parallel to the main research programme.^{1,94,95} They were designed to look at individual differences in wellbeing and health and examined positive and negative coping styles and attributions in sectors (university staff and nurses) where problems with wellbeing at work have already been identified. The theoretical basis for this approach is given next.

4.2 Transactional theory and coping

As well as examining the importance of job characteristics, it is essential to understand how differences between individuals may affect their wellbeing at work.⁹⁶ Transactional theories of stress⁹⁷ place emphasis not just on job characteristics, but also on subjective appraisals of stressors and individual differences (particularly in coping), which may be important in the stress process.⁹⁶ Coping has been described as any cognitive or behavioural efforts to manage, minimise or tolerate events that individuals perceive as potentially threatening to their wellbeing.⁹⁸ Coping does not imply success in dealing with situations, but describes responses to stressors that may include problem-solving, self-blame, escape and avoidance, wishful thinking, seeking advice and support, and so on.⁹⁷

Folkman *et al.*⁹⁸ claim that problem-focused forms of coping are likely to be associated with lower levels of negative health outcomes, and that coping of an emotion-focused type, such as self-blame, or escape/avoidance is likely to associate with poor mental health. For example, Healy & McKay⁹⁹ found that avoidance coping predicted poor mental health in nurses, and active problem-solving was positively related to satisfaction.

4.3 Rationale behind the nurses study

There have been many studies of the wellbeing of nurses.¹⁰⁰ The traditional models based on job characteristics (demands–control–support (DCS) and effort–reward imbalance (ERI)) were tested simultaneously in this population to see how much each contributes to the variance in anxiety and depression. Ways of coping were also investigated, due to its centrality in transactional stress models, and to see how much additional variance it explained over the use of job characteristics. McVicar¹⁰¹ and Kirkcaldy & Martin¹⁰⁰ also suggest that there is a need for more understanding of how individual variation in nurses' reactions to job characteristics affects health outcomes.

It was hoped that assessing the relative importance of the above factors in predicting health outcomes, and finding any interactive effects between them, would be useful for supporting the view that individual differences can add to the study of work-related health, and to help to provide empirical support for organisational interventions to improve wellbeing.

4.4 Method

4.4.1 Participants

The participants in this cross-sectional survey were a sample of 870 nurses from all occupational grades and roles employed in the UK National Health Service.

4.4.2 Materials

The 21-item version of the Effort–Reward Imbalance (ERI) Questionnaire¹⁰² was as used in the Whitehall II study.¹⁰³ A 27-item version of the Job Content Questionnaire¹⁰⁴ was used. Four subscales measured job demands (workload, time pressure); decision authority (control over decisions); skill discretion (chance to use skills); and levels of social support. The Ways of Coping Checklist⁹⁷ is a well known 68-item scale used to assess coping behaviours, and this study used Vitaliano *et al.*'s¹⁰⁵ revised 42-item version of this scale. The 42 items are used to assess five factors, labelled 'problem-focused coping', 'seek advice', 'self-blame', 'wishful thinking' and 'escape/avoidance'. Participants were asked to think of a recent stressful work experience and to indicate on a four-point Likert scale how often they used each of the suggested behaviours. The hospital anxiety and depression scale¹⁰⁶ is a 14-item scale that measures self-reported anxiety and depression using two subscales. Participants respond on a four-point Likert scale how often they have felt or experienced the suggested anxious or depressed feelings or situations in the past week.

4.4.3 Procedure

Ethical approval for the study was granted by the Cardiff University School of Psychology Ethics Committee, in accordance with ethical guidelines from the American Psychological Association and the British Psychological Society.

4.5 Results

4.5.1 Effects of coping styles

It was predicted that positive coping would be associated with low levels of depression and negative coping with high levels of anxiety and depression in nurses. The correlations in Table 3 show significant relationships between the negative coping behaviours of wishful thinking, self-blame and escape/avoidance, and increased anxiety and depression.

	Anxiety	Depression
Problem-focused coping	0.04	-0.10*
Self-blame	0.48**	0.38**
Wishful thinking	0.34**	0.28**
Seek advice	0.04	-0.08
Escape/avoidance	0.34**	0.37**
Job demands	0.33**	0.26**
Social support	-0.34**	-0.40**
Skill discretion	-0.21**	-0.26**
Decision authority	-0.21**	-0.24**
Extrinsic effort	0.43**	0.40**
Intrinsic effort	0.57**	0.48**
Intrinsic reward	-0.41**	-0.43**

Table 3
Correlations
between coping
and job
characteristics
against anxiety and
depression

** = $p < 0.01$; * = $p < 0.05$

These relationships were supported by the regressions in Table 4. Problem-focused coping was negatively correlated with depression, but no significant correlations were found between seeking advice and outcomes. These findings support those of many researchers, particularly Folkman *et al.*⁹⁸ The data showed that negative coping behaviours were generally more important than positive ones, suggesting that an absence of negative coping behaviours may in fact be more strongly associated with positive mental health outcomes than the presence of positive coping behaviours.

Seeking advice was associated with lower depression scores; however, it was also associated with increased anxiety. This may indicate that seeking advice has different effects in depressed and anxious individuals; or that seeking advice may be an *a priori* positive coping strategy for potential depression, whereas those with anxiety may simply be more likely to seek advice *post hoc*; or finally that these two aspects of advice-seeking are manifested differently in the two regressions due to relationships with other factors.

Self blame and escape/avoidance predicted increased levels of anxiety, and problem-focused coping was associated with significantly lower anxiety scores. The above variables accounted for 24.1 per cent of the variance in anxiety scores, and self-blame was the most important factor, followed by escape/avoidance and problem-focused coping. For depression, self-blame and escape/avoidance were significantly associated with increased scores, and problem-focused coping and seeking advice were associated with significantly lower scores. Self-blame and escape/avoidance were again the most important predictors. These factors accounted for 20.8 per cent of the variance in depression scores.

It was predicted that coping, effort, rewards, demands, control and support would account for a significant amount of the variance in anxiety and depression, and that ways of coping would significantly add to the explained variance in outcomes, over and above use of DCS and ERI alone. Regression analyses involving simultaneous entry of coping, DCS and ERI variables against anxiety and depression revealed that problem-focused coping, social support, skill discretion and intrinsic reward were significantly associated with lower anxiety and depression scores, and that self-blame and intrinsic effort were both significantly associated with higher anxiety and depression (see Table 5).

Table 4
Regressions of
coping against
anxiety and
depression

	β weight	Standard error	Standardised β weight	t	Significance
Anxiety					
(Constant)	5.229	0.487		10.742	0.001
Problem-focused coping	-0.017	0.009	-0.060	-1.924	0.050
Self-blame	0.076	0.007	0.409	11.373	0.001
Escape/avoidance	0.034	0.009	0.133	3.694	0.001
Model: $R = 0.491$, $R^2 = 0.241$				F: 84.0	0.001
Depression					
(Constant)	3.768	0.424		8.878	0.001
Problem-focused coping	-0.019	0.008	-0.079	-2.258	0.024
Seek advice	-0.014	0.006	-0.084	-2.314	0.021
Self-blame	0.045	0.006	0.296	7.809	0.001
Escape/avoidance	0.045	0.008	0.212	5.678	0.001
Model: $R = 0.456$, $R^2 = 0.208$				F: 52.2	0.001

Additionally, escape/avoidance and extrinsic effort predicted significantly higher depression, and seeking advice and job demands predicted significantly increased anxiety. The variables accounted for 47.2 per cent of the variance in anxiety scores, and 43.3 per cent in depression scores – the highest for any of the regressions. The inclusion of coping in the final regression models supported the assertion that individual difference variables can significantly contribute to and account for different percentages of the variance in depression and anxiety (about one-eighth more) over DCS and ERI factors alone.

4.6 Discussion

The results of this study are important because, while there is a significant amount of research on the relationship between mental health and job characteristics and coping where these factors are considered in isolation, there is far less research that considers them simultaneously. However, this is exactly the kind of research that is necessary to enable comparison of the relative importance and interactions of constructs in the prediction of health outcomes.¹⁰⁷ Although these data are cross-sectional and not causal, they may be important for providing empirical support for organisational interventions that aim to improve work at both primary (organisational and job characteristic) and secondary (individually focused) levels, especially when resources are limited and targets must be prioritised. For example, it was shown that ‘overcommitted’ people (those with high intrinsic effort) and those with negative coping strategies (particularly for anxiety) and low social support (particularly for depression) were most likely to suffer negative mental health outcomes. Thus these could well be primary interventional targets (eg by training to reduce negative coping and enhance positive coping, to discourage overcommitment and to enhance social support and organisational feedback mechanisms).

It was also shown that, while job characteristics had a significant effect on outcomes, they were often less important than intrinsic effort, problem-focused coping, negative coping and social support. This research also suggests that a primary focus on individual and social support factors and a secondary focus on job characteristics may be pertinent in occupations where changing working practices is not a realistic option, such as for nurses, firefighters, doctors, police officers and so on.

4.7 Conclusions

The results of this study show that there are robust associations between ways of coping, job demands, control, social support, efforts, rewards, and anxiety and depression in this sample of nurses, and many of these associations were predicted by the hypotheses. The data support much past research, but it is evident that the simultaneous use of multiple theoretical constructs from popular stress models and coping adds something new to the existing body of workplace stress research.

	β weight	Standard error	Standardised β weight	t	Significance
Anxiety					
(Constant)	7.330	1.017		7.208	0.001
Problem-focused coping	-0.027	0.009	-0.095	-3.052	0.002
Seek advice	0.014	0.006	0.067	2.098	0.036
Self-blame	0.046	0.006	0.250	7.937	0.001
Job demands	0.021	0.007	0.099	3.035	0.002
Social support	-0.016	0.005	-0.111	-3.261	0.001
Skill discretion	-0.033	0.009	-0.104	-3.494	0.001
Intrinsic reward	-0.014	0.007	-0.069	-1.971	0.049
Extrinsic effort	0.012	0.007	0.062	1.745	0.081
Intrinsic effort	0.060	0.006	0.361	10.775	0.001
Model: $R = 0.687$, $R^2 = 0.472$				F: 68.02	0.001
Depression					
(Constant)	9.156	0.982		9.328	0.001
Problem-focused coping	-0.017	0.007	-0.072	-2.412	0.016
Self-blame	0.015	0.005	0.096	2.712	0.007
Escape/avoidance	0.022	0.007	0.101	2.997	0.003
Internal attributions for positive events	-0.024	0.009	-0.085	-2.721	0.007
Social support	-0.019	0.004	-0.153	-4.436	0.001
Skill discretion	-0.028	0.008	-0.107	-3.475	0.001
Intrinsic reward	-0.019	0.006	-0.120	-3.298	0.001
Extrinsic effort	0.015	0.005	0.097	2.800	0.005
Intrinsic effort	0.042	0.005	0.310	9.020	0.001
Model: $R = 0.660$, $R^2 = 0.436$				F: 58.81	0.001

Table 5
Regressions of ways of coping, attributional style, demands, control, support, efforts and rewards, against anxiety and depression

The results showed that no single group of factors emerged overall as being the most important in accounting for variance in anxiety and depression, and DCS, ERI and coping each added uniquely to the study of anxiety and depression in nurses. These relationships, as well as the role of other individual differences in the stress process, should be explored in future research.

The workplace is a complex environment, and stress at work is a complex process. The fact that different individuals can respond to the same stressors in different ways shows that an understanding of how different individual difference factors and job characteristics compare, interact, and influence one another is very important. Understanding these relationships and the relative contribution of factors is important for theoretical reasons, and for possible application in designing organisational interventions, particularly when alteration of job characteristics is not feasible.

The next study examined whether these results could be replicated in another sample. It also examined the importance of attributions and not only considered mental health but also investigated job satisfaction.

4.8 A study of wellbeing in university staff

4.8.1 Rationale behind the study

The available evidence suggests that university staff often report issues related to wellbeing at work. However, this population remains far less researched than other stereotypically stressed populations, particularly in the UK; Tytherleigh *et al.*¹⁰⁸ state that most research on university populations comes from the USA, New Zealand and Australia. The effects of stress-related illness in this population also have consequences for students, who could suffer from lower quality teaching and support from stressed university employees.

While coping research is very popular in the general work stress literature, there remain only a handful of studies that investigate coping in university populations, and many of these have mixed results.^{109–111} Attributional style¹¹² is another individual characteristic related to health outcomes in clinical literature. The concept refers to how individuals explain or perceive the causes of events on a series of continua (internal or external, stable or unstable, global or local). Positive ways of attributing are those where positive events are seen as being due to internal causes, are stable over time, and will occur in other domains (and the opposite for negative events), and negative attributions are where positive events are seen as externally caused, unstable and local (and the opposite for negative events). This concept is similar in some aspects to the appraisal stage of transactional models, where causes, threats and consequences of negative events are analysed. However, use of this concept in occupational stress literature is rare, and even rarer in university samples.

The job characteristic variables of demands, control, social support, rewards and extrinsic efforts, as well as intrinsic efforts, ways of coping and attributional style, and their associations with self-rated depression, job satisfaction and anxiety, were investigated in a university population. This was done to compare the relative importance of each factor in accounting for levels of outcome variables and to find any interactions. The same measures were used in a sample of the general population, to compare the two samples on the above variables. DCS and ERI variables were selected for their strength in associating with health outcomes in occupational literature, coping for its centrality in transactional stress models and clinical literature, and attributional style due to its novelty in occupational research and its place in clinical depression literature.

It was predicted that university staff would have more mental health problems than a general population sample. It was also predicted that in university staff positive coping (ie problem-focused coping and seeking advice) would be significantly associated with low levels of depression and anxiety and high job satisfaction, and that negative coping (ie self-blame, escape/avoidance and wishful thinking) would be associated with high levels of anxiety and depression and low job satisfaction. It was also predicted that positive attributional style behaviours would be associated with low levels of anxiety, depression and job satisfaction in university staff, and negative attributions would be significantly associated with high anxiety, depression and low job satisfaction.

4.9 Method

Ethical approval for the study was granted by the Cardiff University School of Psychology Ethics Committee, in accordance with ethical guidelines from the American Psychological Association and the British Psychological Society.

4.9.1 Participants

The participants were a sample of 307 university employees and 120 members of the general population. The university sample was 73.6 per cent female, with a mean age of 41.9 (SD = 10.68) and an average working week of 38 hours. The general population sample was 68.9 per cent female with a mean age of 45.6 (SD = 11.49) and an average working week of 35 hours. The samples also comprised a well-distributed range of occupational roles. Therefore the two samples were relatively similar.

A bulk email was sent to all academic and administrative staff at Cardiff University requesting participants for a study on stress and health at work. Those who responded were sent further details about the aims and methodology, and a questionnaire pack with freepost return envelope. The general public participants were contacted from a pool of potential participants who had previously taken part in psychological research at the university and had indicated that they would be willing to participate in future research.

4.9.2 Materials

The questionnaire pack contained demographic questions as well as the following questionnaires:

- the hospital anxiety and depression scale¹⁰⁶
- the 42 items from Vitaliano *et al.*'s¹⁰⁵ revised version of Folkman & Lazarus's Ways of Coping Checklist⁹⁷
- a 21-item version of the ERI questionnaire¹⁰³
- the Job Content Questionnaire¹⁰⁴ (JCQ)
- a modified version of the Attributional Style Questionnaire¹¹⁴ (ASQ).

In the ASQ, participants read 12 hypothetical work situations (six positive, six negative, half affiliation- and half achievement-oriented) and were asked to make attributions as to why they think these situations are likely to have occurred (eg 'You get a raise. Is this likely to be due to...?'). Participants responded to each item on three anchored seven-point dimensions, indicating their view on the likely locus of cause (internal vs external), stability of the cause (future events vs just this event) and globality of cause (happens with other events vs just this event). Finally, job satisfaction was measured using the satisfaction subscale of the Copenhagen Psychosocial Questionnaire (COPSOQ).¹¹⁵ This consists of four items relating to satisfaction with work conditions, the job as a whole, prospects and usage of abilities. Participants respond to each on a four-point Likert scale, with responses from 'very satisfied' to 'highly unsatisfied'.

4.10 Results

Table 6 shows the results of significant correlations between independent variables and anxiety, depression and job satisfaction for university staff. It can be seen that so-called positive coping, attributional behaviours and job characteristics such as social support, decision authority, skill discretion and reward show negative correlations of small to moderate sizes with anxiety and depression, and positive correlations with satisfaction. It can also be clearly seen that the more negative characteristics, such as self-blame, wishful thinking, escape/avoidance, internal and global attributions for negative events, job demands, and extrinsic and intrinsic effort, have positive relationships with anxiety and depression and negative relationships with job satisfaction. Correlations ranged from 0.11 to 0.68 and most were significant in excess of 0.01. Table 7 shows the results of three regressions, with coping and attributional factors regressed against anxiety, depression and job satisfaction. The regressions support many associations shown in the correlations. Self-blame, escape/avoidance and global attributions for negative events all have positive relationships with anxiety (as does the covariate of female sex) and global attribution for positive events has a negative relationship with anxiety. By standardised beta weight, self-blame is the most important factor, followed by escape/avoidance, attributions and gender. These factors accounted for 27.6 per cent of the variance in anxiety scores. For depression as an outcome, self-blame and escape/avoidance have positive relationships with depression, and internal attribution for positive events shows a negative relationship with depression. Escape/avoidance was the most important factor by standardised beta weight, followed by self-blame, attributions and age (showing an increase in depression with age). These factors accounted for 19.4 per cent of the variance in depression score. For job satisfaction, only problem-focused coping and global attribution for positive events were associated with an increase; however, wishful thinking, escape/avoidance, global attribution for negative events, and seeking advice were all associated with reductions in job satisfaction. All factors were similar in importance by standardised beta weight, and accounted for 20 per cent of the variance in job satisfaction score.

Table 8 shows the three final regressions, the results of which were determined by backwards selection using all job characteristics and individual difference variables, age and sex, regressed against anxiety, depression and job satisfaction. Self-blame, wishful thinking, job demands and intrinsic effort were significantly associated with increased anxiety scores, while problem-focused coping, social support and decision authority were associated with lower anxiety scores. Intrinsic effort shows the strongest association by standardised beta weight, followed by job demands and self-blame, with all other factors showing similar standardised betas. These factors account for 55 per cent of the variance in anxiety. For depression, escape/avoidance, job demands and extrinsic and intrinsic effort were related to a significant increase in score, while internal attribution for positive events, social support, skill discretion and intrinsic rewards were associated with significantly lower depression. Intrinsic effort and social support had the strongest associations with depression by standardised beta, followed by escape/avoidance and extrinsic effort. The above variables accounted for 52 per cent of the variance in depression scores. Finally, seeking advice, escape/avoidance and global attribution for negative events were significantly associated with lower job satisfaction, while

Table 6
Significant correlations between anxiety (HAD-A), depression (HAD-D), satisfaction, and coping, attributions and job characteristics

	HAD-A	HAD-D	Satisfaction
Problem-focused coping		-0.117*	0.164**
Self-blame	0.468**	0.342**	-0.230**
Wishful thinking	0.353**	0.281**	-0.299**
Escape/avoidance	0.363**	0.345**	-0.307**
Internal attributions, positive event	-0.169**	-0.228**	0.190**
Internal attributions, negative event	0.146*		
Stable attributions, positive event	-0.157**	-0.120*	0.161**
Global attributions, negative event	0.129*	0.152*	-0.132*
Job demands	0.408**	0.360*	-0.112*
Social support	-0.308**	-0.437**	0.444**
Skill discretion		-0.118*	0.366**
Decision authority	-0.266**	-0.284**	0.435**
Extrinsic effort	0.476**	0.479**	-0.193**
Intrinsic effort	0.604**	0.549**	-0.221**
Intrinsic reward	-0.332**	-0.395**	0.682**

** = significant at 0.01; * = significant at 0.05

social support, skill discretion, decision authority, global attribution for positive events and intrinsic reward were significantly associated with increases in job satisfaction. These factors accounted for 57 per cent of the variance in satisfaction. Reward was by far the most important factor, followed by social support and global negative attributions, with other factors all of similar standardised beta weights.

4.11 Discussion

It was predicted that positive coping behaviours (problem-focused coping, seeking advice) would be significantly associated with lower scores in anxiety and depression and higher job satisfaction, and negative coping (self-blame, escape/avoidance, wishful thinking) with higher anxiety and depression, and low job satisfaction. Problem-focused coping was found to be associated with low depression and increased satisfaction in the correlations in Table 6, with increased satisfaction in the regression in Table 7, and with lower anxiety in Table 8. Self-blame, wishful thinking and escape/avoidance also consistently showed significant positive relationships with anxiety and depression and negative relationships with job satisfaction. Both positive and negative coping behaviours figured highly in importance in predicting outcomes by standardised beta weight, with self-blame the third most important subfactor in predicting anxiety, only after job demands and intrinsic effort. Escape/avoidance was the third most important in predicting depression.

The above data suggest that coping behaviours have significant associations with anxiety, depression and job satisfaction in university employees in the predicted directions. It was also predicted that positive attributional behaviours would be associated with low depression, anxiety and high job satisfaction scores, and negative attributional behaviours with high anxiety, depression and low satisfaction. The correlations in Table 5 show that internal and stable attributions for positive events, and global attributions for negative events, were associated with the outcomes in the predicted directions, internal attributions for negative events were also associated with anxiety as predicted. The regressions also showed that global positive attributions predicted low anxiety and high job satisfaction, internal positive attributions, which could be seen as analogous to locus of control,¹¹⁶ predicted low depression, and global negative attributions predicted low satisfaction and high anxiety.

In the anxiety and depression regressions, attributional behaviours appeared less important (by standardised beta weight) than coping behaviours, but for job satisfaction, attributions appeared

Table 7
Regressions of ways of coping, attributions, age and sex, on mental health and satisfaction in university staff

	β weight	Standard error	Standardised β weight	t	Significance
Anxiety					
(Constant)	4.607	1.145		4.024	0.001
Self-blame	2.234	0.392	0.359	5.702	0.001
Escape/avoidance	1.235	0.443	0.173	2.787	0.006
Global attribution: positive event	-0.572	0.270	-0.143	-2.121	0.035
Global attribution: negative event	0.540	0.257	0.144	2.105	0.036
Sex (female)	1.064	0.528	0.108	2.014	0.045
Model: $R = 0.525$, $R^2 = 0.276$				F: 20.05	0.001
Depression					
(Constant)	4.055	1.431		2.833	0.005
Self-blame	0.866	0.332	0.175	2.610	0.010
Escape/avoidance	1.569	0.374	0.276	4.199	0.001
Internal attribution: positive event	-0.579	0.220	-0.151	-2.631	0.009
Age	0.036	0.019	0.110	1.933	0.054
Model: $R = 0.440$, $R^2 = 0.194$				F: 15.86	0.001
Job satisfaction					
(Constant)	7.507	0.735		10.207	0.001
Problem-focused coping	0.930	0.320	0.176	2.909	0.004
Seek advice	-0.641	0.249	-0.154	-2.572	0.011
Wishful thinking	-0.696	0.258	-0.181	-2.703	0.007
Escape/avoidance	-0.766	0.262	-0.195	-2.924	0.004
Global attribution: positive event	0.436	0.157	0.198	2.770	0.006
Global attribution: negative event	-0.417	0.148	-0.202	-2.824	0.005
Model: $R = 0.446$, $R^2 = 0.199$				F: 10.87	0.001

more important. Indeed, in the regression in Table 7, where all job characteristics and individual variables were entered simultaneously, global attributions for positive and negative events were second and fourth most important (by standardised beta weight) in predicting satisfaction, with intrinsic reward first and social support third. Therefore, while not all attributions are significant predictors, overall there is evidence that positive attributional behaviours tend to be associated with low anxiety and depression and high job satisfaction in university employees, and negative attributions with increased anxiety and depression and decreased satisfaction.

It was also predicted that the addition of coping and attributional style would significantly increase the explained variance in outcomes, over the use of DCS and ERI variables alone. The regressions in Table 7 show that subfactors from each experimental construct (coping, attributions, DCS and ERI) were represented in the final regression equation for depression and job satisfaction, and all but attributional style were present in the final anxiety regression. These regressions accounted for the highest percentages of variance in outcomes (55 per cent in anxiety, 52 per cent in depression, 57 per cent in satisfaction) and the inclusion of coping behaviours in all regressions, and attributions in depression and job satisfaction, showed that these variables make a significant contribution. Indeed, four of the eight factors in the anxiety equation were coping variables, with self-blame third most

Table 8

All job characteristics and individual differences regressed against anxiety, depression and satisfaction in university staff

	β weight	Standard error	Standardised β weight	t	Significance
Anxiety					
(Constant)	5.742	1.170		4.908	0.001
Problem-focused coping	-0.920	0.447	-0.096	-2.061	0.040
Seek advice	0.668	0.354	0.087	1.887	0.060
Self-blame	1.086	0.356	0.174	3.051	0.003
Wishful thinking	0.764	0.378	0.109	2.019	0.045
Job demands	0.039	0.009	0.197	4.170	0.001
Social support	-0.024	0.009	-0.129	-2.797	0.006
Decision authority	-0.021	0.010	-0.094	-2.049	0.041
Intrinsic effort/over-commitment	0.080	0.010	0.415	8.135	0.001
Model: $R = 0.742$, $R^2 = 0.551$				F: 39.61	0.001
Depression					
(Constant)	8.579	1.138		7.539	0.001
Escape/avoidance	0.848	0.256	0.150	3.314	0.001
Internal attribution: positive event	-0.386	0.161	-0.103	-2.400	0.017
Job demands	0.019	0.009	0.120	2.167	0.031
Social support	-0.035	0.007	-0.245	-5.044	0.001
Skill discretion	-0.020	0.010	-0.101	-2.093	0.037
Extrinsic effort	0.022	0.011	0.138	2.097	0.037
Intrinsic effort/over-commitment	0.042	0.009	0.276	4.680	0.001
Intrinsic rewards	-0.019	0.008	-0.113	-2.298	0.022
Model: $R = 0.719$, $R^2 = 0.517$				F: 37.41	0.001
Job satisfaction					
(Constant)	-0.693	0.839		-0.826	0.410
Seek advice	-0.350	0.180	-0.083	-1.949	0.052
Escape/avoidance	-0.448	0.170	-0.114	-2.635	0.009
Global attribution: positive event	0.258	0.121	0.118	2.128	0.034
Global attribution: negative event	-0.325	0.127	-0.158	-2.565	0.011
Social support	0.015	0.005	0.142	2.886	0.004
Skill discretion	0.015	0.006	0.108	2.342	0.020
Decision authority	0.013	0.006	0.102	2.092	0.037
Intrinsic reward	0.060	0.006	0.512	10.200	0.001
Model: $R = 0.754$, $R^2 = 0.569$				F: 37.87	0.001

important (by standardised beta) overall, and escape/avoidance third most important in depression. Finally, global attributions for positive and negative events were the second and fourth most important variables in the prediction of job satisfaction. These results show that coping and attributions do add value to regressions in the prediction of mental health and job satisfaction outcomes in university employees, and are as important, or in some cases more important, than some traditional DCS and ERI variables.

