The relationship between workplace stress, and
Job characteristics, individual differences, and mental health.

George M. Mark

Centre for Occupational and Health Psychology

School of Psychology

Cardiff University

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Thesis Summary

The focus of this thesis was on issues surrounding the antecedents, workplace circumstances, and features of individuals that relate to states commonly referred to as *stressful*, and how these states and characteristics interact in the prediction of mental health and job satisfaction outcomes. The introduction gives a brief outline of the aims and methods of the thesis. This is followed by a literature review that describes how certain work environments can lead to negative outcomes for employee wellbeing. The various definitions of stress are described, as are a number of popular work-stress models and their pros and cons, and the important nature and impact of individual difference variables. Chapter 3 describes a potential future direction for occupational stress research, that combines key features of existing research, which in part forms the rationale for this work. The succeeding chapters describe a series of studies, where the relationships between mental health and satisfaction outcomes, and job characteristics and individual differences, were investigated in populations of nurses, university employees, and the general public. These studies combined and tested key aspects of several theoretical viewpoints in the existing literature, including Demands-Control-Support, Effort-Reward Imbalance, and Transactional stress models, in an effort to develop a new theoretical perspective. A new model of stress takes shape over the course of the work, and is fully tested in the final quantitative study. Many aspects of this model were supported, with a key feature being the formal integration of a role for subjective perceptions of work stress. It is argued that this model could form the basis for future research into work-related stress and individual characteristics. A qualitative interview study is the last piece of research described, which focused on issues related to stress, wellbeing, and individual perceptions in university staff.

Chapter 1

An Introduction to the thesis

This chapter is a short introduction to the thesis which states the key issues and brief aims of the research, the methodology and populations used, and outlines why the current research is considered useful in adding to the literature on work stress..

1.1 Key aspects and basic methods and variables

The two main methodologies used in the research were questionnaires and semi-structured interviews. Self-report questionnaires were used to gather quantitative data from approximately 1500 participants on a variety of job features, individual characteristics, and mental health and job satisfaction outcomes. Sample populations included nurses, university employees, and members of the general public in the South Wales area. Semi-structured interviews were also carried out on a small sample of university employees on the topic of stress at work, to provide an extra qualitative dimension to the data collection.

The selection of the factors used in this research was made by referring to the occupational stress literature, and considering a range of variables from the most popular work-stress models, as well as important personal and coping variables in predicting mental health outcomes from the clinical and social psychology literature. Independent variables included job demands, social support, job control, job rewards, intrinsic efforts (overcommitment), individual coping behaviours, individual attributions for the causes of events, age, and gender. Dependent variables included anxiety, depression, stress-related illness, job satisfaction, and self-rated job stress.

One key aspect of this research is that primacy is not given to any single domain of factors in predicting outcomes, and it is proposed that only by understanding the relationships and relative importance between workplace features and individual characteristics and responses, can an ecologically valid picture of the work-stress process be formed. Such a picture is considered necessary to help design viable interventions to limit the potential serious economic and human consequences of stressful workplaces.

While there is a great deal of research into stress at work and how it may relate to certain job characteristics or individual differences, as well as a plethora of models that try and capture these processes, there is far less research that considers these variables simultaneously and thus how they compare and relate. The principle of using multiple constructs to investigate the antecedents and consequences of stress, is very important in guiding much of the work described in this thesis.

1.2 Product of research

Research from occupational psychology literature, as well as data gained from initial research, enabled the formulation of a new stress model. The model builds on strong evidence from existing research, by combining the features of several popular stress models into a single conceptualisation, and adds features from research on coping and attributions. The model was named the Demands Resources and Individual Effects model (DRIVE) and this framework was tested using the collected data, and many features of it were found to be supported.

This research is therefore considered significant, because the derived stress model integrates many features of popular viewpoints into a single framework, which unlike many previous models, considers the importance of environmental and individual characteristics in a robust and flexible way, that reflects the dynamic nature of individuals and their perceptions and responses to workplace stressors.

1.3 Why study stress?

There is evidence that stress in the workplace is a growing problem in the UK and in other industrialised nations. As this problem grows so do its costs, which amount to billions of pounds worldwide, and millions of individuals adversely affected. Sickness absence, mental health problems, accidents, heart disease, and many other issues are thought to be related to increasingly stressful workplaces. These problems are leading governments to create legislation related to work stress for the protection of employees, with growing amounts of research carried out by academics and health providers in this increasingly topical area.

The long-term effects of work stress have been shown to cause problems in many working populations and occupations, and in many different countries across

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the world. It is hoped that the research described in this thesis can add to the literature on stress in the workplace, and that by greater understanding of the issues described, reliable methods can be developed to help counteract the effects of unhealthy work, and to redesign unhealthy workplace environments.

1.4 Dissertation Structure

This dissertation begins with a literature review, which outlines the important issues, models, and variables in current occupational psychology literature. This is followed by an account of a preliminary study into the relationships between gender, ways of coping with work stress, and anxiety, depression, and fatigue. This study was mainly carried out to investigate and certify the constructs of coping and a measuring instrument. A second study is then described, where a new stress model is proposed. This research focuses on the relationships between workplace psychosocial stressors, ways of coping and attributional style, and anxiety and depression in a sample of British nurses. The model is tested further by the next study, which examines the associations between job characteristics, coping, attributions, and anxiety, job satisfaction, and depression, in a sample of Welsh university employees.

Based on aspects of the above research, the proposed stress framework is then expanded, with new features and variables added. The results of the previous studies are then re-analysed in novel ways to test the expanded DRIVE model. Then a qualitative interview study is described, where nine Cardiff University employees were interviewed using a semi-structured method, on their understanding of the nature of stress, and their opinions on its causes, consequences, and who is responsible for dealing with it.

Finally, a concluding chapter is presented, which summarises all of the work previously described, as relating to the initial study aims, and what the implications may be for the literature and for future research and practice.

Chapter 2

A literature review

2.1 Chapter Introduction

This review of the literature describes how changes in the nature of many work environments have led to increases in stressful job characteristics, as well as increased awareness of work stress issues and legislation to protect employees. It illustrates how these changes may also be causally implicated in many stress-related physical and psychological problems.

The economic and human consequences of these issues are outlined, and the nature of 'work stress' is defined. Many of the major theoretical models that depict the stress process are described, with the most influential being critically evaluated using empirical evidence, and their implications for intervention are discussed.

The important role played by individual differences in the stress process is outlined, and the influence and effects of many significant individual difference factors is described, with reference to moderating and mediating effects.

Finally it is concluded that while many stress models present fruitful frameworks for stress research, there remains much work to be done to support well specified and ecologically valid multi-factor conceptualizations of the stress process.

2.2 The changing work environment and its effects

It is a common perception that working life is changing in Britain and across the world, and these changes have led to new challenges and problems for organisations and employees. In recent years this has been characterised by the decline of manufacturing and many forms of industry in the UK, the advance of IT and the service sector, more short-term contracts, outsourcing, mergers, automization, trade union declines, and globalisation and more international competition (Cox & Griffiths, 1995; Schabracq & Cooper, 2000). The majority of these changes mean that workers are under growing pressure to compete, adapt, and learn new skills in order to meet the demands of their work (Cox & Griffiths, 1995). Schabracq and Cooper (2000) state that the combination of new technology, globalised economies, and new

organizational products and processes, have caused unprecedented changes and increasing stakes in working environments.

In this climate, there is also an increasing awareness of what is commonly called "work stress" and what implications and negative consequences this can have for employers and for the quality of workers' lives. A great deal of new stress and health employment legislation has been implemented worldwide, to combat the potential negative effects of work stress. These include the Health and Safety at Work Act in the UK, The Work Environment Act in Sweden, the Code du Travail in France (Kompier, De Gier, Smulders, & Draaisma, 1994) and the European Parliament Working Time Directive (Europarl, 2004).

Schabracq and Cooper (2000) write that organisations have adapted to the pressure for change in a number of ways, including trying to minimise labour costs by increasing the "flexibility of labour", both with individuals performing multiple tasks (qualitative flexibility) and by varying the amount of personnel and their working hours (quantitative flexibility). Also, organizations have become "lean and mean" by employing new technology, reducing the number of hierarchical levels, and with responsibilities pushed lower in the hierarchy (Schabracq & Cooper, 2000). Schabracq and Cooper (2000) also state that such organisations may attempt to outsource for staff and services, and join networks or merge with multinationals, however these changes can result in lay-offs of personnel, resulting in a loss of knowledge and experience.

Therefore these shifts in the nature of organizations due to pressure from the changing macro-economic climate, may result in increasingly "stressful" working environments, the manifestations of which can be present in daily conditions in many forms. For example a lack of control at work, with shorter holidays, longer hours, insufficient rewards, job insecurity, and poor promotion prospects. Other problems may include a lack of meaningful work, increased time pressure, lack of support and opportunity for feedback, isolation, harassment, under or over-skilling, role and group conflict, and work-life balance issues (Griffiths, 1998).

The UK Health and Safety Executive (HSE, 2007) has attempted to categorise these stressors in a "Management Standards" approach, which states that there are six key areas of work design, which if not properly managed can contribute to numerous negative outcomes. The categories used are: Demands (e.g. workload, work patterns, work environment – noise, temperature, lighting etc); Control; Support; Relationships

(e.g. conflict, bullying at work); Role (understanding of roles, and conflict between roles); Organisational change (how changes are managed, communicated, and fed-back).

All of the pressures listed above are known as "psychosocial stressors", and these have been implicated as risk factors for many physical and psychological problems in employees. These include increased risks of heart disease, gastro-intestinal problems, anxiety, depression, burnout, absence, fatigue, accidents, substance misuse, musculoskeletal disorders, work-family conflict, and many other problems (Cox & Griffiths, 1995; Gianakos, 2002; HSE, 2007). These outcomes can have serious consequences for employers as well, leading to high turnover, staff absences, strikes, decreased productivity, work errors and accidents, lack of commitment, low morale, sabotage, bad public relations, and an increased risk of employee lawsuits.

2.3 The Economic and mental health costs of stress related illness

The economic and health costs of stressful work environments may be much greater than most suspect. Cardiovascular illness has been strongly implicated as a potential health outcome for those exposed to stressful work conditions, particularly high demands and low levels of control (Karasek, 1979) and high levels of effort and low levels of reward (Peter & Siegrist, 1999). In Britain, heart disease accounts for a loss of 70 million working days per year and causes 180,000 deaths (Earnshaw & Cooper, 1994).

Alcohol misuse, another common issue related to work stress, costs the UK economy an estimated £2.2 billion from sickness absence and turnover (Earnshaw & Cooper, 1994). The Confederation of British Industry (CBI) claims that the average cost to businesses of sickness absence, including musculoskeletal disorders in 2003 was £11 billion (a 3.7% rise over 2002) or £588 per employee (Personnel Today, 2005). Arnold, Cooper and Robertson (1995) state that some estimate the total cost of sickness absence in the UK to be as much as 10% of the Gross National Product. Cox, Griffiths, and Rial-Gonzales (2000) cite an EU study from 1996 which showed that 29% of surveyed workers believed that work had affected their health, with 23% of respondents claiming to have been absent from work in the previous 12 months due to stress-related issues. The study found that the average number of days absent was 4

days per year, or 600 million working days across the EU. A study of 46,000 US employees by Goetzel, Anderson, Whitmer, Ozminkowski, Dunn and Wasserman (1998, cited in Sonnentag & Frese, 2003) showed that the health care costs of those suffering from high levels of stress were 46% higher than those who did not.

A large body of literature also suggests that work stress is closely related to anxiety and depression (Wang & Patten, 2001) and Tennant (2001) suggests that depression is the most likely adverse psychological outcome of exposure to work stress. A survey by Hodgson, Jones, Elliot, and Osman (1993, cited in Buunk, deJonge, Ybema, & deWolff, 1998) found that musculoskeletal disorders, job stress and depression were the three most commonly mentioned problems in a UK sample. Gabriel (2000) found that increased stressors at work were significantly related to increased incidence of depression and anxiety, and states that depression costs the US economy over $47 billion, and 200 million lost working days per year.

Statistics released in 2007 by the UK Health and Safety Executive, stated that from 2005-06 (HSE, 2007) work-related stress, depression, and anxiety, cost the UK economy £530 million, with 530,000 workers thought to have sought medical advice for work-related stress. Overall, 30 million working days were lost due to work related ill-health, with 6 million lost due to workplace injury.

2.4 The nature of work stress

Cox and Griffiths (1995) state that many believe that there is no consensus as to the definition of the term *stress*, and Dewe and Trenberth (2004) claim that it is almost a tradition in work stress research to point out the difficulties surrounding the various definitions of stress. However Doublet (2000, p. 227, cited in Dewe & Trenberth, 2004) raises the point that: "if it is not stress, then what do people experience when they say they are stressed?"

Despite all the hyperbole, Cox and Griffiths (1995) state that, there are really only three different types of conceptions of the nature of stress: First is the "engineering" approach, where stress is seen as a stimulus or characteristic of the environment in the form of level of demand, i.e. as an independent variable, causally antecedent in the development of damaging health outcomes, or as Symonds described (1947, cited in Cox & Griffiths, 1995) "what happens to the individual, not what happens in him".

Second is the physiological approach, where the definition of stress is based upon the physiological or biological changes that occur in the person when they are in a stress state, e.g. as a dependent variable based on neuroendocrine activation. Selye in the 1930s (cited in Cox & Griffiths, 1995) was a major proponent of this view, and postulated that noxious environmental stimuli caused a non-specific (distress) physiological response in an individual, which occurred in three stages of alarm, resistance, and exhaustion. Selye (1946) suggested that such stress states are adaptive in the short term for self-preservation and avoiding danger (e.g. flight/fight), but that due to the demands of modern society, individuals may be repeatedly exposed to stress states that cause significant pathological effects. He termed this a "Disease of Adaptation".

The third view is termed the psychological approach by Cox and Griffiths (1995) where stress is not conceived of as a mere stimulus or response, but is itself the dynamic state that occurs as an individual interacts with their environment (Cox, Griffiths, & Rial-Gonzales, 2000). Cox (1987) refers to this as "the stress process" and supports a cognitive viewpoint, which is concerned with the mental transactions that occur in stressful situations.

Cox and Griffiths (1995) claim that the engineering and physiological approaches are conceptually flawed, in part because they treat people as passive vehicles for stimulus and response, and are unable to account for the obvious effects of cognitive or situational factors on performance and wellbeing. For example the effects of noise on cognitive tasks, where the type of noise (e.g. controllable or uncontrollable) rather than level, is the key factor in performance (Cox & Griffiths, 1995) and also where cultural biases in perceptions can alter the relative value of a stimulus. Additionally, only psychological approaches allow for the influence of individual difference factors in the stress process (such as personality, gender, coping abilities etc) which are important in understanding why some individuals find certain situations stressful and others do not.

Despite the relative dominance of psychological theories of stress in occupational psychology, Dewe (2004) bemoans the continual discussion of the merits of different definitions of stress, and maintains that researchers should focus on trying to understand the meanings individuals give to events, and why these are significant, rather than rehashing the same definitional debates.

2.5.1 Theories and models of stress and wellbeing at work

There are many different models of workplace stress, and these vary in popularity and empirical support. Some of these will be outlined below, starting with some well-known models that have been influential in the past in occupational stress research. These include Person-Environment fit, the Sociotechnical viewpoint, the Job Characteristics Model, the Vitamin Model, and the Michigan Model. Also described will be some of the most currently popular and influential work-stress models, including the Demands-Control Support, and Effort-Reward imbalance models, Lazarus and Colleagues' Cognitive theory of Psychological Stress and Coping, and the Transactional viewpoint of Cox and Colleagues. Finally, other notable approaches that build on some of the above models will be described, such as Semmer's Goal-Oriented theory, Hobfall's Conservation of Resources Model, the Demand-Skill-Support model, the Job-Demands-Resources model, and the Demand-Induced-Strain-Compensation model.

2.5.2 Person-Environment fit

Lewin (1951) observed that an individual's personal characteristics interacted with their work environment to determine strain, and consequent behaviour and health. This concept was developed into the Person-Environment fit model (French, 1973), which suggests that the match between a person and their work environment is key in influencing their health. For healthy conditions, it is necessary that employees' attitudes, skills, abilities and resources match the demands of their job, and that work environments should meet workers' needs, knowledge, and skills potential. Lack of fit in either of these domains can cause problems, and the greater the gap or misfit between the person and their environment, the greater the strain as demands exceed abilities, and needs exceed supplies (Sonnentag & Frese, 2003). These strains can relate to health related issues, lower productivity, and other work problems (French, Caplan, & Harrison, 1982).

The theory makes distinctions between objective reality and subjective perceptions of reality, and between the objective person (actual skills and needs) and objective environment (actual demands and rewards), and a lack of fit between any combination of these factors can cause strain (Cox et al. 2000). Defence mechanisms

also operate in the model, to try and reduce subjective misfit, such as denial, reappraisal of needs, and coping, which is defined as any efforts to reduce objective misfit, such as learning new skills (Buunk, deJonge, Ybema, & deWolff, 1998). Buunk et al. (1998) also describe how positive misfit can occur, where one has more skills or capabilities than are required, evidence for which was found in a sample of 2000 workers by Caplan, Cobb, French, Van Harrison, & Pinneau (1972, cited in Buunk et al. 1998).

Lazarus (1991) states that while the P-E fit model represented an advance in thinking, it is flawed in that the concept of fit between the person and environment is static, with emphasis on stable relationships rather than the changing process of action and interaction in work contexts. Buunk et al. (1998) state that with a few exceptions, empirical support for the theory is limited.

2.5.3 The Sociotechnical Approach

Conceptually similar to the P-E fit model, socio-technical conceptualisations focus on the match between individual workers and their environments. Based on open systems theory, from the work of Trist and Bamforth at the Tavistock Institute in London in the mid 20th Century, Sociotechnical theory sees the entire organisation as the unit of analysis (Kompier, 2003). It is a theory of environmental design, and states that organisational healthiness (an efficient and productive organisation and staff) is achieved through joint optimisation of the social (i.e. workforce) and technical (the environment/machinery) systems in the workplace. Key concepts that contribute to health workplaces include flexibility, control, innovation by workers, and autonomous groups (Kuipers & Van Amelsvoort, 1990, cited in Kompier, 2003) and when the skills and abilities of workers are not in synch with the technical demands of work, stresses and strains then result.

According to Kompier (2003) there is little empirical research to support the sociotechnical approach and it has little predictive validity. Kompier (2003) also states that it has poor applicability in the form of organisational interventions, and is not a conventional model of work stress, but is more of a holistic design theory of healthy workers and workplaces.

2.5.4 The Job Characteristics Model

Hackman and Oldham's (1980) job characteristics model focuses on important aspects of job characteristics, such as skill variety (how many different skills are required), task identity (how well everyday tasks are related to overall work goals), task significance (how important the job is), autonomy (how free the individual is to manage their own working), and feedback (the amount of reward, praise, or comment the worker receives). These characteristics (which can be of positive or negative value) are proposed to lead to 'critical psychological states' of experienced meaningfulness, experienced responsibility for outcomes, and knowledge of outcomes of work. It is proposed that positive characteristics give rise to positive mental states, which lead to cognitive and behavioural outcomes, e.g. motivation, satisfaction, low absenteeism, growth, effectiveness, and turnover, and vice versa. In conjunction with the model, Hackman and Oldham (1980) developed the Job Diagnostic Survey, a questionnaire for job analysis, the outcomes of which imply five main types of job-redesign: combining tasks; formation of working units; making a client-centred structure; creating feedback methods; and job enrichment.

According to Kompier (2003) there is an impressive literature relating the outcome variables to the core job characteristics, and despite criticisms of the three-stage model, with some claiming that two-stages better fit the data, a meta-analysis by Viswesvaran and Ones (1995) supported the three-stage conceptualization. This model appears well integrated with the Job Diagnostic survey, providing a useful package of theory, survey, and interventions, however it is limited in the variety of the core job characteristics that are considered important, with only a small number of key psychological states.

2.5.5 The Vitamin Model

Developed by Warr (1987) the Vitamin Model proposes that certain job characteristics have an effect on mental health that is analogous to the way that vitamins work in the human body. Simply put, vitamin intake improves health and functioning up to a certain level, however, once past a certain level, vitamins stop having a positive effect (Buunk et al. 1998). "Constant effects" from vitamins are where health increases linearly with increasing dose up to a threshold, after which

increased dose has no positive or negative effect (such as with the case of vitamin C). However some vitamins have a curvilinear or "additional decrement" effect, e.g. vitamin D, where moderate levels of the vitamin are the most beneficial, but too much or too little have negative health effects (van Veldhoven, de Jonge, Broersen, Kompier, & Meijman, 2002). The vitamin model proposes that work characteristics can have effects very similar to these vitamin effects, with Warr (cited in Buunk et al. 1998) identifying nine main job features that match these patterns. Safety, salary, and task significance are cited as constant, or linear effect work vitamins (e.g. increasing salary is positive up to a certain point, after which extra salary makes no difference) and job demands, autonomy, social support, skill utilization, skill variety, and task feedback, as curvilinear effect work vitamins. The idea that mental health (and thus work performance) increases as job demands increase up to a certain point, before job demands become noxious to health, echoes the work of Selye (1974) on the concept of "eustress".

Buunk et al. (1998) describe how the Vitamin model includes strong emotional components, and affective wellbeing is expressed on three dimensions of discontent-content, anxious-comfortable, and depressed-pleased. Buunk et al. (1998) also state that individual characteristics can moderate the effect of job characteristics on health, the three main types of which according to Warr (cited in Buunk et al. 1998) are abilities, values, and baseline mental health, and that stronger moderating effects should occur when individual and job characteristics are "matched".

Despite the interesting premise of the Vitamin model, both Sonnentag & Frese (2003) and Buunk et al. (1998) state that evidence for the model is mixed and inconclusive, and van Veldhoven, Taris, de Jonge, and Broersen (2005) state that the full model has yet to be empirically investigated.

2.5.6 The Michigan Model

The Michigan Model is based on a framework established by French and Kahn at the University of Michigan in 1962, and is sometimes known as the ISR model (Institute of Social Research) the Social Environment Model, or the Role Stress Approach. Like the P-E fit model (French et al. 1982) the Michigan Model (Caplan, Cobb, French, Harrison, Pinneau, 1975) also places much emphasis on the individual's own subjective perceptions of stressors. Environmental stressors, such as role ambiguity,

conflict, lack of participation, job security, workload, lack of challenge etc, are subjectively perceived, and then personality variables, demographics, and social support moderate these perceptions to lead to health outcomes (Kompier, 2003). Role issues, such as role conflict, role ambiguity, and role expectations are particularly central stressors, hence why it is sometimes known as the Role Stress Approach (Kompier, 2003).

The model was refined by Hurrell and McLaney (1988) from the U.S. National Institute of Occupational Safety and Health to result in what is known as the NIOSH model, which as well as specifying examples of how stressors, individual differences, acute reactions, and illness outcomes occur, also focuses more on the role of objective workplace factors in the aetiology of work stress (Huang, Feurstein, & Sauter, 2002).

Buunk et al. (1998) state that the Michigan model does not have a clear theoretical perspective that easily leads to specific hypotheses, and that the model is hard to empirically evaluate due to its complexity. Mixed support was found for aspects of a simplified Michigan Model in regards to the relationship between managerial support and job satisfaction by Jones, Smith, and Johnston (2005), however a general lack of empirical support means it does not have much predictive validity for health outcomes, unlike other models such as Karasek's well-known Demand-Control model (Karasek, 1979).

2.5.7 Demand Control Support Model

The Demands-Control model (Karasek 1979) is currently perhaps the most influential model of stress in the workplace (Kompier, 2003). The original model focuses on two dimensions of psychosocial job characteristics, which are job demands (or work-related pressures, for example from high workload) and job control. The latter factor is sometimes called decision latitude (Karasek, 1979) and is made up of the sub-factors of decision authority (control over work situation) and skill discretion (possibility of using learnt skills and competencies). Cox & Griffiths (1995) call the demand-control model an "interactional" model, as it focuses on the *structural* features of an individual's interactions with their environment (as opposed to the *process* of what is occurring in this interaction).

The model was expanded to include the factor of social support (DCS) by Karasek and Theorell (1990) in response to evidence that suggested that support may act as a buffer in high demand situations (Cooper, Dewe, & O'Driscoll, 2001). The job content questionnaire (Karasek, Brisson, Kawakami, Houtman, Bongers, & Amick, 1988) was developed to measure these factors.

Karasek (1979) conducted longitudinal research on a sample of Swedish men, and found that those exposed to high levels of demand, as well as having low levels of job control (a high-strain situation), were disproportionately more likely to show increased levels of depression, fatigue, and cardiovascular disease and mortality. It was also found that the lowest probabilities of illness and death were in individuals with moderate or even high demands, if they also had high levels of job control. This scenario was termed an active or a challenge situation (Cox et al. 2000). Karasek (1979) thus hypothesised an interaction effect, whereby high levels of demand, when combined with low levels of control would cause high strain and negative health outcomes, however high levels of control would buffer the negative effect of demands to result in active learning and normal or even positive health outcomes. A high control and low demands situation was proposed to be a low-strain scenario, and a low demands and low control situation as a passive scenario. The inclusion of social support in the later model (Karasek & Theorell, 1990) also leads to a hypothesised buffering effect of social support on high levels of job demands (Cooper, Dewe, & O'Driscoll, 2001). Such an effect was found by Lim (1996) and Moyles and Parkes (both cited in Cooper et al. 2001).

Karasek originally envisioned this interaction to be a *relative excess* interaction (van Vegchel, de Jonge, & Landsbergis, 2005) where strain equals the value of demands, minus control, plus a constant, so that strain is minimised when demands and control are equivalent, and the constant helps correct the calculation to give emphasis to "too many demands" rather than "too little control". Van Vegchel et al. (2005) state that despite Karasek's original specification, the interaction effect is often operationalised in the form of a multiplicative interaction, or in the quadrant approach, where those above and below the medians on demands and control are divided into quadrants, with their strain outcomes compared.

There is a large amount of evidence to suggest that job demands significantly associate with negative health outcomes, and job control and social support with positive health outcomes, in a variety of populations, as shown by a review of studies

from 1979-1999 by Van der Doef and Maes (1999). However, there is mixed support for the interactive effects of demands and controls, with some claiming these effects to be largely additive (Warr, 1990). Cooper, Dewe, and O'Driscoll (2001) state that due to this mixed evidence, there are no definitive conclusions about a moderating influence of control on demands. Kompier (2003) also states that there is evidence that the relationship between control and health may in fact be curvilinear, so that both too little and too much control can have negative consequences for health.

Despite the expansion of the model by Karasek and Theorell (1990) to include a support dimension, the model can also be criticised for its over-reliance on a limited number of job characteristics which may not reflect the dynamic multi-stressor nature of modern workplaces. Secondly it can be criticised because in the model, these job characteristics are seen as "objective", despite the fact that they are measured using subjective self-report measures (Frese & Zapf, 1999). Thirdly (despite the subjective nature of the job characteristics measured) the model takes virtually no account of individual differences in perception or susceptibility to stressors, and stressors are seen to have a rather mechanistic effect on individuals. The model therefore can't explain why the same levels of demand and control in two individuals may give rise to different behavioural or health outcomes (Perrewe and Zellars, 1999). This is related to the "oversimplification assumption" which as stated by Payne, Jick, & Burke (1982) comes from focusing too much on environmental demands, and is the erroneous notion that the presence of an environmental demand is an indication that the event *is* demanding, when in some cases for some individuals it clearly is not. Karasek (1998) responded to some of these criticisms by acknowledging that individual perceptions were an important part of the person-environment interaction, but still maintained the primacy of the objective environment. He also attempted to integrate certain individual factors, such as self-esteem changes, into a long-term exhaustion outcome.

Other problems with the DCS model include its definition of demand as based primarily on workload and not other types of demand (Cox et al. 2000) and that the conceptualisation of control is quite a narrow view of this multi-dimensional construct (Carayon, 1993, cited in Cox et al. 2000). For example, Parkes (1989) distinguishes other types of control not mentioned in the DCS, such as control as an objective characteristic of the work situation, as a subjective evaluation on how controllable a work situation is, and also a general belief on the extent to which important outcomes

are controllable. The DCS model also assumes that high control is always a desirable state (and a positive moderator of negative demands) however it is clear that some individuals may not see job control as desirable, and may find having control a stressor in itself, for example if they have a low sense of self efficacy.

Due to the popularity of this model, it is important to mention its consequences for organisational intervention. The implications for job redesign are obvious from the content of the model: that healthy jobs ought to have high levels of control without extreme levels of demand, and with wide networks of social support. Research by Van der Doef & Maes (1998) Ganster (1995) and Kristensen (1995; all cited in Kompier, 2003) have supported the efficacy of these measures.

The DCS model can be used to provide empirical support for primary (organisational or job characteristics) level interventions, but it is arguable whether it can be used to make recommendations about secondary level interventions (e.g. individually focused measures such as stress-awareness training). This is because the DCS model presupposes *a priori* which factors are important, and has no way of accounting for the influence of pervasive problems in organisations that do not fit in with the remit of the theory. For example, employees could have low demands or high levels of control, but may have conflict between subgroups, poor coping skills, or be subject to age or gender discrimination. Stressors that cannot be accounted for by the DCS model.

Finally, using the DCS model as a basis for job redesign, assumes that altering the levels of demand, support, and control are actually possible. However, many jobs are inherently demanding, such as being a nurse, teacher, doctor, or stockbroker, and it may not be feasible to alter the structure of these jobs in line with recommendations of the DCS. Instead it may be more realistic to train such workers in coping and improving self-efficacy, time management, awareness of discrimination issues, and providing more opportunities for feedback or greater reward.

In conclusion, the DCS is a popular and influential model of workplace stress with good predictive validity, but it is limited in encapsulating the stress process. It is also still largely based on a stimulus-response paradigm, of a type that Dewe (1991) states is conceptually sterile. It could be most useful when used in conjunction with other models of job characteristics, as well as those with an individual difference or subjective perceptions component.

2.6.1 Transactional Theories of Stress

Cox and Griffiths (1995) make a distinction between two types of psychological model of work stress, *interactional* or structural approaches, such as the DCS model, and *transactional* or process models.

Interactional models focus on the structural characteristics of the stress process, i.e. which stressors are likely to lead to which outcomes in which populations, however transactional views are more cognitive, and focus on the dynamic relationship that occurs between individuals and their environment in terms of mental and emotional processes (Cox et al. 2000). Transactional views often place emphasis on the role of subjective perceptions of the environment, and are more likely to acknowledge the possible impact of individual difference factors, such as differences in coping, appraisal, personality, locus of control etc. Some of the main models with these features in the occupational stress literature are described below, together with some implications for practice and intervention.

2.6.2 Effort Reward Imbalance

The Effort-Reward imbalance model (ERI: Siegrist, 1996) is a popular view of stress at work, that along with the DCS model forms the theoretical basis for much organisational research, and like DCS, the ERI model was developed with a focus on cardiovascular disease (Siegrist, 1996). The ERI model has some basic transactional features, but also has things in common with interactional views, because while it places emphasis on subjective perceptions of the environment, the role of individual differences and the explication of internal processes is far less developed than in other transactional models that will be described in due course, such as models by Folkman and Lazarus (1980) and Cox (1987).

The key concept of ERI is one of reciprocity, or work as part of a social exchange process. Echoing the balance orientation of the P-E fit model (French et al. 1982) where a misfit between a person's abilities and the demands of their job causes strain, the basic supposition of ERI is that effort at work should be compensated by suitable rewards, and a mismatch between these will lead to stressful experiences (Peter & Siegrist, 1999). A situation which is particularly likely when efforts are high and rewards are low.

Rewards are defined as money, esteem, career opportunities, and security. Effort is proposed to have two components: intrinsic effort, from the personal motivations of the individual, such as a need for control and overcommitment (a tendency to make excessive efforts or be committed to unrealistic goals); and extrinsic motivations, or external pressures, such as workload (similar to the concept of job demands in the DCS model, Kompier, 2003). External demands are also proposed to relate to the status of the labour market and how easily alternative employment can be found. The ERI model therefore combines the conceptual basis of P-E fit, with rewards, occupational demands from the extrinsic effort component, and the individual difference variable of intrinsic effort.

According to Peter and Siegrist (1999) the DCS model is only concerned with extrinsic factors, whereas the ERI uses extrinsic factors (e.g. extrinsic effort) and intrinsic factors (from overcommitment). The ERI model is also different to the DCS model (and again echoes the P-E fit model) in that it is not the "actual" level of mismatch between efforts and rewards that is important in creating feelings of effort-reward imbalance, but rather their perceived mismatch (Siegrist, 1996). This implies a role for individual differences, as different subjective perceptions are likely to result from variability between individuals, however there is no further explication of how this could happen in the theory.

Peter and Siegrist (1999) cite five major studies that support all or some of the assumptions of the ERI model. Studies including Siegrist, Peter, Junge, Cremer and Seidel (1990) and the Whitehall II study in the UK (Bosma, Peter, Siegrist, & Marmot, 1998) have shown significantly elevated risks of coronary heart disease (2.7-6.1 times higher) in those exposed to high effort-low reward conditions, compared to low effort and/or high reward, when age, smoking, BP and cholesterol are controlled. Van Vegchel et al. (2002) also found strong effects for the reward components relating to self-esteem and job security on psychosomatic complaints and exhaustion outcomes, and de Jonge, Bosma, Peter, and Siegrist (2000) found that individuals with high efforts and low rewards were up to 21 times more likely to suffer emotional exhaustion than those with low efforts and high rewards.

The relationship and disparity between effort and rewards is often operationalised in empirical research by a ratio term between the levels of efforts and rewards. However, Van Vegchel et al. (2005) state that it was not until recently that the nature of this relationship was clearly specified. Siegrist, Starke, Chandola, Godin,

Marmot, Niedhammer, and Peter (2004) specify that the ratio should be calculated by efforts divided by rewards multiplied by a correction factor, with a value close to zero indicating low efforts and high rewards, and values beyond 1 indicate high efforts not met by rewards. Significantly, Van Vegchel et al. (2005) found that when comparing the different ways of expressing the effort-reward disparity relationship, it was a multiplicative interaction term, rather than a ratio term that consistently gave significant effects in the prediction of negative outcomes, suggesting that research that uses this form of interaction may be more fruitful than work that uses the traditional ratio term.

Kompier (2003) has noted a problem with many studies that use simple ratio terms for ERI, whereby if effort is high and reward is equally high, a score of 1 results, however when effort and reward are both equally low, a score of 1 also results, despite representing two very different type of work conditions. Kompier (2003) also points to a lack of conceptual clarity about how "overcommitment" is used, as sometimes it's treated as a moderator, an IV, a DV, a personal characteristic, or a type of behaviour.

While the ERI expands on the DCS model in several key ways, and the predictive validity of the model is good, the role of individual differences is limited to the intrinsic effort dimension, and as the factors that influence subjective perceptions of efforts and rewards are not specified, there are no proposed mechanisms by which individual differences may influence the stress perception process. Kompier (2003) states that ERI doesn't provide a detailed redesign theory, but like the DCS model implies basic design principles largely based on primary interventions only, i.e. fair recompense for effort, feedback systems, and bonuses and promotion prospects etc. Like the DCS model, its recommendations for possible secondary interventions would be limited, by the small number and a priori nature of the factors the ERI model considers, to the neglect of other job characteristics factors shown to be important in the DCS. Research has shown that there is significant scope for these two models to be used in conjunction, as each can add cumulatively to the explanation of variance in emotional and physical health outcomes (de Jonge et al. 2000).

2.6.3 The Cognitive theory of Psychological Stress and Coping

Lazarus and Folkman's theory of psychological stress and coping (1984) is perhaps the most theoretically influential transactional theory. Sometimes known as the Cognitive or Cognitive-Relational approach, the individual and their environment are seen as coexisting in a dynamic reciprocal relationship, where stress is neither a stimulus nor response, but is the psychological and emotional state that is internally represented as part of a stressful transaction (Folkman, Lazarus, Gruen, and DeLongis, 1986). Individuals are hypothesised to consciously assess the situations they encounter to see if they are demanding or threatening, and if necessary to mobilise resources to deal with these. The two key concepts in this process are appraisal and coping (Cox et al. 2000).

Folkman et al. (1986) describe how Primary Appraisal is the first stage of the appraisal process, where encounters are subjectively evaluated to see what is at stake, e.g. it terms of potential harm, risk, threats to self esteem etc. This is the stage at which events are given meaning and value to the individual, and are assessed to see if the transaction potentially thwarts or facilitates an individual's goals (Perrewe & Zellars, 1999). Lazarus (1994, cited in Perrewe & Zellars, 1999) states that there can be three potential types of encounter, namely: an irrelevant encounter that has no significance for the individual; a benign-positive encounter that is beneficial/desirable; and a stressful encounter that is harmful, threatening, or challenging. These assessments allow for the influence of individual differences, because the nature of what is considered stressful is individual specific (Park & Folkman, 1997).

In later work, Park and Folkman (1997) write that the attribution of meaning to an individual's understanding of the world and its events, can be framed by existing beliefs based on their *global meaning*. These are enduring beliefs and valued goals, based on fundamental assumptions, theories of reality (e.g. religion) worldview, self-worth, and accumulated life experience, and these are generally considered stable over time. Park and Folkman (1997) further propose, that the making of *situational meaning* is what occurs when an individual's global beliefs and goals, interact with the specifics of a particular person-environment transaction, and is defined by the processes of primary appraisal, as well as secondary appraisal and coping, the second and third stages in Folkman et al.'s transactional theory.

If a situation is evaluated as potentially stressful, then the secondary appraisal process occurs, which is where the individual evaluates if the potential harm can be altered, avoided or prevented (Park & Folkman, 1997), where to assign blame or credit (to oneself or another), and what future expectations are. Various potential types of action or ways of coping are also assessed, again informed by global meaning systems, as well as by past coping experiences and successes, personality variables, personal resources etc. Folkman and Lazarus (1980) defined two major categories of coping response, whereby an individual could attempt to cope using a more rational problem solving type approach (problem-focused coping) or an emotional-oriented coping approach (emotion-focused coping) each of which is suitable for different kinds of situation.

Once the various possible coping methods have been assessed and selected, then the final stage of the model occurs, whereby coping is implemented. Coping constitutes according to Folkman et al. (1986) "cognitive and behavioural efforts to manage (reduce, minimise, master, or tolerate) the internal and external demands of the person-environment transaction that is appraised as taxing or exceeding the person's resources". Park and Folkman (1997) suggest that coping is the main method by which incongruence between global meaning and situational meaning is managed, which is according to Park and Folkman (1997) entirely consistent with Festinger's (1957) concept of cognitive dissonance as a cause of mental distress.

Therefore a failure or inability to cope successfully (e.g. from large demands, or lack of resources or experience) is likely to lead to stress and negative health outcomes (Cox et al. 2000). These outcomes could include a range of problems described by Cox and Griffiths (1995) including increased incidence of coronary heart disease, gastro-intestinal problems, anxiety, depression, fatigue, musculoskeletal disorders, etc, as well as the consequences for organisations that these problems imply.

While there is research on some aspects of Folkman and Lazarus' work, such as the relationships between coping and health outcomes, due to the complex and multi-faceted nature of their theory, it is difficult to empirically investigate. Examples include: Folkman et al. (1986) where personality, primary appraisal, secondary appraisal and coping were investigated in stressful situations in a sample of 150 adults, and support was found for aspects of the model in the prediction of psychological symptoms; and Dewe (1991) who found that primary and secondary

appraisal factors and coping, all contributed significantly to the prediction of emotional discomfort in a workplace sample.

Unlike the DCS and to some extent the ERI model, Folkman and Lazarus' model gives weight to the job situation, subjective perceptions, and various individual differences factors such as coping style. Indeed Lazarus argues (1991) that many stress management interventions fail because they treat all people as if they were alike, and it is useful to view the individual, the group, and the workplace as a single analytic unit, rather than separate variables which are to be manipulated independently.

Some have questioned the limited nature of the problem-focused versus emotion-focused distinction of the original coping theory, for example, that it is a weak distinction that is not well supported, with poor predictive validity (Dewe, Cox and Ferguson, 1993), and that there are difficulties surrounding the definition of coping, as it can be seen as a process, a stable trait, or as situation specific (Cooper et al. 2001; Cox & Ferguson, 1991). Briner, Harris and Daniels (2004) have also stated that the conception of appraisal is too simplistic and doesn't include individuals' histories, and anticipated futures. Cox (1987) also states that the processes discussed may not be as rational as presented in transactional theories.

Hart and Cooper (2001) criticise the Folkman and Lazarus' cognitive-relational approach for its lack of focus on the role of enduring personality characteristics and emotions in the stress process. They describe a *Dynamic-Equilibrium* approach which combines the cognitive viewpoint, with information about emotion and perceived quality-of-life, and propose that separate paths, underpinned separately by positive and negative affectivity, link state and trait components of emotion and personality variables. Importance is given particularly to neuroticism and extraversion due to their temporal stability.

2.6.4 Cox's Transactional model of Occupational stress

Cox's transactional model of work stress (1985; Cox & Mackay, 1981) is heavily influenced by the work of Lazarus and Colleagues and many of the processes and stages in the two models are similar, however there are certain important differences and clarifications in Cox's model, particularly a clarified structure and greater focus on occupational health and individual differences (Cox & Ferguson, 1991).

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Cox's framework has five stages. The first stage represents the demand or job characteristics of the environment. The second stage represents the individuals' perceptions of these demands relative to their ability to cope. These two stages could be seen as analogous to the primary appraisal stage of Folkman and Lazarus' model (1980). Stress is conceptualised as being the psychological state when there is a mismatch between perceptions of the significance of a demand, and beliefs about one's ability to cope with it. Cox and Ferguson (1991) describe how this primary appraisal process is influenced by the internal and external demands experienced, as well as coping abilities and resources, and support from others. The level of coping control is also seen as particularly important in Cox's model.

The third stage of the model is associated with the mental and physical changes that the person undergoes as a result of the recognition of a stress state, and involves secondary appraisal and coping, which are analogous to those in Folkman and Lazarus' model. Cox and Ferguson (1991) describe the psychological changes that occur in a stress state, including mood change, emotional experience, e.g. tension, feeling worn out, or depressed etc, as the defining feature of the stress state for the individual. Thus the awareness of a stressful problem initiates a cycle of behaviours that are "an adjustment *to* the situation, or an adjustment *of* the situation" failure of which leads to negative health outcomes. The fourth stage of the model represents the outcomes or consequences of coping, and finally, the fifth and last stage is feedback which is proposed to occur in relation to all other stages.

Cox and Ferguson (1991) state that primary appraisal is a continual monitoring process, and that secondary appraisal is a distinct decision making process, and that the entire stress process is grounded in a "problem solving" context. Cox (1987) writes that the basic framework for this context involves recognition of a problem, diagnosis, suggestion of possible solutions, evaluation of suggested solutions, implementation, feedback, and learning, and that such a problem-solving approach can also be used as the basis for organizational interventions.

Cox and Ferguson (1991) also make a point of stressing the importance of individual differences in this transactional model. Differences in locus of control, hardiness, and coping resources are deemed particularly important, and may exert effects in the model via a mediating role in appraisal, and a moderating role in helping to determine health outcomes.

A clearer structure, the inclusion of a feedback stage, and particularly the emphasis on individual differences which exert an influence by mediation and moderation, represent important steps forward over the model of Lazarus and colleagues, however, Cox warns that in reality, the problem solving process in a stress setting is unlikely to be so rational (Cox, 1987). For example, appraisal and coping processes may not be open to such conscious evaluation, and may be carried out with bias, insufficient information, and to appear irrational or counterproductive. Inadequate analysis, consideration of a limited number of solutions, and little or no attention may be paid to feedback or past learning. However, it could be argued that these problems could be what makes the difference between successful and unsuccessful problem-solving episodes.

Much of the evidence related to the above model is very similar to that related to Folkman and Lazarus' model, for example research on coping and appraisal. However, while there is plenty of supporting research on the main effects of individual difference factors such as hardiness, locus of control, self-efficacy etc, and their relationship to health outcomes, data on possible mediating and moderating roles of these factors are far less conclusive (see Cooper *et al.* 2001, Spector, 2003, & Parkes, 1994). Moreover (like Lazarus model) the very complexity that gives the above model such flexibility means that it is hard to empirically test, unlike the simpler interactional-type model of Karasek (1979).

2.7.1 Other Stress Models

Aside from the models described above, there are several other models of workplace stress that have some interesting implications, but may be less well known than some of those described above. Some of these are outlined below.

2.7.2 Barriers to task fulfilment

Semmer (2003) presents an interesting theoretical framing of work related stress which is centred on life goals and "barriers to task fulfilment". Semmer describes how stress comes from appraisals of threat or loss when these are related to the anticipated or actual thwarting of goals. "Goals" refers to all desired states, including general dispositions, values, identities, and tasks. Semmer (2003, citing Cropanzano, James,

& Citera, 1993) claims that personality is made up of a system of these goal states, and that personal strivings, concerns, and life tasks are goal directed, and are linked to self-identities. Therefore any events that threaten or could potentially block goal states are threatening and stress inducing (Semmer, 2003). Semmer (2003) postulates that working towards goal states is related to job satisfaction, and that aspiration towards goals is overlooked in many stress theories. Individual differences are deemed important, particularly the personality factor Type A, which has a strong goal achievement component.

Semmer states that one of the ways of reducing stress is to alter goals, e.g. making them more realistic or achievable, however this could have hidden costs to do with lessened motivation or satisfaction. Semmer (2003) proposes that reduction of goals can cause a negative state in which the individual accepts what they will settle for, which is different to what they want, a so called "resentful adaption" state.

Semmer's conceptualisation of goals and barriers to task fulfilment appears to be a reframing of certain common work-stress mechanisms in a goal-oriented framework. Indeed the conceptualisation of personality as goal states appears to have aspects in common with *Global Meaning* as described by Park and Folkman (1997) and the stress state from potential barriers to goal fulfilment, as the incongruence felt when *situational* meaning and global meaning to not match. The concept of positive mental states being conceptualised as a system of goals is interesting, but gives rise to certain questions regarding how certain stressors may threaten goal states, e.g. physical stressors such as noise, how positive working environments aid goals, and how open to conscious appraisal this process may be. Some support for the above concept has been shown, as stress from the endangering of goals has been found to correlate with psychosomatic symptoms (Semmer, 2003) however, this finding would also be in line with other work stress theories, and given the range of alternative stress models, the added value of considering work stress at such a broad level of abstraction is not clear.

2.7.3 Conservation of Resources Model:

Similar in some aspects to the goal oriented view above, Hobfall's (1989) conservation of resources (COR) model views "resources" as personal characteristics (self esteem etc), conditions (e.g. being employed), energies (time or money), and

objects of value (Buunk et al. 1998). Situations deemed as stressful are those that may threaten resources, or when anticipated resource gains after investment do not occur. Hobfall (1989) claims that: "Resources are the single unit necessary for understanding stress".

The model in contrast to many stress models, also makes predictions about behaviour in times of low stress as well as high stress, with individuals acting to consolidate and increase resources in times of low stress, and to protect, conserve, or try and limit loss of resources in times of high stress (Buunk et al. 1998).

The specification of protecting resources as a motivator for behaviour is not uncommon in psychology, and is related to work by Maslow (1968) and Pearlin, Lieberman, Menagham, and Mullen (1981, as cited in Hobfall, 1989) and also bears resemblance to goal states from Semmer's (2003) model, and the idea of global meaning from Park and Folkman, (1997). Four kinds of resources are defined in the model, and these are: object resources (e.g. possessions); conditions (marriage, tenure, seniority); personal characteristics; and energies (time, money, knowledge).

Hobfall (1989) criticises *balance* models where stress is seen as the product of imbalances between perceived demands and responses. Hobfall states that as balance models define both demands and coping capacities by subjective perceptions, and that each is offset by the other, there is no anchor point by which to judge these, and as a result such models are tautological, overly complex, and not-open to refutation, a problem he states which is not present in objective stressor/stimulus based models. The model states therefore that much emphasis is based on "objective" standards of loss, and that while subjective appraisal of losses does take place, this is based on normative tendencies.

Despite Hobfall's supposition that resources are in part informed by shared social standards (1989) it seems just as likely that the specification of resource-related goals is also (or even ultimately) an individual process, for example it is entirely feasible that an individual could have resource-related goals that are in opposition to social norms. This being the case, the emphasis Hobfall (1989) places on objective standards for loss (in order to avoid the problems with balance models as specified above) seem at odds with the manner in which individuals must assess the possible impact of external threats to internal resources, i.e. in a subjective manner. For example, for an individual whose major work-related resource aims relate to a sense of self-esteem and personal rewards, the "objective" stressor of a shouting supervisor

may be a serious resource threat. However, for a factory worker who dislikes their job but knows it is secure, and whose aim is only to get paid and go home, a shouting supervisor may be irrelevant, or not a stressor at all. Thus the view of this stressor is subjective and not normative. It is also not clear how the model could explain a situation where a promotion may lead to more pay, job security, power, respect, and control, but also to increased stress and negative health, because in this case objective "resources" are boosted.

The model implies that a large amount of resources can act to offset or counteract future loss (which motivates behaviour in times of low stress) however, this may give rise to an issue that results from treating psychological resources in the same conceptual and quantitative way as physical resources, as it is likely that different types of resources are qualitatively distinct, and may have different values in different situations or at different times.

Support for some aspects of the model have been reported, for example by Grandley and Cropanzano (1998) who found that negative states were experienced as a result of expectations of leaving one's job, which was interpreted as a loss of resources, and by Lee and Ashforth (1996) in a meta-analysis on burnout studies, who argue that resources overcome the need for defensive coping.

Hobfall's aim of building a bridge between balance models and those with objective workplace stressors is commendable, and the aspect of the model that predicts behaviour in times of low stress is interesting. However, it could be argued that despite placing emphasis on objective norms (like the structurally oriented DCS model) the COR model is specified in process terms (i.e. with a focus on what is happening inside the stress process and individuals) and as such may suffer from a lack of taking account of individual differences and subjective perceptions.

2.7.4 Cybernetic Models

An early model by Cummings and Cooper (1979) known as the *Cybernetic* model, incorporates some transactional and P-E fit elements, but focuses on the "stress cycle", or the chronological series of events that ensue in the stress process. This model suggests that behaviours are directed towards goal states, and that deviations from this can cause strain by the mechanism of mismatch between a person's actual and preferred states. The process involves detection of deviation, selection of possible

adjustment processes, implementation of processes (i.e. coping) and then the outcome effect (Cooper, Dewe, & O'Driscoll, 2001). Cooper et al. (2001) state that this model is useful as it draws attention to the temporal character of stressful interactions, and that time is an important factor to consider.

Edwards (1992, cited in Sonnentag & Frese, 2003) developed a related and more rigidly structured Cybernetic model, where it was proposed that an input was provided by the individual's state or features of the environment, then a reference value follows, based on desires, values, and goals, and then a "comparator" compares the input function with the reference value, followed by output functions (behaviours activated by discrepancies between input and reference values). Sonnentag and Frese (2003) state that cybernetic models remain largely empirically unsupported.