4.12 Conclusions

Coping variables accounted for more variance than attributional behaviours; however, it is interesting that attributional style made a valuable contribution to regression models, particularly in job satisfaction, despite being so rarely used in occupational research. This suggests that in predicting outcomes, understanding the ways that individuals view the causes of events may be just as important as what those events are or how they are coped with. The simultaneous use of these key theoretical constructs (DCS, ERI, coping, attributions) is rare in the literature and is important in this research, because it allows the comparison of the relative importance of subfactors in predicting outcomes in a single sample, as well as any interactions that may be present.¹⁰⁷ Research such as this could also be used to identify which individuals are most at risk, on the basis of their job and individual characteristics.

Results show that there are strong associations between the traditional variables of efforts, demands, control, supports and rewards, and depression, anxiety and job satisfaction, and also between coping and attributional style and these outcomes. This is important, given the inflexibility of traditional models such as DCS and ERI to take account of individual differences, and the paucity of research on attributional style in work-related stress. The fact that both environmental and individual characteristics were important in the prediction of outcomes supports the premise of transactional stress theories and illustrates the need for models and research which integrates individual and job characteristics factors.³⁰

4.12.1 Overall conclusions about coping and attributional styles

The results from these two studies show that the effect of the nature of the job on health will vary depending on the coping and attributional styles of the person. This means that it is important to include both individual appraisals of the job as well as measures of the work environment. In the next stage of the research, there is a strong emphasis on the combined effects of job characteristics and appraisals of these. What was missing so far was an assessment of both positive characteristics and appraisals, and this was rectified in the new data collection.

5 New data collection

5.1 Background

The new data collection comprised two studies:

- a cross-sectional study of established workers
- a longitudinal study of young people starting work.

Together, these studies allowed the project to:

- include and assess a range of relatively new measures of positive job characteristics, appraisals and outcomes
- address issues associated with exclusively cross-sectional research
- make comparisons between the two cohorts of respondents.

Their combined aim was to consider the extent to which work is good for health.

Both studies were to some extent developed in the light of the findings of the previous phase of the project, the literature review and secondary analyses. This phase suggested a very limited use of measures of positive job characteristics, appraisals and outcomes and, as a result, little agreement on a 'gold standard' set of such measures. In addition, it highlighted the fact that previous work has often failed to consider or control for a range of potentially influential factors (such as personality, previous wellbeing, demographics and so on). Both components of the earlier phase also pointed to the importance of a multifactorial, holistic approach to the area.

The established workers study, therefore, was designed to include a range of relatively new measures of positive job characteristics, appraisals and outcomes, together with more traditional negative measures and factors measuring potentially confounding factors. The longitudinal study included, as far as possible, the same diverse range of measures. This allowed us to compare the established and starting work cohorts directly. In addition, collecting data before and after starting work allowed us to address three other issues. First, cause and effect relationships are difficult to determine in this area because of the widespread use of cross-sectional designs. Second, in addition to studying features of work environments, the research included key individual difference characteristics, which background research has suggested are very important in the work–wellbeing relationship. This allowed pre-work measures to be taken to control for non-work-related factors. Third, the impact of past employment was eliminated, allowing a clearer view of the causal effects of work on wellbeing and health.

5.2 Approach of the new data collection

The new data collection, therefore, used a multimethodological approach to consider the extent to which work is good for health. To do this, both studies took a process approach to work and wellbeing by considering the job characteristics–appraisals–outcomes pathway. First, the established workers dataset was used to:

- assess patterns of (both positive and negative) association along this pathway
- assess the new positive measures of job characteristics, appraisals and outcomes
- model the associations between job characteristics, appraisals and outcomes.

Following this, the new starters dataset was used to:

- make a comparative model of the associations between job characteristics, appraisals and outcomes
- assess changes associated with starting work in wellbeing over time.

Using this approach across the two studies allowed us to consider:

- how to use positive and negative measures together to more fully describe the relationship between work and wellbeing
- whether the patterns of association seen in and models appropriate for an established workers' group are comparable and appropriate for use among those starting work.

5.3 Methods

5.3.1 Established workers study

During 2008 a series of stress seminars was run by the Cardiff Work Environment Research Centre. These seminars were aimed at public and private sector organisations of all sizes, and attendees included representatives of educational institutions, local authorities, charities, consultancy firms, utilities and service providers, and manufacturing organisations. Initially, in late 2007, invitations to a seminar in January 2008 were sent to human resources managers from organisations based in South Wales on a list of Wales's top 300 businesses. All invitations made it clear that organisations attending the event would be offered the opportunity to take part in a free stress audit. Following this initial mailing, information about the seminar was quickly passed on by word of mouth and inclusion in various organisational newsletters (eg from IOSH), and the event was almost immediately oversubscribed. To accommodate all interested organisations, two further seminars were held in April and June 2008.

At the seminars, a brief overview of the content and demonstration of the survey software was given, and attendees were asked to contact the research team if they would like to meet to discuss the possibility of a stress audit further in private. The audit involved participating organisations in a survey of their employees. Surveys were carried out electronically, though organisations were able to take part using some (or all) traditional paper questionnaires if they preferred. Electronic participation involved organisations emailing employees with the covering letter, which included a link to the questionnaire. The questionnaire could then be completed online and submitted directly, though provision was also made for downloading a paper version, which could be returned using a Freepost address. Participating organisations offered respondents entry into a prize draw as an incentive to participate.

5.3.2 New starters study

For the study of people starting work, students graduating from two large educational institutions in Cardiff in the summer of 2008 were approached using multiple recruitment strategies, including:

- flyers
- electronic noticeboard entries
- handouts at graduation ceremonies
- direct face-to-face recruitment by a research team member during lectures
- direct mailing by departments
- direct emails.

Students interested in the study were asked to complete two questionnaires: the first immediately before beginning their job, and the second approximately three months after starting work. Again, both questionnaires could be carried out electronically, though individuals were able to take part using traditional paper questionnaires if they preferred (see above). Data from the two questionnaires were matched using a series of 'security' questionnaires included on each occasion. Participants completing both questionnaires were able to enter a prize draw.

5.4 Results – established workers study

5.4.1 Participating organisations and response rates

In total, 1,563 people completed and returned a questionnaire as part of the established workers survey. Respondents were employed by one of three participating organisations (two large public sector organisations (397 and 1,088 respondents each) and one smaller private charity (78 respondents)). Questionnaires were sent to 11,563 people across the three organisations (4,500, 6,839 and 224 respectively), giving a response rate of 14 per cent overall (and organisational response rates of 9, 16 and 35 per cent respectively).

5.4.2 Respondents

Most of the respondents were female (1,074, 70 per cent) and their mean age was 43.33 years (sd = 11.66, minimum 17, maximum 72). Most were married or living with a partner (1,140, 74 per cent) and just over half were educated to degree level or higher (810, 52 per cent). The majority of respondents worked full-time (1,184, 76 per cent) and had permanent jobs (1,307 (85 per cent)). On average they worked 34.63 hours per week (sd = 11.28).

5.4.3 Patterns of association

Correlations were used to assess associations between sets of measures in groups representing (positive and negative) job characteristics, appraisals and outcomes (Table 9).

Table 9
Groups of
measures

Groups	Measures	Description of measures	Positive or negative
Job characteristics	HSE Management Standards ¹¹⁷	Seven scales measuring demand, management support, peer support, control, role, relationships and change	Positive and negative
	Effort–Reward Imbalance (ERI)	Three scales measuring extrinsic effort, intrinsic effort and reward	Positive and negative
	Job–Demand–Control (JDC)	Three scales measuring demand, control and support	Positive and negative
	Uplifts	Six scales measuring the frequency and intensity of uplifts from skills, supervisor and co-workers	Positive
Appraisals of job characteristics	Work involvement (Warr)	Three scales measuring job involvement, job motivation and higher order need strength	Positive
	Job Descriptive Index (JDI)	Five scales measuring satisfaction with work, supervisor, co-workers, promotion and pay	Positive
	Job Satisfaction Scale (JSS)	Ten scales measuring satisfaction with pay, promotion, supervisor, benefits, reward, conditions, co-workers, nature of work, communication and total	Positive
	Work stress	Single-item measure of work stress	Negative
	Job enjoyment	Single-item measure of job enjoyment	Positive
	Perceived stress scale (PSS)	One scale measuring perceived stress	Negative
Outcomes	General health	Single-item measure of health in the last 12 months	Negative
	General stress	Single-item measure of stress outside work	Negative
	Tiredness	Single-item measure of tiredness on waking	Negative
	Symptoms	Three scales giving number of symptoms experienced in the last 14 days, last year and ever	Negative
	Hospital Anxiety and Depression Scale (HADS)	Two scales measuring anxiety and depression	Negative
	Positive and Negative Mood Scale (PANAS)	Two scales measuring positive and negative mood	Positive and negative

Overall measures were calculated by summing all the scales for HSE Management Standards,¹¹⁷ uplifts frequency and intensity, QWL, Warr and JDI (a total JSS score is already part of the JSS scoring system). All correlations were also assessed in terms of strength, with those significant but below 0.50 defined as modest or low. In addition to this approach, a second assessment method was used, in which the numbers and proportions of significant correlations within groups of analyses were considered.

Associations with appraisals

Of the 660 possible associations between appraisals and job characteristics, 598 (91 per cent) were significant (see Appendix 3). Table 10 shows that all the strong associations with appraisals were between job, rather than individual, characteristics.

	JDI overall	JSS total	QWL overall	Work stress	Job enjoyment
HSE overall	0.63, <0.0001	0.74, <0.0001	0.80, <0.0001		
Extrinsic effort				0.56, <0.0001	
Intrinsic effort				0.53, <0.0001	
Reward	0.64, <0.0001	0.71, <0.0001	0.67, <0.0001		
Job demand				0.58, <0.0001	
Social support	0.64, <0.0001	0.67, <0.0001	0.73, <0.0001		
Control	0.59, <0.0001		0.65, <0.0001		
Uplift overall frequency			0.53, <0.0001		
Uplift overall intensity	0.63, <0.0001	0.59, <0.0001	0.70, <0.0001		0.53, <0.0001

Table 10
Most significant
associations with
appraisals

Appraisals of the job, therefore, were most strongly associated with job characteristics (as opposed to individual characteristics). The strongest association was between the overall QWL and HSE scores.

Positive appraisal measures (JDI, JSS, QWL and job enjoyment) were particularly associated with positive job characteristics (social support, control, reward and uplifts), while the negative appraisal measure (work stress) was more closely associated with negative job characteristics (job-related effort and demand).

Associations with mental health outcomes

Of the 88 possible associations between outcomes and job characteristics, 86 (98 per cent) were significant. Outcomes were most strongly associated with job (as opposed to individual) characteristics and appraisals (Table 11).

	Anxiety	Depression	PANAS +	PANAS –
JDI all			0.51, <0.0001	
JSS total		–0.54, <0.0001		
Stress	0.50, <0.0001			
HSE overall	–0.52, <0.0001	–0.57, <0.0001		
Extrinsic effort		0.50, <0.0001		
Intrinsic effort	0.62, <0.0001	0.53, <0.0001		0.53, <0.0001
Reward		–0.52, <0.0001		
Uplift overall intensity		–0.51, <0.0001	0.55, <0.0001	
General stress	0.62, <0.0001	0.53, <0.0001		0.59, <0.0001
Fatigue	0.60, <0.0001	0.60, <0.0001		0.58, <0.0001

Table 11
Most significant
associations with
outcomes

5.4.4 Independence of variables

Correlations were also carried out to consider associations between each of the groups of measures. Most of these associations were moderate. However, the associations between QWL, JDI and JSS were very high (above 0.75), suggesting that perhaps only one of these measures need be included in the future. Five other correlations were above 0.70:

- HSE overall and social support
- uplifts intensity and frequency
- anxiety and negative PANAS
- anxiety and depression
- HSE and QWL.

The latter three are intuitively logical and were expected. However, the first, particularly in conjunction with the strong associations between HSE overall and measures of quality of working life and job satisfaction, raises the question of what the HSE management standards are measuring.

Assessing the new measures

Factor analysis and correlation were used to consider the psychometric properties of the new measures of job characteristics, appraisals and outcomes. Factor analyses were used to examine the inter-correlations between items of specific scales. Correlations were used to examine associations between the independent variables and the outcomes. These analyses suggested that, on the whole, all the new measures were appropriate and effective. There were, however, two main areas that were less positive. First, the change factor of the HSE Management Standards had particularly low reliability. Second, none of the three Warr (work and life attitudes) measures was significantly correlated with either work stress or anxiety.

Factor analysis was then used to consider whether the positive and negative measures in the three groups (job characteristics, appraisals and outcomes) were measuring different concepts or opposite ends of the same concept.

Three analyses were run, each including all the positive and negative measures of either job characteristics, appraisals or outcomes. The analyses grouped similar measures together into broader factors, so measures assessing similar concepts, either positively or negatively, were categorised together. If the positive and negative measures of job characteristics, appraisals or outcomes are measuring different concepts, then very few of the factors produced by the analyses would contain both positive and negative measures.

5.4.5 Associations between job characteristics, perceptions and outcomes

In order to assess the associations within the work–wellbeing process, factor analyses were used to derive job characteristic, perception and outcome factors.

Creating factors

First, three factor analyses were run representing job characteristics, appraisals and outcomes. Factor analysis is a method of deriving clusters of associated items that can then be used as scores in subsequent analyses. This reduces the number of variables included in the analyses and hence reduces the possibility of chance effects. All items from the questionnaire except those measuring demographics (age, gender, ethnicity, marital status and education), diet, work status (full-time/part-time, contract type, position and so on) and stress outside work (which was used as a measure of negative affectivity) were included in one of the three analyses. Two of the physical health measures, emphysema and heart attack, were excluded from the outcomes factor analysis at this stage because so few respondents reported them. These initial factor analyses showed that the job characteristics items together explained 76 per cent of the variance, the appraisal items 77 per cent and the outcomes items 72 per cent.

Next, a series of factor analyses were run within each group to establish the optimum number of factors (see Appendix 3, Tables 45–50). These suggested six broad job characteristics, five appraisal factors and three outcome factors (see Table 12). Two sets of these factors were created: the first included all items identified by the factor analyses; the second excluded items from the scales not included in one organisation's survey (ERI, uplifts, work patterns and physical working conditions (job characteristic measures), and PANAS and QWL (Table 13). One of the job characteristic factors, role, had better reliability when items were excluded (Table 13), so that version of the factor has been used in all the following analyses.

Preliminary multivariate regression analyses suggested that all three outcomes were associated with both job characteristics and appraisals, and that both the positive and negative outcomes were associated with both negative and positive job characteristics and appraisals.

In the light of the secondary analyses and literature review findings, and given these results suggesting that a multifactorial approach is most appropriate, a 'combined effects' approach to modelling these associations was therefore used and is presented below.

Combined effects modelling

The aim of these analyses was principally to create a total score which reflected the combined effects of job characteristics and appraisals. There are a number of potential methods of doing this and the

Table 12
Job characteristics,
appraisals and
outcome factors

Factor	Comprising
Job characteristics	
1 Manager support	Manager support; Intrinsic reward; Uplifts (from supervisor)
2 Demand	Demand; Extrinsic effort; Intrinsic effort; Unsociable and unpredictable hours
3 Control	Control over work organisation
4 Role	Role; Night work
5 Peer support	Peer support; Uplifts (from co-workers)
6 Skills	Skill discretion; Uplifts (from skills)
Appraisals of job	
1 Management	Satisfaction with management/supervisor, quality of working life in terms of management
2 Work	Intrinsic job motivation and higher order need strength, enjoyment, satisfaction with work and the nature of work, and quality of working life in terms of autonomy
3 Stress	Stress, satisfaction with conditions, quality of working life in terms of balance
4 Reward	Satisfaction with pay, promotion and benefits, and quality of working life in terms of pay
5 Peers	Satisfaction with co-workers
Outcomes	
1 Negative mental wellbeing	Negative mood, anxiety, depression, cognitive failures at work
2 Physical health	Physical health and symptoms, pain killers, fatigue, minor accidents at work
3 Positive mental wellbeing	Positive mood, quality of work in terms of autonomy and happiness

one selected here is now described. The measure used was a 'good job score', with high scores reflecting more positive job characteristics and appraisals. One job characteristic score (demand) and two appraisal scores (stress and reward) were recoded so that higher scores indicated lower demand, lower stress and higher reward respectively. Total job characteristics and appraisal scores were then created by totalling each of the six job characteristics factors and five appraisal factors respectively. A total job characteristics and appraisal score was also created by totalling the six job characteristics and five appraisal scores. These total scores were split into quartiles. Each of the three outcome scores were split at the median, and the negative mental wellbeing and physical health outcomes were recoded so that a higher score indicated the lower (ie better) half of the distribution.

Backwards stepwise logistic regression was used to assess the association between the good job score (job characteristics and appraisals score) and the outcomes (see Tables 14–16). The regression model also included the demographic (age, gender, marital status, education), work (full-time, contract, pattern) and general stress factors to control for any potential confounding influence of these individual characteristics.

Negative mental wellbeing was strongly associated with total job characteristics and appraisals. A dose–response type relationship was suggested, with those in the highest (most positive) quartile for the total job characteristics and appraisals score being over 23 times as likely to have low (positive) levels of negative mental wellbeing compared to those in the lowest (least positive) quartile (Table 14). This pattern of association was apparent for both physical health and positive mental wellbeing as well (Tables 15 and 16). There were also significant associations with both individual characteristics (such as age and general stress (the measure of negative affectivity)) and elements of type of work, emphasising the importance of controlling for other factors.

Table 13
Reliability of new factors

	All items			All items included in all three surveys		
	Items	Cronbach α	n	Items	Cronbach α	n
Job characteristics						
1 Manager support	21	0.956	261	9	0.931	1317
2 Demand	20	0.918	353	9	0.864	1318
3 Control	11	0.858	1292	n/a		
4 Role	6	0.593	377	4	0.857	1512
5 Peer support	15	0.906	312	7	0.873	1338
6 Skills	12	0.871	323	6	0.793	1375
Appraisals of job characteristics						
1 Management	33	0.963	358	23	0.941	1217
2 Work	33	0.949	352	25	0.921	1261
3 Stress	22	0.905	373	16	0.876	1266
4 Reward	33	0.886	347	29	0.855	1111
5 Peers	20	0.916	1248	n/a		
Outcomes						
1 Negative mental wellbeing	31	0.941	344	21	0.912	1299
2 Physical health	19	0.910	1327	n/a		
3 Positive mental wellbeing	10	0.925	373	Not possible		

Table 14
Associations between the good job score and negative mental wellbeing

<i>n</i> = 668		OR (CI)	<i>p</i>
Total JC&A (good job) score	Low	1.00	<0.0001
	Second quartile	2.48 (1.35–4.55)	
	Third quartile	8.01 (4.34–14.76)	
	High	23.70 (12.45–45.12)	
Age		1.02 (1.00–1.04)	0.02
General stress	High	1.00	<0.0001
	Low	9.48 (6.22–14.42)	

The next set of analyses attempted to benchmark the subcomponents of the good job score with the outcomes. The results of these are shown in Appendix 3 and they can be briefly summarised as follows. Total job characteristics scores were associated with all the outcomes in a dose–response manner. The strength of these associations was not as great as seen in the analysis of the good job score. A similar conclusion applied to the analyses using the total appraisal score. The job characteristics and appraisal scores were then subdivided into positive and negative components. Both job characteristic scores and appraisal scores were included in the same analyses. The strongest predictor of negative mental health was negative appraisals of the job. Positive appraisals had a smaller independent contribution. The same applied to physical health outcomes, although the effects of negative and positive appraisals were more similar. Finally, positive mental health was predicted largely by both positive and negative appraisals, but also by negative and positive job characteristics.

<i>n</i> = 673		OR (CI)	<i>p</i>
Total JC&A (good job) score	Low	1.00	<0.0001
	Second quartile	2.79 (1.67–4.68)	
	Third quartile	3.80 (2.27–6.35)	
	High	6.87 (4.04–11.69)	
Age		1.02 (1.01–1.04)	0.01
Gender	Male	1.00	0.02
	Female	0.63 (0.42–0.93)	
Full-time	Full-time	1.00	0.003
	Part-time	2.05 (1.28–3.30)	
Pattern	Fixed hours	1.00	0.05
	Other*	1.45 (1.00–2.08)	
General stress	High	1.00	<0.0001
	Low	4.42 (3.10–6.31)	

* Flexitime or shift work

Table 15
Associations
between the good
job score and
physical health

		OR (CI)	<i>p</i>
Total JC&A (good job) score	Low	1.00	<0.0001
	Second quartile	2.89 (1.24–6.75)	
	Third quartile	5.24 (2.23–12.33)	
	High	22.83 (7.73–67.42)	
Age		1.03 (1.00–1.07)	0.05

Table 16
Associations
between the good
job score and
positive mental
wellbeing

The next set of analyses compared total positive scores with total negative scores. These two scores represented the combination of the presence of positive job characteristics and appraisals compared to the presence of negative job characteristics and appraisals. The results showed an independent effect of the positive and negative scores, with the impact of negative job characteristics and appraisals being greater for negative mental health whereas positive job characteristics and appraisals had a bigger effect on positive mental health (positive and negative scores also had similar effects on physical health).

Finally, the influence of the individual factor scores was examined. Not surprisingly, many of these had significant effects but these were generally small ($OR < 2$) compared to the effect sizes seen with the combined scores.

5.5 Conclusions – established workers study

The results from this new data collection have shown that the best predictor of health outcomes is the combined measure of total job characteristics (both presence of positive features and absence of negative) and the appraisals of these. This has, therefore, been named the ‘total good job score’. This study has been important in that it is one of the few that have examined both the presence of positive characteristics as well as the absence of negative. One weakness of the study has been that it is a cross-sectional study, which makes it difficult to draw conclusions about causal mechanisms. The next study was a longitudinal study of those starting work. Measurement of pre-work characteristics allowed the effects of factors such as demographics or personality to be eliminated. The aim of the next study was to determine whether the results obtained here were also observed in the new starters sample.

5.6 Results – new starters study

In total, 173 people were recruited to the study. By February 2009, 128 (74 per cent) had found a job, and of these 81 (63 per cent) completed the baseline questionnaire. Just over three-quarters of these participants (62, 77 per cent) also completed the follow-up questionnaire. Using the baseline and follow-up questionnaires' security questions, 56 sets of data (90 per cent of the completed follow-up questionnaires) were successfully matched.

Among this group, 44 (79 per cent) were female and their mean age was 25.21 years (sd = 5.55, minimum 20, maximum 43). Seventeen (30 per cent) were married or living with a partner and all were educated to degree level or higher. Fifty (91 per cent) worked full-time; 32 (58 per cent) had permanent jobs; and on average they worked 40.04 hours per week.

5.7 Comparing the established and starting work cohorts

5.7.1 Overall scores

Tables 17–19 show participants' scores on the job characteristics, perceptions and outcomes measures, together with comparative scores from the established workers.

Table 17
Established worker
and new starter
participants' job
characteristics
scores

	Established workers				New starters			
	Mean	SD	Min	Max	Mean	SD	Min	Max
HSE overall	25.09	4.11	11.18	34.50	25.74	4.07	18.30	33.62
Extrinsic effort	19.28	19.43	0	100	17.92	17.33	0	58.33
Intrinsic effort	46.30	20.71	0	100	47.09	18.26	8.33	83.33
*Reward	82.25	18.45	0	100	91.91	12.95	45.83	100
Job demand	61.61	21.95	0	100	58.18	22.46	8.33	100
Social support	77.98	19.91	0	100	75.66	23.09	0	100
Control	66.09	15.82	11.11	96.30	63.13	15.11	15.74	88.89

* Significantly different

In terms of job characteristics, the established workers had a higher mean HSE control score (indicating greater levels of control at work than those starting work (3.42 (0.79) compared to 3.17 (0.79), $F(1, 1548) = 5.43, p = 0.02$). Those starting work, however, had a higher mean HSE peer support score (4.01 (0.79) compared to 3.79 (0.81), $F(1, 1568) = 3.92, p = 0.05$) and a higher reward score (indicating greater reward) ($F(1, 408) = 13.05, p < 0.0001$). Those in the new starters group had a higher mean JDI score on pay (indicating greater satisfaction with pay) (34.00 (13.24) compared to 29.93 (13.75), $F(1, 1356) = 4.57, p = 0.03$), promotion (26.55 (18.57) compared to 12.94 (12.95), $F(1, 1368) = 5.97, p < 0.0001$) and overall ($F(1, 1145) = 3.83, p = 0.05$) than the established workers. Their JSS pay score was also significantly higher (15.02 (4.95) compared to 12.50 (4.94), $F(1, 1391) = 13.24, p < 0.0001$), as were their promotion (14.96 (4.96) compared to 11.23 (4.40), $F(1, 1353) = 37.64, p < 0.0001$), reward (15.40 (4.01) compared to 14.16 (4.56), $F(1, 1369) = 3.95, p = 0.05$), conditions (14.13 (4.38) compared to 12.73 (4.10), $F(1, 1375) = 5.93, p = 0.02$), communications (16.62 (3.94) compared to 14.54 (4.76), $F(1, 1383) = 10.21, p = 0.001$) and JSS total ($F(1, 1140) = 8.84, p = 0.003$) scores. The established workers group had a higher mean QWL pay score (indicating better quality of working life in terms of pay) (10.72 (2.23) compared to 10.00 (1.63), $F(1, 444) = 5.14, p = 0.02$). Those starting work had higher mean QWL pride (15.28 (2.55) compared to 14.36 (2.94), $F(1, 444) = 4.77, p = 0.03$) and happiness (19.09 (3.78) compared to 16.89 (3.61), $F(1, 434) = 17.20, p < 0.0001$) scores. The new starters group also had a higher mean Warr work involvement score (indicating greater involvement) (34.27 (5.26) compared to 32.46 (6.39), $F(1, 1417) = 4.34, p = 0.04$).

	Established workers				New starters			
	Mean	SD	Min	Max	Mean	SD	Min	Max
Warr overall	104.40	11.65	25	126	105.80	12.08	71	124
*JDI overall	166.63	41.37	24	264	178.81	51.14	65	259
*JSS total	134.45	27.06	46	214	146.47	28.82	90	212
QWL overall	121.07	19.55	76	164	123.86	16.07	89	167
PSS	45.41	5.12	14	62	45.37	3.71	35	56
Work stress	2.68	0.94	1	5	2.61	0.78	1	5
Work stress: high	<i>n</i> = 275; 18%				<i>n</i> = 6; 11%			
Job enjoyment	3.81	1.08	1	5	3.88	0.92	1	5
Job enjoyment: high	<i>n</i> = 987; 64%				<i>n</i> = 38; 68%			

* Significantly different

Table 18
Established worker and new starter participants' appraisal scores

The established workers group had a higher mean depression score than the new starters group ($F = 8.16$ (1, 1588), $p = 0.004$).

	Established workers				New starters			
	Mean	SD	Min	Max	Mean	SD	Min	Max
Anxiety	7.85	4.41	0	21	7.50	3.87	1	18
Anxiety: clinical	<i>n</i> = 402; 26%				<i>n</i> = 12; 21%			
*Depression	4.82	3.74	0	20	3.35	2.83	0	11
Depression: clinical	<i>n</i> = 118; 8%				<i>n</i> = 1; 2%			

* Significantly different

Table 19
Established worker and new starter participants' outcome scores

5.7.2 Overall scores summary

Although the established workers and starting work groups were broadly similar in terms of job characteristics, perceptions and outcomes, there were some differences on specific measures.

In terms of job characteristics, those in the new starters group reported greater reward, while those in the established workers group reported greater control, and these differences seem intuitively likely.