2.7.5 Models focused on Musculoskeletal disorders

Balance theory (Carayon, Smith, & Haims, 1999) is a multi-factor work stress model with similarities to the NIOSH and Socio-technical models, however with particular focus on the musculoskeletal and psychological demands that harmful work characteristics can have on individuals. The model proposes that negative work characteristics can cause imbalances between the elements of a work system, these include worker, task and environmental situations, and technology and organizational factors (Huang, Feurstein, & Sauter, 2002). These imbalances then can lead to stressful psychological reactions, pain and negative health, and particularly to upper extremity musculoskeletal disorders. This can happen via ergonomic or behavioural factors, such as cumulative trauma from poor posture, repetition, continual force, etc (Carayon et al. 1999) as well as via psychobiological changes in blood pressure, heart rate, stress hormones, and from tendon, nerve strain and muscle tension. Therefore psychological and physiological stress can work in parallel to result in a range of coronary, gastrointestinal, mental, and musculoskeletal negative health outcomes, (Carayon et al. 1999). Huang et al. (1999) note that this model is largely speculative and there is a lack of detail on some of the processes involved, and that there is little empirical evidence for the effects of work and organisational factors on ergonomic exposures, and how these combine to form risk factors.

Another model with a focus on musculoskeletal health outcomes is the Workstyle Model (Feurstein, 1996). An individuals' workstyle is described as their

particular pattern of cognitions, behaviours and physiological reactions when performing tasks at work. Certain workstyles are proposed to result in a "cascade" of physiological changes in response to psychosocial stressors, repeated evocation of which can lead to musculoskeletal disorders (Huang et al. 1999). High risk workstyles are those that include poor posture, excess force use, having fewer breaks, and other behaviours likely to cause muscle strain and tension. Huang et al. (1999) state that this model is clear in its recommendations for workplace intervention regarding musculoskeletal problems, but it still requires empirical support. Also, while the model acknowledges the importance of behavioural, cognitive, and physiological responses in response to stressors, this aspect of the theory is not detailed in comparison to the musculoskeletal components.

2.8.1 New stress models

Recently a newer wave of stress models have emerged that take important aspects of existing models and try to develop them in new ways. Examples of these include the Demand-Skill-Support model, Demand-Induced-Strain-Compensation model, and the Job-Demands-Resources model. These models are outlined below.

2.8.2 Demand-Skill-Support model

The Demand-Skill-Support model (DSS: van Veldhoven, Taris, de Jonge, & Broersen, 2005) was developed largely based on DCS model (Karasek and Theorell, 1990) with the aim of seeing how many factors were needed at a minimum to adequately explain stress and well-being, and if such a model could be applied across a variety of occupations and outcomes.

Van Veldhoven et al. (2005) citing work by Sparks and Cooper (1999) and others, state the importance of incorporating enough job characteristics factors into a model for situational specificity, while not being overly complex. The authors' aim therefore, was to specify a parsimonious general model that would be applicable to a wide variety of occupational situations, that while not exhaustive, would have enough complexity to cover the majority of stress-inducing work situations.

On a sample of 37,000 Dutch employees in four branches of industry, van Veldhoven et al. (2005) investigated the relationship between the outcome variables

of work-related fatigue, task satisfaction, and organizational commitment, with the work place characteristics of: pace and amount of work; physical effort; skill utilization; task autonomy; quality of social relationships with colleagues; quality of relationships with supervisor; and job security. Factor analysis was applied to the sample to test the best fit of the various combinations of above factors to the results gained.

The best fit for the data was found to be a model that included the four factors of physical and time demands, skill utilization, and quality of social relationships (combined for colleagues and co-workers). Task autonomy, and job security were found not to make significant improvements in predicting outcomes over the above four factors. On the basis of their results van Veldhoven et al. (2005) proposed that quantitative and qualitative demands were more likely to relate to health outcomes and strain, skill utilization, and social support were more likely to relate to attitudinal outcomes and wellbeing. The four-factor solution was also found to be a good fit for the data over four branches of industry, suggesting it could be applied to a range of occupational situations.

The sample size used in the creation of this model is impressive, and while the model was formulated with parsimony in mind, it could be criticised for several reasons. Firstly, all of the job characteristic factors used are derived from the DCS model but with several of the original DCS scales split into its subfactors. While it is useful to separate skill utilization and task autonomy forms of control (analogous to skill discretion and decision authority in the DCS) good reasons for the selection only of DCS oriented factors are not given, other than to be in line with current measurement practices (Veldhoven et al. 2005). Also while the use of three different outcome variables is useful (fatigue, task satisfaction, and organizational commitment) the model could perhaps have benefited from the inclusion of an affective mental health-based outcome, such as anxiety or depression, or a more objective outcome such as absence behaviour. The authors do acknowledge however that they use only a limited number of job characteristics, and the model could perhaps be improved with the inclusion of more, and conclude that a general four-factor DCS based model is a good starting point for research.

The DSS model gives little recognition of the impact of individual differences in the stress process, or subjective perceptions of job demands. While this is in line with the authors' stated aims of a parsimonious model that captures aspects of

stressful environments with the minimum of factors (and is also due to its roots and similarity to the DCS model) this goes against a prevailing trend to view stress as a relative, subjective, transactional process (Dewe, 1991, Dewe & Trenberth, 2004, Perrewe & Zellars, 1999, Florio, Donnelly, & Zevon, 1998, Frese & Zapf, 1999, and Spector, 2003) and the explanatory value of a model that attempts to reduce, rather than increase the picture of the complexity of the stress process may be questioned.

A model derived from the principle of parsimony such as this could be very useful as a preliminary screening tool to get a broad view of the levels of stress in an organisation. If such general risks were found, this could perhaps be followed by a more detailed investigation that may provide more information about potential interventional strategies. The DSS may also benefit from further testing with the inclusion of other job characteristics, as the lack of inclusion other factors in the initial research, calls into question the authors' conclusion that a model based on DCS factors is indeed the best approach.

2.8.3 Demand Induced Strain Compensation model

De Jonge et al. (2000) found that sub-factors of the Demands-Control-Support and Effort-Reward-Imbalance models had independent cumulative effects in the prediction of emotional exhaustion, job satisfaction, and psychosomatic and physical health complaints. Similar results were found by Rydstedt, Devereaux, and Sverke (2007) and both they and de Jonge et al. (2000) conclude that future research should look to refining and combining aspects of these two models.

An approach that attempts to do this is the Demand-Induced-Strain-Compensation model (de Jonge & Dormann, 2003). This model was developed particularly with a focus on stress in service jobs. The central assumption of the model is that there are various types of demands and resources, and that each of these are matched, so that emotional demands at work are most likely to be compensated for by emotional resources, cognitive demands by cognitive resources, and physical demands by physical resources (van Veldhoven et al. 2005). Furthermore the strongest interactions between demands and resources are likely to occur also on these qualitatively matched dimensions, and that each of these interactions is related to a particular type of emotional or affective outcome (van Vegchel et al. 2005). For example, if high behavioural demands are met with low behavioural resources, high

cognitive demands with low cognitive resources, and high emotional demands with low emotional resources, then adverse health is likely to result. However, if high demands in each dimension are met with high resources, then motivation, learning and growth are likely to result. This has been called the "triple match principle" (de Jonge & Dormann, 2003). This model therefore takes the principles of balance, reciprocity, demands, and resources of different types, from the ERI and DCS models. More research is needed on this model, particularly with respect to the interesting hypothesis that resources in a particular domain are best compensated by resources in the same domain, however citing de Jonge and Dormann (2004) van Vegchel et al. (2005) state that preliminary results are promising.

2.8.4 The Job Demands-Resources Model

Finally, one new approach that has attempted to develop and expand upon the basis of existing research is the Job Demands-Resources Model (JD-R: Demerouti, Bakker, Nachreiner & Schaufeli, 2001). The JD-R model takes cues from numerous approaches described above, including DCS and COR models, and attempts to explain how the conditions of *job demands* and *job resources* can influence illness and organizational commitment (Llorens, Bakker, Schaufeli, & Salanova, 2006). Demands are said to be physical or social aspects of a job that require efforts and thus have physical and mental costs. Resources are workplace or organisational aspects that help with the achievement of work goals, reduce demands, or stimulate growth and development.

Therefore it is by the presence of demanding and resource providing job conditions, that the key processes of health impairment and motivation are influenced. Burnout (from sub-factors of exhaustion and cynicism) and work engagement (from vigour and dedication) are proposed to be opposing psychological states that lead to health impairment (Llorens et al. 2006). Organisational commitment may be damaged by burnout through the health impairment process, or boosted by engagement through the motivation process.

Llorens et al. (2006) maintain that the JD-R is a heuristic, overarching model, the principles of which can be applied to any occupational setting regardless of the particular demands or resources involved. The JD-R model also extends upon the

DCS model by stating that many different resources may buffer the impact of many different demands on stress outcomes (Bakker, Demerouti, and Euwema, 2005).

Research has supported aspects of the model, for example Llorens et al. (2006) show that burnout mediates a negative relationship between job demands and organizational commitment in Dutch and Spanish samples, and engagement plays a mediating role in the relationship between resources and commitment. Also, Bakker et al. (2005) showed that interactions between demands and resources explained a unique proportion of the variance in exhaustion and cynicism outcomes.

Xanthopoulou, Bakker, Demerouti, and Schaufeli (2007) state that although there is some support for JD-R, the model is still very much based on the DCS model of Karasek (1979) and thus much research on the JD-R has only focused on the characteristics of the work environment. Bakker et al. (2005) acknowledge the potential importance of individual differences in the JD-R model, but state that by studying work characteristics, it is possible to determine characteristics that are related to outcomes in *most* people.

However, Xanthopoulou et al. (2007) attempted to further the research based on the JD-R model, by adding the category of *personal resources*. Personal resources are conceptualised as characteristics that contribute to resiliency, such as general self-efficacy, organisational based self-esteem (OBSE), and optimism, and that these resources should moderate and mediate the relationships between environment and outcomes. Despite previous research that supported the moderating role of efficacy, self esteem, and optimism (Van Yperen & Snijders, 2000, Pierce & Gardner, 2004, and Mäkikangas & Kinnunen, 2003, all cited in Xanthopoulou et al. 2007) no moderating role for personal resources was found (Xanthopoulou et al. 2007). However, evidence was found that personal resources mediated the relationship between job resources, and work engagement and exhaustion.

Despite the mixed support for a role of personal resources in the JD-R framework, the enhanced JD-R model represents a significant theoretical step forward over the JDC, DSS, and COR models, and the addition of personal factors into a resource-based model, that also integrates important job characteristic features, may well be a fruitful direction for future research.

2.9.1 The importance of Individual Differences

The above sections described many of the historical and more up-to-date stress models that have been influential in the field of occupational stress research. It is clear that there are divides between models of different types, for example those that mainly focus on job characteristics, such as the DCS and DSS models, and those that include a role for subjective perceptions of stressors, such as the Michigan and P-E fit models, and models such as the ERI that combine both of these features. There are the models that focus on the psychological processes that may occur in stressful interactions, such as the transactional models of Folkman and Lazarus (1981) and Cox (1987). Finally there are models that try and combine aspects of the above models, such as the DISC and JD-R models.

While these distinctions are useful for understanding the development of stress models, there is another feature of stress theory that is particularly relevant to the current discussion. This feature is whether or not the framework takes account, or includes a role for individual difference variables. While the possible influence of Individual Differences (IDs) is implicit in models that treat stressors as subjective (such as the ERI model and others) very few models actually have an explicit role for individual difference factors integrated into them. The ERI model has the ID factor of intrinsic effort, but this factor is specific and its influence on subjective perceptions is not specified. The theories of Folkman and Lazarus (1980) and Cox (1987) pay specific attention to the individual difference factor of coping styles, and new research on the JD-R model includes a role for self-esteem, efficacy, and optimism, but in other models an explicit role for ID factors is uncommon. This is despite the fact that much research points to a strong effect of many ID variables in the stress process.

The following section will discuss how various types of individual difference variables (IDs that add to resiliency are often called *personal resources*, Xanthopoulou et al. 2007) can be important in the stress process. Some of these individual difference variables are of more relevance in the context of some stress models than others, however even excluding direct links to particular stress models, there is good evidence that many of these factors are implicated directly and indirectly in the relationship between stress at work and health outcomes.

Parkes (1994) states that individual differences in personality and coping can play major roles in the processes by which psychosocial work conditions influence

mental and physical health outcomes (and therefore organisational health). For example, without some emphasis on the role of individual differences, any theory may find it difficult to account for how two people can perceive the same job stressor in different ways, and how different levels of stress and strain outcomes can result (Spector, 2003).

Parkes (1994) argued that more research into individual differences must be carried out to clarify their effects in predicting stress, and to implement person and environment focused interventions. Briner, Harris, and Daniels (2004) state that individual contexts and behaviour are vital to understand the causes of strain, stress, and coping, and that it may make no sense to consider stressful job characteristics as "out there" without subjective individual perceptions taken into account. Indeed Briner et al. (2004) propose that stressors are not even stressors if the individual does not perceive them as such, a viewpoint echoed in models such as Person-Environment fit, the ERI model, the transactional models of Folkman and Lazarus (1980) and Cox (1987).

2.9.2 Individual Differences and the Stress Process

Payne (1988) states that there are a large range of individual difference variables (IDs) that may be involved in the stress process, and gives various examples of what these could be. For example Genetic IDs: physique, constitution, reactivity, sex, and intelligence; Acquired IDs: social class, education, age; and Dispositional IDs: trait anxiety, personality, self esteem, locus of control, coping style, and others. Similarly Parkes (1994) claims there are at least seven types of ID variables that affect responses to job demands, including demographics, personality, coping, work expectations, preferences and commitment, health related factors, and abilities and skills.

Payne (1988) states that individual differences may have influences at many points in the stress process, and attempts to simplify the issue by stating five main questions that can be asked about any individual difference variable to probe its influence in the stress process. These are:

1) "Do individual differences play a role in selecting individuals into jobs which differ in stressfulness?"

2) "How do individual differences relate to the development of symptoms of psychological strain?"

3) "How do individual differences relate to perceptions of stress in the environment?"

4) "Do they act as moderators of the stress-strain relationship?"

5) "Do they affect the way people cope with stress?"

These questions are interesting and provide a good framework for the analysis of ID variables in the stress process, particularly the last three questions. The first question is of theoretical interest, and may be useful to ask in relation to selection procedures for particular occupations, or for job adjustment and promotion assessment, however it has less relevance in relation to the current discussion.

The second question relates not to differences in susceptibility of developing negative health outcomes from stressors, but to differences in displaying the *symptoms* when suffering from strain. For example two individuals may be suffering from the same levels of strain/negative health, but one individual may be more likely to show signs of this, or indeed display greater symptoms than their level of strain may normally be associated with. Payne (1988) discusses several ID factors that may lead to differences in symptom development. The main factor that is associated with this question is that of Negative Affect or NA, which is linked to neuroticism (Payne, 1988) and is a general tendency see the world in a negative way, and to be more likely to interpret stressors in a negative or threatening way (Tennant, 2001). Individuals showing high levels of NA are therefore more likely to appraise events as stressful, which relates to increased reporting of symptoms. Other IDs that may relate to increased symptom reporting are type A personality, pessimism, and those with an external locus of control (Payne, 1988). More about some of these factors will be discussed in due course.

In relation to the last three questions, Payne (1988) states that some differences between individual perceptions of stress may be due to measurement error, some to real differences in environment e.g. two workers being treated differently, but that some are likely to result from differences between individual interpretations. He also states that factors such as neuroticism, locus of control, type A personality, ways of coping, and others could be related to perceptual differences, as

well as in moderating perceptions to result in different health outcomes. Indeed different ways of coping have been hypothesised to be a major moderator in the prediction of stress-related health outcomes (Folkman et al. 1986).

2.9.3 Mediators and Moderators

The last three of Payne's questions may be the most relevant for the study of IDs and the stress process, and some models, for example Folkman and Lazarus (1980) and Cox (1987) have stages that correspond to perceptions (appraisal) and coping processes (which may influence outcomes via moderation). Cox and Ferguson (1991) suggest that Payne's last three questions reflect two types of research in work stress, namely, which individual differences are "components or *mediators* of stress appraisal" and/or which are "*moderators* of the stress-outcome relationship".

Mediators are variables that transmit an effect, but do not qualitatively change the effect (Baron & Kenny, 1986). For example Nolen-Hoeksema, Morrow, and Fredrickson (1993) have argued the mechanism by which stress leads to negative affective responses is mediated by rumination, so that those who are stressed are more likely to ruminate, and it is rumination that leads to greater negative feelings and in turn perceptions. If a tendency to ruminate is different in different individuals, then this difference may lead to negative perceptions of outcomes in some individuals, but not in others. Therefore mediation (in this case by rumination) could be a process by which physical events or job characteristics are invested with meaning and gain psychological value or relevance. Mediation is a process that Cox and Ferguson (1991) believe is related to the primary appraisal stage of transactional stress models.

The other process that Cox and Ferguson (1991) mention is important in stress research related to individual differences is that of moderation. Moderators are variables that change the direction or strength of a relationship between other variables, or determine when certain responses to stress will occur (Cox & Ferguson, 1991). Specific moderating effects may include buffering or interactive effects, and many ID variables are hypothesised to moderate the relationship between stressors and health outcomes. For example, when faced with a perception that an environmental demand is stressful or threatening, an individual who uses adaptive coping behaviours or other personal resources, may be able to "cope" or modify the stressful feelings or perceptions to result in positive or non-harmful health outcomes

(Cox and Ferguson, 1991). Cox and Ferguson (1991) propose that these processes may occur during secondary appraisal or coping stages of transactional models. Semmer (2003) suggests that ID variables *should* act as moderators between stress and outcome variables, and while such findings are often found, they are not found as often as theory would predict.

To further complicate the possible effects of mediation and moderation in the stress process, other authors have also stated that moderating effects can occur between environmental stressors and perceptions of those stressors (Spector, 2003) for example, not only could positive ways of coping turn a stressful perception into a non-damaging outcome (i.e. a moderating effect as already described) positive coping could also moderate a stressful "objective" job event, to make the individuals' perceptions of it non-stressful. However, Spector (2003) maintains that there have been few good tests of this particular moderator hypothesis.

There are many individual difference factors that have been studied in work stress and depression research, including hardiness, locus of control, type A personality, neuroticism (Parkes, 1994) coping behaviour (Cox & Ferguson, 1991), gender (Jick & Mitz, 1985), and attributional style (Perrewe & Zellars, 1999). Some of these factors will now be discussed in more detail, with attention paid to any possible mediating and moderating effects in the stress process.

2.9.4 Locus of Control

Locus of control (LOC) is an individual difference (or personal resource) variable that should not be confused with control as conceptualised in the DCS model (i.e. a job characteristic to do with the control a person is allowed to have over their work). Locus of control is a factor which centres around a person's own beliefs about their ability to control a situation or environment and whether specific and general outcomes can be determined by their own efforts, or by factors beyond their control such as the actions of others or "fate" (Rotter, 1966).

An internal LOC is a trait whereby a person believes they can control the world and events around them and that rewards result from personal efforts, skills and competencies (Kirkaldy & Martin, 2000) and those with an external LOC tend to believe that events are often largely beyond their control (Spector, 2003). Spector (2003) states that these beliefs can be hierarchical in that they can be event/domain

specific (perhaps based on previous localised successes or failures) or general. Spector (2003) states that internals are less likely to perceive situations as stress inducing, because controllable situations are less likely to elicit negative emotions.

Spector (2003) claims that "internals" are more likely to be proactive in taking care of their own health, and may take different jobs (perhaps being more confident about taking high pressure jobs) and are more likely to be motivated to succeed. Kirkcaldy and Martin (2000) showed that in a nursing sample, internals had better mental health, and externals reported more job stress and dissatisfaction. Research has also shown that externals are likely to report less autonomy, more anger, anxiety, depression, frustration at work, less job satisfaction, mental strain, counterproductive behaviour, and more coronary heart disease (Spector, 2003). Spector and O'Connel (1994, cited in Spector, 2003) found that LOC associated significantly with role ambiguity, conflict, job satisfaction, and anxiety. Locus of control is also related to self efficacy, but Folkman (1984) suggests that self efficacy is a situational control judgement more likely to affect secondary appraisal, and locus of control is more stable and trait-like, and more likely to affect primary appraisal.

Baron and Kenny (1986) and Cox and Ferguson (1991) suggest a mediating effect of LOC during appraisal, to result in less threatening subjective perceptions (Baron & Kenny, 1986, and Cox & Ferguson, 1991), and other research also suggests a moderating role for LOC where an internal LOC is associated with better health outcomes (Johnson & Sarason, 1978; Krause & Stryker, 1984, cited in Cox & Ferguson, 1991).

Van der Doef and Maes (1999) cite three studies (Daniels & Guppy, 1994, Parkes, 1991a, & Parkes 1991b) where in those with an internal locus of control, demands and controls were found to have additive effects, but in those with an external locus of control, control had a moderating effect on demands.

2.9.5 Hardiness

Parkes (1994) describes hardiness as a 'personal resistance resource', which could be seen as a measure of "mental toughness". Kobasa, (1979) hypothesised that the construct was made up of three sub-factors, namely control beliefs, commitment (a life approach focused on curiosity, new experiences, and a sense of coherence or meaning), and challenge (a belief that change is normal and useful for growth).

Lease (1999) found that hardiness was significantly predictive of general stress and role stress. Semmer (2003) states that main effects for the positive association between hardiness and health are often found, and cites eight studies from 1989 to 2000 that show such relationships. Cooper et al. (2001) citing (Allred & Smith, 1989) state that the link between hardiness and health may arise because hardy individuals have more adaptive cognitions regarding stressors.

Kobasa and colleagues have claimed a moderating effect for hardiness in health outcomes at work, however Kobasa, Maddi, and Courington's (1981) study on 250 US executives for hardiness, stress, and illness showed no significant interaction effects. Semmer (2003), Cohen and Edwards (1989) and Parkes (1994) all state that that the evidence for this effect is mixed or weak. Klag and Bradley (2004) found that hardiness buffered the effects of stress on illness in men, but not in women, and the same effect was found in Benishek and Lopez (1997), and three other studies cited by Klag and Bradley (2004). Klag and Bradley (2004) suggest that this difference may be a result of gender differences in coping, or in the different expression of the trait in men and women.

There is also some evidence for a mediating effect of hardiness in primary appraisal, for example data from Rhoedewalt and Agustsdottir (1984, cited in Cox & Ferguson, 1991) found that students with low hardiness were more likely to perceive life events as undesirable, and that this was related to psychological distress.

Parkes (1994) claims that interest in the hardiness construct has waned, due to doubts about its validity, particularly that three such different components can be realistically combined into a single factor, and Cox and Ferguson (1991) state that the difficulty in finding mediating and moderating effects of hardiness may relate to problems with the construct and its measurement.

A construct related to both locus of control and hardiness is that of Sense of Coherence (SOC) which relates to beliefs that the environment is structured, predictable, explicable, and meaningful and that one has the necessary resources to deal with or manage the environment (Semmer, 2003). Semmer (2003) states that despite evidence for relationships between SOC and anxiety, and some mediating effects with regards to working conditions, it overlaps heavily with other constructs as well as negative affect, hence its status as a distinct construct is in doubt.

2.9.6 Type A behaviour

Parkes (1994) describes Type A behaviour as an 'action-emotion complex' characterised by a tendency towards impatience, hostility, irritability, job involvement, competitiveness, and achievement striving. Parkes (1994) states that research has shown that Type A behaviour has a positive relationship with increased risk of cardiovascular illness and other negative health outcomes.

Spector (2003) states that no personality variable has stronger links to health and wellbeing than Type A behaviour, and that Type A individuals are likely to be more emotionally sensitive to job stressors which may be manifested in appraisal mechanisms. Glass and Carver (1980, cited in Spector, 2003) argued that Type A individuals have a high need for control, and are likely to overreact when a situation is uncontrollable, and Kirmeyer (1988, cited in Spector, 2003) found that Type A individuals reported significantly higher levels of workload than other employees, when in fact their workloads were the same. It was also suggested that those with Type A behaviour have a lower threshold for anger and frustration. Semmer (2003) states that Type A behaviour is important in his goal related stress theory, because Type A behaviour is strongly related to goal orientation, and Type A individuals react in a strongly negative way to threats to control.

Payne (1988) states that over half of studies reviewed by Mathews and Haynes (1986), Schmidt, Dembroski and Blümchen (1986) and Powell (1987, all cited in Payne, 1988) showed a significant relationship between Type A and coronary heart disease, but that reports of links between Type A and psychological strain vary, for example Keenan and McBain (1979, cited in Payne, 1988) found no relationship between Type A and strain, but Kelly and Houston (1985, cited in Payne, 1988) found a strong relationship between Type A and job tension.

Kirkcaldy and Martin (2000) found that Type A was a significant predictor of physical health outcomes, in contrast to Locus of control, which they found was a better predictor of mental health outcomes. Jick and Mitz (1985) state that men are significantly more likely then women to show Type A personality, which is a risk factor for coronary heart disease, and may contribute to making men more at risk from CHD.

Parkes (1994) argues that the Type A construct has validity issues, and factor analysis has identified that several components of Type A do not intercorrelate with

each other, casting doubts on how valid it is to have a single construct made up of so many different sub-factors.

2.9.7 Attributional Style

There has been much research carried out on the ID factor of attributional style (sometimes known as explanatory style) and its relationship to health outcomes, particularly in the area of clinical psychology (Joiner & Wagner, 1995). However, attributional style and its relationship with stress-related health outcomes has received less attention in the area of work psychology, despite the fact that Sweeney, Anderson, & Bailey (1986) in a major meta-analysis claimed that attributional style was the most significant overall individual difference characteristic in the aetiology of depression, and Tennant (2001) suggests that depression is the single most likely negative psychological health outcome of work stress.

Attributional style was developed from the theory of learned helplessness (Abramson, Seligman, & Teasdale, 1978) and is conceived of as the way in which individuals view the causes of positive and negative events that occur. Abramson et al. (1978) proposed that individuals who are vulnerable from depression may feel helpless in the face of negative events, and as such exhibit a negative attributional style. The construct can be measured using the attributional style questionnaire (ASQ: Peterson, Semmel, von Bayer, Abramson, Metalsky, & Seligman, 1982) and is made up of three dimensions around which individuals base their understanding of events: internal-external; stable-unstable; and global-specific (Furnham, Sadka, & Brewin 1992).

Internal attributions are those where an individual considers themselves responsible for the occurrence of an event, such as failing an exam because they hadn't studied, and an external attribution as being caused by exterior factors (Furnham, Sadka, & Brewin 1992) such as the questions were very hard. This dimension is functionally similar to locus of control (Sweeney et al. 1986). A stable attribution is one where the causes of events are seen as permanent, and will not change in the future, and an unstable attribution as one where the causes of events are seen as temporary. Finally, a global attribution is one where the causes of situations are seen as pervasive and likely to span many situations, and a local attribution where the causes are relevant only to the current situation (Joiner & Wagner, 1995). A

depressive or negative attributional style, is one where the causes of negative events are seen as internal, stable, and global, and the causes of positive events are seen as external, unstable, and local (Sweeney et al. 1986). A positive attributional style would therefore be the opposite of each of the above for positive and negative events.

Meta-analytic data from Sweeney et al. (1986) and Joiner and Wagner (1995) suggests that there is much evidence from past research that shows that a negative attributional style for positive and negative events significantly and reliably associates with depression in children, adolescents, and adult populations.

Perrewe and Zellars (1999) suggest that research on attributions should be applicable to the workplace, because it is an achievement oriented environment, which is relevant to individuals' understandings of causality behind events. Perrewe and Zellars (1999) note that Weiner (1985, cited in Perrewe & Zellars, 1999) in research on achievement in academic situations, appeared to parallel the process of attributional search (the search for attributional meaning) with the primary appraisal stage of Lazarus' and colleagues transactional stress model. Perrewe and Zellars (1999) suggest that Weiner's conceptualisation could be applied to an organizational context to extend this model. If this is the case, then part of the meaning and value attributed to stressful workplace events (to result in subjective perceptions) may occur through the attributional process. Therefore negative attributional styles may affect the type of perceptions (threatening, stressful, goal threatening, etc) that individuals have about workplace events, and thus attributions could be a potential mechanism by which primary appraisal works.

Research by Clarke and Singh (2004) provides some possible support for this idea, as they found that explanatory style mediated the relationship between stressful events and psychological distress in doctors, but a hypothesised moderating effect of explanatory style on psychological distress was not found. However, a pessimistic explanatory style (analogous to negative attributional style) was found to interact with perceived stress in the prediction of subsequent illness in a longitudinal study of college students by Jackson, Sellers, and Peterson (2002).

Other examples of attributional style research in occupational domains include: Seligman and Schulman (1986) who applied the ASQ to a working sample of insurance sales agents, and found that those with a positive or optimistic explanatory style sold 37% more insurance in their first two years. The ASQ was also given to 103 newly hired agents, and those in the top half when ranked by optimistic style stayed in

the job for twice as long and sold significantly more insurance in a one year period. Furnham, Sadka and Brewin (1992) using an occupational version of the ASQ, found that an optimistic attributional style was significantly associated with workplace satisfaction and motivation. Finally, Welbourne, Eggerth, Hartley, Andrew, and Sanchez (2007) found evidence that a positive attributional style was associated with problem solving coping, positive cognitive restructuring, and intrinsic job satisfaction (i.e. factors associated with achievement, independence, and responsibility).

Furnham, Sadka, and Brewin (1992) note that despite the small amount of research on attributional style in occupational settings, due to the similarity of the internal/external sub-factor of attributional style to the concept of locus of control, research on the latter can be applied to support the importance of the former.

The strength of the research on attributional style in clinical domains, and the small but growing amount of research into its importance in occupational domains, is good evidence that the concept could be useful in future research into occupational stress and health, particularly if research finds further support for the proposal that attributional style may be implicated in primary appraisal processes.

2.9.8 Coping

Coping is considered by many authors to be a key process in the relationship between psychosocial job stressors and health outcomes. As has been previously mentioned, coping in an important stage of the transactional stress models of Folkman and Lazarus (1980) and Cox (Cox & Ferguson, 1991). It is during this stage (which occurs after secondary appraisal) that coping behaviours are proposed to occur, and as coping behaviours vary between individuals, as well as appearing to often have trait-like characteristics, coping can therefore also be conceived of as an individual difference variable.

While coping behaviours or strategies are often viewed as stable, dispositional characteristics of individuals, Parkes (1994) states that situational and environmental factors in determining coping behaviours are also important. In transactional theories, individuals are assumed to be able to select from a range of coping options, which they choose and implement in response to different situations, on the basis of current threats and past experience (Cox & Ferguson, 1991).

Folkman and Lazarus (1985) proposed a classification that has proved popular in research on coping behaviours. Of the range of behaviours used to coping with threatening or stressful situations, Folkman and Lazarus suggested that coping could be divided into one of two major categories of response: either problem focused behaviours, that involve rational efforts to solve the problem, make plans of action, etc, or emotion focused coping, which aims to deal with the problem by managing emotional states or making emotional responses (e.g. venting frustrations, getting upset, avoidance behaviours, etc). The former were proposed to be adaptive for many situations, particularly those for which outcomes could potentially be changed, and the latter for situations which could not be changed (e.g. the death of a loved one) however the exclusive use of emotion focused behaviours were proposed to be counterproductive and related to negative health outcomes. Other classifications of types of coping behaviour include: Vigilance/Avoidance (Krohne, 1996) with the former related to an excessive focus on the threat related aspects of a stressors, and the latter where attention is averted from threatening cues; and the similar conceptualisation of Monitoring/Blunting (Miller, 1980, cited in Krohne, 1996).

Folkman and Lazarus' Problem-focused and emotion-focused distinction has proved perhaps the most popular in coping research, but has been criticised as being too simple by many (for example Dewe & Guest, 1990) and alternative, more complex classifications for coping behaviours have been suggested, such as by Carver, Scheier, and Weintraub, (1989) and others, who have suggested that a five or six factor structure for coping is a better representation of how people really cope. These alternative coping conceptualisations will be discussed in a later section.

Folkman et al. (1986) and Schaubroeck (1999) claim that the relation between events and health status is mediated by coping processes, and according to Cox and Ferguson (1991) mediation is a key process in primary appraisal. This suggests that knowledge of past coping success and an individuals' own coping repertoire, can influence the appraised threat of a situation. Cox and Ferguson (1991) also state that coping itself is a key moderator in the stress-outcome relationship, and that individual differences in coping tactics and abilities are instrumental in influencing different health outcomes.

There is much evidence relating to the links between coping behaviours and health outcomes, for example Healy and McKay (2000) found that avoidance coping related to poor mental health, and active problem solving related to satisfaction in

nurses. However, Cooper et al. (2001) state that there are inconsistencies in the findings, and Bar-Tal and Spitzer (1994) and Erera-Weatherley (1996, both cited in Cooper et al. 2001) claim that much coping research is disappointing and knowledge is even today still limited as to the contribution of coping, and how it relates to stressors and strain. Also Briner, Harris and Daniels (2004) state that there is much research, but a very narrow range of methods used. Dewe et al. (1993) also claim that a major issue in the field, is the failure to establish a consistent research framework for the measurement and identification of coping strategies, and thus more research remains to be done.

2.9.9 Neuroticism, Negative Affect, & Trait Anger

Neuroticism is a tendency towards pessimism, emotional vulnerability, and negative reaction to life and work stressors (Tennant, 2001) and there is often found to be a high correlation between neuroticism and emotional distress (Parkes, 1994). Negative affect is a general meta-characteristic of neurotic individuals to see the world negatively, has been shown to moderate the relationship between stressors and negative health outcomes (Tennant, 2001). Spielberger (1972, cited in Spector, 2003) noted that such forms of anxiety only relate to the psychosocial environment, and are not related to conditions of physical danger.

Spector (2003) argues that individuals with a negative affect characteristic are far more likely to be sensitive to psychosocial stressors, suggesting it could have an effect in appraisal, and such individuals may be more likely to be anxious and perceive more conflict, workload, role ambiguity, role conflict, and injustice. Individuals high in negative affect in addition to perceiving more stressors, may also be more likely to respond to health related self-report questions in a more negative way, which can be a source of bias in questionnaire studies.

In a meta-analysis, Spector (2003) cites a number of studies that show significant correlations between negative affect and anxiety, and somatic symptoms, job satisfaction, frustration, anger, doctor visits, anxiety, and counterproductive behaviour, and Booth-Kewley and Friedman (1987, cited in Spector, 2003) found links between anxiety and cardiovascular disease. Spector (2003) also found significant correlations between trait anxiety and role ambiguity, role and interpersonal conflict, and physical health symptoms. Parkes (1990) Heinisch and Jex

(1997) and Fox, Spector, and Miles (2001, all cited in Spector, 2003) found moderating effects of NA that enhanced the relationship between stressors and strains.

There are parallels between trait anger and negative affect, with the former being a tendency to find a wide variety of situations to be annoying and frustrating, and to respond with anger. The outcomes of trait anger and negative affect are very similar according to Spector (2003) and those with trait anger and negative affect are likely to create increased stressors for themselves, for example by creating interpersonal conflict, and responding to situations with anger.

Evidence that relates neuroticism/negative affect to health outcomes appears strong, however, the strong theoretical overlap in characteristics (and correlation) between neuroticism, and anxiety and depressive symptoms, means that including neuroticism/negative affect as an independent variable with a mental health related outcome, may give rise to a danger of attributing anxiety or depression outcomes to neuroticism, when they may be part of the same meta-characteristic. Indeed the meta-characteristic nature of negative affect may not be a realistic representation of such a wide range of characteristics, and may lack discriminant validity (Spector, 2003).

2.9.10 Summary of work-related and individual risk factors for negative outcomes

In the course of this review, a large number of stress-related risk factors for negative health outcomes have been described. These comprise workplace factors included in particular stress models and individual factors. To illustrate the huge array of potential stressors faced by workers, and to recap on these to bring the reader up to date, all of the organisational, workplace, situational, and individual the risk factors so far described will be re-listed here. While this list is broad, it is not exhaustive, and many other risk factors could no-doubt be added to it: A mismatch between individual skills, abilities, attitudes and resources, and environmental characteristics; Lack of skill variety, task identity, autonomy, and feedback; Role ambiguity, unrealistic expectations, role conflict, lack of participation and challenge, poor job security and short-term contracts; Organisational change, and poor work relationships (including bullying at work and conflict); High levels of demands, low control, low social support; High extrinsic and intrinsic efforts, and low rewards; Perceptions that subjective harm, risk, and threats cannot be coped with or exceed personal resources;

Negative or unhealthy methods of coping, or low levels of positive or adaptive coping; Thwarted goals, and lack of ability to conserve or build resources; Physical or mechanical stressors (including noise, trauma, repetition, posture); An external locus of control; Low levels of hardiness; Type A behaviour; A negative or pessimistic attributional style; High levels of neuroticism.

2.9.11 Summary of Chapter 2 and links to Chapter 3

The literature review in chapter 2 has attempted to outline some of the main issues associated with increasing levels of work-related stress in our society, and the growing awareness of what this may mean for the health of employees, and the economic costs to employers and the UK economy.

The review also described many of the key models relating to work-related stress, together with their pros and cons. Chapter 2 also discussed the importance of ID factors, and how these can influence subjective perceptions and expressions of stress, and emphasised the importance of taking account of these factors when examining the stress process – something that many popular stress models do not do.

Chapter 3 will attempt to draw together the different threads that exist in current work-stress research and practice, and will argue that most stress frameworks either suffer from too much or too little complexity, in regards to the influence of individual differences and their relationship to subjective perceptions in the stress process. A third path that sits somewhere between these extremes is proposed, and upon this basis a rationale is suggested which will guide the research carried out in this thesis.

Chapter 3

A future direction for occupational stress research

3.1 A lack of development in the literature

The large number of stress models described in the previous chapter illustrate how many different viewpoints there are of occupational stress, and show how complex the processes are that they are trying to capture. While the range of stress models in the workplace is impressive, it is true that certain viewpoints have historically been more popular, and that even today several models appear to be something of a theoretical status quo for many empirical investigations.

Dewe claimed in 1991 that the primary concern for many years in occupational research had been to explore the relationship between stimulus and response, and that despite the advances in alternate views with a more relational perspective (such as transactional stress models) that there had been no real attempt to understand what stress actually *is*. Dewe (1991) also stated that few studies had attempted to implement transactional methods, and that work-stress research had failed to capitalise on the crucial definitions of appraisal and coping. He also argued that there was a need to develop theoretical and empirically supported transactional frameworks using appropriate measurement strategies. Schaubroeck (1999) agreed and stated that there was no well-accepted working model of appraisal and coping processes, despite a requirement for one. However, little seemed to have changed by 2004, when Briner, Harris, and Daniels claimed that very little stress research makes a new contribution, with only a narrow range of methods used in the study of stress. Further, they claimed that there is little new theory, and a fundamental reappraisal of the field is needed.

3.2 Transactional perspectives and the literature

Dewe (1991) argued that transactional perspectives were largely accepted at a *conceptual* level by most researchers, and the roles of individual differences and subjective perceptions were seen by many as integral to the entire stress process (for example Parkes, 1994, and Cox & Ferguson, 1991). Indeed, many authors such as

Dewe (1991), Dewe and Trenberth (2004), Perrewe and Zellars (1999), Florio, Donnelly, and Zevon (1998), Frese and Zapf (1999), and Spector (2003) suggest that while transactional conceptualisations may be the most ecologically valid and theoretically rich, empirical research is still more likely to be based on models that have a stimulus-response basis or focus on the objective stressor (such as the DCS model) or that largely neglect individual differences and multiple independent variables (such as the ERI model). It is possible that the paucity of complex research on transactional models may be due to the multi-factorial nature of these models such as those by Folkman and Lazarus, and Cox and colleagues, which makes supporting research difficult to carry out. Data from research based on such models, may also have poor predictive validity, due to the number of the factors involved.

3.3 Individual Differences and combined effects in the literature

There is much support for many of the effects of numerous ID factors in work stress and health outcomes, but there is little support for the combined effects of these factors in the same sample (Long, Kahn, & Schutz, 1992). However, Jick and Mitz (1985) and Long, Kahn, and Schutz, (1992) write that multi-factor research is necessary when a number of independent variables are implicated in an outcome, because without combining them, the relative explanatory power of the different independent variables cannot be known, and also no interactions between variables can be tested. Also, Dewe and Trenberth (2004) claim that the best way to make coping research more clinically relevant, is to use transactional frameworks, especially if the gap between theory and practice in stress research is to be bridged.

Given the increasing number and intensity of psychosocial stressors in today's working environments, and the organisational and individual problems these can cause, it is important to carry out more research into the most ecologically valid and balanced theoretical approaches, that take account of a range of important job characteristics and individual difference variables. Only then can research lead to empirically supported multi-factor interventions, to help fight the causes and consequences of stress-related illness.

3.4 Too little complexity in stress-related research

Despite the support of many of the above authors for transactional-type models, full-blown transactional theories (i.e. theories that describe the stress process in terms of antecedent factors, cognitive processes, emotional experiences, and health outcomes) (Cox, 1978, Cox & Griffiths, 1995, Lazarus, 1991) are complex and difficult to test, and may not be the only way forward. It is clear that job characteristic stimulus-response type models, that focus only on work conditions may not be the most accurate and ecologically valid depiction of the stress process for individuals, however it is possible that they are "good enough" to capture the range of stress-related factors for most work situations and individuals.

While it is important to avoid falling into the oversimplification assumption (that the presence of an environmental stressor implies that an individual will be "stressed" by it) job characteristics models may be a good way of gaining an initial snapshot of how healthy a workplace may be, and which roles or departments in an organisation may require further stress audits. Models such as the DCS or DSS may be very useful for this kind of work, although it may also be important to include a wider range of job characteristics for such a purpose. Examples of more complex viewpoints include the DISC model, which combines aspects of the DCS and ERI, and such a view is reflected in the recent development by the UK Health and Safety Executive, of a measurement tool by that combines items from DCS and ERI questionnaires (HSENI.gov.uk, 2007).

Brief and George (1991) in response to Lazarus' (1991) view on the vital need to understand individual patterns in stress responses, claimed that Lazarus may go too far, and that it was instead useful to try and understand what factors affected *most* workers exposed to them. Following this, basic job characteristic models could be described as having a "majority of the people, majority of the time" approach, that do less to help understand what stressful encounters are like for individuals. Indeed in situations where interventions are required, but job characteristics cannot be altered (for example due to circumstances, lack of resources, or the nature of the work itself) job characteristic models may be of limited value, because they have less scope to recommend interventions that do not involve the alteration of job characteristics. In such situations, it is only stress research that is informed by ID variables and that (explicitly or implicitly) acknowledge the role of subjective perceptions, that can be

used to help design empirically supported individually-based interventions. Such interventions can by all means be implemented on the basis of a job characteristics stress audit, but they won't be empirically supported methods that are applicable to that job situation at that time.

3.5 Too much complexity in stress-related research

The theoretical alternative to job characteristic-based research therefore, may often been seen as work that undertakes a transactional perspective, which as discussed previously takes a more individual-centred view, with a role for individual differences and subjective perceptions. However, another key feature of transactional stress models is (according to Cox and Griffiths, 1995) that they also focus on the *process* of the stressful transaction, that takes place in the individual when they encounter a stressful environmental stimulus. Such a focus has lead to the development of structured process-oriented frameworks in the models by Folkman and Lazarus' and Cox and colleagues, which attempt to explain the processes by which an individual perceives the presence of a threat, analyses its possible effects and ways to cope with it, foresees possible future outcomes, implements coping, experiences actual outcomes, and applies feedback. While the development of such comprehensive conceptualisations was clearly a huge task, the task of empirically supporting such models is also a great task, which may explain why so few large scale studies have been carried to try and support these models. In addition, as stated by Cox himself (1987), the actual appraisal and coping process, and the psychological stages that individuals actually go through, are unlikely to be so rational as outlined in transactional theories, and Briner, Harris, and Daniels (2004) suggest that coping (and appraisal) processes are significantly more complex than transactional theories suggest, and that many other individual factors and histories are not accounted for in current theory.

Lazarus (1991) states that many stress interventions fail because they treat individuals as if they were all alike. He also states (as Brief & George noted in 1991) that as stress is an individual and subjective phenomenon, identifying general work conditions that affect most workers is not useful. Unfortunately, the endpoint of carrying such complexity to its logical conclusion, is that everyone is different, and it is not possible to produce a conceptualisation that accounts for every factor in any

given job situation or an "all of the people, all of the time" approach. Of course such complexity is not what transactional theories suggest, and much work has transactional features without following a full stage-based process-oriented view (indeed some advocate a more simple "outcome-oriented" view, where stressful individual and work characteristics are conceptualised purely in terms of their correlates in health-based outcomes, such as anxiety and depression) but a huge array of variables and personal experiences become relevant, when one aggregates the mechanics of specific mental processes into discrete stages, and tries to apply the effects of individual difference variables to each.

3.6 A middle ground between simplicity and complexity

Therefore if job characteristic models have too little complexity, and highly structured process-oriented transactional viewpoints have too much, there perhaps may be another approach that sits somewhere between the two. Such an approach would need to not delve too deeply into the actual mental processes that may be occurring in a stressful transaction, but still acknowledges the input of multiple individual difference variables, while maintaining a role for stressful job characteristics as the primary source for subjective stress perceptions.

Brief and George (1991) suggested that it was important to try and identify negative conditions that affected most workers. If this was done, but in conjunction with also finding which individual difference characteristics affected most workers (either to predispose them to view job characteristics as stressful, to exacerbate the effects of those stressful perceptions, or to buffer individuals from stressors) then this could be a view that could be said to try and consider "most of the people, most of the time".

The latest research on the Job Demands-Resources model (Xanthopoulou et al. 2007) could be said to be an approach that has things in common with this concept, as it attempts to use job characteristics from the DCS model to represent environmental demands, and to investigate the mediating and moderating effects of the personal resources of self-efficacy, self-esteem, and optimism on outcomes. While results for this research were mixed, it represents an important framework for future research, but which could benefit from the inclusion of more individual and work characteristics.

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3.7 Rationale for Research

The previous chapter gave an overview of the growing problem of psychosocial stressors at work, as well as some of the economic and health-related issues that can arise from increasingly stressful workplaces. The chapter also gave a review of the many and varied ways that the stress process has been conceptualised in occupational stress research, from simple theories that focus on several basic work conditions, through to complex theories that conceptualise stress as a process made of a series of conceptual stages, that are open to the influence of individual differences. Also described were a range of individual difference variables, that have been hypothesised to be significant in exacerbating or buffering of effects of psychosocial stressors on health outcomes.

It was also suggested that while there are merits to many of these types of approaches, there are also problems, particularly to do with under and over-complexity, and that much research still remains to be done to help understand stress and how individuals can react differently to workplace stressors. Finally, a viewpoint that that follows a more central path, which takes elements from several different approaches, is suggested as a good basis for future research, however more work is needed to investigate the value of such a direction.

The work described in this thesis will research some of the important job characteristics, individual difference factors, and associated health outcomes in the area of occupational stress, in an attempt to provide more information for the development and support of a new model of workplace stress. The aim is that such a model will acknowledge the important role played by psychosocial workplace stressors in the stress process, as well as accounting for the role of important individual difference factors in: i) the development of subjective experiences of stress as derived from psychosocial stressors, and; ii) in influencing the possible health-related outcomes that result from subjective stressful perceptions. It is hoped that such a model will acknowledge the important aspects from many existing work-stress models, and will be complex enough to realistically represent aspects of the stress process, without getting bogged down in the minutiae of more complex theories and mental processes. Furthermore it is hoped that a framework based on an empirically supported model of workplace characteristics and individual differences, could be

useful in the future for guiding occupational stress interventions, as well as research for the benefit of employees, and employers alike.

3.8 Theoretical basis for variable selection

The review of the literature, as well as considerations based on recent research trends, popular theory, and the most current developments in occupational stress literature, have provided the basis to help inform which factors were selected for consideration as part the research for this dissertation.

Firstly, the Demand-Control-Support model (Karasek and Theorell, 1990) and the Effort-Reward-Imbalance model (Siegrist. 1996) were selected as popular theories that represent the influence of the work environment. The ERI model supposes that measures of effort and reward are subjective, and while the DCS model presupposes that levels of demands, control, and social support are "objective" workplace characteristics, the fact that they are usually measured (like the ERI) with a questionnaire, means that they are in actuality subjective perceptions of workplace characteristics. Therefore, the measures of demands, control, social support, extrinsic efforts, and rewards (while subjectively measured) are for the purposes of this research, considered to be "job characteristics", and as such are considered the starting point of stress for the purposes of this research. Additionally, job demands and extrinsic efforts can be considered as work demands, with high levels of social support, skill discretion, decision authority, and rewards as work resources (low levels of these latter four characteristics could also be seen as work demands). Finally, intrinsic effort from the ERI model is considered as an individual difference characteristic.

The transactional stress models of Folkman and Lazarus (1980) and Cox (1987) are seen as important theoretical counterpoints to the above models, and as such have been important in the development of many advances in stress research. The first individual difference factor selected for inclusion in this research was that of coping style. Coping is seen as a central process in the work of Folkman and Lazarus (1980) and Cox (1987) and is also seen as an important ID factor relating to health outcomes by many, such as Parkes (1994), Dewe and Guest (1990) and others. Also, and perhaps just as significantly, it could be argued that attempting to cope is seen by the layperson to be a normal reaction when faced with a stressful situation. Indeed

perhaps often the first question asked by friends or relatives to an individual who has suffered a stressful event is "how are you coping?" Hence it is considered an important ID factor to consider, from both theoretical and lay viewpoints.

Another ID factor that has been used in parts of this research is attributional style. This factor was selected because in other areas of psychology (such as clinical psychology) it is established as an important factor in the aetiology of mental health outcomes, and there is a great deal of research to support this. However it has been largely overlooked in occupational psychology research (an exception being Perrewe & Zellars, 1999). Also, locus of control is the main control-oriented ID variable used in work psychology, however this conceptualisation has some limitations. For example, an internal or external locus of control is often seen to apply across many life situations (Spector, 2003) however with attributional style, individuals are proposed to have positive or negative styles, which can relate to internal *or* external attributions, based on positive or negative events. Attributional style also adds extra dimensions over LOC by the inclusion of stable-unstable, and global-local sub-factors, thereby increasing the explanatory power of the construct.

Finally, attributions and attributional style, as a way of *making meaning* are proposed to be important in the process of attributing cause and consequence to events. In other words, attributions may be important in the processes of forming stressful perceptions of events, or in other words, in the primary appraisal stages of transactional stress models, and there has been little research on attributional behaviours in this context.

Finally, gender has been used as an independent variable in parts of this research, due to the large amount of evidence that men and women may suffer (or at least report) different levels of mental health, particularly depression, and may adopt different attributional or coping styles.

The dependent variables selected for use in this research are mainly mental-health oriented factors. These included anxiety and depression, as both of these states have been strongly implicated as possible outcomes for exposure to work related stress (Wang & Patten, 2001; Tennant, 2001). Job satisfaction was also used as a dependent variable for several studies, as was the measure of asking participants (to state yes or no) if they believed that stress at work had ever caused, or made an existing illness worse.