Those in the new starters group had higher levels of job satisfaction, both overall and on specific measures including pay, promotion, reward, conditions and communications, and higher levels of work involvement. Those in the established workers group had a higher quality of working life in terms of pay, while new starters had a higher quality of working life in terms of both pride (in their work and organisation) and happiness. These differences again seem to be consistent with intuitive logic.

Finally, those in the established workers group had higher depression levels.

Overall, therefore, any differences between the two groups seem to reflect differences that are expected as a result of differences in the participants' career stage.

Comparison of the patterns of associations among the starting work and established workers groups

Comparing the patterns of association with appraisals and outcomes among the established worker and new starter cohorts also showed strong similarities. Tables 20 and 21 show the most significant associations from both datasets. Both sets of results raise the question of what the HSE management standards are measuring, in that in each case there were very strong associations between HSE overall score and JSS, JDI and QWL; these associations were significantly greater than those with work stress

(−0.36 for new starters and −0.46 for established workers), and a strong association with social support was also apparent in both datasets (see below). Furthermore, both sets of results suggest that different types of job characteristic are associated with the positive and negative appraisals but that the associations with outcomes are clearer in the established workers.

Table 20
Most significant associations with appraisals – established worker and new starter datasets

		JDI overall	JSS overall	QWL overall	Work stress	Job enjoyment	Warr overall
HSE overall	Est.	0.63, <0.0001	0.74, <0.0001	0.80, <0.0001			
	New	0.75, <0.0001	0.82, <0.0001	0.80, <0.0001		0.52, <0.0001	
Extrinsic effort	Est.				0.56, <0.0001		
	New				0.73, <0.0001		
Intrinsic effort	Est.				0.53, <0.0001		
	New				0.53, <0.0001		
Reward	Est.	0.64, <0.0001	0.71, <0.0001	0.67, <0.0001			
	New	0.61, <0.0001	0.62, <0.0001	0.54, <0.0001			
Job demand	Est.				0.58, <0.0001		
	New				0.53, <0.0001		
Social support	Est.	0.64, <0.0001	0.67, <0.0001	0.73, <0.0001			
	New	0.66, <0.0001	0.72, <0.0001	0.68, <0.0001			0.51, <0.0001
Control	Est.	0.59, <0.0001		0.65, <0.0001			
	New			0.54, <0.0001			
Fatigue	New			−0.63, <0.0001			

5.7.3 Findings for established workers and new starters

Overall, the pattern of associations seen in the established worker and new starter databases were very similar. This suggests that the starting work findings, though based on small numbers, are robust.

5.7.4 Patterns of association using the created factors

Patterns of association between individual characteristics, job characteristics, appraisals and outcomes were explored further in the new starter dataset by deriving the factors of job characteristics, appraisals and outcomes identified using the established worker dataset. Here it was also possible to control for pre-work levels of neuroticism, anxiety and depression in correlations with individual characteristics and outcomes as appropriate. In addition, measures of individual characteristics were taken from the baseline questionnaire, so they represent pre-work levels of such characteristics.

Associations with appraisals

Of the 45 possible correlations between appraisals and pre-work individual characteristics, 10 (22 per cent) were significant and nine (20 per cent) were significant after controlling for neuroticism. Of the 30 possible correlations between appraisals and job characteristics, 23 (77 per cent) were significant. Of the 10 possible correlations between the total scores for job characteristics and both job characteristics and appraisals, all were significant. The strong (0.50 or above) correlations with perceptions are shown in Table 22.

Appraisals were again most strongly associated with job characteristics. This is similar to the pattern seen among the established workers group.

Associations with outcomes and appraisals

Of the 15 possible correlations between outcomes and appraisals, 11 (73 per cent) were significant and eight (53 per cent) were significant after controlling for pre-work anxiety and depression. Of the

		Anxiety	Depression	PANAS +	PANAS –
JDI all	Est.			0.51, <0.0001	
JSS all	Est.		–0.54, <0.0001		
Warr overall					
Stress	Est.	0.50, <0.0001			
Enjoy					
HSE overall	Est.	–0.52, <0.0001	–0.57, <0.0001		
Extrinsic effort	Est.		0.50, <0.0001		
Intrinsic effort	Est.	0.62, <0.0001	0.53, <0.0001		0.53, <0.0001
	New	0.52, <0.0001			
Reward	Est.		–0.52, <0.0001		
Social support					
Control					
Uplift overall frequency					
Uplift overall intensity	Est.		–0.51, <0.0001	0.55, <0.0001	
General health					
General stress	Est.	0.62, <0.0001	0.53, <0.0001		0.59, <0.0001
Tiredness					
Fatigue	Est.	0.60, <0.0001	0.60, <0.0001		0.58, <0.0001
Symptoms: day					

Table 21
Most significant associations with outcomes: appraisals – established worker and new starter datasets

	Management support	Demand	Peer support	Skill	Total JC	Total JC & P
Management	0.86, <0.0001		0.71, <0.0001	0.51, <0.0001	0.74, <0.0001	0.89, <0.0001
Work				0.82, <0.0001	0.44, 0.006	0.58, 0.002
Stress		0.80, <0.0001			0.50, 0.001	
Reward	0.71, <0.0001		0.67, <0.0001		0.65, <0.0001	0.80, <0.0001
Peers	0.53, <0.0001		0.79, <0.0001		0.59, <0.0001	0.74, <0.0001

Table 22
Most significant associations with appraisals

27 possible correlations between outcomes and pre-work characteristics, 12 (44 per cent) were significant and six (22 per cent) remained significant after controlling for neuroticism and anxiety or depression as appropriate. Of the 18 possible correlations between outcomes and job characteristics, 13 (72 per cent) were significant and six (33 per cent) remained significant after controlling for anxiety and depression. Of the nine possible correlations between outcomes and the total measures, six (67 per cent) were significant, all of which remained significant after controlling for both anxiety and depression. The strong associations with the outcomes are shown in Table 23.

Outcomes were most strongly associated with job characteristics and appraisals (as opposed to pre-work individual characteristics), which again is similar to the pattern for the established workers group.

Table 23

Most significant associations with outcomes after controlling for anxiety (Anx.) and depression (Dep.)

		Demand	Stress	Total P	Total JC & P
Negative mental wellbeing	Anx.	-0.52, <0.0001		-0.61, <0.0001	-0.57, <0.002
	Dep.	-0.56, <0.0001		-0.62, <0.0001	-0.59, <0.0001
Physical health	Anx.	-0.51, <0.0001	-0.59, <0.0001	-0.57, 0.001	-0.57, 0.003
	Dep.	-0.54, <0.0001	-0.62, <0.0001	-0.61, <0.0001	-0.61, <0.0001

Collinearity

Correlations were also carried out to consider associations between each of the four groups of measures: pre-work individual characteristics, job characteristics, appraisals and outcomes. Most of the associations with groups of factors were moderate. Excluding the total measures (which were all highly correlated as expected), only three associations were above 0.70 (tiredness and fatigue, management support and peer support, and negative mental wellbeing and physical health), and each of these was intuitively logical.

5.7.5 Summary

Overall, therefore, outcomes were most strongly linked to appraisals and job characteristics. Appraisals, in turn, were most strongly linked to job (rather than individual) characteristics. This lends support to the process approach to work and wellbeing (ie from job characteristics, through appraisals, to outcomes). Any associations with individual characteristics, by contrast, were relatively weaker. The findings also suggest a tendency towards associations between negative or positive items more than mixed associations. In addition, the strong associations with the total measures, in particular the total job characteristics and appraisals measure, suggest that this combined, inclusive approach is particularly appropriate.

A second method of assessment, namely considering the proportion of significant associations in each set of correlations, supports the overall view of which areas were most strongly associated (see Table 24).

Table 24
Proportions of significant associations

	Pre-work individual characteristics	Job characteristics	Appraisals	Outcomes
Job characteristics	15%			
Appraisals	20%	77%		
Outcomes	22%	33%	53%	
Total measures	33%	92%	100%	67%

All of these findings are very similar to those seen in the established workers study.

5.7.6 Changes in wellbeing over time

Finally, the new starter data were used to consider changes in wellbeing, or the impact of starting work, over time. Repeated measures of the four negative wellbeing outcome measures taken at baseline (ie immediately before starting work) and again at follow-up (ie three months after starting work) showed no significant change between the two time points (see Table 25). However, with the exception of the PSS (which was virtually unchanged), all scores increased over time, indicating reduced wellbeing three months after starting work compared to before starting work. Similar analysis of the single positive wellbeing outcome measure taken at baseline and again at follow-up, though, showed a significant change, with average levels of happiness much higher at time 2 than at time 1.

There was a significant increase in positive measures of wellbeing associated with starting work. However, there was also a numerical but non-significant trend towards deterioration in negative measures of wellbeing. The small sample size and relatively short follow-up period should, of course, be borne in mind.

	Time 1		Time 2		<i>F</i>	df	<i>p</i>
	Mean	se	Mean	se			
Anxiety	7.11	0.51	7.51	0.53	0.58	1–54	0.45
Depression	2.77	0.41	3.30	0.39	2.49	1–52	0.12
PSS	46.02	0.44	45.37	0.51	1.57	1–53	0.22
PFRS-f	33.26	2.05	35.78	1.93	1.56	1–53	0.22
General happiness	11.89	0.65	20.30	0.58	56.60	1–55	<0.0001

Table 25
Changes in
outcome measures
over time

5.8 New data collection summary

The first phase of the project comprised a literature review and secondary analyses. These investigations suggested:

- limited use of positive measures in this field
- relatively little previous work taking into account the effect of other potentially important factors (such as demographics and personality)
- the importance of a multifactorial approach.

Studies of coping and attributional style showed that it was important to include appraisals of job characteristics as well as measures of the working environment. The aim of the new data collection phase of the project was to consider the extent to which work is good for health. Within this framework, it was also possible and important to begin to address the three issues identified in the first phase. A multimethodological approach was used to carry out two studies. The first was a cross-sectional survey of established workers, and the second was a longitudinal survey of young people starting work, in which participants completed questionnaires before beginning their first job and again three months later. Both studies included both positive and negative measures of job characteristics, perceptions and outcomes, as well as further measures of potentially influential individual characteristics.

Findings from both studies suggested that appraisals of job characteristics (eg perceived stress, job satisfaction) were more strongly associated with job characteristics than with individual characteristics (eg demographics), and in turn that outcomes were more strongly associated with both job characteristics and appraisals of these than with individual characteristics. This suggests that a process approach to work and wellbeing, comprising job characteristics, appraisals of job characteristics and outcomes, is appropriate. Data from the established workers study suggested that, on the whole, the relatively new positive measures of job characteristics, appraisals and outcomes were both appropriate and effective. In addition, these data suggested that positive and negative measures of job characteristics, appraisals and outcomes were measuring different concepts as opposed to opposite ends of the same spectra. A combined effects, or multifactorial, approach to work and wellbeing was also shown to be particularly appropriate. Comparisons between the established workers and new starters showed strong similarities, suggesting that the models and measures are appropriate for both groups.

In conclusion, the new data collection suggests that a process approach to work and wellbeing, comprising job characteristics, appraisals and outcomes, is appropriate. Within this, a multifactorial approach of combined effects best describes the associations between work and wellbeing. The data also suggest that the extent to which work is good for health depends not only on workers' exposure levels (ie their job characteristics), but also on their appraisals of these. This has important implications for both interventions and prevention, in that it suggests that changes in both job characteristics and/or appraisal may be associated with changes in wellbeing outcomes.

6 Conclusions

There has been a major shift in occupational health away from diseases associated with manual labour, with musculoskeletal disorders and stress, anxiety and depression currently the most prevalent occupational health issues. These are a major cause of sickness absence, loss of productivity and long-term worklessness. The cost of these to the individual, the organisation and society is considerable and there is a need for prevention and management. As well as removing negative aspects of work, it is important to determine what defines a good job and which positive job characteristics are related to improved wellbeing.

The present project had three main aims:

- to review scientific evidence on the effects of different job characteristics on wellbeing
- to conduct secondary analyses of large existing databases to address issues that could not be determined from reviews
- to conduct new studies to investigate relationships between the nature of work and health.

These aims were addressed using a multimethodological approach which included recent developments in theory and methodology (eg the process approach to wellbeing and the combined effects analysis technique). The whole project was intended, therefore, to be an integrated, multifaceted approach to a relatively new area.

6.1 Key findings of the project

6.1.1 The literature review

The literature review examined prior research to determine ‘what is a good job?’ and what evidence is present about work improving health and wellbeing. As predicted, the review identified many gaps in our knowledge. There is an extensive literature on risk factors for stress at work, the scale of occupational stress and the health outcomes associated with negative job characteristics and perceived stress. In contrast, there have been few reviews of positive job characteristics and wellbeing at work, and only a small number of relevant articles were identified. In addition, it was apparent that most of the literature had no clear philosophical background, grounding or standpoint.

Generally, most researchers have suggested that there are many key factors which lead to a good or healthy workplace or job. However, a problem with much of the research is that it is unclear whether it is the presence of positive characteristics or the absence of negative characteristics that is important. Measures of wellbeing also appear to be multifactorial (this applies to happiness, job satisfaction and quality of working life). Both direct and indirect pathways between healthy workplace practices and wellbeing have been proposed, although there is little research on factors that might modify such effects. The literature on this topic often appears very focused on specific issues and frequently fails to control for or consider the range of variables that are clearly important.

Many of the issues that emerged from the literature were addressed by secondary analyses of existing data (eg examining both the positive and negative ends of job characteristics while controlling for other job characteristics). Other issues, such as the restricted use of measures of positive job characteristics, appraisals and wellbeing, were addressed in the new data collection.

6.1.2 Secondary analyses

Much of the previous research seemed to make the implicit assumption that the absence of negative work characteristics is the same as the presence of positive work characteristics; and very little research considered whether changes in work characteristics were associated with corresponding changes in the outcome measures over time. These issues were addressed in this project’s secondary analyses of existing databases. These involved multivariate analyses of job characteristics (controlling for other factors such as demographics) with multiple health outcomes. Work characteristics were subdivided into tertiles or quintiles so that it was possible to identify the thresholds for significant associations between work and possible outcomes. It was possible, therefore, to examine dose–response relationships and to determine whether it was the presence of positive characteristics or the absence of negative characteristics that had the larger effect. Analyses including multiple factors were also conducted so that confounding influences of other variables were removed. This approach has been used in the present authors’ previous research on the combined effects of occupational health hazards.^{6,7} The analyses considering the presence or absence issue found strong associations between both negative and positive outcome and predictor

measures. These associations were independent of other potentially confounding factors. The nature of these associations fell broadly into two groups, suggesting either a dose–response type association or a greater presence effect. The analyses considering the changes over time issue showed strong associations between change in job characteristics and change in wellbeing over time. However, these analyses also showed the influential impact of levels of job characteristics at baseline, suggesting a significant impact from previous experience.

6.1.3 Individual differences

The literature review also showed that individual differences in coping and attributional style have largely been ignored. Two studies addressed these issues. The first study investigated the relationships between job demands, control, social support, efforts, rewards, coping and attributional style in predicting anxiety, depression and job satisfaction in a sample of 307 university employees from the UK. Results were compared to those from a sample of 120 members of the general population. Hypotheses predicted that workplace demands, intrinsic and extrinsic effort, and negative coping and attributional behaviours would be associated with high levels of depression and anxiety and low job satisfaction in university employees. It was also predicted that rewards, social support, job control and positive coping and attributional behaviours would be significantly associated with lower levels of depression and anxiety, and high job satisfaction. These hypotheses were supported, with social support, intrinsic effort, rewards, self blame and escape/avoidance coping, playing a particularly important role in predicting outcomes.

The second study investigated the relationships between job characteristics and coping in predicting levels of anxiety and depression in nurses. Participants were 870 nurses from the south of England. Independent variables included job demands, social support, job control, efforts, rewards and ways of coping. Hypotheses predicted that job demands, intrinsic and extrinsic effort, and negative coping would be significantly associated with higher levels of depression and anxiety, while social support, rewards, job control, and positive coping would be associated with lower levels of depression and anxiety. All hypotheses were fully or partially supported. Moderating effects of positive coping behaviours on negative job characteristics were not found. It was shown that coping behaviours significantly added to the explanation of variance in anxiety and depression outcomes, over and above the use of job characteristics alone. This indicated the importance of coping factors in wellbeing and health research, in accordance with the multifactor premise of transactional models.

6.1.4 New data collection

The aim of the new data collection phase of the project was to consider the extent to which work is good for health. Within this framework, it was also possible to begin to address issues identified by the literature review and secondary analyses, namely the relative lack of use of positive measures, the frequent failure to control for potentially influential variables and the need for a multifactorial approach to work and wellbeing.

The new data collection comprised two studies. The first was a cross-sectional survey of established workers, and the second was a longitudinal survey of young people starting work in which participants completed questionnaires before beginning their first job and again three months later. Both studies included both positive and negative measures of job characteristics, appraisals and outcomes, as well as further measures of potentially influential individual characteristics.

Findings from both studies suggested that appraisals of job characteristics (eg perceived stress at work, job satisfaction) were more strongly associated with job characteristics than with individual characteristics (eg demographics or personality), and in turn that outcomes (positive and negative mental health and physical health) were more strongly associated with both job characteristics and appraisals of these than with individual characteristics. This suggests that a process approach to work and wellbeing, comprising job characteristics, appraisals of characteristics and outcomes, is appropriate. Data from the established workers study suggested that, on the whole, the relatively new positive measures of job characteristics, appraisals and outcomes were both appropriate and effective. In addition, these data suggested that positive and negative measures of job characteristics, appraisals and outcomes were measuring different concepts as opposed to opposite ends of the same spectra. A combined effects, or multifactorial, approach to work and wellbeing was also shown to be particularly appropriate.

Comparisons between the established workers and new starters group showed strong similarities, suggesting that the models and measures are appropriate for both groups. Data from the new starters study showed no significant change in negative outcomes over time. The relatively short follow-up period and small sample size may both be implicated in this finding.

Overall, a multifactorial approach of combined effects best describes the associations between work and wellbeing. The data also suggest that the extent to which work is good for health depends not only on workers' exposure levels (ie their job characteristics), but also on their appraisals of their work. This has important implications for both interventions and prevention, in that it suggests that changes in both job characteristics and/or appraisals of work may be associated with changes in wellbeing outcomes.

6.2 Summary of the issues addressed in this report

The principal issue addressed was 'What job characteristics are good for health?' The new data collection showed that the best indicator of good health is the combined score representing the sum of positive (and absence of negative) job characteristics and the appraisals of these (eg job satisfaction, absence of stress at work). This score is far superior to individual components or specific combinations of these. Specific components are likely to be important because any interventions will aim to change those where problems are observed. However, the measure that acts as the best indicator of a good job represents the global picture, something which is more akin to the 'culture' than any individual component. Wellbeing at work will generally reflect the balance between the beneficial characteristics and their appraisals and the adverse conditions and their appraisals. However, wellbeing does not always change in a dose-response fashion for all factors, and this is something which requires further investigation. It should also be noted that health has been measured here by subjective reports. Further research can now use the present approach to look at specific diseases and also accidents and injuries. Similarly, specific sectors and groups of workers (eg older workers) can now be studied using the framework developed here. The mechanisms underlying the associations found in this study can also be addressed by combining the present approach with a more biopsychosocial model.

In summary, the present project has addressed the issues of what a good job is and how characteristics associated with a good job relate to health. The present approach can now be applied to other occupational safety and health issues that have been identified as having a high priority.

6.3 Implications of the research

This final section of the report discusses the implications of the research for theoretical development, policy and practice. Suggestions are made for further research and these focus on the ways in which the current research team at Cardiff University could develop the area.

6.3.1 Implications for theoretical development

The first question addressed by both the present project and the team's earlier research is what form an indicator assessing job characteristics should take.

The combined effects approach: are there problems?

This research has shown that the best predictor of stress, fatigue and mental health and musculoskeletal problems (and other outcomes such as accidents at work) is the total number of negative factors that a person perceives they are exposed to at work. Such effects hold up when negative affectivity is covaried. This approach was originally incorporated into the HSE Management Standards,¹¹⁷ but emphasis subsequently shifted to individual components and adjusting for negative affectivity disappeared. The combined effects approach still covers individual factors and allows one to determine whether there are selective influences (and specific problems) that underlie different outcomes. What it does initially is to show whether or not problems are present (it acts as a piece of litmus paper, warning light or flag system) and then allow a fine-grain dissection of them. The present project allowed this approach to be extended to consider positive aspects of work.

Models of stress and wellbeing

Transactional models of stress emphasise the different stages in the stress process and consider not only job characteristics but appraisals of stress and the impact of different coping styles and personal factors (eg personality, attributional style) in determining the outcomes. Mark & Smith³⁰ have applied such a model (the DRIVE model) to mental health issues and shown that it has much better predictive value than one based solely on job characteristics. Such models also show how primary, secondary and tertiary interventions can be best applied. The next step is clearly to integrate this approach with the combined effects model so that one uses scores which reflect the total influence of job characteristics, total influence of perceptions of stress and individual resources to predict different outcomes. Again, this process approach can be applied to positive aspects of work and wellbeing.

Impact of organisational factors

The present researchers' recent work on combined effects and safety culture has shown that organisational factors are important predictors of both health and safety. Future research can now add these into the current models and measuring instruments.

What makes a good job?

Future research must be relevant to a wider agenda including 'good jobs' and Health, Work and Wellbeing.¹¹⁸ Indeed, these recent topics have often been reviewed with little consideration of analysis of existing data using the Management Standards approach. For example, it has been suggested that job satisfaction is not a useful measure of a good job and that adoption of the Management Standards approach and use of the indicator tool leads to a good quality workplace. However, the present research shows that the indicator tool largely measures job satisfaction, which contradicts the above statement.

The research described in this report examined both negative and positive aspects of work and measured the relationship between these and wellbeing. The modified combined effects score can now also be expressed as a balance between bad/good features of the job and in this respect reflects a more complex version of the older models of demand–control–support and effort–reward imbalance. Similarly, the present approach to 'good jobs' included assessment of the job–wellbeing process, which requires measurement of job characteristics, perceptions of wellbeing and positive outcomes.

6.3.2 Implications for practice and policy

The major topic that has been influenced by the present research is the collation of information about the effects of different job characteristics on wellbeing. Previous approaches have largely collected information about negative effects (eg occupational stress) and developed theories, practical approaches and policies aimed at such issues. The emphasis has now shifted towards positive working environments and improving wellbeing through work. This approach can be linked to a general trend in prevention and health promotion rather than a more therapeutic stance that advocates waiting until things go wrong and then trying to correct them. The present project has shown which areas require further research and it has provided a framework that can be used both to study and also to change wellbeing in the workplace. This approach will be important for a number of reasons, which are outlined below.

Current occupational health issues

Musculoskeletal disorders and stress, anxiety and depression are currently the most prevalent occupational health issues. They are a major cause of sickness absence, loss of productivity and long-term worklessness. The cost of these to the individual, the organisation and society is considerable and there is a need for prevention and management. There is some degree of co-morbidity between musculoskeletal disorders and stress, and there is evidence of similarities in the causal factors. This suggests that a similar approach to both areas may be effective. Indeed, given the links between stress and mental illness and other diseases (eg cardiovascular disease and cancer), a unified approach may have far-reaching effects on wellbeing and long-term health. The present project provides an approach that can be applied to these areas and it can be integrated with approaches aimed at both practice and policy, while also having an impact on theoretical development.

The Management Standards approach

The Management standards approach¹¹⁷ was developed by the Health and Safety Executive (HSE) to reduce levels of work-related stress. It has two major aspects: a risk management methodology and an assessment model using an indicator tool. The Management Standards approach is a key component of the HSE's 'stress toolbox', which is being expanded by adding secondary and tertiary interventions that can deal with common mental health problems at an individual level. It is suggested that the framework developed in the present project will provide a better toolbox than one based on the Management Standards approach. For example, several weaknesses and limitations of the current Management Standards have been identified. In particular, there is a need to:

- incorporate higher level organisational factors
- balance positive and negative drivers of employee health
- provide evidence of the validity and reliability of the Indicator Tool and risk management process
- tailor the approach to specific contexts
- address the equivalence of different approaches to the topic
- provide a better link between the risk assessment and interventions
- develop a business case for managing stress and other common health problems
- educate and provide support for the users and experts.

There is also a need to expand the Management Standards approach to address issues such as:

- broadening the approach to allow it to address factors common to different conditions and those specific to particular conditions
- developing a set of competences for users of the approach
- developing more supportive compliance and enforcement regimes
- developing the approach for use with small and medium-sized enterprises
- examining the use of the Management Standards in job retention and return to work
- examining an extension of the approach to public health issues.

In terms of policy it has been argued that prevention strategies must be placed within the overarching 'health, work and wellbeing' message.¹¹⁸ This requires a wider development of the health management agenda to develop strategies that go beyond current methods of primary prevention. It is argued that the present project, combined with other aspects of research currently being undertaken at Cardiff University, provides the basis from which the following objectives can be addressed:

- development of a new form of the Management Standards that can be applied to a wider range of health issues, including positive wellbeing at work
- extension of the approach by adopting a framework that can integrate different areas and collect data to test the core concepts and models
- assessment of the feasibility and practicality of the approach in a variety of organisational contexts.

6.3.3 Implications for interventions

Wellbeing through work

The present researchers are currently part of a network in Wales (funded by the European Social Fund) that is examining measurement of wellbeing at work and the extent to which different interventions improve wellbeing and reduce the risk to job retention caused by mental health problems. This programme will provide access to a range of organisations and allow rapid and cost-effective data collection, which can extend the present project.

The role of a case manager in improving wellbeing at work

This research has involved care workers who have high levels of stress and high rates of absenteeism due to mental health problems. Following an approach similar to the Management Standards, a case manager employed by the organisation has used the information from the risk assessment to develop and evaluate secondary and tertiary interventions. A pilot study has produced a significant reduction in stress levels and reduced absenteeism due to mental health problems by 60 per cent. The case manager model provides a good example of how information from the risk assessment can then be used to beneficial effect. Again, this approach can now be used to improve wellbeing rather than just helping the individual cope with negative aspects of work.

6.3.4 Implications for communication

The Cardiff University multi-disciplinary work and wellbeing network

A multi-disciplinary research network has been set up to facilitate cross-disciplinary input (from the Social Sciences and Psychology departments, the Business School and the Medical School) into policy, practice and further research.

The Cardiff Work Environment Research Centre (CWERC) seminar series

This seminar series has allowed the university to cover many of the issues relevant to this project with over 100 organisations in Wales. It is therefore possible to examine engagement, education and the practical issues involved in translating research tools into forms which are widely acceptable. Indeed, experience with these organisations is that engagement is a crucial issue that needs to be urgently addressed. Information on ways of improving this will be obtained from the present project.

Link with job retention and return-to-work programmes

While the issue of wellbeing has been examined widely in people with established jobs, it has clearly become an issue for those whose job retention is threatened and those who are aiming to returning to work. A key issue in these areas is to focus on fulfilled employment and 'good jobs', rather than merely aiming to reduce the numbers of people not in employment.

Link with public health

It is clearly the case that occupational wellbeing should not be considered in isolation. Many of the issues covered in the present project are relevant to life outside work. Collaboration with the Cardiff Wellbeing Connect Network and the Welsh Wellbeing Network will allow the approaches developed here to be applied to other contexts.

Link with biopsychosocial approaches to wellbeing

It will eventually be important to link any developments in the occupational area with an understanding of the underlying biopsychosocial mechanisms. Collaborations with colleagues at Cardiff University and elsewhere mean that such future developments could easily occur (eg studies of gene expression, biomarkers and brain imaging can be conducted).

6.4 Possible future research

The present project has not only advanced research in the area but has implications for the next steps. Some potential further studies are outlined next.

A position paper on approaches to work and wellbeing

The approach adopted here is that existing indicator tools should be modified to reflect the total influence of job factors and perceptions of stress and wellbeing. A paper describing the development of this approach is desirable. Secondary analyses of existing data are required to support development of revised measuring instruments. For example, the present authors have shown that many of the scales of indicator tools can be replaced by single items.

Development of revised measuring instruments and validation of these

The revised measuring instruments will need to be much shorter and correlations with the existing measures will need to be examined. An initial pilot study could develop the new measures and examine the psychometric properties of the instrument. Following this, correlations between the items in the new instrument and longer validated questionnaires will need to be examined. This survey would measure:

- demographics
- nature of job
- positive and negative job characteristics
- positive and negative perceptions of the job (perceived stress, job satisfaction and so on)
- individual characteristics (negative affectivity, the attributional styles of positive and negative coping methods) and mental health outcomes (positive and negative)
- musculoskeletal disorders
- accidents, injuries and productivity
- absenteeism
- general health status (symptom checklists).

Sample sizes would be based on the effects we have observed in our current and past research. Logistic regressions would be carried out to determine the strength of associations between the new indicator tool and the outcomes controlling for possible confounders (eg demographics, personality).

Analysis of the predictive power of the new approaches

A representative sample of 2,000 participants would be selected from the electoral register and stratified to cover a range of different sectors. This data collection would provide a good test of the new indicator tool and enable evaluation of the extent to which it can be applied to new topics (eg incorporation of organisational factors, inclusion of positive factors, or use with a variety of outcomes).

Collection of new data from those with existing problems at work

The previous surveys did not set out to recruit individuals with conditions such as stress, musculoskeletal disorders or other common health problems. Further research needs to examine the current issues in samples whose job retention may be at risk because of occupational health issues.

Discussion of the framework in which the indicator tool is used

One of the major issues encountered during this project was getting organisations to engage in the assessment process. Similarly, others do not know what to do with the information from the indicator tool once they have it. These issues can be raised with the authors' research management group (the Cardiff University 'Wellbeing at work' network), local organisations (those who attend the CWERC

seminars) and the management and participants of the 'Wellbeing through work' project. The information obtained from these groups will contribute to the development of best practice and also ensure the equivalence of the variety of methods used.

References

- 1 Mark G. *The relationship between workplace stress, and job characteristics, individual differences, and mental health*. Unpublished PhD thesis, Cardiff University, 2008.
- 2 Waddell G and Burton A K. *Is work good for your health and well-being?* The Stationery Office, 2006.
- 3 Smith A, Johal S S, Wadsworth E, Davey Smith G and Peters T. *The scale of occupational stress: the Bristol stress and health at work study* (Research Report 265). HSE Books, 2000.
- 4 Mackay C, Cousins R, Kelly P, Lee S and McCaig R. Management standards and work-related stress in the UK: policy background and science. *Work and Stress* 2004; 18 (2): 91–112.
- 5 Smith A, Wadsworth E, Shaw C, Stansfeld S, Bhui K and Dhillon K. *Ethnicity, work characteristics, stress and health* (Research Report 308). HSE Books, 2005.
- 6 Smith A, Allen P and Wadsworth E. *Seafarer fatigue: the Cardiff Research Programme*. Maritime and Coastguard Agency, 2006. www.mcga.gov.uk/c4mca/research_report_464.pdf.
- 7 Smith A, McNamara R and Wellens B. *Combined effects of occupational health hazards* (Contract Research Report 287). HSE Books, 2004.
- 8 Chaplin K, Wadsworth E and Smith A P. Healthy minds at work: 2. Stress in those starting work. *Occupational Health (at Work)* 2009; 5 (5): 27–29.
- 9 Rick J, Briner R B, Daniels K, Perryman S and Guppy A. *A critical review of psychosocial hazard measures* (Contract Research Report 356). HSE Books, 2001.
- 10 Rick J, Thomson L, Briner O B, O'Regan S and Daniels K. *Review of existing scientific knowledge to underpin standards of good practice for key work-related stressors – Phase 1* (Research Report 24). HSE Books, 2002.
- 11 Warr P B. *Work, happiness, and unhappiness*. Erlbaum, 2007.
- 12 Stansfeld S A, Fuhrer R, Shipley M J and Marmot M G. Work characteristics predict psychiatric disorder: prospective results from the Whitehall II study. *Occupational and Environmental Medicine* 1999; 56: 302–307.
- 13 Stansfeld S A, Head J and Marmot M G. *Work-related factors and ill health: the Whitehall II study*. HSE Books, 1999.
- 14 Cooper C L. Stress and the global recession. *Stress and Health* 2009; 25 (2): 127.
- 15 Kuper H, Marmot M and Hemmingway H. Systematic review of prospective cohort studies of psychological factors in the aetiology and prognosis of coronary heart disease. In: Elliott P and Marmot M (eds). *Coronary heart disease epidemiology* (second edition). Oxford University Press, 2005 (pp. 363–413).
- 16 Everson-Rose S A and Lewis T T. Psychosocial factors and cardiovascular diseases. *Annual Review of Public Health* 2005; 26: 469–500.
- 17 Chandola T, Brunner E and Marmot M. Chronic stress at work and the metabolic syndrome: prospective study. *British Medical Journal* 2006; 332: 521–525.
- 18 Pressman S D and Cohen S. Does positive affect influence health? *Psychological Bulletin* 2005; 131: 925–971.
- 19 Cooper C L. Stress and well-being. *Stress and Health* 2009; 25 (3): 207.
- 20 Diener E. Subjective well-being. *Psychological Bulletin* 1984; 95: 542–575.
- 21 Cooper C L, Field J, Goswami U, Jenkins R and Sahakian B (eds). *Mental capital and well-being*. Wiley/Blackwell, 2009.
- 22 Black C. *Working for a healthier tomorrow*. Department for Work and Pensions, 2008. www.dwp.gov.uk/docs/hwwb-working-for-a-healthier-tomorrow.pdf.
- 23 Stansfeld S A and Candy B. Psychosocial work environment and mental health – a meta-analytic review. *Scandinavian Journal of Work, Environment and Health* 2006; 32: 443–462.
- 24 Stansfeld S A, Clark C, Caldwell T, Rodgers B and Power C. Psychosocial work characteristics and anxiety and depressive disorders in midlife: the effects of prior psychological distress. *Occupational and Environmental Medicine* 2008; 65: 634–642.
- 25 Foresight. *Mental Capital and Wellbeing Project outcomes*. Foresight, 2008. www.bis.gov.uk/foresight/our-work/projects/current-projects/mental-capital-and-wellbeing/reports-and-publications.
- 26 Beddington J, Cooper C L, Field J, Huppert F, Jenkins R, Jones H S, Kirkwood T B L, Sahakian B and Thomas S M. The mental wealth of nations. *Nature* 2008; 455: 1057–1060.
- 27 Allin P. Measuring societal well-being. *Economic and Labour Market Review* 2007; 1: 46–52.
- 28 Constable S, Coats D, Bevan S and Mahdon M. *Good jobs* (Research Report 713). HSE Books, 2009.
- 29 Pickvance S. What is well-being at work? *Occupational Health (at Work)* 2009; 6: 35–37.
- 30 Mark G M and Smith A P. *Stress models: a review and suggested new direction* (vol. 3, EA-OHP series edited by Houdmont J and Leka S). Nottingham University Press, 2008 (pp. 111–144).

- 31 Wadsworth E J K, Chaplin K, Allen P H and Smith A P. What is a good job? Current perspectives on work and improved health and well-being. *The Open Health and Safety Journal* 2010 (in press).
- 32 World Health Organization. *Constitution of the World Health Organization*. Basic Documents (45th edition supplement), 2006. www.who.int/governance/eb/who_constitution_en.pdf.
- 33 Barnett R C. Relationship of the number and distribution of work hours to health and quality-of-life (QOL) outcomes. *Research in Occupational Stress and Well-being* 2006; 5: 99–138.
- 34 Delhey J. *Life satisfaction in an enlarged Europe*. Office for Official Publications of the European Communities (European Foundation for the Improvement of Living and Working Conditions), 2004. www.eurofound.europa.eu/publications/htmlfiles/ef03108.htm.
- 35 Böhnke P. *First European quality of life survey: life satisfaction, happiness and sense of belonging*. Office for Official Publications of the European Communities (European Foundation for the Improvement of Living and Working Conditions), 2005. www.eurofound.europa.eu/publications/htmlfiles/ef0591.htm.
- 36 Haller M and Hadler M. How social relations and structures can produce happiness and unhappiness: an international comparative analysis. *Social Indicators Research* 2006; 75: 169–216.
- 37 Frey B and Stutzer A. Happiness research: state and prospects. *Review of Social Economy* 2005; 62: 207–228.
- 38 Kapitány B, Kovacs K and Krieger H. *Working and living in an enlarged Europe*. Office for Official Publications of the European Communities (European Foundation for the Improvement of Living and Working Conditions), 2005. www.eurofound.europa.eu/publications/htmlfiles/ef0595.htm.
- 39 Wallace C, Pichler F and Hayes B C. *First European quality of life survey: quality of work and life satisfaction*. European Foundation for the Improvement of Living and Working Conditions, 2007.
- 40 Warr P B. Searching for happiness at work. *The Psychologist* 2007; 20: 726–729.
- 41 Judge T A, Thoresen C J, Bono J E and Patton G K. The job satisfaction–job performance relationship: a qualitative and quantitative review. *Psychological Bulletin* 2001; 127: 376–407.
- 42 Kinicki A J, McKee-Ryan F M, Schriesheim C A and Carson K P. Assessing the construct validity of the Job Descriptive Index: a review and meta-analysis. *Journal of Applied Psychology* 2002; 87: 14–32.
- 43 Hochwarter W A and Kiewitz C. Positive affectivity and collective efficacy as moderators of the relationships between perceived politics and job satisfaction. *Journal of Applied Social Psychology* 2003; 33: 1009–1035.
- 44 Hillier D, Fewell F, Cann W and Shephard V. Wellness at work: enhancing the quality of our working lives. *International Review of Psychiatry* 2005; 17: 419–431.
- 45 Grawitch M J, Gottschalk M and Munz D C. The path to a healthy workplace: a critical review linking healthy workplace practices, employee well-being, and organizational improvements. *Consulting Psychology Journal* 2006; 58: 129–147.
- 46 Sauter S L, Lim S-Y and Murphy L R. Organizational health: a new paradigm for occupational stress research at NIOSH. *Japanese Journal of Occupational Mental Health* 1996; 4: 248–254.
- 47 Rose M. Good deal, bad deal? Job satisfaction in occupations. *Work, Employment and Society* 2003; 17: 503–530.
- 48 Freeman R B. Job satisfaction as an economic variable. *American Economic Review* 1978; 93: 135–141.
- 49 Freeman R B. The exit-voice tradeoff in the labor market: unionism, job tenure, quits and separations. *Quarterly Journal of Economics* 1980; 95: 643–673.
- 50 Clegg C W. Psychology of employee lateness, absence and turnover: a methodological critique and empirical study. *Journal of Applied Psychology* 1983; 68: 88–101.
- 51 Mangione T W and Quinn R P. Job satisfaction, counterproductive behaviour and drug use at work. *Journal of Applied Psychology* 1975; 60: 114–116.
- 52 Borjas G J. Job satisfaction, wages and unions. *Journal of Human Resources* 1979; 4: 21–40.
- 53 Jamal M. The job stress and job performance controversy: an empirical assessment. *Organizational Behavior and Human Performance* 1984; 33: 1–21.
- 54 Judge T A and Watanabe S. Another look at the job satisfaction–life satisfaction relationship. *Journal of Applied Psychology* 1993; 78: 939–948.
- 55 Palmore E. Predicting longevity: a follow-up controlling for age. *Journal of Gerontology* 1969; 39: 109–116.
- 56 Clark A E. Job satisfaction and gender: why are women so happy at work? *Labour Economics* 1997; 4: 341–372.
- 57 Sloane P J and Williams H. Job satisfaction, comparison earnings, and gender. *Labour* 2000; 14: 473–501.

- 58 Blanchflower D and Oswald A. *Well-being over time in Britain and the USA* (Working Paper 7487). National Bureau of Economic Research, 2000.
- 59 Frey B S. *Not just for the money*. Edward Elgar Publishing, 1997.
- 60 Krueger P, Brazil K, Lohfeld L, Edward H G, Lewis D and Tjam E. Organization specific predictors of job satisfaction: findings from a Canadian multi-site quality of work life cross-sectional survey. *BMC Health Services Research* 2002; 2: 1–8.
- 61 Edimansyah B A, Rusli B N, Naing L, Rusli B A M and Winn T. Relationship of psychosocial work factors and health-related quality of life in male automotive assembly workers in Malaysia. *Industrial Health* 2007; 45: 437–448.
- 62 Blegen M A. Nurses' job satisfaction: a meta-analysis of related variables. *Nursing Research* 1993; 42: 36–41.
- 63 Beasley J W, Karsh B T, Hagenauer M E, Marchand L and Sainfort F. Quality of work life of independent vs employed family physicians in Wisconsin: a WReN study. *Annals of Family Medicine* 2005; 3: 500–506.
- 64 Nasermoaddeh A, Sekine M, Hamanishi S and Kagamimori S. Associations between sense of coherence and psychological work characteristics with changes in quality of life in Japanese civil servants: a one-year follow-up study. *Industrial Health* 2003; 41: 236–241.
- 65 Steptoe A, Wardle J and Marmot M. Positive affect and health-related neuroendocrine, cardiovascular and inflammatory processes. *Proceedings of the National Academy of Sciences of the United States of America* 2005; 102: 6508–6512.
- 66 Steptoe A and Wardle J. Positive affect and biological function in everyday life. *Neurobiology of Aging* 2005; 26 Supplement 1: 108–112.
- 67 Ryff C D, Dienberg I, Urry H L, Muller D, Rosenkrantz M A, Friedman E M, Davidson R J and Singer B. Psychological well-being and ill-being: do they have distinct or mirrored biological correlates? *Psychotherapy and Psychosomatics* 2006; 75: 85–95.
- 68 Marsland A L, Cohen S, Rabin B S and Manuck S B. Trait positive affect and anti-body response to hepatitis B vaccination. *Brain, Behavior, and Immunity* 2006; 20: 261–269.
- 69 Polk D E, Cohen S, Doyle W J, Skoner D P and Kirchsbaum C. State and trait affect as predictors of salivary cortisol in healthy adults. *Psychoneuroendocrinology* 2005; 30: 261–272.
- 70 Tugade M M and Frederickson B L. Resilient individuals use positive emotions to bounce back from negative emotional experiences. *Journal of Personality and Social Psychology* 2004; 86: 320–333.
- 71 Rosenkrantz M A, Jackson D C, Dalton K M, Dolski I, Ryff C D, Singer B H, Muller D, Kalin N H and Davidson R J. Affective style and in vivo immune response: neurobehavioral mechanisms. *Proceedings of the National Academy of Sciences of the United States of America* 2003; 100: 11148–11152.
- 72 Blazer D G and Hybels C F. What symptoms of depression predict mortality in community-dwelling elders? *Journal of the American Geriatric Society* 2004; 52: 2052–2056.
- 73 Ostir G V, Markides K S, Black S A and Goodwin J S. Emotional well-being predicts subsequent functional independence and survival. *Journal of the American Geriatric Society* 2000; 48: 473–478.
- 74 Ostir G V, Markides K S, Peek M K and Goodwin J S. The association between emotional well-being and the incidence of stroke in older adults. *Psychosomatic Medicine* 2001; 63: 210–215.
- 75 Berkman L F and Glass T A. Social integration, social networks, social support and health. In: Berkman L F and Kawachi I (eds). *Social epidemiology*. Oxford University Press, 2000.
- 76 Cohen S and Syme S L (eds). *Social support and health*. Academic Press, 1985.
- 77 Lyubomirsky S, Tkach C and DiMatteo M R. What are the differences between happiness and self-esteem? *Social Indicators Research* 2006; 78: 363–404.
- 78 Pinquart M and Sorenson S. Influences of socioeconomic status, social network and competence on subjective well-being in later life: a meta-analysis. *Psychology and Aging* 2000; 15: 187–224.
- 79 Requena F. Friendship and subjective well-being in Spain: a cross-national comparison with the United States. *Social Indicators Research* 1995; 35: 271–288.
- 80 Cooper H, Okamura L and Gurka V. Social activity and subjective well-being. *Personality and Individual Differences* 1992; 13: 573–583.
- 81 Baldassare M, Rosenfield S and Rook K S. The types of social relations predicting elderly well-being. *Research in Aging* 1984; 6: 549–559.
- 82 Banks J, Marmot M, Oldfield Z and Smith J P. Disease and disadvantage in the United States and in England. *Journal of the American Medical Association* 2006; 295: 2037–2045.
- 83 Adler N E, Marmot M, McEwen B S and Stewart J (eds). *Socioeconomic status and health in industrial nations: social, psychological and biological pathways* (vol. 896). New York Academy of Sciences, 1999.

- 84 Subramanian S V, Kim D and Kawachi I. Covariation in the socioeconomic determinants of self rated health and happiness: a multivariate multilevel analysis of individuals and communities in the USA. *Journal of Epidemiology and Community Health* 2005; 59: 664–669.
- 85 Diener E, Suh E M, Lucas R E and Smith H L. Subjective well-being: three decades of progress. *Psychological Bulletin* 1999; 125: 276–302.
- 86 Frederickson B L. The broaden-and-build theory of positive emotions. *Philosophical Transactions of the Royal Society of London B, Biological Sciences* 2004; 359: 1367–1378.
- 87 Folkman S. Positive psychological states and coping with severe stress. *Social Science and Medicine* 1997; 45: 1207–1221.
- 88 Chen C C, David A, Thompson K, Smith C, Lea S and Fahy T. Coping strategies and psychiatric morbidity in women attending breast assessment clinics. *Journal of Psychosomatic Research* 1996; 40: 265–270.
- 89 Burgdorf J and Panksepp J. The neurobiology of positive emotions. *Neuroscience and Biobehavioral Review* 2006; 30: 173–187.
- 90 Steptoe A, O'Donnell K, Marmot M and Wardle J. Positive affect, psychological well-being and good sleep. *Journal of Psychosomatic Research* 2008; 64: 409–415.
- 91 Smith A, Wadsworth E, Moss S and Simpson S. *The scale and impact of drug use by workers* (Research Report 193). HSE Books, 2004.
- 92 Smith A, Wadsworth E, Moss S and Simpson S. *The scale and impact of medication use by workers* (Research Report 282). HSE Books, 2004.
- 93 Smith A P and Wadsworth E J K. *Safety culture, advice and performance: the association between safety culture and safety performance, health and wellbeing at an individual level, and safety culture, competent occupational safety and health advice and safety performance at a corporate level* (Research Report 09.1). Institution of Occupational Safety and Health, 2009. www.iosh.co.uk/information_and_resources/research_and_development/research_fund/idoc.ashx?docid=c979d7a4-fc21-425a-9c2b-acaa1fc1aaff&version=-1.
- 94 Mark G and Smith A P. Occupational stress, job characteristics and coping in nurses. Submitted (2010).
- 95 Mark G and Smith A P. Occupational stress, job characteristics and coping in university employees. Submitted (2010).
- 96 Cox T and Ferguson E. Individual differences, stress and coping. In: Cooper C L and Payne R (eds). *Personality and stress: individual differences in the stress process*. Wiley, 1991.
- 97 Folkman S and Lazarus R S. An analysis of coping in a middle-aged community sample. *Journal of Health and Social Behaviour* 1980; 21: 219–239.
- 98 Folkman S, Lazarus R S, Gruen R J and DeLongis A. Appraisal, coping, health status and psychological symptoms. *Journal of Personality and Social Psychology* 1986; 50 (3): 571–579.
- 99 Healy C M and McKay M F. Nursing stress: the effects of coping strategies and job satisfaction in a sample of Australian nurses. *Journal of Advanced Nursing* 2000; 31 (3): 681–688.
- 100 Kirkcaldy B D and Martin T. Job stress and satisfaction among nurses: individual differences. *Stress Medicine* 2000; 16: 77–89.
- 101 McVicar A. Workplace stress in nursing: a literature review. *Journal of Advanced Nursing* 2003; 44 (6): 633–642.
- 102 Siegrist J. Adverse health effects of high-effort/low-reward conditions. *Journal of Occupational Health Psychology* 1996; 1: 27–41.
- 103 Kuper H, Singh-Manoux A, Siegrist J and Marmot M. When reciprocity fails: effort–reward imbalance in relation to coronary heart disease and health functioning within the Whitehall II study. *Occupational and Environmental Medicine* 2002; 59: 777–784.
- 104 Karasek R, Brisson C, Kawakami N, Houtman I, Bongers P and Amick B. The Job Content Questionnaire (JCQ): an instrument for internationally comparative assessments of psychosocial job characteristics. *Journal of Occupational Health Psychology* 1998; 3 (4): 322–355.
- 105 Vitaliano P P, Russo J, Carr J E, Maiuro R D and Becker J. The Ways of Coping Checklist psychometric properties. *Multivariate Behavioral Research* 1985; 20: 3–26.
- 106 Zigmond A S and Snaith R P. The Hospital Anxiety and Depression Scale. *Acta Psychiatrica Scandinavica* 1983; 67: 361–370.
- 107 Long B C, Kahn S E and Schutz R W. Causal model of stress and coping: women in management. *Journal of Counselling Psychology* 1992; 39 (2): 227–239.
- 108 Tytherleigh M Y, Webb C, Cooper C L and Ricketts C. Occupational stress in UK higher education institutions: a comparative study of all staff categories. *Higher Education Research and Development* 2005; 24 (1): 41–61.
- 109 Lease S H. Occupational role stressors, coping, support and hardiness as predictors of strain in academic faculty: an emphasis on new and female faculty. *Research in Higher Education* 1999; 40 (3): 285–307.

- 110 Abouserie R. Stress, coping, strategies and job satisfaction in university academic staff. *Educational Psychology* 1996; 16 (1): 49–56.
- 111 Richard G V and Kreishok T S. Occupational stress, strain and coping in university faculty. *Journal of Vocational Behaviour* 1989; 34: 117–132.
- 112 Sweeny P, Anderson K and Bailey S. Attributional style in depression: a meta-analytic review. *Journal of Personality and Society Psychology* 1986; 50: 974–991.
- 113 Buckner A, Faul F and Erdfelder E. GPOWER: *a priori, post hoc* and compromise power analyses for the PC (computer program). Bonn University, 1992.
- 114 Peterson C. On shortening the Expanded Attributional Style Questionnaire. *Journal of Personality Assessment* 1991; 56: 179–183.
- 115 Kristensen T S, Hannerz H, Høgh A and Borg V. The Copenhagen Psychological Questionnaire – a tool for the assessment and improvement of the psychosocial work environment. *Scandinavian Journal of Work Environment and Health* 2005; 31 (6): 438–449.
- 116 Spector P E. Behavior in organizations as a function of employee locus of control. *Psychological Bulletin* 1982; 91: 482–497.
- 117 Health and Safety Executive. *Management Standards for work related stress*. www.hse.gov.uk/stress/standards.
- 118 Department for Work and Pensions. *Health, work and wellbeing*. www.workingforhealth.gov.uk.

Appendix 1: Articles covered by the literature review

This list covers all of the articles included in the literature review that were read in full (see pages 17–18 for more details). The papers are listed in categories of descending relevance to the present research project.

Superscript numbers after authors' names refer to the full list of articles considered for review on pages 85–88.

Most relevant

Quality of work life

Krueger *et al.* 2002⁴⁵ – cross-sectional survey

This cross-sectional questionnaire study aimed to identify organisation specific predictors of job satisfaction.

Sample

This study covered non-physician staff in six independent Canadian healthcare organisations. The overall response rate was 33 per cent, $n = 1,819$ (25–55 per cent across the six sites). The study concluded that job satisfaction is a multidimensional construct which is a product of the global evaluation of one's workplace and context. Although there are some commonalities, some predictors of job satisfaction seem to be organisation and context-specific.

Measures

The factors associated with job satisfaction for the six sites combined, in order of importance, were:

- belief that the organisation carries out its mission statement,
- good communication
- less frequently being asked to do an excessive amount of work
- good decision latitude
- being satisfied with pay level
- being satisfied with the organisation's recognition of employee contributions
- being female
- good role clarity
- being satisfied that the organisation keeps employees informed
- good team work
- being given enough time to get the job done
- good organisation–staff relations.

The factors that were significant at individual sites also included:

- good decision authority
- being satisfied with patient or resident care
- good supervisor social support
- hours per week spent on job-related activities
- job classification
- organisational support of training and development.

Wellness at work

Hillier *et al.* 2005⁴⁶ – review article

This is a review article from a UK group focusing on peer-reviewed literature published between 1993 and 2005 on research into the link between employee health and performance. It considered health problems addressed by health promotion and disease prevention, and the impact of interventions on improving health risk, reducing healthcare costs and improving worker performance.

The paper gives an overview of strategies, theories and approaches concerned with improving 'wellness' at work. The authors recognise that research has largely focused on the identification of stress in the workplace rather than the measurement or consideration of wellness. Alongside acknowledging the human benefit of addressing employee wellness, the authors highlight how

performance detriments are seen when workers become 'disengaged'. They state that workplace wellness programmes have been shown to reduce healthcare-related costs and worker absenteeism as well as improve productivity (they define wellness as a positive, sustainable state that allows us to thrive and flourish).

They conclude that a job should be much more than simply a way of earning a living. It provides identity, contact and friendship with other people, a way of putting structure in your life and an opportunity to meet goals and contribute. They suggest that there are important key success benchmarks that need to be attended to in developing a strategy to increase wellness at work in organisations. These include senior managers with the skills to manage people effectively.

Finally, it is highlighted that the issue of employee wellness needs to be dealt with at earlier stages than it is at present. As well as the problem of many senior positions being filled by people on the basis of their technical rather than people management skills, the authors suggest that awareness of wellness should start as early as possible in schools and the education system.

Path to a healthy workplace

Grawitch *et al.* 2006⁴⁷ – critical review

This is a review article from a US group.

Measures

The review identifies five general categories of healthy workplace practices:

- work–life balance
- employee growth and development
- health and safety
- recognition
- employee involvement.

They also suggest that the link between healthy workplace practices and employee and organisational outcomes is contingent on the effectiveness of the communication within the organisation and the alignment of practices with the organisational context.

It described the PATH model (practices for the achievement of total health), which reflects a synthesis of previous research. It comprises three components:

- healthy workplace practices (work–life balance, employee growth and development, health and safety, recognition, and employee involvement)
- employee wellbeing (physical health, mental health, stress, motivation, commitment, job satisfaction, morale and climate)
- organisational improvements (competitive advantage, performance and productivity, absenteeism, turnover, accident and injury rates, cost savings, hiring selectivity, product or service quality, and customer service and satisfaction).

The results showed that healthy workplace practices link to employee wellbeing and organisational improvements, and employee wellbeing and organisational improvements link to each other. They suggest a direct pathway from healthy workplace practices to organisational improvements and an indirect pathway from healthy workplace practices to organisational improvements through employee wellbeing.