While the range of variables selected for study in this research is broad, a review of the stress-related risk factors listed in section 2.9.10 shows that there are a great many more variables that could be of significance to this research that are not included. Factors such as role and organisational conflict, role ambiguity, bullying at work, lack of feedback, physical stressors, locus of control, hardiness, neuroticism, and type A behaviour, are all important risk factors. However, due to the large number of independent variables already selected for this research, and the fact that this work is based on testing factors from some key stress models in the literature, these alternate variables were not included in the current work. However, these variables should be considered for future research.

It is hope that the independent and dependent variables mentioned above will provide a wide snapshot of the range of stressors and health outcomes that are important in the stress process, and thus will help provide further knowledge on the possible causes and consequences of stress at work. It is also hoped that the above variables will provide a wide enough basis from which to develop a viable model of stress, that has some of advantages over existing stress models, as expressed earlier in this chapter.

3.9 The issue of confounding variables

It is important to note that despite the number of independent variables that are considered in this research, there are also a number of possible confounding variables that could affect the accuracy of the results (particularly with dependent variables such as anxiety and depression). In addition to the possible confounds introduced by not including the risk factors as listed above (e.g. role stressors, bullying, locus of control, type A, etc) there are a number of other potential confounders that may be pertinent. These include educational level, occupational status, pay, social class, full time vs. part time work, working pattern, smoking and drinking behaviour, etc.

In some of research described in the following chapters, many of these confounders will be taken into account (particular attention will be paid to them in chapter 5). In the research where they are not controlled for, it is understood that there is a possibility that these confounders could have influenced the results, and thus the results should be treated with caution. More detail about confounding variables can be found in chapter 5.

3.10 Summary of Chapter 3 and links to Chapter 4

The purpose of chapter 3, was to outline some of the problems that exist with the current literature on work-related stress, with a particular focus on existing stress models. The chapter outlined how transactional stress perspectives, while having admirable aims, may be too complex to find easy empirical support, and suffer from a certain lack of theoretical clarity and predictive validity. It also outlined that other more simple models are easier to base research on, and may have better predictive validity, but offer a limited capacity to recommend organisational intervention, and fail to adequately take account of individual differences. It was argued however, that research can take a middle line between these two, and on that basis a rationale was offered to follow such a direction. Also key variables were selected from the range of those used in existing stress models, to investigate this proposal.

Chapter 4 describes a preliminary experiment, carried out to help clarify the structure of the construct of coping, and to develop a potential instrument for measuring it, to be used in future studies. The study described in chapter 4 was also used to develop some research experience in comparing participants for gender differences in coping and mental health outcomes.

Chapter 4

Study One: Coping and its relation to Gender, Anxiety, Depression, and Stressful workplace events

4.1 Chapter summary

The aim of the first study described in this thesis was to build the foundation for an understanding of the basic issues involved in workplace stress, individual differences, and mental health, and to analyse the structure of coping and to develop a measuring instrument to be used in future work. Gender differences in coping with workplace events were examined, as were the relationships between coping and mental health outcomes, and gender and mental health outcomes. A factor analysed version of the Ways of Coping Checklist, as well as scales measuring positive and negative mood, fatigue, anxiety and depression, were administered to a sample of 240 adults from the South Wales area in a cross-sectional design. Results showed that negative coping styles significantly predicted negative health outcomes, and positive coping styles predicted less negative outcomes. No significant differences were found for health outcomes between men and women, but women were significantly more likely to use self blame and wishful thinking coping. Further research should use more independent variables, such as workplace characteristics, to explain more of the variance in health outcomes than just that explained by coping styles alone.

4.2.1 Introduction

Many researchers in the areas of health psychology and occupational psychology consider coping to be a central process in the relationship between stressors and health outcomes (Falkum, Olff, & Aasland, 1997) and interest has been growing since the beginning of the 1980s in coping processes and their role in mental health (Carver, Scheier, & Weintraub, 1989). Coping is thought to be particularly instrumental in the aetiology of depression (Folkman & Lazarus, 1986) which is an affective mood disorder characterised by feelings of hopelessness, anxiety, despair, low self worth, negative future predictions, lack of energy, and many other symptoms (Tennen, Herzberger, & Nelson, 1987). Tennant (2001) has suggested that of all psychological

outcomes that can occur from exposure to work stress, depression is perhaps the most likely.

Depression, anxiety, and fatigue, along with many other stress-related negative health problems, are issues of increasing concern today. A National Mental Health Association survey in the USA (Gabriel, 2000) found that depression was the third most common problem faced by workplace Employee Assistance Programmes and reports that depression is also the third most expensive workplace-related health problem in the USA, with costs of over $47 billion a year, and 200 million working days lost in absence behaviour, due to stress related depression, equating to a national average cost of $600 per employee.

4.2.2 The measurement and structure of coping

The work of Folkman and Lazarus (1980) has been particularly germane in providing a framework for the study of coping. As has been previously discussed, coping behaviours have been characterised as cognitive or behavioural efforts to manage, reduce, minimise, master, or tolerate, events that individuals perceive as dangerous, threatening, or exceeding personal resources (Folkman, Lazarus, Gruen, and DeLongis, 1986). The application of coping strategies to a situation does not necessarily imply successful or adaptive behaviours, indeed certain coping behaviours may be maladaptive and can lead to other significant long-term problems, for example avoidance coping through counterproductive means such as through alcohol or drug use (Briner, Harris, & Daniels, 2004).

Briner, Harris, and Daniels (2004) state that if coping efforts "worked", the potential strain is reduced or removed. However, if threatening situations are not dealt with, due to inability to cope successfully (e.g. from lack of skills, resources or experience) then this is likely to lead to "stress scenarios" and negative health outcomes (Cox, Griffiths, & Rial-Gonzales, 2000). These could include depression, increased incidence of heart disease, gastro-intestinal problems, anxiety, burnout, fatigue, musculoskeletal disorders, accidents, substance misuse, as well as consequences for work-life balance issues, and problems for employers, such as absence, turnover, and lack of organisational commitment (Cox and Griffiths, 1995).

Much research on coping focuses on the functional architecture of coping (Cox & Ferguson, 1991) where individuals are assumed to have access to a repertoire

of coping options, which they assess during secondary appraisal. The assessment of coping often uses self reports and the ways of coping checklist (WCCL: Aldwin, Folkman, Schaefer, Coyne, Lazarus, 1980) is a common measure, which uses 66 items that assess the frequency of endorsement of a variety of coping behaviours. Such measures can be used to assess situational coping (by focusing on a particular event) or dispositional coping (by focus on general cross-situational coping). Correlations between these two are generally modest, supporting the view that different situations can give rise to dynamic behaviours, however Folkman et al. (1986) imply that both appraisal and coping mechanisms are stable over time across similar situations.

Folkman and Lazarus (1980) proposed that coping could take one of two major forms: efforts designed to target the problems underlying distress (problem focused coping) such as by making plans of action, taking things one step at a time, focus on the problem etc; and those efforts aimed at regulating emotional states (emotion focused coping) such as seeking sympathy, becoming angry etc. Folkman and Lazarus (1980) proposed that problem focused behaviours are more adaptive in situations amenable to change, and emotion focused behaviours are more effective when there is no opportunity for change, although too much emotion focused coping could also be counterproductive.

4.2.3 Coping and Depression

Folkman et al (1986) thought coping to be particularly instrumental in the aetiology of depression and much research has found evidence that different coping styles often strongly correlate with differing levels of depression (Cronkite & Moos 1995). For example, Whatley, Foreman, and Richards (1998) found that problem-focused coping behaviours associated with significantly lower anxiety and depression scores in students at two time periods, and emotion-focused coping associated with significantly increased anxiety and depression, and increased scores on a trait anger measure. Zeidner (1994) found that emotion focused coping significantly predicted anxiety during university finals, and those with less active coping behaviours showed higher levels of depression, and Haghighatgou and Peterson (1995) found similar results in a sample of Iranian students. Lease (1999) found that avoidance coping significantly predicted role stress in academics. Welbourne, Eggerth, Hartley,

Andrew, and Sanchez (2007) found that problem-solving coping associated with increased job satisfaction, and finally, Diong, Bishop, Enklemann, Tong, Why, Ang, and Khader (2004) who found that stress experience was associated with avoidance and re-appraisal coping.

However, as stated by Cooper et al. (2001) there are inconsistencies in the findings of coping research, for example research by Biggam, Power, and Macdonald (1997) showed no relationship between methods of coping and psychological distress in a sample of Scottish police officers. Torkelson and Muhonen (2004) found that there was no relation between problem focused coping and health, and that the emotion focused strategy of seeking emotional support associated with *fewer* health problems in male and female managers. Finally, Carver and Scheier (1994) found that knowledge of coping styles did not predict levels of future distress in students faced with exam stress.

Despite Lazarus and Folkman's (1984) assertion that problem focused coping is more adaptive when the situation is amenable to change, and emotion focused when it isn't, as well as claims by Cox and Ferguson (1991) that coping is multidimensional and situation specific, much dispositional research has found that individuals may tend to cope using a limited number of behaviours across situations (even when these are maladaptive).

4.2.4 Gender differences in depression

One major trend that has been found in many areas of clinical research is the finding that females appear to be significantly more likely than males to suffer from depression (Sowa & Lustman, 1984). Nolen-Hoeksema (1990) reports that in a national institute of mental health study of 1980, of the 10.2% who had diagnosable depressive symptoms, 70% were female, and in another major study in 1996, 76% all sick days taken for depression at work were taken by women.

Data from the USA, Australia, Britain, Germany, and Israel show females to be around twice as likely to suffer from depression, which is also reflected in the ratio of attempted suicides, where women are up to twice as likely to attempt suicide as men (Nolen-Hoeksema, 1990). Nolen-Hoeksema (1990) states that these differences "are accepted as absolute truth by most mental health practitioners". Sowa and Lustman compared the differences between the self-rated depression scores on the

Beck Depression Inventory (Beck, 1967, cited in Nolen-Hoeksema, 1990) for 140 male and female college students and found that women scored significantly higher on depression and rated stressful life events as having the most severe and negative impact.

However, not all studies report increased levels of depression for females, for example Hawkins, McDermott, Shields, and Harvey (1989) found that there were high levels of depression in university students, but no overall differences between men and women, despite the fact that women scored higher on the "depressed affect" section of the scales, which were characterised by feelings of loneliness, sadness, and inability to "shake off the blues". Also Nolan and Willson (1994) and King and Buchwald (1982) found no overall differences in depression between men and women.

Nevertheless, McNee (cited in Tennen, 2004), states that "Depression is the number one barrier women face in the workplace" and that depression is a far bigger obstruction to professional success than childcare responsibility, pregnancy, and sexual harassment. However, McNee (2004) reports that despite the high incidence of depression in women, fewer than half of depressed women seek help, and many are worried about being stigmatised, appearing weak, or losing their jobs.

Psychosocial factors are vital in the aetiology of work stress, and social and workplace stressors are likely to be different for men and women. Such stressors can include life events, workplace discrimination, role conflict, and socioeconomic differences such as education level, income, and poverty (Cronkite & Moos 1995).

Women are more likely to suffer from multiple competing roles, such as mother, worker, wife, etc, and women are thus more likely to suffer work-family balance and role issues (Brems 1995). Women are also more likely to prefer home-based social supports, and men to use work-based social support (Gianakos, 2002). Women may also face socioeconomic disadvantage and discrimination at work. For example, Brems (1995) states that 46% of single parent women are below the poverty line in the USA, and women have lower levels of education and lower incomes for the same job and educational level.

The Demand-Control-Support model (DCS: Karasek & Theorell, 1990) emphasises the importance of control at work, and Snow, Swan, Raghavan, Connell, and Klein (2003) note that women are often likely to be employed in lower status jobs, and therefore have less control over their work. Also Sowa and Lustman (1984)

found evidence that stressors had a more pronounced, long lasting and negative impact upon women, so that if men and women suffer similarly stressful life-events, women would be more likely to become depressed.

4.2.5 Gender differences in coping

In addition to the potentially different psychosocial stressors faced, there is also evidence that men and women may attempt to cope with stressors in different ways. For example, research by many authors has shown that women are more likely to exhibit an emotion-focused approach to stress and men are more likely to show a problem-focused approach (Brems 1995). This was found by Zeidner (1994) in students trying to cope with exam stress, by Whately et al. (1998) and by Haghighatgou and Peterson (1994), and as stated above, there is evidence that problem-focused styles are likely to correlate with better mental health outcomes than emotion-focused coping, particularly depression. Brems and Johnson (1989) also found that coping strategies were not just related to biological sex, but were shown to correlate with gender role score on the Bem Sex Role Inventory (Bem, 1974, cited in Brems & Johnson, 1989).

Butler and Nolen-Hoeksema (1994, cited in Oltmanns & Emery, 1998) state that there may not be gender differences in initial levels of depression, but that different styles of responding give rise to different levels of measured depression. They suggested that men may employ distracting styles to divert attention from their depressed mood, for example by working on hobbies and playing sports. Whereas women were observed to have a ruminative style, that involves brooding and worrying, which serves to prolong and intensify the feelings of depression.

Portello & Long (2001) found that women managers were more likely to see threats at work (suggesting differences in appraisal mechanisms, or a mediating effect of sex on appraisal) and to use disengagement coping when threatened, and Narayanan, Shanker, & Spector (1999) claim that women were more likely to base esteem on interpersonal relations and are thus more vulnerable to organisational conflict. Vagg. Spielberger, and Wasala (2002) found that women were most distressed by increased responsibility, inadequate salaries, and reduced personal time, and men were most distressed by lack of power and participation, conflicts, and interruptions.

Klag and Bradley (2004) suggested that coping could mediate the relationship between hardiness and health in both sexes, and that hardiness was a more effective buffer in men than women against stress and ill health. Negative attributional behaviours which often correlate with depression have also been found to be more likely exhibited by women than men (Boggiano and Barrett, 1991; Brems (1995).

Jick and Mitz (1985) claim that there is evidence for a moderating role of biological sex on health outcomes, but that more research needs to be done on the moderating effect of sex on the stressor-strain relationship. Jick and Mitz (1985) state that while men on the whole may possess better psychological attributes, and more adaptive coping repertoires, the research literature is biased against women, because emotion-focused coping is typically seen as a negative and "female" method of coping, that perpetuates the stereotype that women deviate from the normal and healthy "male" types of coping.

4.2.6 Alternative coping conceptualisations

Despite the popularity of the problem focused/emotion focused distinction in coping behaviours as originally proposed by Folkman and Lazarus (1984), this classification has been criticised by many as being too simplistic. These factors are derived by aggregating a large number of diverse coping behaviours into mean scores, which Dewe and Guest (1990) states is too narrow and loses much of the essence of coping. Carver, Scheier and Weintraub (1989) state that stressors often elicit both emotion-focused and problem focused coping, and that emotion focused items involve too wide a range of responses (such as seeking social support, denial, reinterpretation of events, etc) to be captured in one single factor.

Several authors have created coping scales with a more complex structure than the WCCL's 2-factor model. Carver et al. (1989) designed the COPE scale, which is influenced by the WCCL, and contains the factors of problem focused coping, emotion focused coping, venting of emotions, and behavioural and mental disengagement. Cox and Ferguson (1991) support the multi factorial nature of coping and state that coping is far more multidimensional and situation specific than is suggested by the PFC/EFC distinction. Vitaliano, Russo, Carr, Maiuro, and Becker (1985) analysed the psychometric properties of the original WCCL (Aldwin et al. 1980) and then developed a revised 42-item version, which had significantly better

psychometric properties, with coping style scales based on the sub-factors of problem focused coping, seeking social support, blamed self, wishful thinking, and avoidance. Falkum, Olff, and Aasland (1997) developed a slightly different scale using Vitaliano et al.'s (1985) revised 42 items of the original WCCL. They derived a six factor structure, where problem focused coping was split into three factors of action oriented coping, accommodation, and positive thinking, with the seeking support and self blame factors retained, and with wishful thinking and avoidance collapsed into one defence factor.

Dewe and Guest (1990) claim that even with the large amount of research into coping, it is a poorly defined construct, our measurement techniques are inadequate, we know too little about the coping strategies people use, and there is still far too little empirical evidence on the effect of coping, particularly in work situations. Dewe (2004) also claims that coping classifications should reflect what value the person gives to coping behaviours and what they are thinking and doing, rather than the values others give to coping. Carver et al (1994) state that much research gives evidence about what types of coping lead to negative outcomes, but less research gives evidence on which types of coping facilitate good outcomes.

Briner, Harris, and Daniels (2004) state that our existing knowledge is still partial, and much coping research contributes little to our understanding. Dewe and Guest (1990) suggest that the study of coping is difficult, because by nature coping is internal, and may often not be measurable other than by self report, with reliability and validity consequences.

4.2.7 Rationale

This study aimed to compare men and women on a range of coping and mental-health related factors, to find out more about the structure of coping, and to build experience of a range of analysis techniques, including correlation, factor analysis, ANOVA, and multiple regression.

Following Vitaliano et al. (1985) a factor analysis of the revised 42-items from the WCCL was carried out, to see what factor structure for coping styles could be derived, and how well these relate to health outcomes. Also men and women were compared for their self-reported coping styles for stressful workplace events, and their scores for anxiety, depression, cognitive difficulties, somatic symptoms, and fatigue.

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4.3 Hypotheses

Hypothesis 1:

The experimental hypothesis predicts that there will be a significant difference between the scores of men and women on the Hospital Anxiety and Depression scale (HAD) where women will report more symptoms of anxiety and depression. The hypothesis also predicts that men and women will report significantly different levels of fatigue, cognitive difficulties, and somatic symptoms (from the PFRS scale).

Hypothesis 2:

The experimental hypothesis predicts that self-rated coping styles for stressful workplace events, as derived from an exploratory factor analysis of the WCCL, will differ significantly in endorsement between men and women.

Hypothesis 3:

The experimental hypothesis predicts that (assuming the factor analysis derives factors similar to those found by Vitaliano et al. 1985) that "positive" coping styles such as positive thinking, problem solving, planning action, and seeking advice/support will be related to lower levels of negative mental health outcomes, and that "negative" coping behaviours, such as self blame, escape avoidance, or wishful thinking will be related to higher negative mental health outcomes.

Hypothesis 4:

The experimental hypothesis predicts that coping styles and gender will account for a significant percentage of the variance in predicting the various health outcomes.

4.4 Method

4.4.1 Participants

An a-priori power analysis was conducted using Gpower software (Buchner, Faul & Erdfelder, 1992) which showed that using a significance level of .05, and assuming a medium effect size of .5, at least 174 subjects would be required for an experimental power of 0.95. The participants used in this experiment were 240 adults ($\underline{M}$ = 38.56 years, $\underline{SD}$ = 6.47) who responded to flyers distributed at primary schools in the Cardiff area, requesting (adult) participants for a study on mental health and coping. They were 104 men ($\underline{M}$ = 39.95 years, $\underline{SD}$ = 6.53) and 136 women ($\underline{M}$ = 37.49 years, $\underline{SD}$ = 6.25) and were from a variety of socio-economic and racial groups. Participants were informed as to the purposes of the experiment, and were told that they did not have to answer any questions they did not want to, and could withdraw from the experiment at any time. Participants were also told that their responses would be kept anonymously.

4.4.2 Materials

The Revised Ways of Coping Checklist (Vitaliano et al. 1985) is a 42-item scale based on the 66 item WCCL by Aldwin et al. (1980) that has five subscales, measuring Problem-focused coping, Blamed Self, Wishful Thinking, Seeks Social Support, and Avoidance coping styles. Due to several different derived factor-structures for the WCCL in the literature, for this study, the 42 items were factor analysed using principle component analysis with varimax rotation. A five-factor solution was found to be the best fit to the data with two items removed as they did not load strongly onto any factor. A detailed description of the results and procedure of the factor analysis can be found in the results section. The five factors derived were labelled as: Wishful Thinking; Problem Focused Coping; Escape/Avoidance; Seek Advice and Support; and Self Blame. These factors were therefore very similar in structure to those derived by Vitaliano et al. (1985) but with the removal of two items.

For completion of the coping checklist, participants were asked to think of some recent stressful work experiences (or if they couldn't then other life situations) and then to indicate the extent to which they had used each of the suggested coping

behaviours. Responses were made in the same format as in Vitaliano et al. (1985) with participants indicating responses on a 4-point likert scale. A score of 0 indicated "used not at all", 1 indicated "used sometimes", 2 indicated "used often", and a score of 3 indicated "used all the time". Sample items included "I just took things one step at a time", "Made a plan of action and followed it", and "Realised you brought the problem on yourself". Mean scores for each factor were calculated, with a higher score indicating a greater tendency to use that coping style. The factor structure of the scales used in the current analysis were determined by factor analysis (see section 4.6.1). Derived scale internal consistency was good for all subscales, with Cronbach α scores calculated as .81 for Problem focused coping, .79 for Seek advice, .81 for Self Blame, .89 for Wishful thinking, and .79 for Escape/Avoidance.

The hospital anxiety and depression scale (HADS: Zigmond & Snaith, 1983) is a 14-item scale that measures self reported anxiety and depression. Developed for use in hospital staff, it has also shown good validity in other populations (Crawford, Henry, Crombie, & Taylor, 2001). Fourteen mood-related descriptions are presented, with seven measuring anxiety, and seven measuring depression. Participants are asked to review the items and indicate on a 4-point likert scale the extent to which they have been feeling in the previous week, with responses ranging from "not at all" (a score of 0) to "nearly all the time" (a score of 3). Example items include "Worrying thoughts go through my head" and "I feel cheerful". Scores are summed from items for each subfactor, with final anxiety and depression scores ranging from 0-21. Scores of 11 or more were considered by Zigmond and Snaith (1983) to be high enough to be of clinical significance, indicating that the individual may require clinical treatment for anxiety or depression. Cronbach α scores were found to be .81 for the anxiety subscale, and .83 for depression.

The Profile of Fatigue Related Symptoms Questionnaire (PFRS: Ray, Weir, Phillips, & Cullen, 1992) is a 54 item scale that measures four factors of cognitive difficulties (e.g. slowness of thought, difficulty concentrating), fatigue (physically tired), somatic symptoms (pain, etc), and emotional distress (which was not used). Fifty-four symptoms are presented, and participants are asked to rate on a 7-point likert scale the extent to which they have experienced each in the past seven days. A score of 0

indicates "not at all" up to a score of 6 which indicates "extremely". Sample items include "Feeling tense", "Being irritable", and "Stomach pain". Scores were summed for each subscale with final scores for each factor being converted into percentages. Reliability scores were calculated as .74 for cognitive difficulties, .78 for fatigue, and .71 for somatic symptoms. The emotional distress factor was not included as a dependent variable due to its conceptual similarity to both anxiety and depression.

4.5 Procedure

Participants were given an instruction sheet outlining the purposes of the study and assuring confidentiality of responses. Participants were also told that they didn't have to answer any questions they didn't want to, and they could withdraw from the study at any time. Contact details of researchers were given if participants required any further information about the study. Participants were asked to sign consent forms and were told that they could ask any questions during completion of the questionnaires. They then received a questionnaire pack which contained demographic questions, as well as the PFRS, HAD, and 40-item factor analysed WCCL. Instructions for all questionnaires were given as specified by the original authors, and it typically took 20-40 minutes for participants to complete all questions.

4.6 Results

4.6.1 Factor Analysis of WCCL

The factor analysis of the WCCL will be described to show the process by which the coping style factors were derived. The factor analysis was conducted over eight phases of calculations as described below.

Estimates for the minimum number of participants required for a factor analysis vary from between 3 and 20 times the number of items (Mundfrom, Shaw, and Lu Ke, 2005), however Mundfrom et al. (2005) state that there is little empirical evidence for these recommendations. Floyd and Widaman (1995) recommend a 5-to-1 participant to variable ratio and a minimum sample size of 200. The sample size in the present study was 240 for 42 items, or a 5.7-to-1 ratio.

In phase one, data collected from Vitaliano et al.'s (1985) 42-item revision of the WCCL were analysed using a principle components analysis (PCA) with varimax rotation. A solution was reached in 19 iterations with the initial scree plot suggesting a 5, 6, or 7 factor solution, however 10 factors had eigenvalues over 1. The pattern matrix was examined and items were placed on factors that loaded over .3. Seven factors emerged, six of these factors were distinct and in line with the structure of the WCCL by Vitaliano et al. (1985) with one factor showing mixed content of items.

In phase two, a forced 7 factor solution was run with PCA and varimax rotation. A solution was reached in 27 iterations and the scree plot suggested a 5 or 6 factor solution. The pattern matrix suggested 6 clearly defined factors, with the seventh factor having only 1 item loading onto it (which was item 6: "Accepted the next best thing to what I wanted").

To see if this item could be forced into another factor, a 6 factor forced solution was run in phase three. However instead of forcing this single item into another factor, the solution forced two previously distinct factors to be combined into one, leaving item 6 as a lone factor.

In phase four, a 7 factor forced solution was rerun (minus item 6) and a solution was reached in 18 iterations. The scree plot suggested 5 factors however, and while some factors made sense, this solution caused many items to loaded onto unexpected factors.

In phase five, a 6 factor forced solution was run (with item 6 included) with the solution taking 19 iterations, and with the scree plot suggesting 5 factors. However, one of the derived factors had only two items load onto it.

In phase six, a 5 factor forced solution was run in 13 iterations, with the scree plot again suggesting 5 factors. This gave the best solution so far with nearly all items except item 6 loading above .3 onto logical factors consistent with those of Vitaliano et al.'s factor structure (1985). Item 39 ("Tried to make myself feel better by eating, drinking, smoking, or taking medications") was not consistent with the other items in the factor that it loaded onto, but fit well into the factor that it loaded onto second (this loading was still above the accepted limit of .3).

Item 6 did not load strongly onto any factor in the 5 factor forced analysis, but loaded highest onto the problem focused coping factor, Phase seven was used to check if the removal of item 6 affected scale reliabilities. Two 5-factor forced solutions were run, with item 6 both present and excluded. Internal reliabilities for the

relevant factor showed values of .809 for both solutions, therefore as item 6 made no difference to the reliability of the factor, it was permanently removed in the interests of parsimony. During phase seven, it was also found that the removal of item 15 ("Stood my ground and fought for what I wanted") *increased* the reliability of the subfactor it loaded onto from .772 to .788, and as it failed to load satisfactorily onto any other factor it was also permanently removed.

Finally in phase eight, a forced 5 factor PCA with varimax rotation was re-run with items 6 and 15 removed. All items were placed into their highest loading factors over .3, except item 39, which was placed on its second highest loading factor of .313 (escape/avoidance) and item 5 (Made a plan of action and followed it) which was placed on its second highest factor loading of .306 (Problem focused coping). This was acceptable as item 5 fits logically into the latter factor, and increases factor reliability from .802 to .809.

Therefore the final 40 items gave a scale with five distinct coping style factors which were designated: Wishful Thinking; Problem focused coping; Escape/Avoidance; Seek Advice/Support; and Self Blame. Factor loadings (Eigenvalues) for each item are shown in Appendix 1.1. The items and factor descriptions are shown in Appendix 1.2, with original item numbers from the 42-item WCCL (Vitaliano et al. 1985).

Internal reliability scores were calculated for the factors as: .894 for Wishful thinking; .809 for Positive Thinking/Planning; .789 for Escape/Avoidance; .788 for Seek Advice and Support; and .813 for Self Blame.

4.6.2 Descriptive statistics:

Shown below in table 1, are the descriptive statistics for age for all participants.

Table 1: Descriptives for age

	N	Minimum	Maximum	Mean	Std. Deviation
Age Combined	240	20.23	53.69	38.5549	6.47361
Age Men	104	23.78	53.69	39.9459	6.52648
Age Women	136	20.23	53.12	37.4912	6.25006

Shown below (table 2) is a frequency table of clinical anxiety and depression scores on the HAD. It shows that those who score over 11 out of 21 (a clinically relevant

score as defined by Zigmond and Snaith, 1983) are 16.3% of men, and 15.7% of women for anxiety, and 8.7% of men, and 8.1% of women for depression. This amounts to 16% of all participants for anxiety, and 8.4% of all participants for depression.

Table 2: Percentage of men and women with clinical Anxiety and depression scores

	% Clinical Anxiety	N Clinical Anxiety	% Clinical Depression	N Clinical Anxiety
Male	16.3%	17 (of 104)	8.7%	9 (of 104)
Female	15.7%	21 (of 134)	8.1%	11 (of 135)
Combined	16.0%	38 (of 238)	8.4%	20 (of 239)

A Chi Square calculation was carried out to see if the percentages of participants who scored above the clinical cut-off of 11 on the anxiety and depression susbcales of the HAD, differed significantly between males and females. However, the Chi-square (see appendix 1.3) showed that there were no significant differences between men and women for the frequency in scoring at clinical levels on the HAD.

Shown below in table 3, are descriptive statistics for all independent and dependent variables for males and females both separately and combined. Scores for all variables appear very similar for both males and females, except for wishful thinking, and seek advice/support coping styles, where women score slightly higher for both.

Table 3: Descriptives for all independent and dependent variables for men and women

	Sex	N	Mean	Std. Deviation	Min	Max
Wishful thinking	Male	101	1.073	.7759	.00	2.88
(WCCL)	Female	136	1.285	.8076	.00	3.00
	Total	237	1.195	.7995	.00	3.00
Positive thinking	Male	101	1.644	.4956	.15	2.85
(WCCL)	Female	133	1.632	.4642	.23	2.54
	Total	234	1.637	.4770	.15	2.85
Escape Avoidance	Male	103	.891	.5191	.00	2.33
(WCCL)	Female	136	.869	.5786	.00	2.44
	Total	239	.878	.5527	.00	2.44
Advice Support	Male	103	1.443	.6229	.00	3.00
(WCCL)	Female	135	1.625	.6752	.17	3.00
	Total	238	1.546	.6579	.00	3.00
Self Blame	Male	102	.973	.6866	.00	3.00
(WCCL)	Female	135	1.054	.7132	.00	3.00
	Total	237	1.019	.7015	.00	3.00

Cognitive Difficulties	Male	101	24.109	11.4016	11.00	65.00
(PFRS)	Female	133	25.384	12.5262	11.00	75.00
	Total	234	24.833	12.0451	11.00	75.00
Fatigue	Male	102	28.569	14.8694	12.00	79.00
(PFRS)	Female	135	29.882	14.1612	12.00	81.00
	Total	237	29.317	14.4538	12.00	81.00
Somatic Symptoms	Male	102	24.480	10.6527	15.00	61.00
(PFRS)	Female	133	26.617	12.2213	15.00	69.00
	Total	235	25.689	11.5914	15.00	69.00
Anxiety	Male	104	5.942	4.1520	.00	20.00
(HAD)	Female	134	6.045	3.9696	.00	16.00
	Total	238	6.000	4.0420	.00	20.00
Depression	Male	104	4.481	4.3309	.00	20.00
(HAD)	Female	135	4.267	3.6080	.00	16.00
	Total	239	4.360	3.9317	.00	20.00

4.6.3 ANOVA Calculation

A one-way ANOVA calculation was carried out on the results, to compare men and women for levels of anxiety, depression, coping styles, cognitive difficulties, fatigue, and somatic symptoms. The results of the ANOVA (see appendix 1.4) show that there were significant differences between men and women on the wishful thinking and seek advice and support subscales of the WCCL, with women using significantly more wishful thinking coping, $F(1,235) = 4.13$, $p = .043$, and significantly more seeking of advice and support, $F(1,236) = 4.5$, $p = .035$. There were however no significant differences between men and women on the other subscales of the WCCL, and no significant differences in PFRS subscales of Fatigue, Cognitive Difficulties, and Somatic Symptoms. Finally there were no significant differences between men and women in anxiety and depression scores from the HAD.

4.6.4 Correlations:

Table 4 below, shows a series of Pearson correlations that were carried out to compare the relationships between coping styles from the WCCL and the mental and physical health outcomes from the PFRS and HAD. These were carried out both with all subjects combined, and split by sex to enable comparisons between men and women.

Table 4: Correlations between coping styles and dependent variables for men and women.

	Wishful Thinking		Positive Thinking		Escape Avoidance		Advice Support		Self Blame	
	M	F	M	F	M	F	M	F	M	F
Cognitive Difficulties	.532**	.262**	-.148	-.087	.524**	.329**	.021	.029	.409**	.348**
Sexes combined	.388**		-.121*		.418**		.037		.377**	
Fatigue	.508**	.282**	-.141	.003	.529**	.337**	-.024	.123	.223*	.294**
Sexes combined	.404**		-.060		.417**		.072		.268**	
Somatic Symptoms	.459**	.239**	-.108	.059	.475**	.347**	.094	.054	.321**	.278**
Sexes combined	.339**		-.018		.397**		.077		.299**	
HAD Anxiety	.527**	.486**	-.153	.012	.512**	.502**	-.051	.080	.332**	.456**
Sexes combined	.505**		-.061		.504**		.026		.402**	
HAD Depression	.398**	.411**	-.071	-.132	.622**	.422**	-.184*	-.08	.204*	.346**
Sexes combined	.412**		-.104		.510**		*		.279**	

** = p > .001
* = p > .05

Wishful thinking correlated significantly with all mental health outcomes for men and women combined and the sexes separately, with positive correlations in combined samples of .388 for cognitive difficulties; .404 for fatigue; .339 for somatic symptoms; .505 for HAD anxiety; .412 for HAD Depression. For all correlations except HAD depression, the correlations between wishful thinking and the health outcomes were higher for males than females, with particular discrepancies between the sexes in cognitive difficulties (.532 vs .262), fatigue (.508 vs .282), and somatic symptoms (.459 vs .239).

Problem focused coping significantly negatively correlated with cognitive difficulties (-.121, p = .034) but for neither sex when split by sex (due to the reduction in sample size).

Escape/avoidance correlated significantly with all mental health outcomes for men and women combined, and for the sexes separately, with positive correlations in combined samples of .418 for cognitive difficulties; .417 for fatigue; .397 for somatic symptoms; .504 for HAD anxiety; .510 for HAD Depression. Again, for all correlations between escape/avoidance and health outcomes, the correlations were higher for males than females. There were particular differences between the sexes in cognitive difficulties (.524 for males vs .329 for females), fatigue (.529 vs .337), and HAD depression (.622 vs .422).

Seeking advice and support only correlated significantly with HAD depression for sexes combined (-.125) and for males alone (-.184). All other correlations between advice and support and health outcomes were non significant.

Finally, self blame correlated significantly with all mental health outcomes for men and women combined and men and women separately, with correlations in combined samples as .377 for cognitive difficulties; .268 for fatigue; .299 for somatic symptoms; .402 for HAD anxiety; .279 for HAD Depression. When split by sex all correlations were significant to at least $p < .05$ (with most significant to $p < .001$) with particular differences between the sexes on HAD anxiety (.332 for men vs .456 for women); and HAD depression (.204 vs .346).

4.6.5 Regressions:

Fifteen main-effect multiple regressions were run to investigate the relationships between coping styles, gender, and mental health outcomes. For each of the dependent variables of anxiety, depression, cognitive difficulties, fatigue, and somatic symptoms, three sets of stepwise regressions were run. In the first for each DV, sex and coping style (wishful thinking, problem focused coping, escape/avoidance, seek advice, and self blame) were entered using stepwise selection. This would demonstrate whether sex, and which coping styles were significant predictors of mental health outcomes. Then regressions were re-run with coping styles only as the independent variables, once for the male participants, and once for the female participants, to show if were any differences in patterns of coping behaviours in predicting outcomes between male and female participants. Intercorrelations between independent variables show that there are no values above .8, showing no multicollinearity (see appendix 1.5). The final regressions for each set of calculations are shown below.

Table 5: Anxiety regressions for men and women combined and separately

Anxiety Combined	Beta Weight	Std. Error	Standardised Beta weight	t	Sig.
(Constant)	3.588	.863		4.157	.000
Wishful Thinking	2.022	.324	.400	6.234	.000
Escape Avoidance	1.976	.469	.269	4.215	.000
PFC	-1.036	.461	-.122	-2.247	.026
Model: R = .595, R² = .354				F: 40.96	.001

Anxiety Men	Beta Weight	Std. Error	Standardised Beta weight	t	Sig.
(Constant)	1.425	.699		2.038	.044
Wishful Thinking	2.341	.500	.433	4.680	.000
Escape Avoidance	2.364	.759	.289	3.116	.002
Model: R = .630, R² = .397				F: 30.88	.001

Anxiety Women	Beta Weight	Std. Error	Standardised Beta weight	t	Sig.
(Constant)	2.225	.591		3.764	.000
Wishful Thinking	1.681	.435	.344	3.867	.000
Escape Avoidance	1.917	.605	.282	3.168	.002
Model: R = .555, R² = .308				F: 28.45	.001

Biological sex was not found to be a significant predictor of any mental-health related dependent variable in any of the regressions. However when the regressions were split by sex, as shown in the second and third section of each table, there are slightly different patterns of coping styles found to be significant in predicting each of the health outcomes.

For the anxiety regression above, wishful thinking was found to be the most significant predictor by standardized beta weight for both men and women combined, and for both men and women separately. The data in the std. beta weight column shows that for men and women combined, with each unit increase in wishful thinking score, there is a 2.022 unit increase in anxiety score on the HAD, and a 2.341 unit increase for men alone, and a 1.681 unit increase for women alone.

Escape/avoidance was found to be the second most significant predictor by standardized beta weight for men and women combined (1 unit escape/avoidance = 1.976 increase in anxiety) and for the sexes separately (men: 1 unit = 2.364; women: 1 unit = 1.917).

Finally, problem focused coping (PFC) associated with a significant decrease in anxiety scores when men and women are combined, with one unit of PFC predicting a 1.036 unit decrease in anxiety score. This however was not found for men and women separately, perhaps due to the reduction in sample size. Problem focused

coping was the third most important predictor of anxiety for sexes combined by standardized beta weight.

All regressions were found to be significant to p <.001, and the R^2 values show that the significant coping styles accounted for 35.4% of the variance in anxiety for the sexes combined, for 39.7% of the variance in men's anxiety, and 30.8% of the variance for women.

Table 6: Depression regressions for men and women combined and separately

Depression Combined	Beta Weight	Std. Error	Standardised Beta weight	t	Sig.
(Constant)	3.599	.877		4.103	.000
Escape Avoidance	2.284	.469	.321	4.867	.000
Wishful Thinking	1.429	.329	.292	4.348	.000
Advice Support	-.833	.378	-.140	-2.205	.028
PFC	-1.014	.514	-.123	-1.971	.050
Model: R = .564, R^2 = .318				F: 26.15	.001

Depression Men	Beta Weight	Std. Error	Standardised Beta weight	t	Sig.
(Constant)	-.453	.721		-.629	.531
Escape Avoidance	4.251	.782	.503	5.434	.000
Wishful Thinking	1.133	.516	.203	2.196	.031
Model: R = .630, R^2 = .397				F: 30.94	.001

Depression Women	Beta Weight	Std. Error	Standardised Beta weight	t	Sig.
(Constant)	4.269	1.050		4.065	.000
Wishful Thinking	1.480	.413	.332	3.579	.000
Positive Thinking	-1.940	.598	-.249	-3.242	.002
Escape Avoidance	1.441	.569	.232	2.533	.013
Model: R = .519, R^2 = .270				F: 15.76	.001

In the depression regressions for men and women combined, escape/avoidance was shown to be the most significant predictor by std. beta weight, followed by wishful thinking, seek advice and support, and positive thinking. Escape/avoidance and wishful thinking predicted significant increases in depression scores on the HAD, and seeking advice and support, and PFC predicted significant decreases in depression. These factors accounted for 31.8% of the variance in depression.

For men only, escape/avoidance and wishful thinking were also the first and second most important predictors, both predicting increases in depression score, however seeking advice and positive thinking were not significant predictors. Despite there only being two significant predictors in men, these factors accounted for nearly 40% of the variance in depression scores.

For women, wishful thinking was the most significant predictor, with PFC second, and escape/avoidance third. These factors accounted for only 27% of the variance in depression scores. All regressions were significant to p <.001.

Table 7: Cog. Difficulties regressions for men and women combined and separately

Cognitive Difficulties Combined	Beta Weight	Std. Error	Standardised Beta weight	t	Sig.
(Constant)	19.366	2.799		6.919	.000
Wishful Thinking	3.253	1.186	.215	2.742	.007
Escape Avoidance	4.155	1.557	.188	2.668	.008
Self Blame	3.540	1.278	.204	2.770	.006
Model: R = .511, R^2 = .261				F: 19.3	.001
Cognitive Difficulties Men	**Beta Weight**	**Std. Error**	**Standardised Beta weight**	**t**	**Sig.**
(Constant)	12.481	1.956		6.381	.000
Wishful Thinking	5.682	1.458	.388	3.897	.000
Escape Avoidance	6.352	2.170	.291	2.927	.004
Model: R = .596, R^2 = .355				F: 25.07	.001
Cognitive Difficulties Women	**Beta Weight**	**Std. Error**	**Standardised Beta weight**	**t**	**Sig.**
(Constant)	16.583	2.040		8.131	.000
Self Blame	4.827	1.682	.269	2.870	.005
Escape Avoidance	4.526	2.080	.204	2.176	.031
Model: R = .413, R^2 = .170				F: 13.03	.001

In predicting Cognitive difficulties (CD), wishful thinking and escape avoidance were the two most significant coping styles by standardized beta weight, for both men and women combined and for men alone. For men and women combined, self-blame was the third most significant predictor of cognitive difficulties. All of these factors associated with significant increases in CD.

By contrast, for women only, self blame was the most important predictor, followed by escape/avoidance coping, both of which associated with increases in CD. The significant coping styles predicted 26% of the variance in CD for men and women combined, or 35.5% in men only, but only 17% in women only. All regressions were significant to p <.001.

Table 8: Fatigue regressions for men and women combined and separately

Fatigue Combined	Beta Weight	Std. Error	Standardised Beta weight	t	Sig.
(Constant)	17.794	1.752		10.154	.000
Wishful Thinking	5.283	1.263	.295	4.183	.000
Escape Avoidance	5.819	1.837	.223	3.168	.002
Model: R = .455, R^2 = .207				F: 29.17	.001

Fatigue Men	Beta Weight	Std. Error	Standardised Beta weight	t	Sig.
(Constant)	12.529	2.514		4.984	.000
Wishful Thinking	7.263	1.776	.389	4.090	.000
Escape Avoidance	9.074	2.710	.318	3.348	.001
Model: R = .614, R^2 = .377				F: 27.85	.001

Fatigue Women	Beta Weight	Std. Error	Standardised Beta weight	t	Sig.
(Constant)	22.781	2.261		10.076	.000
Wishful Thinking	5.507	1.471	.313	3.743	.000
Model: R = .313, R^2 = .098				F: 14.01	.001

For fatigue, wishful thinking was the most important predictor for both sexes combined, and for men and women separately, indeed it was the only significant predictor for women. Wishful thinking associated with a significant increase in fatigue for all regressions. For men alone, and for the sexes combined, escape/avoidance coping was also a significant predictor, which associated with increases in fatigue. Again these factors accounted for far more of the variance in outcome in men than in women, with 37.7% accounted for in men, and only 9.8% accounted for in women. For the sexes combined this equals 20.7% accounted for. All regressions were significant to p < .001.

Table 9: Somatic Symptom regressions for men and women combined and separately

Somatic Symptoms Combined	Beta Weight	Std. Error	Standardised Beta weight	t	Sig.
(Constant)	16.938	1.433		11.821	.000
Wishful Thinking	3.835	1.048	.264	3.659	.000
Escape Avoidance	4.775	1.520	.227	3.142	.002
Model: R = .431, R^2 = .185				F: 25.16	.001

Somatic Symptoms Men	Beta Weight	Std. Error	Standardised Beta weight	t	Sig.
(Constant)	7.942	2.880		2.758	.007
Wishful Thinking	5.557	1.299	.408	4.279	.000
Escape Avoidance	5.925	1.990	.289	2.977	.004
Advice Support	3.477	1.424	.204	2.441	.017
Model: R = .628, R^2 = .395				F: 19.80	.001

Somatic Symptoms Women	Beta Weight	Std. Error	Standardised Beta weight	t	Sig.
(Constant)	20.870	1.867		11.176	.000
Escape Avoidance	6.805	1.782	.321	3.819	.000
Model: R = .321, R^2 = .103				F: 3.82	.001

Finally, wishful thinking and escape/avoidance were the only coping styles that significantly predicted level of somatic symptoms, in men and women combined, with wishful thinking the most important by standardised beta weight, and both coping styles predicting significant increases in level of somatic symptoms. In women alone, only escape/avoidance was a significant predictor, however in men, wishful thinking was the most important predictor, followed by escape/avoidance, and seeking advice and support. All significant coping styles predicted significant increases in somatic symptoms for all regressions, including seeking advice. The predictors accounted for nearly 40% of the variance in somatic symptoms scores in men, compared to only 10.3% in women, and 18.5% for the sexes combined. All regressions were again significant top < .001.

Shown below is a table of post-hoc experimental power for the regression calculations. Experimental power is the probability of correctly rejecting a false null hypothesis. In other words it is the probability of finding a significant effect, if a real significant effect is present. Using a post-hoc power calculator (Soper, 2007) and entering the alpha level, number of predictors, R^2, and sample size, the following power calculations were made for each of the regressions above. A minimum power of .8 or 80% is considered satisfactory (Soper, 2007).

Table 10: Post Hoc Power analyses

	Combined	Men	Women
Anxiety	1.00	1.00	1.00
Depression	1.00	1.00	0.990
Cognitive Difficulties	1.00	1.00	0.997
Fatigue	1.00	1.00	0.959
Somatic Symptoms	1.00	1.00	0.968

As is clear from the above table, experimental power for all regressions was at least .959. This means that if there was a true significant effect present, the sample size at .05 was large enough to detect it almost 100% of the time.

4.7 Discussion

4.7.1 Factor Analysis

The results of the factor analysis were very similar the factor structure derived for the WCCL as found by Vitaliano et al. (1985) in their revision of the original WCCL (Aldwin et al. 1980). Despite the removal of two items that did not appear to fit well into coherent categories, the other 40 items were well dispersed across the five derived factors and closely matched the content of coping style variables described by Vitaliano et al. (1985). The scree plots consistently showed that a five or six factor solution was the best fit for the data in this sample, which suggests that a two-factor Problem focused vs Emotion focused coping (EFC) style classification is too simple, and supports the suggestions of Dewe and Guest (1990) and others, that a two factor solution is not complex enough to represent how people actually cope. In addition, the regression calculations show that different patterns of coping styles were found to significantly predict different mental health outcomes, and therefore a simple PFC vs EFC classification would not be sufficient to give this discriminant validity. Therefore, the results of the factor analysis support the work of Vitaliano et al. (1985) for a five-factor structure for ways of coping, as does the content of the derived categories which were labelled: self blame; escape/avoidance; seek advice and support; self blame; and problem focused coping.

4.7.2 Hypothesis One

Hypothesis one predicted that males and females would report significantly different levels of mental health, specifically with females reporting more anxiety, depression, fatigue, cognitive difficulties, and somatic symptoms. This prediction was based on the large amount of research that has reported significantly poorer levels of mental health in women, both at both clinical and non-clinical levels, such as Sowa and Lustman (1984) and Nolen-Hoeksema (1990).

However, a one-way ANOVA calculation that compared men and women for all independent and dependent variables (see appendix 1.4) showed that there are no significant differences in levels of mental health outcomes as measured by the HAD and PFRS between male and female participants. Furthermore, biological sex was not

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found to be a significant predictor of anxiety, depression, somatic symptoms, fatigue, or cognitive difficulties in any of the multiple regression calculations carried out.

Finally, two chi-square calculations (see appendix 1.3) comparing the percentage of men and women who scored over the clinical cut-off point of 11 for anxiety and depression on the HAD (as specified by Zigmond & Snaith, 1983) showed that there were no significant differences in frequency of clinical incidence between men and women. Therefore experimental hypothesis one is not supported and the null hypothesis cannot be rejected.

This data does not support the findings reported by Sowa and Lustman (1984) and Nolen-Hoeksema (1990), however it is in line with findings from researchers such as Hawkins et al. (1989) Nolan and Willson (1994) and King and Buchwald (1982) who found no sex differences in depression. This data therefore adds to the conflicting literature on this topic, and questions the long held conceptualisation that women inherently suffer from more mental health problems than men.

4.7.3 Hypothesis Two

Hypothesis two predicted that the coping styles endorsed by men and women for coping with workplace stressors would differ significantly. The results of the ANOVA comparing men and women for coping styles can be found in Appendix 1.4. These data show that while there are no significant differences between men and women for levels of PFC, self blame, and escape/avoidance coping styles, women were found to score significantly higher for the wishful thinking and seeking advice and support coping styles, suggesting that they are more likely to daydream about problems going away, and to speak to others about problems, but show similar levels as men in the other coping styles. Thus there is mixed support for hypothesis two, with significant differences between two of the five derived coping styles. For wishful thinking and seeking advice therefore, the null hypothesis can be rejected, but for the other coping styles, the null hypothesis cannot be rejected.

These findings provide mixed support for the work of authors such as Zeidner (1994), Whately et al. (1998) and Haghighatgou and Peterson (1994), who all found that men were more likely to exhibit problem focused coping styles, (such as positive thinking and planning) and that women were more likely to endorse more emotion-oriented behaviours (such as self-blame, escape/avoidance, and wishful thinking).

4.7.4 Hypothesis Three

Hypothesis three predicted that "positive" coping styles (e.g. problem focused coping, seeking advice) would be associated with lower levels of negative mental health outcomes, and that "negative" coping styles (e.g. self blame, escape avoidance and wishful thinking) would significantly associate with higher negative mental health outcomes.

The correlations in table 4 show that wishful thinking, escape avoidance, and self blame all show significant positive correlations with the negative health outcomes of cognitive difficulties, fatigue, somatic symptoms, and anxiety and depression. This was shown with both male and female participants, and for the sexes combined. These correlations range from around .2 to .62, with most correlations around .3 to .4 with virtually all significant to $p < .001$.

However, from the correlational results there seemed to be less evidence for a relationship between health outcomes, and problem focused coping, and seeking advice. There was a significant negative correlation between positive thinking and cognitive difficulties, but this was small at only -.12. There were also negative correlations between positive thinking and the mental health outcomes for both men and women, and although these were in the predicted direction (and despite several sex specific correlations being larger than -.12) none of them were significant due to the reduction in sample size.

There were two significant negative correlations between seeking advice and support and depression score, for the sexes combined and for men only, however the sexes combined result is clearly due to the larger correlation for men, as the women only correlation is close to zero.

The correlational results therefore provide support for a significant relationship between the negative coping methods and negative health outcomes, but very limited support for the relationship between positive coping styles and health outcomes. More information on these relationships can be found in the results of the multiple regression calculations as discussed below.

Across all five sets of regression equations, it was again the negative coping styles that had the strongest relationships to health outcomes. While there were some differences in expression of coping and outcomes between the sexes, it was clear that

the coping styles of wishful thinking and escape/avoidance were the most consistent in predicting levels of negative health outcomes, with either one style or the other being the most important predictor of outcomes by beta weight in 14 of the 15 regressions. The directions of association between wishful thinking and escape/avoidance were as predicted in hypothesis three, i.e. predicting increased negative health outcomes.