European Quality of Life Survey

Wallace *et al.* 2007⁴⁸ – cross-sectional survey

Sample

This report is based on data from the 2003/04 European Foundation for the Improvement of Living and Working Conditions European Quality of Life Survey of 28 countries. This was an interview survey of approximately 1,000 respondents in each country, selected at random from people aged over 18. The report analyses the data from working respondents (about 500 per country).

Measures

The report considers the relationship between quality of work and quality of life through an analysis of how working conditions, job satisfaction and work–life balance affect life satisfaction. It

concentrates on subjective wellbeing as its measure of quality of life. Quality of work is measured on three dimensions: working conditions, overall satisfaction with work, and perceptions of work–life balance.

Overall, the results point to a rather weak association between quality of work and life satisfaction. Employment settings, such as working hours, type of contract, supervisory responsibilities, having a second job, stress and dangerous conditions at work, are weakly related to life satisfaction; in contrast, perceptions of working conditions, such as occupational status, job security and good pay, show substantially stronger relationships to subjective wellbeing.

Across all countries, people who perceive their work as being both intrinsically and extrinsically rewarding have higher levels of job satisfaction than those who do not. The multivariate analyses conclude that quality of work, whether in the form of employment setting or perceived working conditions, plays a significant role in determining levels of job satisfaction. Generally, perceptions of working conditions are the most influential. Further analyses showed that the relationship between working conditions and life satisfaction is strongly mediated by job satisfaction. Working conditions influence job satisfaction, which in turn influences life satisfaction.

Being unemployed has a strong negative impact on life satisfaction. While it may initially seem that providing jobs of any kind is important, job quality is also crucial. Having better quality employment and a good work–life balance lead to higher job satisfaction levels and a higher level of life satisfaction than other kinds of working conditions do.

Psychosocial work factors and health-related quality of life Edimansyah *et al.* 2007⁴⁹ – cross-sectional survey

Sample

This is a cross-sectional questionnaire study from Malaysia. The aim of this article was to look at the associations between psychosocial work characteristics and health-related quality of life in automotive assembly workers. Participants were males with a minimum of one year's experience who had no reported psychiatric illness.

Measures

The survey found that created skill was positively associated with physical health and psychological domains of health-related quality of life, while skill discretion was positively associated with social relationship and environment domains. Social support was positively associated with physical health and environment domains, while co-workers support was positively associated with psychological and social relationship domains. Job insecurity and hazardous conditions were negatively associated with all domains, while psychological job demands were negatively associated with the environment domain. In order to improve the health status of these workers, the authors suggest that job security and hazardous conditions are the two areas which should be focused on.

Job satisfaction in occupations Rose 2003⁵⁰ – secondary analysis

Sample

This paper presents secondary analysis of the British Household Panel Survey data of 1999, in which 7,365 employees were interviewed.

Measures

The analysis focuses on job satisfaction. The author argues that when examining satisfaction, more attention needs to be paid to distinguishing carefully between the terms 'job' and 'work'. 'Job satisfaction' should be used to describe the extrinsic factors, such as employment contract, skill and finance, while 'work satisfaction' relates to intrinsic factors such as employee involvement, empowerment and self-actualisation.

The paper suggests that there is little evidence that variables bearing on the socio-psychological environment of a job exert the primary influence on job satisfaction scores. But variables relating to the quality of working life in terms of wellbeing and time clearly emerge as important. A regression analysis was conducted and the two strongest predictors of satisfaction were found to be work-related stress and hours worked. The model therefore indicates that employers who wish to increase employee job satisfaction could in all probability do so most immediately and effectively by seeking

ways to reduce hours of work and work-related stress factors (themselves often time-related), rather than through reforms directed at the socio-technical quality of work life.

Work, happiness and unhappiness

Warr 2007¹⁷ – book

In this book, a number of key concepts are deconstructed to make them more meaningful and measurable. For example, a distinction is made between two types of happiness: ‘wellbeing’, which relates to feelings, pleasure and excitement; and ‘self-validation’, which looks beyond pleasure to concepts of self-realisation and being true to oneself.

A key contribution is Warr’s ‘vitamin analogy’, which likens positive work environment features to vitamins. Increased vitamin intake is beneficial, but at a certain point greater intake will make no further difference.

Key variables

Warr suggests a list of 12 key characteristics of any job which must be considered when investigating happiness at work:

- opportunity for personal control
- opportunity for skill use
- externally generated goals
- variety
- environmental clarity
- contact with others
- availability of money
- physical security
- valued social position
- supportive supervision
- career outlook
- equity.

Warr discusses how such job characteristics should be considered in combination and suggests that the combined effect of variables may be interactive and not just additive.

In relation to unemployment and retirement, Warr concludes that unemployment causes ‘considerable unhappiness’, but that findings in relation to retirement are considerably more mixed.

Searching for happiness at work

Warr 2007⁵¹ – summary article

The author outlines six issues which need to be considered when designing future research:

- consider multiple aspects, as there are different scopes of happiness – context-free, domain-specific and facet-specific – which need to be distinguished from each other
- examine a wide range of environmental sources: Warr identifies 12 environmental sources of happiness
- look for non-linear patterns, as some desirable environmental sources become undesirable at high levels
- explore mental processes as well as environmental features; these influential mental processes can be explored in terms of the judgments made when appraising a situation
- recognise the importance of personal baselines, as people are consistent in their behaviours and mental processes across times and settings
- acknowledge that unhappiness is essential to happiness; in many settings people can only experience happiness in the presence of its converse, so one is dependent on the other.

This paper is a summary of all the key points from the book reviewed above which are pertinent to this review.

Number and distribution of work hours to health and quality of life Barnett 2006⁵² – review article

Measures

This represents a thorough consideration of the issue of working hours and quality of life. Alongside a review of the field, the author also reports on the results from two new studies designed to ‘fill some of the critical knowledge gaps’. A major conclusion is that working hours per se are not strongly related to health and quality of life outcomes. Instead, issues such as the distribution and pattern of working hours should be considered as more critical. Also, the author argues that analysis should not focus on the individual, as most people’s lives interact with those of others. Decisions and consequences relating to working hours are experienced in a wider context that should be reflected in any research strategy.

Little attention has been paid to the idea that working long hours may be associated with positive outcomes. Those who work longer hours typically earn more money than those who work shorter hours. In addition, they generally have more benefits, greater opportunity for advancement and higher job security. Engagement in both work and family roles may lead to work–family enrichment which is another positive outcome.

Of particular note is the fact that the author dedicates considerable attention to methodological concerns. Where large numbers of studies are conducted without due consideration of confounding variables and causal ambiguities, Barnett highlights that methodological diligence is essential if valid and meaningful conclusions are to be drawn. Overall the author concludes that long work hours appear to be a weak predictor of both negative and positive outcomes.

Is work good for your health and wellbeing? Waddell & Burton 2006¹⁸ – review

A broad perspective is used to assess the question of whether work is good for you. This is done by means of a systematic review of the literature. The report starts with the general question of whether work is good for you before breaking this down and answering it from a number of different angles. Where the authors set out to draw a general conclusion on the issue of work and wellbeing, it becomes clear that such a broad generalisation may not actually be appropriate, given the huge complexity of the issue.

The value of this review, therefore, lies in the detail and how it explores all aspects of the work and wellbeing debate from unemployment to disability and older age. The background for such discussion is also usefully examined in terms of what work represents in our society.

Methodologically, the review is comprehensive and can therefore be considered of considerable value in the current context. Papers were reviewed on the basis of both their relevance to the subject, and also their methodological soundness. Considering a range of perspectives on the subject, the authors conclude that work is generally good for you.

Moderately relevant

Positive affectivity and collective efficacy as moderators of the relationship between perceived politics and job satisfaction Hochwarter & Kiewitz 2003⁵³ – cross-sectional survey

Sample

This is a cross-sectional questionnaire survey of US university staff.

Measures

The paper focuses on the impact of work politics on job satisfaction and looks at whether positive affectivity and perceived collective efficacy are moderators. The authors also consider the multiplicative effects of these variables on the relationship between perceptions of politics and job satisfaction.

They found that low positive affect–low perceived collective efficacy individuals were less satisfied with their jobs when levels of ‘go along to get along’ politics increased. Also, high positive affect–high perceived collective efficacy individuals reported a significant inverse relationship between perceived

politics and job satisfaction. That is, positive affectivity and perceived collective efficacy were found to interact jointly with the 'go along to get along' dimension of organisational politics to predict job satisfaction. However, there were no significant relationships between positive affect, perceived collective efficacy and general political behaviour, or pay and promotion politics.

Interactive effects of positive affect and a sense of competency on the politics perceptions–job satisfaction relationship

James *et al.* 2005⁵⁴ – longitudinal survey

Sample

This paper describes a questionnaire study of nurses and other care-giving staff in US nursing homes, during which individuals were surveyed at six-monthly intervals up to five times over a period of two and a half years.

Measures

In contrast to the previous paper, this article looks uses positive affect (PA) and sense of competency (SOC) as the 'buffer' variables. Factor analysis suggested that job satisfaction was explained by three domains – pay, management and work. Regression analyses showed that those working full-time were less satisfied with pay but more satisfied with work than those working part-time. As predicted, high positive affect and high sense of competence were found to buffer the effects of negative work politics.

Quality of work life

Beasley *et al.* 2005⁵⁵ – cross-sectional survey

Sample

This was a cross-section questionnaire survey of US family physicians. It was a commission-style study looking at the specific issue of quality of working life amongst physicians in Wisconsin.

Measures

The authors found that independent physicians had significantly more positive ratings of several aspects of the quality of their work life compared with physicians employed by healthcare organisations, including:

- better working relationships
- more satisfaction with family time
- more influence over management decisions
- better satisfaction with being a physician
- better perceived quality of the care they provided
- greater ability to achieve professional goals
- less intention to leave the practice.

Benefits of a preventive job search program on re-employment and mental health

Vuori & Silvonen 2005⁵⁶ – case-control study

Sample

This paper from a Finnish group compares unemployed job-seekers involved in a preventive job search programme which aims to facilitate return to the job market and prevent the negative mental health consequences of unemployment by strengthening job-search self-efficacy and inoculating against setbacks. The 1,230 individuals were randomly assigned to the case and control groups.

Outcomes

The study found that, at a two-year follow-up, those in the programme were more likely to be working or training and had significantly decreased symptoms of depression and increased self-esteem.

Sense of coherence, psychological work characteristics and changes in quality of life

Nasermoaddeli *et al.* 2003⁵⁷ – longitudinal survey

Sample

This paper reports a one-year follow-up questionnaire study of Japanese civil servants.

Measures

It found that sense of coherence was positively associated with all four domains of the WHO Quality of Life questionnaire:

- physical health (eg pain, energy, sleep, mobility)
- psychological (eg positive feelings, self-esteem, body image)
- social relationships (eg personal relations, sex, social support)
- environment (eg physical safety, transport, home environment, access to health and social care)

Job control was related positively to physical health, psychological and social relationship domains, while job demand was negatively related to the physical health domain. The paper concludes that a higher sense of coherence and job control could result in better subjective feelings of wellbeing. It is generally not viable to reduce job demand, so increasing the latitude of control may improve physical health. The authors note that their findings suggest that sense of coherence can predict the movement towards health in a one-year follow-up.

Home-working and work–life balance: does it add to quality of life?

Moore 2006⁵⁸ – cross-sectional survey

Sample

This paper describes data from questionnaires and interviews with UK home-workers.

Measures

Examination of home-workers found they reported average levels of stress and this did not differ by occupation. Differences were found that depended on age of children, whether the respondents were traditional or professional home-workers (ie low-skilled vs high-skilled) and gender. Traditional home-workers were generally women who combined working and caring for their children, while in the case of professional home-workers, the children were generally cared for somewhere else. Most reported flexibility as the main benefit of home-working and believed that this helped to improve their work–life balance. The biggest challenge they faced was overworking.

The authors suggest that if quality of life concerns subjective and objective wellbeing (here GHQ), then home-working in general does not increase quality of life. Rather, working from home has both a positive and negative impact on particular home-workers, varying by type of home work, the reason for home-working and expectations, as much as by psychological factors such as motivation and control. The author also points out that social supports, such as appropriate childcare and a social network that can sustain home-working practices, can be useful in improving the working lives of many.

Quality of work life

Telford 2004⁵⁹ – review article

This is a narrative review and not a research paper, and is therefore of limited use. The main point raised is that nursing standards have dropped; this can be traced back to factors such as substandard supervision and lack of recognition. The focus is on how quality of working life has deteriorated, which does not align with the interests of the present study. This article may be useful for background commentary on wellbeing issues, but has no research value.

Resident job satisfaction and quality of life

Bailit *et al.* 2005⁶⁰ – cross-sectional survey

This paper describes a cross-sectional questionnaire survey of US ob-gyn residents, and looks at working hours and working conditions, job satisfaction and quality of life. It concludes that a reduction in work hours improved respondents' satisfaction with their personal lives but did not alter their job satisfaction levels.

After restrictions were implemented, participants reported working fewer hours per week (89 vs 83), sleeping less while on call (3 vs 2 hours) and greater satisfaction with personal lives. No differences were seen for number of shifts per week (24), average hours of sleep outside the hospital and satisfaction with work.

The authors point out, however, that a restriction to 80 hours per week still means that residents work much longer hours than other workers.

Women, work, and wellbeing

Klumb & Lampert 2004¹⁴ – review article

This review summarises 161 measures of the effects of women's employment on wellbeing. The results from the methodologically strong papers confirm that paid employment has no adverse effects on women. One important consideration is that the same roles can have different effects depending on the context and a range of other factors. Therefore the question should be under which conditions employment becomes adverse or beneficial.

This review imposed strong methodological constraints on the studies included. These papers were classified into two groups: Type II, including the methodologically strong papers ($n = 13$), and Type I, which included the remaining papers ($n = 140$).

Of the 91 Type I studies looking at employment and psychological distress, 48 reported beneficial effects, six adverse effects and 18 no effect. Both of the Type II studies found employment to have a beneficial effect. Employment was associated with reduced psychological distress in women. With regard to physical health, differences were seen that depended on the type of studies conducted. The majority of Type I studies reported beneficial effects, but Type II studies did not show employment to be associated with health. With regard to studies of cardiovascular risks and diseases, both types of study were similar. One study found a beneficial effect of employment, while the remaining two found no effects. The clearest effect was found for mortality; all but one study demonstrated that employed women were at an advantage over non-employed women. Overall the longitudinal studies show that employment either has a beneficial or neutral effect on women's health. Studies of subjective distress and mortality showed a benefit for employment, whereas studies of subjective health or cardiovascular risks and diseases obtained neutral results. The main conclusion is that both type I and type II studies generally find employment to either be either beneficial or neutral to women's health.

Quality of working life

Schouteten 2004⁶¹ – cross-sectional survey

Sample

This paper explored whether group work, or team working, improved the quality of working life in three jobs in two organisations: home helps, district nurses and specialised district nurses. One organisation used a team-based approach while the other was largely focused on individuals.

Measures

The quality of work life was measured using WEBA analyses, which included seven characteristics of 'good jobs':

- completeness of work
- difficulty of work
- monotony of work
- workplace autonomy
- interaction potential
- presence of organising tasks
- information provision.

The results revealed that the job of home help in both organizations was not challenging, with routine tasks. However, in the team-based organisation, workers were responsible for extra tasks. This made their jobs more complete and less monotonous but increased their job pressures. District nurses in the team-based organisations were found to be better equipped to deal with job control needs, and extra tasks again made the work more complete and challenging, despite consultation with colleagues being problematic. Once again, the job of specialised district nurse in the team-based organisation was found to be more complete and challenging than in the traditional organisation. It appears that the positive aspects of team-based groups include jobs that are more challenging and complete with more autonomy and job decision latitude, but also entail more work pressure as work is intensified. More control needs of these occupational groups would require more job control capacity to level the work–pressure balance. The conclusions were that team-based groups could improve the quality of home-based patient care and the quality of working life, but that more complex jobs with more control require higher levels of discretion. The author concludes that team-based work brings with it increased job decision latitude, but also higher work pressure.

Quality of work-life for nurses

Hofmeyer 2003⁶² – narrative article

This narrative article looks at how the working environment and organisational culture can affect health and wellbeing in nurses. In addition it considers what makes a good team and why people may prefer to work on some wards but not others. The aim is identify ways to retain qualified nurses and combat the low levels of staffing that the nursing profession is currently experiencing. This was a review of the literature from both a psychological and sociological perspective.

The majority of nurses report leaving their position due to inadequate or inflexible workplace management practices and feelings of being overburdened, oppressed, marginalised or undervalued by senior colleagues or peers. There is a strong correlation between individuals' perception of respect, inclusion and control in their workplace, and their health and wellbeing.

Organisational culture is an indicator of wellbeing in an organisation. Better working conditions may lead to better health of workers, which may in turn lead to better productivity of organisations.

Determinants of staff job satisfaction

Castle *et al.* 2006⁶³ – cross-sectional survey

Sample

This paper describes a questionnaire study of nurses and other care-giving staff in US nursing homes during which individuals were surveyed at six-monthly intervals up to five times over a period of two and a half years.

Measures

Factor analysis suggested that job satisfaction was explained by three domains – pay, management and work.

Regression analyses showed that males were less satisfied with work than females, married caregivers were less satisfied with work and pay, and older workers were slightly more satisfied with pay. Nursing assistants were less satisfied with pay than nurses, although they were relatively more satisfied with the work. The full-time caregivers were less satisfied with pay than the part-time workers but more satisfied with the work. Those who had been working for between one and five years were generally less satisfied than those who had been working less than a year or more than five years. Caregivers' perception of quality of care was associated with all three of the job satisfaction domains.

Quality of work life

Tung-Chun *et al.* 2007⁶⁴ – cross-sectional survey

Sample

This is a questionnaire study of auditors in Taiwanese accounting firms that focused on the impact of quality of work life (QWL) on career and organisational commitment, and how these commitments affect respondents' intention to leave.

Measures

Correlations revealed a significant positive association between all four QWL dimensions (work-life balance, job characteristics, supervisory behaviour, and compensation and benefits) and career commitment and affective commitment. They were all significantly and negatively related to intention to leave. This suggests that different dimensions of quality of work life lead to different kinds of human resources outcomes: job characteristics and compensation or benefit are good for development of professionalism; work-life balance, supervisory behaviour and compensation or benefits are good for organisational commitment; and perception of work-life balance is good for intention to leave.

Quality of life, sense of coherence and subjective health

Axelsson *et al.* 2005⁶⁵ – cross-sectional survey

Sample

This is a cross-sectional Swedish questionnaire study aiming to describe and analyse upper secondary school students' work attitudes and factors related to these attitudes.

Measures

A total of 551 students completed a questionnaire (response rate 91 per cent) which assessed a number of factors including quality of life, sense of coherence and work ethics.

Using multivariate techniques, the authors conclude that individual factors such as female gender, good quality of life, high sense of coherence, good health, support from both parents, positive experience of school and work contacts are positively related to attitudes towards work.

Not directly relevant

Quality of work life

Beasley *et al.* 2004⁶⁶ – cross-sectional survey

Sample

This cross-sectional questionnaire survey compared the level of quality of US family physicians' work life between in healthcare organisations (their employers).

Measures

The study focused on satisfaction levels and their association with both intention to leave and satisfaction with delivery of care. The work showed significant differences between healthcare organisations and suggested that some were doing better than others at working with their physicians to maximise their satisfaction with the organisation, reduce the likelihood of staff turnover, and enable them to reach their professional goals.

Quality of work life

Caceres 2002⁶⁷ – cross-sectional survey

Sample

This cross-sectional questionnaire survey assessed the impact of training on the quality of life at work among those in the main large cities of Argentina, Brazil and Chile.

Measures

It focused on the impact of training on employability, income and income security. The results suggested that training was associated with an improvement in job security and income level, but also with a deterioration in working conditions (such as work intensity, duration and hazards).

Work improvement and occupational safety and health management systems

Kogi 2002⁶⁸ – review article

Sample

This review article considered occupational safety and health management systems (OSHMSs) across several Asian countries and Australia and New Zealand.

Measures

It focused on comparing OSHMSs between countries and identifying differences and similarities. It concludes by encouraging a multifaceted approach to risk assessment, which should consider other working life factors, and points out that locally adjusted procedures for risk assessment and control must be developed.

Improving the sleeping conditions of night shift workers

Hirose 2005⁶⁹ – review article

This review article provided a summary of the author's previous research on the health of shift workers.

Sample

It described interventions made at two Japanese factories among night-shift workers, and concluded that occupational physicians can improve conditions by monitoring shift workers' health, applying naps and designing schedules for deep, sufficient sleep.

Implementation of an approach to services for mental health consumers Akabas *et al.* 2006⁷⁰ – descriptive article

This paper from a US group described a programme for promoting employment among people with mental health conditions. It focuses on the need to integrate recruitment services and vocational rehabilitation for mental health consumers, and stressed the need for communication between various groups as well as the importance of allowing the consumer to build networks and participate in career clubs (skills development) when looking to start work.

Relationship and work fulfilment in judgments of life quality Twenge & King 2005⁷¹ – scenario study

Measures

This paper from a US group described three scenario studies considering the relative contributions of relationship and work fulfilment to perceived quality of life (where a 'good' life was defined as desirable and morally good).

Sample

The participants were college students and a community-based adult sample. It concluded that while fulfilling personal relationships was essential to good quality of life, work fulfilment was a plus but was not essential. The authors suggest that this is because the relationships domain meets the most intrinsic needs.

Quality of life in and outside the work environment Marques 2006⁷² – literature review and qualitative study

Sample

The paper described a literature review and two qualitative studies in the US focusing on ways in which non-managerial workers could contribute to establishing spirituality at work. The work focused on changing individuals' internal perceptions, and then these individuals doing the same for their colleagues to create a supportive atmosphere at work.

Measures

It argued that if an individual receives feelings of trust, belonging, meaning and fulfilment, this will improve quality of life, create a greater sense of wellbeing and increase satisfaction with work, and therefore decrease stress outside work. It concluded that workers at different levels can help establish spirit at work, but that some workplaces are not susceptible to a spiritual mindset.

Strategy for improved workers' health Smith 2002⁷³ – review article

This is a review article intended to increase awareness and marketing of an improved health and safety programme among US military medical personnel. Its focus was very much on promoting a health and safety programme within the military.

The quality of work life Bodek 2003⁷⁴ – letter

This letter to a journal editor put forward the author's view on what quality of work life is and how it can be improved. It suggested that people want to feel respected at work for what they do and who they are, and that they want good communications with superiors, fellow workers and customers. In addition, for many people, being part of a team is important and individuals need to feel valued for their skills, their knowledge and their participation in the creative improvement process. It concluded that managers need to install a process that encourages and allows workers to participate in the improvement process. It also pointed out that management cannot impose a quality of work life, but they can allow workers to have creative input, and it is from this creativity that true quality of work life arises.

Review of health-related quality of life and work impairment in bipolar disorder Dean *et al.* 2004⁷⁵ – literature review

This literature review by a US team looked at health-related quality of life, physical and social function and work impairment among people with bipolar disorder. It identified 14 articles relating to bipolar and work impairment.

The measures used varied greatly and only a few were used by more than two researchers, and concluded that those with the condition report greater long term unemployment, absenteeism due to emotional problems and somatic complaints and poor work function compared to those with other mental health problems.

The Job Descriptive Index

Kinicki *et al.* 2002¹³ – methodological article

This methodological paper looked at the reliability of the Job Descriptive Index (JDI), which measures job satisfaction.

Measures

The original conceptualisation of the JDI included two key subcomponents: a longer-term assessment of how participants feel about their job compared to other jobs in their lifetime; and a shorter-term assessment of how much satisfaction they feel on a day-to-day basis. The authors suggest that this scale is used to measure job satisfaction more than any other. They conducted a meta-analysis to assess the construct validity of the scale, which they concluded was generally good.

Job satisfaction and job performance

Judge *et al.* 2001¹² – review article

This methodologically focused review looked at research which has considered the relationship between job satisfaction and performance. It focuses on the nature of this relationship, particularly in terms of the direction of causality. The conclusion from the meta-analysis is an estimate of correlation between job satisfaction and performance of approximately 0.30.

The mental health effects of unemployment

Paul & Moser 2006¹⁶ – review article

This literature review and meta-analysis focuses on the underlying processes behind the association between poorer mental health and unemployment. The authors test their theory of incongruence, which is that unemployed people suffer greater negative health effects because there is incongruence between their employment commitment and their employment situation – ie if people place high value on work but are out of employment, this causes them distress. Similarly those in employment but with low work commitment will also suffer from incongruence and therefore negative mental health effects. The reported findings supported the theory.

Work ethic

Miller *et al.* 2002¹⁵ – review article

This review examined the construct of the 'work ethic' and its measurement. Its focus was methodological and it concluded that the Multidimensional Work Ethic Profile gives psychometrically sound measures of the multiple dimensions of the work ethic.

Job satisfaction and retention study

Haut *et al.* 2006⁷⁶ – prospective longitudinal survey

Sample

This longitudinal study considered whether job satisfaction and job retention for intensive care nurses in a US hospital improved with a change in the management of their unit (from a 'mandatory consultation' to a 'semi-closed' surgical intensive care unit).

Measures

Nurses were surveyed with questions on job satisfaction during the year-long transition at five time points at three-month intervals. Job satisfaction was found to have improved significantly, and there was an associated significant decrease in hospital spending on temporary agency nurses as well as a trend toward increased staff nurse job retention. The authors also suggested that there were implications that a stable workforce, and the introduction of nurse practitioners, could benefit both the staff and patients as communication between physicians and nurses improved resulting in the clarification of patient care orders and improved continuity of care.

Job satisfaction, motivation and productivity

Martin 2004⁷⁷ – commentary article

This was an invited commentary to an article by Wiegand & Geller (2004) addressing the potential contribution of positive psychology to organisational behaviour management – ie focusing on the positive features of individuals' experience, traits and their institutions to bring about enhanced productivity and wellbeing in the workplace. The article suggested that workplaces which foster individuals' self efficacy, control and persistence, and reduce their anxiety, are best placed to develop and support individuals' resilience to setback, stress, pressure, challenge, and adversity in the workplace. In addition, it suggested that interventions would be most successful if they addressed worker and supervisor relationships, group relationships and effects, improved staff morale, support functions (eg counselling), value placed on what one does and one's organisation, balancing levels of challenge and skill, enhancing self-efficacy, making works feel like they belong, and enhancing a sense of community. The article emphasised the need for a multilevel approach to evaluating organisational climate.

Quality of work life

Cohen *et al.* 2007⁷⁸ – cross-sectional survey

Sample

This cross-sectional questionnaire survey examined differences in the quality of US child protection investigators' work life between those working in public child welfare agencies (traditional) and a law enforcement agency (a new and experimental approach).

Measures

Respondents in the law enforcement agency had a higher quality of work life and were more satisfied with their jobs and work environment. This group also had lower staff turnover rates. The authors speculated that the higher quality of work life may be because of the (perceived) availability of greater resources and equipment (including cars, laptops and, in some cases, higher salaries). They also suggested that other items, including staff development, concern for health and safety, participations in decisions, good communications and opportunity for advancement, were important. In addition, they recognised the possibility that the law enforcement agency environment may have been seen as new and exciting and as an opportunity to address a serious problem, while the traditional agencies had suffered criticism (including in the media) and unsuccessful reorganisation. Furthermore, they suggested that the two environments' cultures were fundamentally different. They concluded that quality of work life is not just a function of the job itself but can vary with the work environment and organisational culture and norms of the setting.