There was also evidence that problem focused coping associated with a significant reduction in anxiety for the sexes combined. While this relationship did not show up in the correlations as significant, it is possible there was a relationship between positive thinking and one or both of the other significant predictors that helped account for the relationship between positive thinking and anxiety (and thus was evident when the predictors were entered simultaneously).

In depression, positive thinking associated with a significant reduction in depression scores for the sexes combined and for women. This relationship did show up in the correlational data for the sexes combined, but not for women. However again this may have been due to relationships between the other independent variables. There was also a significant association between seeking advice and support, and a lower depression score for the sexes combined, a relationship which was evident in the correlations for men, but not for women.

The results of the depression and anxiety regressions therefore appear to lend support to hypothesis three, that negative coping styles predict poor health outcomes, and more positive styles are likely to associate with improved health outcomes, at least in some circumstances.

The coping style of self-blame was only found to be a significant predictor of outcomes in the cognitive difficulties regression. This was found to be the case in the sexes combined and for women only, and associated with a significant increase in cognitive difficulties. There were good correlations between self blame and the other dependent variables, however as it only appears as a predictor for CD, this may suggest that it plays a different role in the prediction of CD, than for other health outcomes, where perhaps the variance it accounts for is also accounted for by stronger predictors in the other coping styles.

Interestingly, for the final regression of somatic symptoms, the seeking advice and support coping style, associated with a significant increase in symptoms for men, this is despite associating with a significant *decrease* in depression score for the sexes

combined. This suggests that this one coping style could have positive associations or effects for some health outcomes, but negative associations or effects for others (however cause and effect cannot be attributed from a cross-sectional design such as this). Alternatively, there could be two separate expressions of seeking advice which are being tapped into differently in the two regressions: Seeking advice could be seen as a proactive method of helping to cope with problems, i.e. associating with improved health outcomes as in the depression regression; however it is also clearly the case that those who are suffering from stress or negative health, are more likely to seek advice anyway, as could be the case for the latter regression. Therefore one regression could be measuring a cause, and the other an effect.

Overall, the correlational results and the regressions provide support for hypothesis three, particularly for the relationship between negative coping styles and health outcomes. While the support for the relationship between positive coping styles and improved health outcomes was mixed, there is still evidence for these relationships in some of the regressions, either for the sexes combined, or for one or other sex individually. While more research needs to be done to investigate this, there is enough evidence to enable the rejection of the null hypothesis, and hypothesis three can be accepted. These results support the findings of Whately et al. (1998), Zeidner (1994), and Haghighatgou and Peterson (1995).

4.7.5 Hypothesis Four

Hypothesis four predicted that coping styles and gender would account for a significant percentage of the variance in predicting health outcomes. The evidence clearly supports this hypothesis, as was shown by the fact that all regressions were significant to $p < .001$. While some regressions (for example somatic symptoms in women) only accounted for around 10% of the variance in outcomes, most regression equations accounted for around 25% to 35% of the variance in outcomes, with the predictors accounting for around 40% of the variance in anxiety and depression in men. This was despite the fact that gender failed to be a significant predictor of any health outcome. Therefore there is sufficient evidence to enable the rejection of the null hypothesis, and experimental hypothesis four can be accepted.

Further to the results described above, data from the regressions and correlations show that slightly different patterns of coping styles predict health outcomes in men and women. This is of relevance to both hypotheses three and four. For example in depression, escape/avoidance is the most important predictor in men by std. beta weight, and while significant in women, it is less important overall. Also positive thinking is not a significant predictor in men, but it is in women. Similarly, for cognitive difficulties, wishful thinking is a significant predictor for men but not for women, and self blame is significant for women but not men. For fatigue, escape/avoidance is a significant predictor in men, but not in women, and for somatic symptoms, wishful thinking and seeking advice and support are significant in men, neither of which are significant for women. It is also clear that looking at the R^2 values for each regression, that far more variance was explained for each dependent variable in men compared to women, for example, nearly four times as much variance was explained in fatigue for men, in comparison for women.

These results clearly show that while the direction of relationships between independent and dependent variables are largely the same in men and women, the relative importance by std. beta weight of the predictors (coping styles) are different, with different variables significant for different health outcomes.

4.7.6 Implications

Three of the four hypotheses presented in this study were fully or partially supported, and much of the results are in line with the work of previous researchers. However, the lack of significant differences between mental health outcomes in men and women was unexpected (particularly for depression) given the large amount of research that suggests these differences exist. Also, the fact that no significant sex differences were found in three of the five examined coping styles, fails to support much previous research, and adds to the mixed findings on coping differences between the sexes. These data suggest that men and women may be closer in mental health and ways of coping with workplace stressors than much research suggests, perhaps due to increasing numbers of women in the workforce with more women in roles of increasing control and seniority. However the fact that coping styles explained so much more variance in health outcomes in men than in women, suggests that coping may be a better predictor for health outcomes in men, and that women's mental health

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outcomes may be more strongly related to other factors, (for example work conditions or pay etc).

Also it is clear that in this study, for both men and women, there were much stronger relationships between negative coping and health outcomes, than between positive coping styles and health outcomes. While this data is cross sectional and the direction of causality between coping and outcomes cannot be determined, the data suggests the possibility that it may be the absence or presence of negative coping styles that are most instrumental in predicting (or causing) negative health outcomes, rather than the absence or presence of positive coping styles.

This information could have implications for intervention, for example, as negative coping styles were most strongly related to health outcomes, if there was evidence that this was a causal relationship, training on healthy coping behaviours could be used to help avert or deal with negative workplace events. It could also have implications for recruitment, as those with negative coping styles may be less suitable for certain stressful jobs.

The significant amount of explained variance in the many of the outcomes, suggests that coping is important in the prediction of many health outcomes. However even in the most significant regressions, ways of coping accounted for less than 40% of the variance, suggesting that there are many other factors that are also important in the prediction of health. The most obvious factors which may significantly contribute to the explanation of variance in outcomes in relation to the workplace are work characteristics themselves, such as levels of control, reward, or job demands. Indeed there is a great deal of research that focuses only on workplace stressors as the most important antecedent of negative health outcomes (for example Karasek, 1979) with little or no reference to individual differences or ways of coping.

4.7.7 Limitations

There were a number of limitations in the methods and sample used in this study which may have consequences for the validity of the results. For example, while there were similar numbers of male and female participants, with similar average ages, due to the flyer-based selection process (where flyers requested participants for a study on nutrition, work, and stress) participants may not be representative because they were self-selected. For example, perhaps only those who were stressed or had workplace

problems would be motivated to respond, or perhaps the most stressed individuals would not have the time to complete and return a long questionnaire.

Also, as the study used a cross-sectional method, no cause and effect relationships can be suggested between coping styles and health outcomes. For example, those who use escape/avoidance or wishful thinking coping may be more likely to go on and suffer more workplace problems because of their so called "negative" methods of coping, however it is also possible that those who are already stressed from negative work conditions are more likely to use these negative coping styles. A longitudinal design would be more suitable for detecting the direction of such relationships.

As all data came from self-report, there may be issues with the accuracy of the data, for example biases from social desirability, demand characteristics, or negative effect (the tendency to answer questions in a negative way due to a general negative outlook) could have influenced the results to give higher levels of negative health than are accurate.

Another significant limitation to the study was that expressed in section 3.9, to do with possible confounding variables. Aside from gender, which was included as an independent variable in the combined sex regressions (and removed from all due to lack of significance in predicting outcomes) no other possible confounding variables were included as covariates. Factors such as education, occupational status, pay, social class, shiftworking, and health-related behaviours, all could have affected the results, and thus any conclusions should be treated with caution.

4.7.8 Improvements and future directions

Improvements to this study could be made in several areas, such as by using a larger or more representative sample, and by using different measurement methods and questionnaires, for example qualitative measures such as interviews or critical incident technique. Also other dependent variables could be used, which are more appropriate to workplace stress scenarios, such as job satisfaction or organisational commitment.

Another important improvement that could be made to this study, would be the inclusion of more varied independent variables, particularly those related to the workplace, such as job characteristics and psychosocial stressors, for example, job

demands, levels of control, workplace social support, levels of reward, bullying etc. Also more individual characteristics could be used as independent variables, such as personality, locus of control, attributional style, age, etc. Finally some possible confounding variables could be included as covariates, such as those mentioned in the previous section. Using more job characteristics and individual differences as IVs would explain more variance in health outcomes, and could enable better prediction of levels of mental health.

4.8 Conclusion

The results of this study showed that a five factor structure for coping styles based on a factor analysed version of 40 items from the revised WCCL was the best fit for this sample, which supports the factor structure found by Vitaliano et al. (1985). This shows that a two factor problem focused vs emotion focused coping solution, is not an accurate conceptualisation of how people really cope. Indeed five factors are probably too limited to capture the complexities of coping. More research into coping and its relationships with various outcomes is necessary.

The results also show strong relationships between certain coping styles and health outcomes, with some styles better predicting certain outcomes than others. While there appear to be no significant differences between men and women for absolute mental health outcomes, and gender did not significantly predict any dependent variables, there do appear to be differences in the endorsement of certain coping styles, as well as differences in which coping styles predict specific health outcomes.

The fact that between 10% to 40% of the variance in health outcomes was explained by coping. Suggests that more research should be done with other independent variables, as well as more on gender differences in other dependent variables.

4.9 Summary of chapter 4 and links to chapter 5

The study described above was important for the development of this dissertation for a number of reasons. Firstly it provided experience of questionnaire methodologies which formed the large part of the methods for subsequent studies. It also gave

experience of a variety of statistical methods, such as chi-square, ANOVA, multiple regressions, and factor analysis, and finally it enabled the clarification of the structure of coping, for use in further work. This study also provided evidence for the relationships between ways of coping and health outcomes, that can form a good basis for future research, as well as posing questions about the relationships between gender and coping and health outcomes.

The work described in chapter 5 uses a more sophisticated method and number of variables, and proposes a new model of work-stress to guide the research. Attention is also paid to the issue of confounding variables, which were highlighted as a potential issue in the previous study.

Chapter 5

Study Two: Occupational Stress, Job Characteristics and Coping in Nurses

5.1 Summary Rationale

Following the research described above, a second study was carried out, which aimed to expand upon former work, by using a greater number of independent variables in the prediction of health outcomes, and to use more sophisticated methodology and statistical analyses. The sample used was made up of nurses, due to the high levels of psychosocial stressors that this population face. A new stress model was proposed on the basis of past research and literature, the investigation of which forms the basis for much of the research that follows. The key feature of the model and the following research, is the simultaneous investigation of both workplace psychosocial stressors, and individual difference variables in the prediction of health outcomes, with theoretical primacy given to neither one type of variable nor the other. This viewpoint is used in order to provide a balanced approach to the investigation of workplace stressors and health outcomes, to see which factors were the most important in predicting outcomes (individual or environmental) as well as to investigate any possible interactions between job characteristics and individual difference variables. Multi-factor stress research of this type has been described as necessary by many authors (for example Dewe & Trenberth, 2004) but as yet, few studies have attempted to include as wide a range of variables as the research described below.

5.2 Abstract

This study investigated the relationships between job characteristics and individual differences in predicting levels of anxiety and depression in a nursing population. Participants were 870 nurses, who responded to a bulk mail sent out randomly to 4000 nurses from the south and south west of England. Independent variables included job demands, social support, job control, efforts, rewards, gender, ways of coping, and attributional style. Hypotheses predicted that job demands, intrinsic and extrinsic effort, and negative coping and attributions would be significantly associated with higher levels of depression and anxiety, and social support, rewards,

job control, and positive coping and attributions would be associated with lower levels of depression and anxiety. All of these hypotheses were supported. Also found was a buffering effect of high decision authority control on job demands, in the prediction of anxiety. However, the predicted moderating effects of positive coping and attributions on negative job characteristics were not found. Also men and women were found to differ little in terms of the above variables. It was shown that coping and attributional behaviours significantly added to the explanation of variance in anxiety and depression outcomes, over and above the use of demand-control-support, and effort-reward factors alone. This indicated the importance of including individual difference factors in work-stress research, and that no single category of factors – psychosocial job characteristics or individual differences, can account for the complexities of the stress process alone. The results supported many aspects of a proposed stress model, and it is argued that multi-factor research is needed to help develop multi-factor organisational interventions.

5.3.1 Introduction

As has been previously stated, work stress and its consequences are an increasing problem in our society, and the ways that individuals interpret workplace stressors, cope with problems, and suffer from work-related health problems, are important and interesting questions for theory and research, particularly if effective interventions are to be designed.

Work stress has been defined in a number of ways, including as a feature of the environment, a reaction within the individual, or as an interactive process that occurs between individuals and their surroundings (Cox & Griffiths, 1995). This latter perspective, which is endorsed by proponents of transactional stress theories, makes the individual the fulcrum between environment and outcome, whose individual characteristics and coping efforts are instrumental in determining the health-related consequences of stressful work environments. Failure to cope with perceived stressors may lead to many negative outcomes, including heart disease, anxiety, depression, burnout, absence, fatigue, accidents, substance misuse, musculoskeletal disorders, and work-family role issues (Cox & Griffiths, 1995).

5.3.2 Stress in health professionals

Much research has shown that health professionals are a group at significant risk from the negative effects of stressful workplaces, and evidence shows that these individuals may be affected disproportionately highly (Tyler & Cushway, 1998; Kirkcaldy & Martin, 2000). Of health workers, nurses are particularly at risk from stress-related problems, with high rates of turnover, absenteeism and burnout (Kirkcaldy & Martin, 2000; Clegg, 2001). Kirkcaldy and Martin (2000) state that nurses have higher than normal rates of physical illness, mortality, and psychiatric admissions. Clegg (2001) cites figures from 1979-83 which showed that suicide rates for nurses were significantly higher than the national average, and life expectancy for nurses was approximately 72, only one year more than miners.

Calnan, Wainwright, Forsythe, Wall, and Almond (2001) administered the General Health Questionnaire to health service staff and found that 27% of all hospital staff were classified as suffering stress and mental ill-health, compared to between 14 and 18% of the general population. The CBI (1995, cited in Clegg, 2001) reports that in the private sector in the UK in 1994, 3.4% (8 days) of working time was lost through absence per employee, compared to 6% (14 days) in the health service. Kunkler and Whittick (cited in Clegg, 2001) state that UK health service trusts may lose in excess of £1 Billion per year due to sickness absence in nurses.

5.3.3 Psychosocial stressors in Nursing

Nurses can be exposed on a daily basis to a large number of potent stressors, including conflict with physicians and peers, inadequate preparation, discrimination, high workload, uncertainty concerning treatment, and dealing with death and patients and their families (French, Lenton, Walters, and Eyles, 2000). McVicar (2003) also cites "emotional labour" as a stressful feature of working as a nurse. Which is related to the development of patient-nurse relationships and the emotional cost of caring. He states that this factor can be a major source of distress, and can reduce nurses' objectivity in caring for patients.

Lambert, Lambert, and Ito (2004) note that most research on nursing stress has taken place in the UK and USA, and the authors showed that Japanese nurses, despite

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having somewhat divergent roles with nurses in the west, suffer many of the same relationships between workplace conditions and mental health.

Bullying at work is also a significant problem in nursing, and a survey by Ball, Pike, Cuff, Mellor-Clark, and Connell (2002) at the Royal College of Nursing, showed that 30% of nurses on long-term sick leave had reported workplace harassment and intimidation as the main cause of their absence.

Shiftworking is another factor that can be a significant stressor in nurses (McVicar, 2003). Boggild and Knuttson (1999) in a review of 17 studies, found that shiftworkers have a 40% increase in risk of cardiovascular disease, and Kobayashi, Furui, Akamatsu, Watanabe, & Horibe (1999, cited in Cox, Griffiths, & Rial-Gonzalez, 2000) found that cortisol and NK cell (natural-killer immune cell) levels were lower in nurses working nightshifts, suggesting increased stress and lower levels of immune defence.

Despite the widespread incidence of work stress and health problems in NHS staff, a survey by Ball, Pike, Cuff, Mellor-Clark, & Connell (2002, cited in McVicar, 2003) showed that of nurses who showed significant signs of poor psychological health, only 53% had ever received counselling or any other form of support.

An important issue to note regarding stress in the UK health service, is that in many other types of stressful work environments, the employer and the employee are the only stakeholders. However, in the National Health Service, stress at work has consequences not only for employers and employees, but also for patients. Patients may potentially receive a lower quality of care due to stressful hospital environments, with obvious issues relating to staff absences, increased pressure and workload for staff who remain at work, and less money for equipment, medicines, and treatments due to the extra costs of dealing with stressed employees, not to mention the extra costs to the taxpayer. For example, an investigation by the UK audit commission found that in 1999-2000, the NHS provided part-time agency nurses to cover staffing shortfalls at a cost of £810 million (Laurance, 2001). It is likely that some of these shortfalls may have been due to stress related illness in nurses.

5.3.4 Demands-Control-Support

As described in section 5.3.3, it is clear that many of the working conditions that are typical of nursing roles may be implicated in stress-related issues. Thus in order to

understand more about the nature of work-related stress in nurses, and to add to the results from the previous study, it would be appropriate to measure the levels of some of these stressful work characteristics, and attempt to relate these to levels of mental health outcomes.

Two of the most influential theories that are commonly used in studying work-related stress are the Demands-Control-Support model (Karasek & Theorell, 1990) and the Effort-Reward imbalance model (Siegrist, 1996). Both models have been found to predict many physical and psychological health outcomes, including heart disease and mortality, and depression (Van der Doef & Maes, 1999) and have also been used in nursing populations (Weyers, Peter, Boggild, Jeppesen, Jeppe, & Siegrist, 2006, and de Rijk, Le Blanc, Schaufeli, & de Jonge, 1998).

As stated in detail in the review of the literature (section 2.5.7) the DCS model predicts that those exposed to high levels of psychological demand, and low levels of job control and social support, are likely to suffer negative health outcomes. Karasek (1979) proposed an interaction effect between demands and control, so that when demands are high and control is low, a high-strain situation develops, exposure to which is likely to lead to negative health outcomes. High control (from the sub-factors of skill discretion and decision authority) are proposed to buffer the effect of high demands on health outcomes.

This model may be well applied to nursing samples, because a lack of social support as well as excessive demands are common in nursing (Muncer, Taylor, Green, & McManus, 2001) and control often varies by occupational grade.

5.3.5 Effort-Reward-Imbalance

The Effort-Reward Imbalance model (see section 2.6.2 for more detail) is, like DCS, a popular and influential model in work stress research. Based on the concept of reciprocity, the ERI model (Siegrist, 1996) proposes that high levels of work-related effort (from extrinsic job demand sources, and intrinsic motivational sources) should be matched by high levels of reward (economic, recognition, promotion prospects, or job security). It is proposed that if efforts (external demands or internal motivations) are high, but levels of reward are low, then strain and negative health outcomes are likely to ensue. There are various ways of operationalising the relationship between efforts and rewards, with some seeing rewards as having an interactive or buffering

effect on efforts, and others expressing the outcomes of effort and reward levels as based on a ratio between the two. However Van Vegchel et al. (2005) found that a multiplicative interaction between efforts and rewards was a more consistent predictor of health outcomes than a ratio term (see section 2.6.2).

The ERI model may be suited to studying work-related stress in nurses, as there is much evidence that nursing is a demanding occupation and thus requires high efforts, and levels of pay in newly qualified nurses may be lower than other high-stress occupational groups, such as teachers and police officers (Demerouti, Bakker, Nachreiner, & Schaufeli, 2000). Unlike the DCS model, the ERI model does include an individual difference variable in the form of intrinsic effort (which is characterised by being overcommited to work, having difficulty disengaging from work, etc) and the importance of this characteristic is well known.

5.3.6 Coping

Despite the popularity of the above two models, as has been previously argued in the literature review (see section 3.3) in order to gain a balanced picture of the processes surrounding work-related stress, and to develop ecologically valid work stress models, both job characteristics *and* individual difference variables (IDs) are important (Long, Kahn, & Schutz, 1992). Models such as the DCS and ERI which mainly focus on aspects of the environment (intrinsic effort notwithstanding) cannot readily explain for example, how different individuals when exposed to the same levels of demand-control-support, or effort-reward, may suffer different health outcomes (Perrewe and Zellars, 1999). A good example of research that tries to combine these two domains of factors in one method, is the research on the Job Demands-Resources model by Xanthopoulou et al. (2007).

Advocates of transactional theories of stress (e.g. Folkman & Lazarus, 1980) make some important contributions to the case for supporting the role of individual difference variables in the stress process. Indeed subjective perceptions of stressors, and individual differences in ways of coping, viewing problems, past experience, personality-type etc, may all be important in informing and affecting the workplace-individual stress interaction (Cox & Ferguson, 1991).

In transactional stress models, the process of coping and how different individuals cope with problems, is central in the relationship between stressors and

health outcomes (Folkman & Lazarus, 1986) and coping behaviours in the form of coping styles are an important individual difference variable. Coping has also proposed many times to be a central factor in the aetiology of depression (Folkman & Lazarus, 1986).

In addition to the research on coping and health outcomes as described in the literature review (section 2.9.8) and results of the previous study (section 4.6), Healy and McKay (2000) found that avoidance coping predicted poor mental health in nurses, and active problem solving was positively related to satisfaction, and Lambert, Lambert, and Ito (2004) found very similar trends in a sample of nurses in Japan.

5.3.7 Attributional style

Another individual difference factor that may be important in relating to health outcomes from stressful work environments is that of explanatory or attributional style. As described in the literature review in section 2.9.7, Attributional style refers to the ways in which individuals try and understand or explain the causes of life events.

Causes and consequences of events are viewed on three sets of continua: Internal (caused by the individual) or external locus (caused by events outside individual control); Stable (the cause will effect events in the future) or unstable (the cause will not effect future events); and Global (the cause will effect many other events) or local (the cause effects just this event) (Sweeney, Anderson, and Bailey, 1986).

Sweeney et al. (1986) conducted a meta-analysis on attributional style and depression experiments, comprising a total of more than 15,000 subjects. They found that those who attribute negative life events to internal, stable, and global factors, and positive events to external, unstable, and local causes, (so called negative attributional style) are significantly more likely to suffer from depression.

One of the attributional style factors, the internal-external attribution of events, can be seen as analogous to Locus of Control, a very popular conceptualisation of control beliefs, and research often find that an internal locus of control is related to significantly better mental and physical health outcomes (Parkes, 1994). For example Kirckaldy and Martin (2000) found that nurses with an internal locus of control reported significantly lower levels of job related stress and dissatisfaction and better

mental health, and Van de Doef and Maes (1999) found that in those with an internal locus of control, high job control buffered the negative effect of job demands, but in those with an external locus of control, high job control did not buffer high job demands.

5.3.8 Gender and nursing

There are also gender issues related to the nursing profession, as many studies (for example Kirkcaldy & Martin, 2000; Healy & Mckay, 2000; Tyler & Cushway, 1998) have shown that the vast majority of those employed as nurses are female. There is a large amount of literature on gender differences in mental health and work stress, and there is much evidence to suggest that men and woman may face different problems and stressors at work (particularly role stressors) as well as using different ways of appraisal and coping behaviour (Jick & Mitz, 1985). It is also often reported in the literature that woman are significantly more likely to suffer from depression (particularly from self report measures) at a ratio of around 2:1 (Brems, 1995).

Despite the above trends in many spheres of working life, there is still mixed evidence for sex differences in health outcomes in nurses. The previous study (chapter 4) found little evidence of mental health differences between men and women, and only slight differences in endorsement of coping styles. Tyler and Cushway (1998) report that female nurses have higher scores on GHQ and anxiety, Kirkcaldy, Furnham and Trimpop (1999, cited in Kirkcaldy & Martin, 2000) report that male nurses are more stressed, and Kirkcaldy and Martin (2000) find no gender differences at all in physical and psychological health.

5.3.9 Moderators

Moderation is a form of interaction effect that is an important mechanism by which some of the above independent variables may influence one another. As previously stated, both job control and social support may moderate the effects of job demands on health outcomes, and rewards may do the same for high levels of effort. It has also been proposed that individual difference variables can moderate the effects of stressful job characteristics on health outcomes (Cox & Ferguson, 1991). Moderators can change the direction or strength of relationship between other variables, for

example by buffering effects (Cox & Ferguson, 1991). Such effects could potentially occur during coping processes when particular coping behaviours may be used to reduce (or exacerbate) the negative effects of a potentially hazardous environmental stimuli. Similarly, attributional style could have moderating or interactive effects that could reduce the strength of an effect of environmental stimuli on health outcomes (Cox & Ferguson, 1991; Tennant, 2001; Perrewe & Zellars, 1999; Baron & Kenny, 1986).

5.4 Rationale

The aim for the second study was to build a more detailed picture of some of the relationships between workplace stressors, individual differences, and health outcomes, and to add to the results found in the first study, for example to further investigate any potential gender differences in stress, coping and health. It was also hoped that the current study would provide support for a new stress model as proposed in the following section.

Nurses were selected as the population for the current study due to the complex array of stressors that they face, and the high levels of negative mental and physical health they suffer from (Kirkcaldy & Martin, 2000). This is particularly important given the funding and staffing challenges facing the UK health service. McVicar (2003) and Kirkcaldy and Martin (2000) suggest that there is a need for more understanding of how individual variation in perceptions and reactions to stressors in nurses affect health outcomes.

The workplace factors of job demands, job control (from skill discretion and decision authority sub-factors) and social support, were included as independent variables from the DCS model, as were the factors of extrinsic and intrinsic efforts, and levels of rewards, from the ERI model. Calnan et al. (2001) state that there is a need for Effort Reward Imbalance research, to add to the existing body of research into demands and control in nurses.