Organisational citizenship behaviours and perception of workplace safety

Gyekye & Salminen 2005⁷⁹ – cross-sectional survey

Sample

This was a cross-sectional questionnaire interview survey of Ghanaian industrial workers.

Measures

It found a positive association between safety perception and organisational citizenship behaviours (OCBs – discretionary behaviours that go beyond those formally prescribed by the organisation and for which there are no direct rewards – eg volunteering to replace a sick co-worker or providing innovative ideas to improve operations). It also found that those active in OCBs expressed more job satisfaction, were more compliant with safety management policies and had a relatively lower accident involvement rate.

Psychosocial work conditions and quality of life

Tobias-Adamczyk & Brzyski 2005⁸⁰ – cross-sectional survey

Sample

This was a Polish cross-sectional interview study of a community-based sample of 65-year-olds.

Measures

It suggested that high physical job demands combined with low job control diminished job satisfaction in women; that high physical job demands or efforts combined with low control and reward decreased self-rated health scores; and that high psychological job demands and efforts combined with low job control and rewards increased functional independence in both genders. The

authors suggested that their results confirm the relationship between job stress and general wellbeing or self-reported health, and the relationship between psychosocial dimensions of work and predictors of healthy ageing and health outcomes of some job characteristics.

Full list of articles considered for inclusion in the literature review

- 1 Degenholtz H and Kane R. Nursing homes as a place where people work and live: job satisfaction, turnover, workplace injuries, and quality of life. *Gerontologist* 2004; 44: 61–62.
- 2 Weinberg J. OSHA's voluntary protection programs: recognizing the best in worker safety and health. *Gravure* 2003; 10: 68–71.
- 3 Kudielka B M, von Kanel R and Fischer J E. Health related quality of life (SF12): association with psychosocial work characteristics and chronic distress (exhaustion) in a working population. *Journal of Psychophysiology* 2004; 18: 231–232.
- 4 Sale J E M and Smoke M. Measuring quality of work-life: a participatory approach in a Canadian cancer center. *Journal of Cancer Education* 2007; 22: 62–66.
- 5 Saraji G N and Dargahi H. Study of quality of work life (QWL). *Iranian Journal of Public Health* 2006; 35: 8–14.
- 6 Souza L B and Figueiredo M A D. Work and quality of life: workers' strategies for coping with professional wear. *International Journal of Psychology* 2004; 39: 447.
- 7 Smoke M and Sale J. Measuring quality of work-life: a participatory approach in a Canadian cancer centre. *Radiotherapy and Oncology* 2005; 76: S50.
- 8 Kudielka B M, von Kanel R and Fischer J E. Health-related quality of life: association with psychosocial work characteristics and chronic distress (exhaustion)? *Journal of Psychosomatic Research* 2003; 55: 151.
- 9 Arutyunov A T and Turzin P S. К вопросу о сохранении и улучшении профессионального здоровья государственных служащих (On preservation and improvement of occupational health of state employees). *Медицина труда и промышленная экология (Meditsina truda i promyshlennaya ekologiya)* 2006; 5: 1–7 (article in Russian).
- 10 Kentner M. Integrierte Versorgung und medizinische Versorgungszentren (§§140 ff. und §95 Abs. 1 SGB V) unter Beteiligung der Arbeitsmedizin – Voraussetzungen, Realisierung, Benefit (Integrated healthcare and medical service centres (§§140 ff. and §95 Abs. 1 SGB V) involving occupational medicine – presuppositions, realisation, benefit). *Arbeitsmedizin Sozialmedizin Umweltmedizin* 2004; 39: 584–592 (article in German).
- 11 Pronk N. A sense of urgency to improve employee health: the bottom line and the role of worksite health promotion. *ACSM's Health and Fitness Journal* 2003; 7: 6–11.
- 12 Judge T A, Thorensen C J, Bono J E and Patton G K. The job satisfaction–job performance relationship: a qualitative and quantitative review. *Psychological Bulletin* 2001; 127: 376–407.
- 13 Kinicki A J, McKee-Ryan F M, Schriesheim C A and Carson K P. Assessing the construct validity of the Job Descriptive Index: a review and meta-analysis. *Journal of Applied Psychology* 2002; 87: 14–32.
- 14 Klumb P L and Lampert T. Women, work and well-being 1950–2000: a review and methodological critique. *Social Science and Medicine* 2004; 58: 1007–1024.
- 15 Miller M J, Woehr D J and Hudspeth N. The meaning and measurement of work ethic: construction and initial validation of a multidimensional inventory. *Journal of Vocational Behavior* 2002; 60: 421–489.
- 16 Paul K I and Moser K. Incongruence as an explanation for the negative mental health effects of unemployment: meta-analytic evidence. *Journal of Occupational and Organizational Psychology* 2006; 79: 595–621.
- 17 Warr P B. *Work, happiness, and unhappiness*. Erlbaum, 2007.
- 18 Waddell G and Burton A K. *Is work good for your health and well-being?* Department for Work and Pensions and The Stationery Office, 2006.
- 19 Bech P, Andersen M B, Bech-Andersen G, Tonnesen S, Agnarsdottir E and Borg V. Work-related stressors, depression and quality of life in Danish managers. *European Psychiatry* 2005; 20: S318.
- 20 Dargahi H and Sharifi Yazdi M K. Quality of work life in Tehran University of Medical Sciences hospitals' clinical laboratories employees. *Pakistan Journal of Medical Sciences* 2007; 23: 630–633.
- 21 Hanebuth D, Meinel M and Fischer J E. Health-related quality of life, psychosocial work conditions, and absenteeism in an industrial sample of blue- and white-collar employees: a comparison of potential predictors. *Journal of Occupational and Environmental Medicine* 2006; 48: 28–37.
- 22 Kogi K. International research needs for improving sleep and health of workers. *Industrial Health* 2005; 43: 71–79.

- 23 Layer J K. *Human performance in agile production systems: a longitudinal study in system outcomes, human cognition, and quality of work life*. Dissertation Abstracts International: Section B: The Sciences and Engineering, 2006.
- 24 Martel J P and Dupuis G. Quality of work life: theoretical and methodological problems, and presentation of a new model and measuring instrument. *Social Indicators Research* 2006; 77: 333–368.
- 25 Nasl Saraji G and Dargahi H. Study of quality of work life (QWL). *Iranian Journal of Public Health* 2006; 35: 8–14.
- 26 Nieuwenhuijsen K, Verhoeven A C, Bültmann U, Neumeyer-Gromen A and Van Der Feltz-Cornelis C M. *Interventions to improve occupational health in depressed people (review)*. Wiley, 2008.
- 27 Van Laar D, Edwards J A and Easton S. The work-related quality of life scale for healthcare workers. *Journal of Advanced Nursing* 2007; 60: 325–333.
- 28 Azaroff L S, Lax M B, Levenstein C and Wegman D H. Wounding the messenger: the new economy makes occupational health indicators too good to be true. *International Journal of Health Services* 2004; 34: 271–303.
- 29 Brooks B A and Anderson M A. Defining quality of nursing work life. *Nursing Economics* 2005; 23: 319–326.
- 30 Cangemi J and Miller R. Breaking-out-of-the-box in organizations: structuring a positive climate for the development of creativity in the workplace. *Journal of Management Development* 2007; 26: 401–410.
- 31 Cinamon R G, Weisel A and Tzuk K. Work–family conflict within the family – crossover effects, perceived parent–child interaction quality, parental self-efficacy, and life role attributions. *Journal of Career Development* 2007; 34: 79–100.
- 32 Costello S B and Goluchowski M T. Improving safety at mobile road work zones through a study of driver reaction to visual stimuli. *Road and Transport Research* 2006; 15: 18–29.
- 33 Evandrou M and Glaser K. Family, work and quality of life: changing economic and social roles through the lifecourse. *Ageing and Society* 2004; 24: 771–791.
- 34 Glinert L H. Occupational safety communication for hazardous goods: the development of a policy in Israel. *International Journal of Occupational Safety and Ergonomics* 2002; 8: 3–22.
- 35 Greenhaus J H, Collins K M and Shaw J D. The relation between work–family balance and quality of life. *Journal of Vocational Behavior* 2003; 63: 510–531.
- 36 Guyatt G and Schunemann H. How can quality of life researchers make their work more useful to health workers and their patients? *Quality of Life Research* 2007; 16: 1097–1105.
- 37 Hoge M A, Huey L Y and O’Connell M J. Best practices in behavioral health workforce education and training. *Administration and Policy in Mental Health* 2004; 32: 91–106.
- 38 O’Dell K. Women’s work, health and quality of life. *Affilia – Journal of Women and Social Work* 2005; 20: 120–121.
- 39 Pekkarinen L, Sinervo T, Perälä M L and Elovainio M. Work stressors and the quality of life in long-term care units. *Gerontologist* 2004; 44: 633–643.
- 40 Van Duijn M, Lotters F and Burdorf A. Interrelationships between pain, disability, general health, and quality of life and associations with work-related and individual factors – a study among workers on sickness absence for 2 to 6 weeks for musculoskeletal complaints. *Spine* 2004; 29: 2178–2183.
- 41 Fuchs-Kittowski K and Fuchs-Kittowski F. Quality of working life, knowledge-intensive work processes and creative learning organisations – information processing paradigm versus self-organisation theory. In: Brunnstein K and Berleur J (eds). *Human choice and computers – issues of choice and quality of life in the information society*. Kluwer Academic Publishers, 2002.
- 42 Awad S S, Fagan S, Cameron K, Nguyen E, Berger D and Brunicardi C. The impact of the 80 hour work week policy on surgical resident quality of life (QOL). *Journal of the American College of Surgeons* 2004; 199: S74.
- 43 Omar F. Relationship between work family conflict and family work conflict with quality of working life and well being. *Australian Journal of Psychology* 2005; 57: 141.
- 44 Tackett A S, Wilson J F and Griffith C H. Comparing resident quality of life before and after work restrictions. *Journal of Investigative Medicine* 2006; 54: S317–S318.
- 45 Krueger P, Brazil K, Lohfeld L, Edward H G, Lewis D and Tjam E. Organization specific predictors of job satisfaction: findings from a Canadian multi-site quality of work life cross-sectional survey. *BMC Health Services Research* 2002; 2: 1–8.
- 46 Hillier D, Fewell F, Cann W and Shephard V. Wellness at work: enhancing the quality of our working lives. *International Review of Psychiatry* 2005; 17: 419–431.
- 47 Grawitch M J, Gottschalk M and Munz D C. The path to a healthy workplace: a critical review linking healthy workplace practices, employee well-being, and organizational improvements. *Consulting Psychology Journal* 2006; 58: 129–147.

- 48 Wallace C, Pichler F and Hayes B C. *First European quality of life survey: quality of work and life satisfaction*. European Foundation for the Improvement of Living and Working Conditions, 2007.
- 49 Edimansyah B A, Rusli B N, Naing L, Rusli B A M and Winn T. Relationship of psychosocial work factors and health-related quality of life in male automotive assembly workers in Malaysia. *Industrial Health* 2007; 45: 437–448.
- 50 Rose M. Good deal, bad deal? Job satisfaction in occupations. *Work Employment and Society* 2003; 17: 503–530.
- 51 Warr P. Searching for happiness at work. *The Psychologist* 2007; 20: 726–729.
- 52 Barnett R C. Relationship of the number and distribution of work hours to health and quality-of-life (QOL) outcomes. *Research in Occupational Stress and Well-being* 2006; 5: 99–138.
- 53 Hochwarter W A and Kiewitz C. Positive affectivity and collective efficacy as moderators of the relationships between perceived politics and job satisfaction. *Journal of Applied Social Psychology* 2003; 33: 1009–1035.
- 54 James M, Conner D, Treadway D C and Hochwarter W A. The interactive effects of positive affect and a sense of competency on the politics perceptions–job satisfaction relationship. *Journal of Applied Social Psychology* 2005; 35: 798–820.
- 55 Beasley J W, Karsh B T, Hagenauer M E, Marchand L and Sainfort F. Quality of work life of independent vs employed family physicians in Wisconsin: a WReN study. *Annals of Family Medicine* 2005; 3: 500–506.
- 56 Vuori J and Silvonen J. The benefits of a preventive job search program on re-employment and mental health at 2-year follow-up. *Journal of Occupational and Organizational Psychology* 2005; 78: 43–52.
- 57 Nasermoadeli A, Sekine M, Hamanishi S and Kagamimori S. Associations between sense of coherence and psychological work characteristics with changes in quality of life in Japanese civil servants: a 1-year follow-up study. *Industrial Health* 2003; 41: 236–241.
- 58 Moore J. Homeworking and work–life balance: does it add to quality of life? *European Review of Applied Psychology / Revue européenne de psychologie appliquée* 2006; 56: 5–13.
- 59 Telford P. Quality of work life: a leadership imperative. *The Canadian Nurse* 2004; 100: 10–12.
- 60 Bailit J L, Weisberger A and Knotek J. Resident job satisfaction and quality of life before and after work hour reform. *Journal of Reproductive Medicine for the Obstetrician and Gynecologist* 2005; 50: 649–652.
- 61 Schouteten R. Group work in a Dutch home care organization: does it improve the quality of working life? *International Journal of Health Planning and Management* 2004; 19: 179–194.
- 62 Hofmeyer A. A moral imperative to improve the quality of work-life for nurses: building inclusive social capital capacity. *Contemporary Nurse* 2003; 15 (1–2): 9–19.
- 63 Castle N G, Degenholtz H and Rosen J. Determinants of staff job satisfaction of caregivers in two nursing homes in Pennsylvania. *BMC Health Services Research* 2006; 6: 60.
- 64 Tung-Chun H, Lawler J and Ching-Yi L. The effects of quality of work life on commitment and turnover intention. *Social Behavior and Personality* 2007; 35: 735–750.
- 65 Axelsson L, Andersson I, Håkansson A and Ejlerstsson G. Work ethics and general work attitudes in adolescents are related to quality of life, sense of coherence and subjective health – a Swedish questionnaire study. *BMC Public Health* 2005; 5: 103.
- 66 Beasley J W, Karsh B T, Sainfort F, Hagenauer M E and Marchand L. Quality of work life of family physicians in Wisconsin's health care organizations: a WReN study. *Wisconsin Medical Journal* 2004; 103: 51–55.
- 67 Caceres M M J. More training, less security? Training and the quality of life at work in Argentina, Brazil and Chile. *International Labour Review* 2002; 149: 359.
- 68 Kogi K. Work improvement and occupational safety and health management systems: common features and research needs. *Industrial Health* 2002; 40: 121–133.
- 69 Hirose T. An occupational health physician's report on the improvement in the sleeping conditions of night shift workers. *Industrial Health* 2005; 43: 58–62.
- 70 Akabas S H, Gates L B and Oran-Sabia V. Work opportunities for rewarding careers (WORC): insights from implementation of a best practice approach toward vocational services for mental health consumers. *Journal of Rehabilitation* 2006; 72: 19–26.
- 71 Twenge J M and King L A. A good life is a personal life: relationship fulfillment and work fulfillment in judgments of life quality. *Journal of Research in Personality* 2005; 39: 336–353.
- 72 Marques J F. The spiritual worker: an examination of the ripple effect that enhances quality of life in and outside the work environment. *Journal of Management Development* 2006; 25: 884–895.
- 73 Smith H F. Military medicine: establishing a more comprehensive strategy for improved worker health. *Military Medicine* 2002; 167: 611–615.

- 74 Bodek N. The quality of work life. *IIE Solutions* 2003; 35: 25.
- 75 Dean B B, Gerner D and Gerner R H. A systematic review evaluating health-related quality of life, work impairment, and health-care costs and utilization in bipolar disorder. *Current Medical Research and Opinion* 2004; 20: 139–154.
- 76 Haut E R, Sicoutris C P, Meredith D M, Sonnad S S, Reilly P M, Schwab C W, Hanson C W and Gracias V H. Improved nurse job satisfaction and job retention with the transition from a ‘mandatory consultation’ model to a ‘semiclosed’ surgical intensive care unit: a 1-year prospective evaluation. *Critical Care Medicine* 2006; 34: 387–395.
- 77 Martin A J. The role of positive psychology in enhancing satisfaction, motivation and productivity in the workplace. *Journal of Organizational Behavior Management* 2004; 24: 113–133.
- 78 Cohen B J, Kinnevy S C and Dichter M E. The quality of work life of child protective investigators: a comparison of two work environments. *Children and Youth Services Review* 2007; 29: 474–489.
- 79 Gyekye S A and Salminen S. Are ‘good soldiers’ safety conscious? An examination of the relationship between organizational citizenship behaviors and perception of workplace safety. *Social Behavior and Personality* 2005; 33: 805–820.
- 80 Tobiasz-Adamczyk B and Brzyski P. Psychosocial work conditions as predictors of quality of life at the beginning of older age. *International Journal of Occupational Medicine and Environmental Health* 2005; 18: 43–52.

Appendix 2 – Summary of secondary analyses

Glossary

Anxiety	Emotional state in which people feel uneasy, apprehensive, or fearful
Depression	Deep, unshakable sadness and diminished interest in nearly all activities
Psychological distress	Discomforting, emotional state experienced by an individual in response to a specific stressor or demand
General health	Single item asking 'Over the past 12 months, how would you say your general health has been?' Responses – excellent, very good, good, fair, poor
Work-related illness	Single item asking 'Thinking about the past year, have you suffered from any illness that you think was caused or made worse by work?' Responses – yes or no
Job satisfaction	Seven items asking 'How satisfied have you been with the following? Your usual take home pay; your work prospects; the people you work with; physical working conditions; the way your section is run; the way your abilities are used; the interest and skill involved in your job.' Responses – very satisfied, satisfied, dissatisfied, very dissatisfied
Job enjoyment	Single item asking 'In general, how much do you enjoy your job?' Responses on a five-point scale from 'really don't enjoy my job' to 'really enjoy my job'
Perceived stress	Single item asking 'In general, how do you find your job?' Responses – not at all stressful, mildly stressful, moderately stressful, very stressful, extremely stressful.
Job demand	Pace and intensity of work
Extrinsic effort	Situational factors which make work more demanding
Intrinsic effort	Personal factors (such as motivation and commitment to work)
Social support	Support from colleagues and superiors
Control	Control the worker has over work and the skill and variety involved
Reward	Pay, status and opportunities for advancement
Attributional style	How people explain events in their lives
Problem-focused coping	Changing behaviour to deal with a stressful situation (eg modifying, avoiding, minimising)
Emotion-focused coping	Modifying or eliminating emotions associated with a stressful situation (eg viewing the situation in a positive way, relaxation, denial, and wishful thinking)

Table 26
Dependent and independent variables used in the changes over time analyses

		<i>n</i>	%
Dependent variables (psychological distress)			
Clinical – deterioration	No change or better at Time 2	1573	91
	Worse (ie clinically distressed) at Time 2	161	9
Clinical – improvement	No change or worse at Time 2	1519	88
	Better (ie no longer clinically distressed) at Time 2	215	12
Score – deterioration	No change or better at Time 2	1208	70
	Worse (ie higher score) at Time 2	526	30
Score – improvement	No change or worse at Time 2	1098	63
	Better (ie lower score) at Time 2	636	37
Independent variables (extrinsic effort)			
Tertiles*	Improvement (one or more tertiles)	369	22
	No change	977	59
	Deterioration (one or more tertiles)	324	19
Quintiles*	Big improvement (two or more quintiles)	212	13
	Improvement (one quintile)	274	16
	No change	710	43
	Deterioration (one quintile)	295	18
	Big deterioration (two or more quintiles)	179	11
Score	Improvement (one or more points)	621	37
	No change	471	28
	Deterioration (one or more points)	578	35

*Tertiles and quintiles were derived from the Time 1 data. For Time 2 the same cut-points were used (though in fact these corresponded very closely with 'true' tertiles and quintiles derived using the Time 2 data).

Notes to Table 27 (opposite)

NS not significant at univariate level
 No not significant at multivariate level
 Dose presence and absence of independent variable is important
 Presence presence of independent variable is important
 Absence absence of independent variable is important
 Other other relationship
 n/a not analysed

* Dependent variable for job characteristics only

** Independent variable for mental health only

^a This analysis was repeated using just the Cardiff database to control for the possible confounding effect of negative affect. It was then not significant with or without including negative affect.

Independent variables		Dependent variables									
		Negative								Positive	
		Mental health			Physical health		Job outcomes			Job outcomes	
		Anxiety	Depression	Distress	Health	Work illness	Stress*	Negative enjoyment	Negative satisfaction	Positive satisfaction	Positive enjoyment
Negative – job characteristics	Demand	No	No	No	Presence	Dose	Presence	No	Presence	Presence	No
	Extrinsic	Presence	Presence	Dose	Presence	Dose	Dose	Dose	No	No	No
	Intrinsic	Presence	Dose	Presence	Dose	Dose	Dose	Dose	No	No	No
Negative – job perception	Stress**	Presence	Dose	Presence	n/a	n/a	n/a	n/a	Dose ¹	n/a	n/a
Positive – job characteristics	Support	Dose	Dose	Dose	No	No	Dose	No	Dose	Absence	Dose
	Control	Dose	Dose	Dose	No	Dose	No	Dose	Dose	Dose	Dose
	Reward	Dose	Presence	Dose	Dose	Dose	Dose	Dose	Presence	Presence	Dose
Other – coping	Negative attribution	No	NS	n/a	Other	NS	n/a	n/a	n/a	n/a	n/a
	Positive attribution	Dose	Dose	n/a	NS	NS	n/a	n/a	n/a	n/a	n/a
	Problem coping	No	No	n/a	NS	No	n/a	n/a	n/a	n/a	n/a
	Emotion coping	Dose	Dose	n/a	Dose	No	n/a	n/a	n/a	n/a	n/a

Table 27
Summary of the
set of analyses

Table 28
Example of non-significant analysis: job demand and anxiety

	OR	CI	<i>p</i>
Univariate analyses			
Low job demand	0.67	0.58–0.77	<0.0001
Middle	1.00		
High job demand	1.74	1.53–1.98	
Multivariate analyses			
Low job demand	0.92	0.76–1.12	0.15
Middle	1.00		
High job demand	1.13	0.96–1.33	

As an example of a dose–response type association, the analyses for stress and depression are shown in Table 29. After controlling for the potentially confounding factors, stress was strongly independently associated with depression. In order to consider whether the impacts of high (or presence of) and low (or absence of) stress were equal, the analyses were repeated using first the middle group as the reference category and then the low stress group as the reference category. This allowed direct comparison, and showed that the odds ratio (OR) for high stress was 1.48 when compared with moderate stress (indicating that those in the high stress group were almost half as likely again as those in the middle group to be clinically depressed), and that the OR for moderate stress was 1.53 when compared with low stress (indicating that those in the middle group were a little over half as likely again as those in the low stress group to be clinically depressed). A formal comparison was made by carrying out another analysis including both stress in tertiles and a dummy high stress variable (where those in the high stress group were compared with all others) in a single model (together with all the potentially confounding factors). The OR for the dummy high stress variable, which is equivalent to the relative ratio (RR), $1.48 \div 1.53$, was 0.97 and was not significant, indicating that the effects of the presence and absence of stress were not significantly different. (It should be noted that this approach assumes that stress is a proportional score, where a one-point difference is the same at any point on the scale, and therefore that the difference between the categories of stress is equal.) Considering stress in five groups showed similar results (Table 30).

Table 29
Example of a dose–response association: stress and depression (tertiles)

	OR	CI	OR	CI	<i>p</i>
Low stress	0.65	0.43–1.01	1.00		0.004
Middle	1.00		1.53	1.00–2.35	
High stress	1.48	1.06–2.06	2.27	1.39–3.70	
Comparing high and low stress					
	RR		CI		<i>p</i>
High/low	0.97		0.54–1.75		0.91

	OR	CI	OR	CI	<i>p</i>
Very low stress	0.50	0.20–1.25	1.00		0.001
Low stress	0.66	0.42–1.02	1.31	0.53–3.27	
Middle	1.00		2.00	0.80–5.03	
High stress	1.02	0.70–1.49	2.05	0.77–5.40	
Very high stress	2.42	1.47–3.99	4.86	1.74–13.23	
Comparing high and low stress					
	RR		CI		<i>p</i>
Very high/very low	1.21		0.42–3.52		0.73

Table 30
Example of a dose–response association: stress and depression (quintiles)

	OR	CI	OR	CI	<i>p</i>
Low intrinsic effort	0.60	0.51–0.71	1.00		<0.0001
Middle	1.00		1.67	1.41–1.97	
High intrinsic effort	2.33	2.02–2.70	3.88	3.27–4.61	
Comparing high and low intrinsic effort					
	RR		CI		<i>p</i>
High/low	1.40		1.08–1.82		0.01

Table 31
Example of a presence effect: intrinsic effort and psychological distress

	OR	CI	OR	CI	<i>p</i>
Very low intrinsic effort	0.53	0.43–0.66	1.00		<0.0001
Low intrinsic effort	0.77	0.63–0.94	1.45	1.16–1.81	
Middle	1.00		2.00	0.80–5.03	
High intrinsic effort	1.39	1.14–1.69	2.62	2.07–3.31	
Very high intrinsic effort	2.95	2.46–3.55	5.55	4.42–6.97	
Comparing high and low intrinsic effort					
	RR		CI		<i>p</i>
Very high/very low	1.57		1.12–2.20		0.009

Table 32
Example of a presence effect: intrinsic effort and psychological distress

	OR	CI	OR	CI	<i>p</i>
Low extrinsic effort	0.98	0.80–1.19	1.00		<0.0001
Middle	1.00		1.02	0.84–1.25	
High extrinsic effort	1.50	1.26–1.77	1.53	1.25–1.87	
Comparing high and low extrinsic effort					
	RR		CI		<i>p</i>
High/low	1.46		1.07–1.99		0.02

Table 33
Example of a presence effect with non-significant absence effect: extrinsic effort and anxiety

Table 34

Example of an absence effect: social support and positive job satisfaction

	OR	CI	OR	CI	<i>p</i>
Low social support	0.48	0.41–0.56	1.00		<0.0001
Middle	1.00		2.09	1.78–2.43	
High social support	1.98	1.73–2.27	4.15	3.54–4.86	
Comparing high and low social support					
	RR		CI		<i>p</i>
High/low	0.95		0.74–1.22		0.67

Table 35

Example of an absence effect: social support and positive job satisfaction

	OR	CI	OR	CI	<i>p</i>
Very low social support	0.28	0.22–0.36	1.00		<0.0001
Low social support	0.76	0.63–0.93	2.69	2.10–3.45	
Middle	1.00		3.52	2.76–4.49	
High social support	1.62	1.38–1.92	5.69	4.53–7.14	
Very high social support	2.28	1.88–2.76	8.02	6.31–10.20	
Comparing high and low social support					
	RR		CI		<i>p</i>
Very high/very low	0.65		0.45–0.93		0.02

Table 36

Extrinsic effort and psychological distress

		Adjusted but excluding time 1 extrinsic effort score			Adjusted but including time 1 extrinsic effort score		
		OR	CI	<i>p</i>	OR	CI	<i>p</i>
Clinical deterioration							
Tertiles	Better	0.62	0.36–1.07	0.14	0.63	1.36–1.09	0.22
	No change	1.00			1.00		
	Worse	1.12	0.71–1.77		1.09	0.66–1.80	
Quintiles	Much better	0.35	0.14–0.85	0.04	0.33	0.13–0.82	0.05
	Better	0.67	0.40–1.13		0.67	0.40–1.14	
	No change	1.00			1.00		
	Worse	0.76	0.41–1.42		0.81	0.42–1.56	
	Much worse	1.24	0.65–2.36		1.37	0.67–2.79	
Score	Better	0.95	0.57–1.58	0.15	0.98	0.56–1.72	0.29
	No change	1.00			1.00		
	Worse	1.41	0.86–2.32		1.40	0.85–2.30	

Table 36
continued

		Adjusted but excluding time 1 extrinsic effort score			Adjusted but including time 1 extrinsic effort score		
		OR	CI	<i>p</i>	OR	CI	<i>p</i>
Clinical improvement							
Tertiles	Better	1.63	1.11–2.39	0.01	1.28	0.86–1.92	0.35
	No change	1.00			1.00		
	Worse	0.85	0.54–1.34		1.29	0.79–2.10	
Quintiles	Much better	1.81	1.04–3.14	0.001	1.35	0.76–2.41	0.24
	Better	0.94	0.59–1.50		1.00	0.63–1.60	
	No change	1.00			1.00		
	Worse	0.46	0.24–0.87		0.61	0.32–1.18	
	Much worse	0.72	0.38–1.39		1.15	0.57–2.33	
Score	Better	1.94	1.27–2.97	<0.0001	1.34	0.84–2.15	0.47
	No change	1.00			1.00		
	Worse	1.02	0.64–1.63		1.13	0.70–1.82	
Score deterioration							
Tertiles	Better	0.68	0.50–0.94	0.03	0.73	0.53–1.01	0.17
	No change	1.00			1.00		
	Worse	1.07	0.79–1.46		0.97	0.70–1.34	
Quintiles	Much better	0.50	0.30–0.81	0.007	0.53	0.32–0.89	0.11
	Better	0.88	0.63–1.23		0.86	0.61–1.21	
	No change	1.00			1.00		
	Worse	1.02	0.68–1.53		0.95	0.62–1.45	
	Much worse	1.32	0.84–2.07		1.17	0.72–1.91	
Score	Better	0.68	0.50–0.92	0.007	0.74	0.53–1.04	0.16
	No change	1.00			1.00		
	Worse	1.02	0.75–1.39		0.99	0.73–1.35	
Score improvement							
Tertiles	Better	1.78	1.35–2.35	<0.0001	1.46	1.09–1.95	0.02
	No change	1.00			1.00		
	Worse	0.94	0.70–1.27		1.28	0.93–1.78	
Quintiles	Much better	1.79	1.18–2.69	<0.0001	1.40	0.91–2.14	0.11
	Better	0.78	0.57–1.07		0.83	0.60–1.15	
	No change	1.00			1.00		
	Worse	0.63	0.43–0.93		0.81	0.54–1.22	
	Much worse	0.63	0.40–0.99		0.85	0.59–1.55	
Score	Better	2.09	1.57–2.79	<0.0001	1.64	1.19–2.26	0.01
	No change	1.00			1.00		
	Worse	1.12	0.82–1.53		1.21	0.88–1.65	

Appendix 3 – Established workers study

Table 37
Correlations
between job
characteristics,
appraisals and
outcomes (Warr
criteria)

	Warr – job involvement	Warr – job motivation	Warr – higher order need strength	Warr – overall
HSE demands	NS	–0.13, <0.0001	NS	NS
HSE control	0.07, 0.02	0.07, 0.009	0.10, <0.0001	0.10, <0.0001
HSE managers support	0.13, <0.0001	0.17, <0.0001	0.10, <0.0001	0.17, <0.0001
HSE peers support	NS	0.12, <0.0001	0.12, <0.0001	0.12, <0.0001
HSE relationships	NS	NS	NS	NS
HSE role	0.11, <0.0001	0.18, <0.0001	0.15, <0.0001	0.19, <0.0001
HSE change	0.17, <0.0001	0.15, <0.0001	0.14, <0.0001	0.21, <0.0001
HSE overall	0.13, <0.0001	0.11, <0.0001	0.11, <0.0001	0.16, <0.0001
Extrinsic effort	NS	NS	NS	NS
Intrinsic effort	NS	0.15, 0.004	NS	0.10, 0.05
Reward	NS	NS	NS	NS
Job demand	NS	0.15, <0.0001	NS	0.07, 0.01
Social support	0.10, <0.0001	0.11, <0.0001	NS	0.12, <0.0001
Control	0.16, <0.0001	0.20, <0.0001	0.17, <0.0001	0.23, <0.0001
Uplift skills frequency	NS	0.18, 0.001	0.18, 0.001	0.13, 0.01
Uplift supervisor frequency	0.12, 0.02	0.15, 0.004	0.19, <0.0001	0.20, <0.0001
Uplift co-workers frequency	NS	0.13, 0.01	0.26, <0.0001	0.19, <0.0001
Uplift overall frequency	NS	0.17, 0.001	0.26, <0.0001	0.21, <0.0001
Uplift skills intensity	0.19, <0.0001	0.24, <0.0001	0.27, <0.0001	0.29, <0.0001
Uplift supervisor intensity	0.18, 0.003	0.23, <0.0001	0.20, 0.001	0.26, <0.0001
Uplift co-workers intensity	NS	0.19, <0.0001	0.30, <0.0001	0.24, <0.0001
Uplift overall intensity	0.18, 0.002	0.24, <0.0001	0.29, <0.0001	0.30, <0.0001
General health	–0.08, 0.004	–0.08, 0.004	–0.11, <0.0001	–0.11, <0.0001
General stress	NS	NS	NS	NS
Tiredness	–0.06, 0.03	NS	NS	NS
Fatigue	–0.08, 0.004	NS	NS	–0.06, 0.02
Symptoms – day	NS	NS	NS	NS
Symptoms – year	NS	0.07, 0.009	NS	NS
Symptoms - chronic	NS	NS	NS	NS

	JDI – work	JDI – supervisor	JDI – co-workers	JDI – promotion	JDI – pay	JDI – overall
HSE demands	NS	0.34, <0.0001	0.20, <0.0001	0.14, <0.0001	NS	0.23, <0.0001
HSE control	0.24, <0.0001	0.29, <0.0001	0.16, <0.0001	0.14, <0.0001	0.14, <0.0001	0.30, <0.0001
HSE managers support	0.34, <0.0001	0.75, <0.0001	0.34, <0.0001	0.33, <0.0001	0.13, <0.0001	0.59, <0.0001
HSE peers support	0.31, <0.0001	0.43, <0.0001	0.56, <0.0001	0.30, <0.0001	0.12, <0.0001	0.52, <0.0001
HSE relationships	0.24, <0.0001	0.55, <0.0001	0.48, <0.0001	0.24, <0.0001	0.14, <0.0001	0.49, <0.0001
HSE role	0.33, <0.0001	0.39, <0.0001	0.27, <0.0001	0.23, <0.0001	0.08, 0.008	0.41, <0.0001
HSE change	0.37, <0.0001	0.54, <0.0001	0.32, <0.0001	0.37, <0.0001	0.18, <0.0001	0.56, <0.0001
HSE overall	0.39, <0.0001	0.67, <0.0001	0.47, <0.0001	0.36, <0.0001	0.16, <0.0001	0.63, <0.0001
Extrinsic effort	-0.14, 0.009	-0.26, <0.0001	-0.27, <0.0001	NS	NS	-0.19, 0.001
Intrinsic effort	-0.14, 0.007	-0.32, <0.0001	-0.31, <0.0001	-0.12, 0.02	NS	-0.26, <0.0001
Reward	0.37, <0.0001	0.55, <0.0001	0.39, <0.0001	0.42, <0.0001	0.31, <0.0001	0.64, <0.0001
Job demand	NS	-0.27, <0.0001	-0.16, <0.0001	-0.11, <0.0001	NS	-0.20, <0.0001
Social support	0.35, <0.0001	0.73, <0.0001	0.48, <0.0001	0.34, <0.0001	0.19, <0.0001	0.64, <0.0001
Control	0.65, <0.0001	0.33, <0.0001	0.31, <0.0001	0.33, <0.0001	0.33, <0.0001	0.59, <0.0001
Uplift skills frequency	0.47, <0.0001	0.13, 0.01	0.17, 0.001	0.24, <0.0001	0.16, 0.002	0.36, <0.0001
Uplift supervisor frequency	0.28, <0.0001	0.49, <0.0001	0.31, <0.0001	0.27, <0.0001	NS	0.45, <0.0001
Uplift co-workers frequency	0.28, <0.0001	0.13, 0.02	0.37, <0.0001	0.24, <0.0001	NS	0.35, <0.0001
Uplift overall frequency	0.39, <0.0001	0.34, <0.0001	0.38, <0.0001	0.30, <0.0001	NS	0.48, <0.0001
Uplift skills intensity	0.57, <0.0001	0.32, <0.0001	0.31, <0.0001	0.40, <0.0001	0.27, <0.0001	0.57, <0.0001
Uplift supervisor intensity	0.41, <0.0001	0.62, <0.0001	0.40, <0.0001	0.36, <0.0001	0.16, 0.008	0.60, <0.0001
Uplift co-workers intensity	0.41, <0.0001	0.27, <0.0001	0.41, <0.0001	0.28, <0.0001	0.12, 0.03	0.48, <0.0001
Uplift overall intensity	0.53, <0.0001	0.50, <0.0001	0.45, <0.0001	0.39, <0.0001	0.20, 0.001	0.63, <0.0001
General health	-0.20, <0.0001	-0.20, <0.0001	-0.17, <0.0001	-0.19, <0.0001	-0.17, <0.0001	-0.29, <0.0001
General stress	-0.16, <0.0001	-0.19, <0.0001	-0.16, <0.0001	-0.14, <0.0001	-0.15, <0.0001	-0.23, <0.0001
Tiredness	-0.23, <0.0001	-0.19, <0.0001	-0.13, <0.0001	-0.16, <0.0001	-0.15, <0.0001	-0.25, <0.0001
Fatigue	-0.26, <0.0001	-0.26, <0.0001	-0.24, <0.0001	-0.22, <0.0001	-0.20, <0.0001	-0.36, <0.0001
Symptoms – day	-0.14, <0.0001	-0.18, <0.0001	-0.13, <0.0001	-0.16, <0.0001	-0.14, <0.0001	-0.23, <0.0001
Symptoms – year	-0.14, <0.0001	-0.18, <0.0001	-0.19, <0.0001	-0.18, <0.0001	-0.14, <0.0001	-0.26, <0.0001
Symptoms – chronic	NS	-0.11, <0.0001	-0.11, <0.0001	-0.12, <0.0001	-0.07, 0.01	-0.14, <0.0001

Table 38
Correlations between job characteristics, appraisals and outcomes (JDI criteria)

Table 39
Correlations
between job
characteristics,
appraisals and
outcomes (JSS
criteria)

	JSS – pay	JSS – promotion	JSS – supervisor	JSS – benefits	JSS – reward	JSS – conditions	JSS – co-workers	JSS – nature	JSS – communication	JSS – total
HSE demands	0.17, <0.0001	0.15, <0.0001	0.31, <0.0001	0.18, <0.0001	0.39, <0.0001	0.65, <0.0001	0.31, <0.0001	0.14, <0.0001	0.32, <0.0001	0.42, <0.0001
HSE control	0.13, <0.0001	0.14, <0.0001	0.31, <0.0001	0.22, <0.0001	0.34, <0.0001	0.19, <0.0001	0.20, <0.0001	0.22, <0.0001	0.21, <0.0001	0.34, <0.0001
HSE managers support	0.23, <0.0001	0.35, <0.0001	0.76, <0.0001	0.22, <0.0001	0.61, <0.0001	0.31, <0.0001	0.44, <0.0001	0.36, <0.0001	0.55, <0.0001	0.65, <0.0001
HSE peers support	0.19, <0.0001	0.30, <0.0001	0.46, <0.0001	0.19, <0.0001	0.49, <0.0001	0.29, <0.0001	0.64, <0.0001	0.34, <0.0001	0.43, <0.0001	0.55, <0.0001
HSE relationships	0.24, <0.0001	0.28, <0.0001	0.56, <0.0001	0.19, <0.0001	0.47, <0.0001	0.31, <0.0001	0.68, <0.0001	0.27, <0.0001	0.47, <0.0001	0.56, <0.0001
HSE role	0.15, <0.0001	0.23, <0.0001	0.39, <0.0001	0.17, <0.0001	0.38, <0.0001	0.29, <0.0001	0.38, <0.0001	0.43, <0.0001	0.60, <0.0001	0.50, <0.0001
HSE change	0.30, <0.0001	0.41, <0.0001	0.53, <0.0001	0.26, <0.0001	0.58, <0.0001	0.34, <0.0001	0.43, <0.0001	0.39, <0.0001	0.68, <0.0001	0.65, <0.0001
HSE overall	0.28, <0.0001	0.40, <0.0001	0.66, <0.0001	0.29, <0.0001	0.66, <0.0001	0.49, <0.0001	0.61, <0.0001	0.44, <0.0001	0.65, <0.0001	0.74, <0.0001
Extrinsic effort	-0.16, 0.002	-0.11, 0.03	-0.24, <0.0001	-0.19, <0.0001	-0.40, <0.0001	-0.57, <0.0001	-0.35, <0.0001	-0.22, <0.0001	-0.30, <0.0001	-0.39, <0.0001
Intrinsic effort	-0.14, 0.007	-0.15, 0.005	-0.30, <0.0001	-0.15, 0.004	-0.39, <0.0001	-0.49, <0.0001	-0.41, <0.0001	-0.19, <0.0001	-0.31, <0.0001	-0.42, <0.0001
Reward	0.47, <0.0001	0.51, <0.0001	0.54, <0.0001	0.37, <0.0001	0.63, <0.0001	0.30, <0.0001	0.52, <0.0001	0.38, <0.0001	0.56, <0.0001	0.71, <0.0001
Job demand	-0.15, <0.0001	-0.11, <0.0001	-0.24, <0.0001	-0.15, <0.0001	-0.33, <0.0001	-0.65, <0.0001	-0.27, <0.0001	-0.08, 0.002	-0.27, <0.0001	-0.34, <0.0001
Social support	0.28, <0.0001	0.39, <0.0001	0.74, <0.0001	0.22, <0.0001	0.59, <0.0001	0.29, <0.0001	0.55, <0.0001	0.37, <0.0001	0.58, <0.0001	0.67, <0.0001
Control	0.31, <0.0001	0.32, <0.0001	0.36, <0.0001	0.29, <0.0001	0.45, <0.0001	NS	0.28, <0.0001	0.53, <0.0001	0.33, <0.0001	0.49, <0.0001
Uplift skills frequency	NS	0.18, 0.001	0.17, 0.001	0.11, 0.03	0.19, <0.0001	NS	0.21, <0.0001	0.41, <0.0001	0.25, <0.0001	0.27, <0.0001

Table 39
continued

	JSS – pay	JSS – promotion	JSS – supervisor	JSS – benefits	JSS – reward	JSS – conditions	JSS – co-workers	JSS – nature	JSS – communication	JSS – total
Uplift supervisor frequency	0.14, 0.009	0.25, <0.0001	0.52, <0.0001	0.15, 0.007	0.41, <0.0001	0.20, <0.0001	0.27, <0.0001	0.28, <0.0001	0.38, <0.0001	0.45, <0.0001
Uplift co-workers frequency	NS	0.22, <0.0001	0.11, 0.04	NS	0.20, <0.0001	NS	0.31, <0.0001	0.28, <0.0001	0.21, <0.0001	0.26, <0.0001
Uplift overall frequency	NS	0.26, <0.0001	0.36, <0.0001	0.14, 0.01	0.35, <0.0001	0.12, 0.02	0.33, <0.0001	0.37, <0.0001	0.35, <0.0001	0.41, <0.0001
Uplift skills intensity	0.27, <0.0001	0.28, <0.0001	0.29, <0.0001	0.31, <0.0001	0.41, <0.0001	0.12, 0.03	0.32, <0.0001	0.61, <0.0001	0.48, <0.0001	0.50, <0.0001
Uplift supervisor intensity	0.25, <0.0001	0.27, <0.0001	0.60, <0.0001	0.29, <0.0001	0.53, <0.0001	0.24, <0.0001	0.43, <0.0001	0.43, <0.0001	0.54, <0.0001	0.59, <0.0001
Uplift co-workers intensity	0.12, 0.03	0.19, 0.001	0.20, <0.0001	0.16, 0.004	0.29, <0.0001	0.18, 0.001	0.43, <0.0001	0.44, <0.0001	0.39, <0.0001	0.39, <0.0001
Uplift overall intensity	0.24, <0.0001	0.29, <0.0001	0.48, <0.0001	0.31, <0.0001	0.49, <0.0001	0.22, <0.0001	0.47, <0.0001	0.56, <0.0001	0.56, <0.0001	0.59, <0.0001
General health	-0.22, <0.0001	-0.20, <0.0001	-0.21, <0.0001	-0.21, <0.0001	-0.30, <0.0001	-0.22, <0.0001	-0.24, <0.0001	-0.24, <0.0001	-0.23, <0.0001	-0.34, <0.0001
General stress	-0.19, <0.0001	-0.15, <0.0001	-0.16, <0.0001	-0.17, <0.0001	-0.27, <0.0001	-0.33, <0.0001	-0.22, <0.0001	-0.20, <0.0001	-0.22, <0.0001	-0.32, <0.0001
Tiredness	-0.21, <0.0001	-0.21, <0.0001	-0.15, <0.0001	-0.18, <0.0001	-0.26, <0.0001	-0.29, <0.0001	-0.20, <0.0001	-0.27, <0.0001	-0.21, <0.0001	-0.31, <0.0001
Fatigue	-0.27, <0.0001	-0.24, <0.0001	-0.23, <0.0001	-0.24, <0.0001	-0.36, <0.0001	-0.34, <0.0001	-0.33, <0.0001	-0.30, <0.0001	-0.29, <0.0001	-0.44, <0.0001
Symptoms – day	-0.20, <0.0001	-0.18, <0.0001	-0.15, <0.0001	-0.21, <0.0001	-0.26, <0.0001	-0.19, <0.0001	-0.16, <0.0001	-0.17, <0.0001	-0.15, <0.0001	-0.27, <0.0001
Symptoms – year	-0.19, <0.0001	-0.19, <0.0001	-0.13, <0.0001	-0.16, <0.0001	-0.24, <0.0001	-0.19, <0.0001	-0.20, <0.0001	-0.13, <0.0001	-0.17, <0.0001	-0.26, <0.0001
Symptoms – chronic	-0.10, <0.0001	-0.10, 0.001	-0.08, 0.005	NS	-0.13, <0.0001	-0.09, 0.001	-0.09, 0.001	NS	-0.08, 0.004	-0.14, <0.0001

Table 40
Correlations
between job
characteristics,
appraisals and
outcomes (QWL
criteria)

	QWL management	QWL balance	QWL autonomy	QWL pay	QWL pride	QWL happiness	QWL overall
HSE demands	0.34, <0.0001	0.67, <0.0001	NS	0.19, <0.0001	0.31, <0.0001	NS	0.43, <0.0001
HSE control	0.36, <0.0001	0.37, <0.0001	0.51, <0.0001	0.44, <0.0001	0.24, <0.0001	0.29, <0.0001	0.53, <0.0001
HSE managers support	0.80, <0.0001	0.40, <0.0001	0.46, <0.0001	0.34, <0.0001	0.42, <0.0001	0.39, <0.0001	0.74, <0.0001
HSE peers support	0.56, <0.0001	0.42, <0.0001	0.40, <0.0001	0.19, <0.0001	0.40, <0.0001	0.37, <0.0001	0.61, <0.0001
HSE relationships	0.59, <0.0001	0.41, <0.0001	0.29, <0.0001	0.17, 0.001	0.41, <0.0001	0.27, <0.0001	0.55, <0.0001
HSE role	0.47, <0.0001	0.31, <0.0001	0.49, <0.0001	0.13, 0.01	0.40, <0.0001	0.37, <0.0001	0.54, <0.0001
HSE change	0.66, <0.0001	0.36, <0.0001	0.58, <0.0001	0.35, <0.0001	0.46, <0.0001	0.46, <0.0001	0.73, <0.0001
HSE overall	0.74, <0.0001	0.56, <0.0001	0.52, <0.0001	0.35, <0.0001	0.53, <0.0001	0.45, <0.0001	0.80, <0.0001
Extrinsic effort	-0.28, <0.0001	-0.67, <0.0001	-0.16, 0.001	-0.22, <0.0001	-0.27, <0.0001	-0.18, 0.001	-0.42, <0.0001
Intrinsic effort	-0.30, <0.0001	-0.70, <0.0001	-0.18, 0.001	-0.19, <0.0001	-0.34, <0.0001	-0.28, <0.0001	-0.49, <0.0001
Reward	0.62, <0.0001	0.40, <0.0001	0.43, <0.0001	0.29, <0.0001	0.49, <0.0001	0.52, <0.0001	0.67, <0.0001
Job demand	-0.28, <0.0001	-0.65, <0.0001	NS	NS	-0.28, <0.0001	NS	-0.37, <0.0001
Social support	0.77, <0.0001	0.37, <0.0001	0.45, <0.0001	0.32, <0.0001	0.45, <0.0001	0.40, <0.0001	0.73, <0.0001
Control	0.39, <0.0001	0.27, <0.0001	0.79, <0.0001	0.40, <0.0001	0.29, <0.0001	0.56, <0.0001	0.65, <0.0001
Uplift skills frequency	0.20, <0.0001	NS	0.58, <0.0001	NS	NS	0.40, <0.0001	0.36, <0.0001

Table 40
continued

	QWL management	QWL balance	QWL autonomy	QWL pay	QWL pride	QWL happiness	QWL overall
Uplift supervisor frequency	0.56, <0.0001	0.24, <0.0001	-0.44, <0.0001	0.18, 0.001	0.30, <0.0001	0.36, <0.0001	0.56, <0.0001
Uplift co-workers frequency	0.22 <0.0001	NS	0.38, <0.0001	NS	0.22, <0.0001	0.36, <0.0001	0.36, <0.0001
Uplift overall frequency	0.43, <0.0001	0.16, 0.003	0.54, <0.0001	0.11, 0.04	0.28, <0.0001	0.44, <0.0001	0.53, <0.0001
Uplift skills intensity	0.42, <0.0001	0.23, <0.0001	0.66, <0.0001	0.17, 0.002	0.38, <0.0001	0.57, <0.0001	0.59, <0.0001
Uplift supervisor intensity	0.64, <0.0001	0.35, <0.0001	0.54, <0.0001	0.24, <0.0001	0.41, <0.0001	0.51, <0.0001	0.68, <0.0001
Uplift co-workers intensity	0.31, <0.0001	0.23, <0.0001	0.50, <0.0001	0.12, 0.04	0.35, <0.0001	0.46, <0.0001	0.49, <0.0001
Uplift overall intensity	0.56, <0.0001	0.32, <0.0001	0.66, <0.0001	0.21, 0.001	0.47, <0.0001	0.57, <0.0001	0.70, <0.0001
General health	-0.26, <0.0001	-0.48, <0.0001	-0.23, <0.0001	NS	-0.34, <0.0001	-0.35, <0.0001	-0.38, <0.0001
General stress	-0.22, <0.0001	-0.53, <0.0001	-0.19, <0.0001	NS	-0.30, <0.0001	-0.41, <0.0001	-0.39, <0.0001
Tiredness	-0.16, 0.001	-0.39, <0.0001	-0.22, <0.0001	NS	-0.19, <0.0001	-0.36, <0.0001	-0.33, <0.0001
Fatigue	-0.28, <0.0001	-0.48, <0.0001	-0.28, <0.0001	-0.19, <0.0001	-0.34, <0.0001	-0.42, <0.0001	-0.46, <0.0001
Symptoms – day	-0.20, <0.0001	-0.34, <0.0001	-0.15, 0.003	-0.19, <0.0001	-0.23, <0.0001	-0.26, <0.0001	-0.31, <0.0001
Symptoms – year	-0.20, <0.0001	-0.32, <0.0001	-0.13, 0.01	-0.11, 0.03	-0.25, <0.0001	-0.26, <0.0001	-0.30, <0.0001
Symptoms – chronic	-0.12, 0.02	-0.24, <0.0001	NS	NS	-0.17, 0.001	-0.16, 0.002	-0.19, <0.0001

Table 41
Correlations
between job
characteristics,
appraisals and
outcomes (PSS
criteria)

	Work stress	Job enjoyment	PSS
HSE demands	-0.62, <0.0001	0.21, <0.0001	-0.48, <0.0001
HSE control	-0.21, <0.0001	0.18, <0.0001	-0.11, <0.0001
HSE managers support	-0.30, <0.0001	0.38, <0.0001	-0.22, <0.0001
HSE peers support	-0.26, <0.0001	0.32, <0.0001	-0.19, <0.0001
HSE relationships	-0.39, <0.0001	0.28, <0.0001	-0.36, <0.0001
HSE role	-0.24, <0.0001	0.41, <0.0001	-0.18, <0.0001
HSE change	-0.27, <0.0001	0.40, <0.0001	-0.21, <0.0001
HSE overall	-0.46, <0.0001	0.45, <0.0001	-0.35, <0.0001
Extrinsic effort	0.56, <0.0001	-0.19, <0.0001	0.41, <0.0001
Intrinsic effort	0.53, <0.0001	-0.15, 0.004	0.46, <0.0001
Reward	-0.30, <0.0001	0.26, <0.0001	-0.38, <0.0001
Job demand	0.58, <0.0001	-0.16, <0.0001	0.45, <0.0001
Social support	-0.26, <0.0001	0.36, <0.0001	-0.20, <0.0001
Control	NS	0.39, <0.0001	NS
Uplift skills frequency	NS	0.39, <0.0001	0.16, 0.002
Uplift supervisor frequency	-0.17, 0.002	0.30, <0.0001	-0.12, 0.03
Uplift co-workers frequency	NS	0.29, <0.0001	0.11, 0.05
Uplift overall frequency	NS	0.38, <0.0001	NS
Uplift skills intensity	NS	0.55, <0.0001	NS
Uplift supervisor intensity	-0.23, <0.0001	0.43, <0.0001	-0.24, <0.0001
Uplift co-workers intensity	NS	0.39, <0.0001	NS
Uplift overall intensity	-0.15, 0.02	0.53, <0.0001	-0.15, 0.02
General health	0.29, <0.0001	-0.22, <0.0001	0.21, <0.0001
General stress	0.47, <0.0001	-0.20, <0.0001	0.33, <0.0001
Tiredness	0.34, <0.0001	-0.27, <0.0001	0.28, <0.0001
Fatigue	0.38, <0.0001	-0.27, <0.0001	0.33, <0.0001
Symptoms – day	0.17, <0.0001	-0.08, 0.002	0.19, <0.0001
Symptoms – year	0.20, <0.0001	-0.10, <0.0001	0.20, <0.0001
Symptoms – chronic	0.11, <0.0001	NS	0.13, <0.0001

Table 42
Outcomes and job characteristics, individual characteristics and perceptions

	Anxiety	Depression	PANAS +	PANAS –
Warr – job involvement	NS	–0.06, 0.02	0.17, 0.001	NS
Warr – job motivation	NS	–0.08, 0.003	0.26, <0.0001	NS
Warr – higher order need strength	NS	–0.10, <0.0001	0.28, <0.0001	NS
Warr – overall	NS	–0.11, <0.0001	0.30, <0.0001	NS
JDI – work	–0.27, <0.0001	–0.38, <0.0001	0.55, <0.0001	–0.39, <0.0001
JDI – supervisor	–0.34, <0.0001	–0.36, <0.0001	0.24, <0.0001	–0.28, <0.0001
JDI – co-workers	–0.27, <0.0001	–0.36, <0.0001	0.32, <0.0001	–0.21, <0.0001
JDI – promotion	–0.22, <0.0001	–0.29, <0.0001	0.31, <0.0001	–0.23, <0.0001
JDI – pay	–0.16, <0.0001	–0.17, <0.0001	0.19, <0.0001	–0.22, <0.0001
JDI – overall	–0.38, <0.0001	–0.47, <0.0001	0.51, <0.0001	–0.39, <0.0001
JSS – pay	–0.24, <0.0001	–0.27, <0.0001	0.29, <0.0001	–0.28, <0.0001
JSS – promotion	–0.24, <0.0001	–0.27, <0.0001	0.22, <0.0001	–0.23, <0.0001
JSS – supervisor	–0.29, <0.0001	–0.34, <0.0001	0.21, <0.0001	–0.24, <0.0001
JSS – benefits	–0.23, <0.0001	–0.23, <0.0001	0.26, <0.0001	–0.24, <0.0001
JSS – reward	–0.41, <0.0001	–0.46, <0.0001	0.42, <0.0001	–0.42, <0.0001
JSS – conditions	–0.41, <0.0001	–0.41, <0.0001	0.21, <0.0001	–0.29, <0.0001
JSS – co-workers	–0.38, <0.0001	–0.44, <0.0001	0.35, <0.0001	–0.30, <0.0001
JSS – nature	–0.36, <0.0001	–0.47, <0.0001	0.57, <0.0001	–0.39, <0.0001
JSS – communication	–0.34, <0.0001	–0.43, <0.0001	0.40, <0.0001	–0.34, <0.0001
JSS – total	–0.47, <0.0001	–0.54, <0.0001	0.49, <0.0001	–0.47, <0.0001
QWL – management	–0.37, <0.0001	–0.43, <0.0001	0.32, <0.0001	–0.33, <0.0001
QWL – balance	–0.57, <0.0001	–0.60, <0.0001	0.36, <0.0001	–0.46, <0.0001
QWL – autonomy	–0.36, <0.0001	–0.50, <0.0001	0.53, <0.0001	–0.38, <0.0001
QWL – pay	–0.17, 0.001	–0.17, 0.001	0.17, 0.001	–0.11, <0.0001
QWL – pride	–0.37, <0.0001	–0.44, <0.0001	0.45, <0.0001	–0.25, <0.0001
QWL – happiness	–0.48, <0.0001	–0.58, <0.0001	0.59, <0.0001	–0.48, <0.0001
QWL – overall	–0.56, <0.0001	–0.67, <0.0001	0.57, <0.0001	–0.52, <0.0001
Work stress	0.50, <0.0001	0.43, <0.0001	–0.19, <0.0001	0.31, <0.0001
Job enjoyment	–0.36, <0.0001	–0.43, <0.0001	0.46, <0.0001	–0.30, <0.0001
PSS	0.47, <0.0001	0.32, <0.0001	–0.13, 0.01	0.39, <0.0001
HSE demands	–0.48, <0.0001	–0.46, <0.0001	0.11, 0.04	–0.26, <0.0001
HSE control	–0.28, <0.0001	–0.31, <0.0001	0.22, <0.0001	–0.29, <0.0001
HSE managers support	–0.36, <0.0001	–0.43, <0.0001	0.29, <0.0001	–0.30, <0.0001
HSE peers support	–0.37, <0.0001	–0.44, <0.0001	0.28, <0.0001	–0.31, <0.0001

Table 42
continued

	Anxiety	Depression	PANAS +	PANAS –
HSE relationships	–0.44, <0.0001	–0.44, <0.0001	0.20, <0.0001	–0.31, <0.0001
HSE role	–0.38, <0.0001	–0.44, <0.0001	0.40, <0.0001	–0.32, <0.0001
HSE change	–0.36, <0.0001	–0.41, <0.0001	0.37, <0.0001	–0.33, <0.0001
HSE overall	–0.52, <0.0001	–0.57, <0.0001	0.36, <0.0001	–0.42, <0.0001
Extrinsic effort	0.48, <0.0001	0.50, <0.0001	–0.25, <0.0001	0.41, <0.0001
Intrinsic effort	0.62, <0.0001	0.53, <0.0001	–0.28, <0.0001	0.53, <0.0001
Reward	–0.46, <0.0001	–0.52, <0.0001	0.40, <0.0001	–0.48, <0.0001
Job demand	0.43, <0.0001	0.40, <0.0001	NS	0.28, <0.0001
Social support	–0.35, <0.0001	–0.41, <0.0001	0.34, <0.0001	–0.31, <0.0001
Control	–0.23, <0.0001	–0.32, <0.0001	0.48, <0.0001	–0.37, <0.0001
Uplift skills frequency	–0.16, 0.002	–0.23, <0.0001	0.34, <0.0001	–0.15, 0.005
Uplift supervisor frequency	–0.23, <0.0001	–0.32, <0.0001	0.30, <0.0001	–0.19, 0.001
Uplift co-workers frequency	–0.14, 0.005	–0.24, <0.0001	0.37, <0.0001	NS
Uplift overall frequency	–0.22, <0.0001	–0.33, <0.0001	0.40, <0.0001	–0.18, 0.001
Uplift skills intensity	–0.30, <0.0001	–0.46, <0.0001	0.53, <0.0001	–0.29, <0.0001
Uplift supervisor intensity	–0.34, <0.0001	–0.43, <0.0001	0.44, <0.0001	–0.29, <0.0001
Uplift co-workers intensity	–0.26, <0.0001	–0.38, <0.0001	0.50, <0.0001	–0.23, <0.0001
Uplift overall intensity	–0.35, <0.0001	–0.51, <0.0001	0.55, <0.0001	–0.32, <0.0001
General health	0.42, <0.0001	0.44, <0.0001	–0.34, <0.0001	0.40, <0.0001
General stress	0.62, <0.0001	0.53, <0.0001	–0.32, <0.0001	0.59, <0.0001
Tiredness	0.49, <0.0001	0.49, <0.0001	–0.38, <0.0001	0.42, <0.0001
Fatigue	0.60, <0.0001	0.60, <0.0001	–0.46, <0.0001	0.58, <0.0001
Symptoms – day	0.36, <0.0001	0.33, <0.0001	–0.27, <0.0001	0.43, <0.0001
Symptoms – year	0.37, <0.0001	0.33, <0.0001	–0.19, <0.0001	0.38, <0.0001
Symptoms – chronic	0.20, <0.0001	0.19, <0.0001	–0.14, 0.008	0.21, <0.0001

Table 43
Correlations
between outcomes

	Anxiety	Depression	PANAS +
Depression	0.72, <0.0001		
PANAS +	–0.40, <0.0001	–0.60, <0.0001	
PANAS –	0.75, <0.0001	0.63, <0.0001	–0.41, <0.0001

Table 44
Correlations
between job
characteristics

	HSE dem	HSE control	HSE manager	HSE peer	HSE rel'ships	HSE role	HSE change	HSE overall	Extrinsic effort	Intrinsic effort	Reward	Job demand	Social support	Control	Uplift skills f	Uplift super f	Uplift co f	Uplift all f	Uplift skills int	Uplift super int	Uplift co int
HSE control	0.27 <0.0001																				
HSE manager	0.38 <0.0001	0.41 <0.0001																			
HSE peer	0.35 <0.0001	0.31 <0.0001	0.62 <0.0001																		
HSE rel'ships	0.45 <0.0001	0.29 <0.0001	0.51 <0.0001	0.55 <0.0001																	
HSE role	0.29 <0.0001	0.24 <0.0001	0.49 <0.0001	0.43 <0.0001	0.40 <0.0001																
HSE change	0.33 <0.0001	0.40 <0.0001	0.69 <0.0001	0.52 <0.0001	0.47 <0.0001	0.57 <0.0001															
HSE overall	0.61 <0.0001	0.58 <0.0001	0.84 <0.0001	0.76 <0.0001	0.73 <0.0001	0.67 <0.0001	0.81 <0.0001														
Extrinsic effort	-0.67 <0.0001	-0.36 <0.0001	-0.34 <0.0001	-0.38 <0.0001	-0.36 <0.0001	-0.20 <0.0001	-0.30 <0.0001	-0.52 <0.0001													
Intrinsic effort	-0.54 <0.0001	-0.23 <0.0001	-0.31 <0.0001	-0.39 <0.0001	-0.42 <0.0001	-0.22 <0.0001	-0.28 <0.0001	-0.46 <0.0001	0.63 <0.0001												
Reward	0.35 <0.0001	0.28 <0.0001	0.52 <0.0001	0.48 <0.0001	0.51 <0.0001	0.39 <0.0001	0.55 <0.0001	0.61 <0.0001	-0.38 <0.0001	-0.41 <0.0001											
Job demand	-0.88 <0.0001	-0.21 <0.0001	-0.30 <0.0001	-0.29 <0.0001	-0.36 <0.0001	-0.25 <0.0001	-0.28 <0.0001	-0.51 <0.0001	0.65 <0.0001	0.55 <0.0001	-0.27 <0.0001										
Social support	0.34 <0.0001	0.30 <0.0001	0.79 <0.0001	0.65 <0.0001	0.53 <0.0001	0.45 <0.0001	0.60 <0.0001	0.74 <0.0001	-0.35 <0.0001	-0.35 <0.0001	0.57 <0.0001	-0.28 <0.0001									
Control	0.06 <0.0001	0.70 <0.0001	0.40 <0.0001	0.32 <0.0001	0.23 <0.0001	0.21 <0.0001	0.43 <0.0001	0.48 <0.0001	-0.19 <0.0001	-0.15 <0.0001	0.35 <0.0001	NS	0.40 <0.0001								
Uplift skills f	-0.21 <0.0001	0.25 <0.0001	0.19 <0.0001	0.18 <0.0001	NS	0.26 <0.0001	0.22 <0.0001	0.17 <0.0001	NS	NS	0.16 <0.0001	0.19 <0.0001	-0.22 <0.0001	-0.50 <0.0001							
Uplift super f	0.17 <0.0001	0.25 <0.0001	0.59 <0.0001	0.33 <0.0001	0.28 <0.0001	0.26 <0.0001	0.42 <0.0001	0.46 <0.0001	-0.18 <0.0001	-0.21 <0.0001	0.30 <0.0001	NS	-0.52 <0.0001	-0.25 <0.0001	0.40 <0.0001						
Uplift co f	NS	0.15 <0.0001	0.27 <0.0001	0.42 <0.0001	0.17 <0.0001	0.24 <0.0001	0.28 <0.0001	0.31 <0.0001	NS	NS	0.16 <0.0001	NS	-0.33 <0.0001	-0.31 <0.0001	0.41 <0.0001	0.57 <0.0001					
Uplift all f	NS	0.24 <0.0001	0.46 <0.0001	0.40 <0.0001	0.23 <0.0001	0.30 <0.0001	0.39 <0.0001	0.40 <0.0001	NS	-0.12 <0.0001	0.26 <0.0001	NS	-0.48 <0.0001	-0.38 <0.0001	0.64 <0.0001	0.88 <0.0001	0.85 <0.0001				
Uplift skills int	NS	0.30 <0.0001	0.39 <0.0001	0.34 <0.0001	0.20 <0.0001	0.41 <0.0001	0.44 <0.0001	0.39 <0.0001	NS	NS	0.43 <0.0001	0.13 <0.0001	-0.41 <0.0001	-0.51 <0.0001	0.51 <0.0001	0.46 <0.0001	0.42 <0.0001	0.55 <0.0001			
Uplift super int	0.26 <0.0001	0.33 <0.0001	0.65 <0.0001	0.43 <0.0001	0.38 <0.0001	0.36 <0.0001	0.52 <0.0001	0.57 <0.0001	-0.23 <0.0001	-0.27 <0.0001	0.45 <0.0001	NS	-0.58 <0.0001	-0.33 <0.0001	0.36 <0.0001	0.78 <0.0001	0.48 <0.0001	0.71 <0.0001	0.69 <0.0001		
Uplift co int	NS	0.19 <0.0001	0.32 <0.0001	0.46 <0.0001	0.22 <0.0001	0.36 <0.0001	0.39 <0.0001	0.41 <0.0001	-0.13 <0.0001	-0.16 <0.0001	0.29 <0.0001	NS	-0.39 <0.0001	-0.42 <0.0001	0.33 <0.0001	0.45 <0.0001	0.74 <0.0001	0.64 <0.0001	0.65 <0.0001	0.67 <0.0001	
Uplift all int	0.16 <0.0001	0.32 <0.0001	0.57 <0.0001	0.48 <0.0001	0.33 <0.0001	0.45 <0.0001	0.55 <0.0001	0.57 <0.0001	-0.19 <0.0001	-0.22 <0.0001	0.46 <0.0001	NS	-0.57 <0.0001	-0.48 <0.0001	0.47 <0.0001	0.70 <0.0001	0.63 <0.0001	0.75 <0.0001	0.87 <0.0001	0.91 <0.0001	0.87 <0.0001

Table 45
Job characteristics
factor analysis

Job characteristic		Factor			
		1	2	3	4
HSE management standards	Demand		−0.88		
	Control			−0.82	
	Managers' support	0.64			
	Peers' support	0.69			
	Relationships	0.55			
	Role	0.73			
	Change	0.71			
ERI	Extrinsic effort		0.82		
	Intrinsic effort		0.64		
	Reward	0.74			
JDC	Job demand		0.89		
	Social support	0.71			
	Control			−0.77	
Uplifts	Skills frequency				−0.50
	Supervisor frequency				−0.84
	Co-workers frequency				−0.85
	Skill intensity				−0.53
	Supervisor intensity				−0.69
	Co-workers intensity				−0.74

Table 46
Job characteristics
factor analysis –
overall measures

Job characteristic		Factor	
		1	2
HSE management standards	Overall	0.63	
ERI	Extrinsic effort	−0.85	
	Intrinsic effort	−0.79	
	Reward	0.48	
JDC	Job demand	−0.90	
	Social support		0.57
	Control		0.74
Uplifts	Overall frequency		0.88
	Overall intensity		0.88

Job characteristic		Factor		
		1	2	3
HSE management standards	Demand		-0.93	
	Control			-0.92
	Managers' support	0.83		
	Peers' support	0.82		
	Relationships	0.65		
	Role	0.75		
	Change	0.75		
JDC	Job demand		0.96	
	Social support	0.86		
	Control			-0.88

Table 47

Job characteristics factor analysis – excluding ERI and Uplifts (not included in all three organisations' questionnaires)

Job characteristic		Factor	
		1	2
HSE management standards	Overall	0.74	
JDC	Job demand		0.93
	Social support	0.76	
	Control	0.89	

Table 48

Job characteristics factor analysis, overall – excluding ERI and Uplifts (not included in all three organisations' questionnaires)

Table 49
Appraisals factor
analysis

Appraisal		Factor					
		1	2	3	4	5	6
Warr	Work involvement					0.77	
	Intrinsic job motivation					0.68	
	Higher order need strength					0.68	
JDI	Work		0.92				
	Supervisor	0.97					
	Co-workers						0.62
	Promotion			0.53			
	Pay			0.69			
JSS	Pay			0.89			
	Promotion			0.67			
	Supervisor	0.99					
	Benefits			0.76			
	Reward			0.49			
	Conditions				-0.76		
	Co-workers						0.59
	Nature		0.93				
	Communications	0.50					
QWL	Management	0.87					
	Balance				-0.80		
	Autonomy		0.76				
	Pay						
	Pride						
	Happiness		0.52				
Work stress	Overall				0.83		
Job enjoyment	Overall		0.84				
PSS	Overall				0.65		

Appraisal		Factor	
		1	2
Warr	Overall		0.56
JDI	Overall	0.90	
JSS	Overall	0.87	
QWL	Overall	0.87	
Work stress	Overall		0.76
Job enjoyment	Overall	0.75	
PSS	Overall		0.78

Table 50
Appraisals factor
analysis – overall

Logistic regressions showing patterns of associations

Total job characteristics score and appraisals

n = 866		OR (CI)	p
Total JC score	Low	1.00	<0.0001
	Second quartile	4.22 (2.39-7.48)	
	Third quartile	15.42 (8.83-26.92)	
	High	86.37 (45.63-163.45)	
Pattern	Fixed hours	1.00	0.008
	Other (flexi or shift work)	0.63 (0.45-0.88)	

Table 51
Appraisal of
management

n = 892		OR (CI)	p
Total JC score	Low	1.00	<0.0001
	Second quartile	2.54 (1.62-3.98)	
	Third quartile	4.09 (2.62-6.37)	
	High	21.33 (12.76-35.65)	
Age		1.02 (1.00-1.03)	0.01
Full-time	Full-time	1.00	<0.0001
	Part-time	0.41 (0.28-0.62)	
Pattern	Fixed hours	1.00	<0.0001
	Other (flexi or shift work)	0.47 (0.34-0.65)	
Marital status	Married or living together	1.00	0.01
	Other	0.62 (0.43-0.89)	
Education	Degree or higher	1.00	<0.0001
	Other	0.52 (0.38-0.72)	
General stress	High	1.00	0.1
	Low	1.30 (0.95-1.78)	

Table 52
Appraisal of work

Table 53
Appraisal of stress

<i>n</i> = 906		OR (CI)	<i>p</i>
Total JC score	Low	1.00	<0.0001
	Second quartile	1.89 (1.14–3.14)	
	Third quartile	5.61 (3.42–9.20)	
	High	10.52 (6.30–17.53)	
Gender	Male	1.00	0.03
	Female	0.67 (0.47–0.96)	
Full-time	Full-time	1.00	0.005
	Part-time	1.86 (1.20–2.86)	
Contract	Permanent	1.00	0.003
	Other	2.08 (1.29–3.34)	
Education	Degree or higher	1.00	<0.0001
	Other	1.88 (1.34–2.63)	
General stress	High	1.00	<0.0001
	Low	6.53 (4.68–9.09)	

Table 54
Appraisal of reward

<i>n</i> = 829		OR (CI)	<i>p</i>
Total JC score	Low	1.00	<0.0001
	Second quartile	1.57 (1.02–2.44)	
	Third quartile	3.79 (2.46–5.85)	
	High	6.84 (4.34–10.78)	
Full-time	Full-time	1.00	0.07
	Part-time	0.70 (0.48–1.03)	
Marital status	Married or living together	1.00	0.003
	Other	0.59 (0.41–0.83)	
Education	Degree or higher	1.00	<0.0001
	Other	0.52 (0.39–0.71)	
General stress	High	1.00	0.01
	Low	1.50 (1.10–2.03)	

<i>n</i> = 878		OR (CI)	<i>p</i>
Total JC score	Low	1.00	<0.0001
	Second quartile	2.99 (1.90–4.71)	
	Third quartile	5.19 (3.33–8.09)	
	High	16.93 (10.53–27.22)	
Gender	Male	1.00	0.05
	Female	1.39 (1.01–1.92)	
Pattern	Fixed hours	1.00	<0.0001
	Other (flexi or shift work)	0.56 (0.41–0.76)	
Education	Degree or higher	1.00	0.04
	Other	0.73 (0.54–0.98)	

Table 55
Appraisal of peers

<i>n</i> = 692		OR (CI)	<i>p</i>
Total JC score	Low	1.00	<0.0001
	Second quartile	30.49 (7.22–128.80)	
	Third quartile	140.29 (33.33–590.53)	
	High	922.38 (205.27–4144.58)	
Pattern	Fixed hours	1.00	0.02
	Other (flexi or shift work)	0.60 (0.39–0.92)	
Marital status	Married or living together	1.00	0.08
	Other	0.63 (0.38–1.06)	
Education	Degree or higher	1.00	0.005
	Other	0.53 (0.34–0.83)	
General stress	High	1.00	0.002
	Low	2.00 (1.30–3.06)	

Table 56
Total appraisal score

Each of the three outcomes and the total job characteristics score

<i>n</i> = 906		OR (CI)	<i>p</i>
Total JC score	Low	1.00	<0.0001
	Second quartile	2.06 (1.24–3.42)	
	Third quartile	8.38 (5.05–13.91)	
	High	12.79 (7.66–21.37)	
Age		1.02 (1.01–1.04)	0.001
General stress	High	1.00	<0.0001
	Low	4.49 (3.34–6.04)	

Table 57
Negative mental wellbeing outcome

Table 58
Physical health
outcome

<i>n</i> = 922		OR (CI)	<i>p</i>
Total JC score	Low	1.00	<0.0001
	Second quartile	1.57 (1.02–2.42)	
	Third quartile	3.04 (1.98–4.65)	
	High	4.06 (2.63–6.26)	
Age		1.02 (1.00–1.03)	0.01
Gender	Male	1.00	0.004
	Female	0.62 (0.45–0.86)	
Full-time	Full-time	1.00	0.06
	Part-time	1.44 (0.99–2.09)	
General stress	High	1.00	<0.0001
	Low	4.49 (3.34–6.04)	

Table 59
Positive mental
wellbeing outcome

<i>n</i> = 270		OR (CI)	<i>p</i>
Total JC score	Low	1.00	<0.0001
	Second quartile	2.66 (1.24–5.73)	
	Third quartile	3.48 (1.53–7.91)	
	High	6.19 (2.85–13.42)	
Age		1.03 (1.01–1.06)	0.02
Marital status	Married or living together	1.00	0.08
	Other	0.60 (0.34–1.07)	
General stress	High	1.00	0.01
	Low	2.01 (1.17–3.43)	

Each of the three outcomes and the total appraisals score

Table 60
Negative mental
wellbeing outcome

<i>n</i> = 820		OR (CI)	<i>p</i>
Total P score	Low	1.00	<0.0001
	Second quartile	2.21 (1.31–3.71)	
	Third quartile	6.78 (4.00–11.49)	
	High	21.21 (11.92–37.73)	
Age		1.02 (1.00–1.03)	0.06
Education	Degree or higher	1.00	0.005
	Other	1.71 (1.18–2.49)	
General stress	High	1.00	<0.0001
	Low	9.83 (6.76–14.32)	

<i>n</i> = 832		OR (CI)	<i>p</i>
Total P score	Low	1.00	<0.0001
	Second quartile	2.34 (1.49–3.68)	
	Third quartile	3.22 (2.04–5.06)	
	High	7.46 (4.61–12.09)	
Age		1.02 (1.00–1.03)	0.01
Gender	Male	1.00	0.04
	Female	0.69 (0.49–0.98)	
Full-time	Full-time	1.00	<0.0001
	Part-time	2.09 (1.39–3.14)	
Pattern	Fixed hours	1.00	0.008
	Other (flexi and shift work)	1.57 (1.13–2.18)	
General stress	High	1.00	<0.0001
	Low	4.49 (3.25–6.19)	

Table 61
Physical health
outcome

<i>n</i> = 255		OR (CI)	<i>p</i>
Total P score	Low	1.00	<0.0001
	Second quartile	1.96 (0.93–4.13)	
	Third quartile	6.24 (3.04–12.83)	
	High	20.51 (7.94–52.97)	

Table 62
Positive mental
wellbeing outcome

Each of the three outcomes and the total job characteristics score controlling for the total perceptions score

Table 63
Negative mental
wellbeing outcome

<i>n</i> = 668		OR (CI)	<i>p</i>
Total P score	Low	1.00	<0.0001
	Second quartile	1.39 (0.74–2.64)	
	Third quartile	3.07 (1.50–6.31)	
	High	7.70 (3.27–18.09)	
Total JC score	Low	1.00	<0.0001
	Second quartile	1.53 (0.77–3.04)	
	Third quartile	4.03 (1.89–8.62)	
	High	4.21 (1.82–9.75)	
Age		1.02 (1.00–1.04)	0.02
Gender	Male	1.00	0.07
	Female	0.66 (0.43–1.03)	
Education	Degree or higher	1.00	0.05
	Other	1.55 (1.01–2.39)	
General stress	High	1.00	<0.0001
	Low	9.27 (6.05–14.20)	

Table 64
Physical health
outcome

<i>n</i> = 673		OR (CI)	<i>p</i>
Total P score	Low	1.00	<0.0001
	Second quartile	2.28 (1.38–3.75)	
	Third quartile	3.58 (2.17–5.88)	
	High	7.75 (4.50–13.36)	
Age		1.02 (1.01–1.04)	0.007
Gender	Male	1.00	0.01
	Female	0.61 (0.41–0.90)	
Full-time	Full-time	1.00	0.003
	Part-time	2.05 (1.27–3.32)	
Pattern	Fixed hours	1.00	0.03
	Other (flexi or shift work)	1.50 (1.04–2.17)	
General stress	High	1.00	<0.0001
	Low	4.34 (3.03–6.20)	

n = 208		OR (CI)	p
Total P score	Low	1.00	<0.0001
	Second quartile	1.73 (0.76–3.90)	
	Third quartile	5.98 (2.62–13.64)	
	High	30.09 (7.87–115.12)	
Age		1.04 (1.00–1.07)	0.04
General stress	High	1.00	0.10
	Low	1.74 (0.90–3.33)	

Table 65
Positive mental
wellbeing outcome

Each of the three outcomes and the combined score

n = 668		OR (CI)	p
Combined score	Poor JC and poor P	1.00	<0.0001
	Poor JP and good P	3.79 (1.73–8.32)	
	Good JC and poor P	4.08 (2.13–7.79)	
	Good JC and good P	13.80 (8.53–22.31)	
Age		1.03 (1.01–1.05)	0.01
Gender	Male	1.00	0.05
	Female	0.64 (0.42–0.99)	
Education	Degree or higher	1.00	0.06
	Other	1.49 (0.98–2.28)	
General stress	High	1.00	<0.0001
	Low	9.71 (6.37–14.81)	

Table 66
Negative mental
wellbeing

n = 673		OR (CI)	p
Combined score	Poor JC and poor P	1.00	<0.0001
	Poor JP and good P	3.33 (1.69–6.58)	
	Good JC and poor P	1.99 (1.13–3.52)	
	Good JC and good P	3.92 (2.64–5.84)	
Age		1.02 (1.01–1.04)	0.008
Gender	Male	1.00	0.007
	Female	0.59 (0.40–0.86)	
Full-time	Full-time	1.00	0.004
	Part-time	2.01 (1.25–3.23)	
Pattern	Fixed hours	1.00	0.07
	Other (flexi or shift work)	1.40 (0.97–2.01)	
General stress	High	1.00	<0.00017
	Low	4.54 (3.19–6.48)	

Table 67
Physical health

Table 68
Positive mental
wellbeing

<i>n</i> = 208		OR (CI)	<i>p</i>
Combined score	Poor JC and poor P	1.00	<0.0001
	Poor JC and good P	12.70 (2.40–67.30)	
	Good JC and poor P	1.02 (0.37–2.84)	
	Good JC and good P	6.72 (3.30–13.69)	
Age		1.04 (1.01–1.07)	0.02
General stress	High	1.00	0.03
	Low	2.09 (1.09–4.00)	

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