Coping style was included as an individual difference variable, and attributional style was added to see how it compared to coping in the prediction of health outcomes. Attributional style was also included as it has not been used much in occupational literature, despite being an important factor in clinical depression

literature. Finally gender was included to examine possible sex differences in levels of the variables of interest.

All of these factors therefore were simultaneously used to predict levels of anxiety and depression in a nursing population, to see how much variance each of the factors explained, to find relevant interactions, and to see how much additional variance was explained by ID factors, over and above the use of traditional DCS and ERI variables alone.

It was hoped that such a study could help provide more detail for the theoretical understanding of stress and health, and to provide empirical support for potential organisational interventions to combat work stress.

5.4.1 Confounding variables

Confounding variables are extraneous variables that are significantly related to both the dependent variable *and* the independent variable (Pearl, 1998). If confounding variables are not controlled for (i.e. including them as covariates in regression studies) then there is no way to know that a significant relationship between an IV and a DV is not actually due to an uncontrolled confounding variable.

As described in section 3.9, there are several potential confounding variables that could have an effect on the results of the current work, including gender, educational level, occupational status, pay, social class, full time or part time work, shiftworking, and smoking and drinking behaviours. One possible reason why many of these confounders may not significantly affect the results is due to the fact that (according to Van Vegchel, 2005) when samples consist of employees from a single occupational domain (such as nurses or university employees) the confounding effects of many potential socio-economic status factors can be eliminated, because levels of these factors are likely to be similar across most participants. However, in the current study, many of these potential confounding variables will be taken into account, as will be described in sections 5.7.5 and 5.8.5.6.

5.5 A preliminary work-stress model

In chapter 3 it was stated that numerous authors (for example Briner et al. 2004) have claimed that little new research adds to the understanding of the relationships between stressors and health. Dewe (1991) suggests that it is widely accepted that individual differences and subjective perceptions play an important role in the stress process, however many authors (such as Dewe & Trenberth, 2004, Perrewe & Zellars, 1999, and Florio et al. 1998) have stated that there needs to be more research that includes a range of such factors if progress is to be made, and far too much research still is based on models based on stimulus-response principles, such as the Demands-Control-Support model.

It was suggested that while transactional models provide many useful avenues for research, their complexity makes them hard to empirically support, and their process oriented and stage-based structure may be a somewhat artificial characterisation of an even more complex process. A new direction was proposed (section 3.6) which would combine aspects of traditional job stress models (the DCS and ERI) with individual differences and coping, but without focusing too deeply on hypothesising the actual mental stages occurring in the stress process. The Job Demands-Resources model (Xanthopoulou et al. 2007) was suggested as a framework that followed such a line, i.e. combining job demands and resources and personal resources.

On the basis of the literature, and the results of the study described in chapter 4 (which confirmed a role for coping in predicting health outcomes), a new model has been formulated which combines a role for individual differences and job characteristics. This model can be seen below and testing it forms the part of the basis for the next piece of research.

Figure 1: DRIVE model


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                        ┌─────────────────────────┐
                        │ Individual Differences: │
                        │ (Personal Resources &   │
                        │  Personal Demands)      │
                        │                         │
                        │   Coping Style          │────────┐
                        │   Attributional Style   │        │
                        │   Gender                │        ▼
                        │   (Intrinsic Effort)    │    ┌──────────────────┐
                        └─────────────────────────┘    │ Health Outcomes: │
┌──────────────────┐           │                       │                  │
│ Work Demands:    │           ▼                       │   Anxiety &      │
│ Job Demands      │───────────────────────────────────▶   Depression    │
│ Extrinsic Effort │           ▲                       │                  │
│ (Intrinsic Effort)│          │                       └──────────────────┘
└──────────────────┘           │                              ▲
                               │                              │
┌──────────────────┐           │                              │
│ Work Resources:  │           │                              │
│ Job Control      │───────────┴──────────────────────────────┘
│ Social Support   │
│ Rewards          │
└──────────────────┘
```
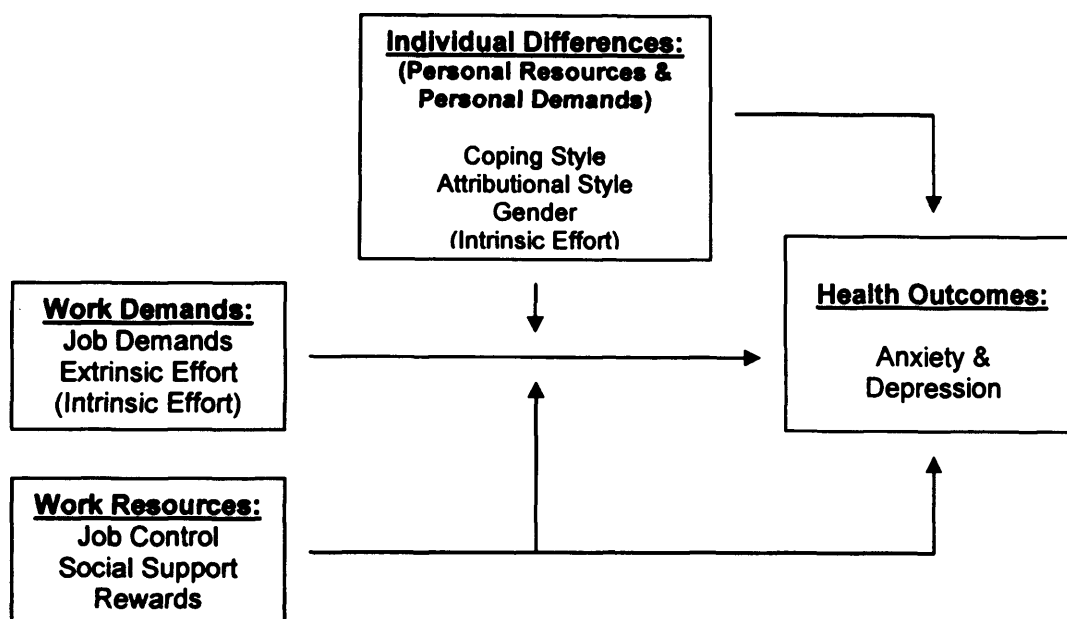
The above model shows that work demands, individual differences, and work resources are all proposed to have main effect relationships with anxiety and depression. It is also proposed that work resources and individual differences may moderate the relationship between work demands and health outcomes. The individual difference variables of positive coping and attributional styles can be seen as personal resources, and negative coping and attributions as "personal demands" (as counter productive behaviours are effectively self-induced demands). Intrinsic effort is shown both as a job demand and as an individual difference, as although it is an ID variable in the literal sense, it has no proposed moderating effects on work demands, and is part of a model (ERI) that the other aspects of which are related to work characteristics (extrinsic effort and reward).

The work demands and resources boxes represent variables from the DCS and ERI models, and the individual differences box represents coping from transactional models, as well as the variable of attributional style. This prospective model makes no predictions about the "importance" of the different variables in predicting outcomes, and gives each type of variable (work and individual demands and resources) a theoretical equivalency.

Any other variables which match the description of outcomes (including job satisfaction, heart disease, musculoskeletal disorders, etc) workplace demands and

resources (bullying, role conflict, job insecurity, etc) and individual differences (self-efficacy, organisational commitment, self-esteem etc) could easily be substituted into the above framework, and could be investigated using the same methodology.

The above model has been named, the Demands, Resources, and Individual Effects (DRIVE) model, and some of the hypotheses below represent tests of the various relationships as represented above.

5.6 Hypotheses

Hypothesis one:

The experimental hypothesis predicts that there will be significant differences in depression, anxiety, and coping behaviours, between male and female nurses, with females scoring significantly higher on anxiety and depression, and endorsing significantly different types of coping and attributional behaviours.

Hypothesis two:

The experimental hypothesis predicts that positive coping behaviours will be associated with low levels of depression and anxiety in nurses, and negative coping behaviours will be associated with high levels of anxiety and depression.

Hypothesis three:

The experimental hypothesis predicts that positive attributional behaviours will be associated with low levels of depression and anxiety in nurses, and negative attributional behaviours will be associated with high levels of anxiety and depression.

Hypothesis four:

The experimental hypothesis predicts that high levels of job demands will be associated with high levels of anxiety and depression in nurses, and high levels of control and social support will be associated with low levels of depression and

anxiety. The hypothesis also predicts that there will be significant interactions between demands and control, and demand and social support, so that high control and social support will buffer the effect of demands in predicting anxiety and depression scores.

Hypothesis five:

The experimental hypothesis predicts that high levels of extrinsic and intrinsic effort will be associated with high levels of depression and anxiety in nurses, and high levels of intrinsic reward will be associated with low levels of anxiety and depression. The hypothesis also predicts that there will be significant interactions between extrinsic efforts and rewards, and intrinsic efforts and rewards, so that high levels of reward, will buffer the effect of high efforts in predicting anxiety and depression scores.

Hypothesis six:

The experimental hypothesis predicts that there will be significant interactions between negative job characteristics (high job demands and extrinsic efforts) and positive individual characteristics (positive attributional styles, and problem focused coping) in nurses, so that positive individual characteristics will buffer the effects of negative job characteristics on mental health outcomes.

Hypothesis seven:

The experimental hypothesis predicts that coping behaviours, attributional style, efforts, rewards, demands, control, and support will account for a significant amount of the variance in anxiety and depression scores in nurses, and that ways of coping and attributional style, will significantly add to the explained variance in outcomes, over and above use of DCS and ERI alone.

5.7 Method

5.7.1 Participants

The participants in this experiment were a sample of 870 nurses from all occupational grades and specialties employed in the UK health service. They were 790 women and 80 men (Mean age = 44.84, SD = 8.8) who responded to a bulk mail posted to 4000 nurses (a 22% response rate) in the South and South West of England, who were randomly selected by the UK Royal College of Nursing. The documentation requested participants for a study into health and safety at work, with a focus on stress and work pressures

An a-priori power analysis (using *Gpower*: Buchner, Faul & Erdfelder, 1992), showed that at a significance level of .05, and a even at a very conservative effect size of 0.2, 870 participants would give an experimental power in excess of .98.

Ethical approval for sampling, methods, and treatment of participants was granted by Cardiff University Psychology ethics committee, in accordance with APA, BPS, and NHS ethical guidelines.

5.7.2 Materials

A 31 page questionnaire booklet was produced for the study, which contained an instruction page that informed participants as to the purposes of the experiment, their right to withdraw, and the anonymous treatment of data. The booklet also contained the five main questionnaires, as well as questions on demographic data, work type (full time or part time and permanent or fixed/temporary), work pattern (shifts or fixed hours), education level, salary, and levels of drinking and smoking.

The 21-item version of the Effort-Reward Imbalance Questionnaire used was the same as that in the Whitehall II Study (ERI: Kuper, Singh-Manoux, Siegrist, & Marmot, 2002). Three subscales measure intrinsic effort (internal motivations such as the tendency to be "overcommitted" to work) extrinsic effort (external job demands such as workload or time pressure) and internal reward (perceptions that pay or promotion prospects are adequate). Participants were asked to consider their work situation and to think about how much each of the suggested statements was

applicable to their work situation (for example "My job promotion prospects are poor").

Participants responded on a four-point likert scale indicating to what extent (if experienced) they find the suggested situations at their work distressing, with responses as "not at all", "somewhat", "rather", and "very" distressed. Scores were calculated as a percentage for each of the three factors. Cronbach α scores were calculated as .80 for the intrinsic effort subscale, .74 for extrinsic effort, and .84 for intrinsic reward.

A 27-item version of the Job Content Questionnaire (JCQ: Karasek, et al. 1998) was used in this study. Three subscales measure the level of job demands the individual is exposed to (such as workload and time pressure); how much job control they have (from decision latitude and skill discretion sub-factors); and levels of social support at work (For example "How often do you get help and support from your immediate superior").

Participants were asked to consider how much each of the suggested statements apply to their work situation. Answers were indicated on a four-point likert scale, with responses as "often", "sometimes", "seldom", and "never/almost never". Percentage scores were calculated for each of the three subfactors. Cronbach α scores were calculated as .85 for the social support subscale, .81 for decision authority, .68 for job demands, and .68 for skill discretion.

The coping style questionnaire used was based on a factor analysed version of the 42-item revised Vitaliano et al. WCCL (1985) using principle component analysis with varimax rotation. The resulting five-factor solution exactly matched the factor structure of the scale used in study one, including the removal of items 6 and 15 (see appendix (1.2). The factors were labelled: Problem focused coping (Cronbach α = .84); Seek advice (Cronbach α = .82); Self Blame (Cronbach α = .88); Wishful thinking (Cronbach α = .84); and Escape/Avoidance (Cronbach α = .76). 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 coping behaviours with available responses as: "Not at all", "sometimes", "often", or "all the time" (example item: "Make a plan of action and follow it"). Final scores were converted into percentages.

The original Attributional Style Questionnaire (ASQ: Peterson, et al. 1982) was aimed at students, and contained 12 hypothetical situations (6 positive, 6 negative, half affiliation, half achievement oriented) that may occur in a student environment. Participants were asked to imagine themselves in the suggested situations, and to make attributions as to what they thought would have been the causes of each, and then to answer questions about those attributed causes. The version in this study retained this structure, but the items were re-worded to apply to workplace situations. (see appendix 2.1) Participants were asked to consider the suggested situations and then to think of a potential cause for why each may have occurred.

Responses were made on three 7-point dimensions, relating to locus of cause (internal or external), stability of cause (will be a cause of events in the future, or just at this time) and globality of cause (causes other events, or only this event). This resulted in six distinct scores, of internality, stability, globality of attributions, for both positive and negative events. A small pilot sample of participants showed that both versions of the ASQ (the original student version, and the workplace version) were slightly confusing as to the response format, so examples of possible anchored responses were given at the ends of the scale to illustrate, e.g. for the item: "You can't get all the work done that others expect of you. Is this likely to be due to.....", anchored examples were given as: "you being given too much work" or "your lack of time planning". Percentage scores were calculated for each of the six subscales of: Internal locus for positive events (Cronbach α = .55); stable cause for positive events (Cronbach α = .61); global cause for positive events (Cronbach α = .73); External cause for negative events (Cronbach α = .54); unstable cause for negative events (Cronbach α = .69); local cause for negative events (Cronbach α = .78). Reliability scores for the original scale were reported by Peterson (1991) as varying from .4 to .88.

Anxiety and depression were the main dependent variables in this study, and as in the previous work these were measured using the hospital anxiety and depression scale (HADS: Zigmond & Snaith, 1983) which has two 14-item scales measuring self reported anxiety and depression. Participants responded on a four-point likert scale, as to how often they had in the past week experienced the suggested situations or feelings. Reliability scores were calculated as .84 for anxiety, and .78 for depression. Total scores were calculated out of 21 for each subscale, with 11 or more considered

as a potential clinical case, in line with recommendations by Zigmond and Snaith (1983).

5.7.3 Procedure

Those who responded to the request for participants were sent a questionnaire and freepost return envelope. Completion time was between 20-40 minutes, and instructions were given where appropriate as specified by (or adapted from) original questionnaire instructions. Participants were informed as to the purposes of the experiment, and that they could withdraw at any time, and it was emphasised that the results were anonymous. Participants were also told that any concerns about mental-health related issues resulting from participation should be raised with their doctor. Any questions about other work-related issues should be directed towards nursing representatives. Contact details for the research team were provided so that contact could be made by participants about any other queries or requests for information.

5.7.4 Analysis

Results were analysed with the computer statistics package SPSS, using a variety of parametric tests, including Pearson correlations to compare individual and job characteristics to anxiety and depression, factor analysis for the factor structure of the coping scale, and multiple regressions to predict anxiety and depression outcomes from a range of job characteristic and individual differences, and to test possible interaction effects.

5.7.5 Analysis of potential confounding variables

In addition to the data collected on the main independent and dependent variables, data was also collected on some key potential confounding variables. These were: full time or part time work; contract type (permanent or fixed/temporary); work pattern (shifts or fixed hours); education level; salary; level of drinking; smoking behaviour.

In order to see if any of these variables were potential confounders, a series of linear regressions were run, with each of the above variables entered as the independent variable and i) with the experimental DVs of anxiety and depression as

the dependent variables, and ii) with each of the experimental IVs found to be significant in predicting anxiety and depression, entered as the DV. In other words, each possible confounder was tested for association with both dependent and significant independent variables. Those regressions in which an IV *and* a DV significantly associated with a potential confounder, had to be re-run taking that confounder into account. The results of these calculations are discussed in section 5.8.5.6.

5.8 Results

5.8.1 Factor Analysis of Coping Scale

The factor Analysis of the coping checklist was carried out using principle components analysis and varimax rotation. A scree plot suggested a five factor solution, and a five factor forced solution was run. As in the factor analysis described in the previous study (section 4.6.1) all items loaded strongly onto appropriate factors with eigenvalues of .3+ except item 15 which was removed due to not loading highly onto any factor. Item 6 (accepted the next best thing) only loaded onto the positive thinking factor, where it made no difference to scale internal reliability and was also excluded as it did not fit with the other scale items. The resulting five factor solution was therefore identical to that found in study one (see appendix 1.2 for factor structure).

Factors were named as Positive thinking/planning (α = .84) Seek advice & support (α = .82); Self Blame (α = .88); Wishful thinking (α = .84); Escape/Avoidance (α = .76).

5.8.2 Descriptive statistics

Table 11 shows that the mean ages of male and female nurses are very similar.

Table 11: Age of participants

	N	Minimum	Maximum	Mean	Std. Deviation
Age Combined	863	22	67	44.84	8.83
Age Men	75	24	64	44.11	9.44
Age Women	787	22	67	44.90	8.77

Table 12: Frequency of clinical Anxiety and depression scores in men and women

	% Clinical Anxiety	N Clinical Anxiety	% Clinical Depression	N Clinical Anxiety
Male	18.75%	15	6.25%	5
Female	25.70%	203	5.57%	44
Combined	25.20%	218	5.63%	49

Table 12 shows that overall 25.2% of nurses were shown to have high levels of anxiety over the clinical cut-off point, and 5.63% had high levels of depression. By gender this is 18.75% of men, and 25.7% of women for anxiety, and 6.25% of men, and 5.57% of women for depression. Overall therefore, of the 831 nurses who responded fully to all of the anxiety and depression questions, 227 (or 27.3%) had clinical levels of anxiety or depression, or both. Additionally, the data showed that regardless of sex, 44.8% of nurses indicated that they believed that they had suffered an illness in the past year that had been caused or made worse by stress at work.

Chi-square calculations were carried out to compare the levels of clinical anxiety and depression for men and women, but there were no significant differences between the sexes on levels of clinical HAD scores (see appendix 2.2).

5.8.3 ANOVA

A one-way ANOVA was carried out to compare men and women for scores on all independent and dependent variables. It was found that for all variables (anxiety, depression, all coping style subfactors, job control, job demands, social support, extrinsic and intrinsic efforts, reward, and attributions of locus, stability, and globality for positive and negative events) there were no significant differences in scores

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between male and female participants (see appendix 2.3). Due to this, and the fact that only 80 of 870 participants were male, henceforth all calculations were carried out with scores for male and female participants combined.

5.8.4 Correlations

Table 13 shows Pearson correlations between all independent variables and anxiety and depression. The table shows that "negative" coping characteristics, such as self blame, escape/avoidance, and wishful thinking, show significant positive correlations with anxiety and depression, with correlations of between .28 and .48 and all significant to $p < .01$. Problem focused coping had a very small but significant negative correlation with depression, but a non significant correlation with anxiety. Seeking advice has no significant correlations with either outcome variable.

For attributional style, the "positive" styles of internal and stable attributions for positive events showed small but significant negative correlations with anxiety and depression (from -.12 to -.27), and the "negative" style of global attributions for negative events showed small positive correlations with anxiety and depression (.13 - .16). The attributional styles of internal attributions for negative events (internal-negative) stable-negative, and global-positive, showed no significant correlations with outcomes.

The table shows that negative job characteristics such as job demands and extrinsic effort correlate positively with anxiety and depression, as does intrinsic effort, whereas positive job characteristics such as control (skill discretion and decision authority) intrinsic reward and social support showed significant negative correlations with anxiety and depression. These correlations range from .26 to .57 and all are significant to $p < .01$.

Table 13: Correlations of coping style, attributional style, demands, controls, support, and efforts and rewards against anxiety and depression.

	HAD-A	HAD-D
Problem-F Coping	.04	-.10*
Self Blame	.48**	.38**
Wishful Thinking	.34**	.28**
Seek Advice	.04	-.08
Escape/Avoidance	.34**	.37**
Internal attributions, Positive event	-.19**	-.27**
Internal attributions, Negative event	.04	.04
Stable attributions, Positive event	-.12**	-.16**
Stable attributions, Negative event	.09	.08
Global attributions, Positive event	-.02	-.03
Global attributions, Negative event	.13**	.16**
Job Demands	.33**	.26**
Social Support	-.34**	-.40**
Skill Discretion	-.21**	-.26**
Decision Authority	-.21**	-.24**
Extrinsic Effort	.43**	.40**
Intrinsic Effort	.57**	.48**
Intrinsic Reward	-.41**	-.43**

$** = p < .01$ $* = p < .05$

5.8.5 Regressions

A series of multiple regressions were carried out to investigate the effects of multiple independent variables in predicting depression and anxiety. Variable selection was made by manual backwards selection, with variables removed on the basis of significance level and standardised beta weights. Intercorrelations between variables showed no correlations over .8, suggesting no multicollinearity issues.

5.8.5.1 Coping and attributional style against anxiety and depression

Table 14 shows two regressions where the individual difference variables of coping and attributional styles were simultaneously entered against anxiety and depression. Most variables show similar associations with anxiety and depression as those shown in the correlations. Self blame, escape/avoidance, and stable attributions for negative events predicted increased levels of anxiety, and stable attributions for positive events associated with significantly lower anxiety scores. Problem focused coping, and

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internal attributions for negative events appeared to be associated with lower anxiety scores, but these were not statistically significant at .05, both however added significantly to the overall regression model and thus were retained. The above variables accounted for 24.5% of the variance in anxiety scores, and self blame was the most important factor by standardised beta weight, followed by escape/avoidance.

For depression, self blame and escape avoidance coping associated significantly with increased scores, as did global attributions for negative events. Seeking advice, and internal attributions for both positive and negative events associated significantly with lower depression scores. Self blame and escape/avoidance were again the most important predictors by std. beta weight. These factors accounted for 22.3% of the variance in depression scores.

Table 14: Regressions of coping and attributional style against anxiety and depression

Anxiety	Beta Weight	Std. Error	Standardised Beta weight	t	Sig.
(Constant)	6.939	1.197		5.799	.001
Problem focused coping	-.016	.010	-.056	-1.706	.088
Self Blame	.074	.007	.393	10.511	.001
Escape/Avoidance	.035	.010	.133	3.624	.001
Stable attributions for positive events	-.029	.012	-.084	-2.333	.020
Internal attributions for negative events	-.023	.012	-.062	-1.851	.065
Stable attributions for negative events	.026	.010	.089	2.536	.011
Model: R = .495, R² = .245				F: 39.82	.001
Depression	Beta Weight	Std. Error	Standardised Beta weight	t	Sig.
(Constant)	6.389	1.023		6.244	.001
Seek Advice	-.018	.006	-.108	-3.155	.002
Self Blame	.040	.006	.258	6.461	.001
Escape/Avoidance	.038	.008	.181	4.739	.001
Internal attributions for positive events	-.042	.010	-.146	-4.198	.001
Internal attributions for negative events	-.026	.010	-.087	-2.600	.009
Global attributions for negative events	.021	.007	.103	3.111	.002
Model: R = .472, R² = .223				F: 35.35	.001

5.8.5.2 Demands, control and support against anxiety and depression

Table 15 shows regressions of job demands, controls, and social support, against anxiety and depression, with an interactive effect between demands and decision authority in predicting anxiety.

As shown in the correlations, for both anxiety and depression, job demands had a significant relationship with increased anxiety and depression scores, and social support and skill discretion were associated with significantly lower anxiety and depression scores. For depression, decision authority was not significant as a predictor at .05, but added significantly overall to the regression model.

For anxiety, there was also a significant interactive effect between decision authority and job demands. This relationship is shown in Plot 1, and it can be seen that at low levels of job demands, anxiety levels were similar regardless of level of decision authority, however at high demands, anxiety scores were significantly higher in those with low decision authority. Therefore decision authority appeared to buffer the effect of high job demands on anxiety score.

For anxiety, job demands was the most important predictor by std. beta weight, followed by social support and skill discretion. However for depression, social support was the most important predictor, with job demands and skill discretion of equal importance. The above variables accounted for 21.4% of the variance in anxiety, and 22.4% of the variance in depression scores.

Table 15: Regressions of job demands, control, and social support against anxiety and depression

Anxiety	Beta Weight	Std. Error	Standardised Beta weight	t	Sig.
(Constant)	7.645	1.686		4.535	.001
Job Demands	.102	.020	.465	5.055	.001
Social Support	-.033	.005	-.219	-6.415	.001
Skill discretion	-.048	.011	-.153	-4.547	.001
Decision authority	.045	.025	.234	1.767	.078
Job Demands x Decision Authority	-.001	.001	-.321	-2.203	.028
Model: R = .462, R^2 = .214				F: 43.81	.001

Depression	Beta Weight	Std. Error	Standardised Beta weight	T	Sig.
(Constant)	9.682	.789		12.279	.001
Job Demands	.033	.006	.184	5.680	.001
Social Support	-.036	.004	-.287	-8.479	.001
Skill discretion	-.048	.009	-.182	-5.455	.001
Decision authority	-.010	.005	-.062	-1.844	.065
Model: R = .473, R^2 = .224				F: 58.47	.001

Plot 1: Interaction of job demands and decision authority in predicting anxiety
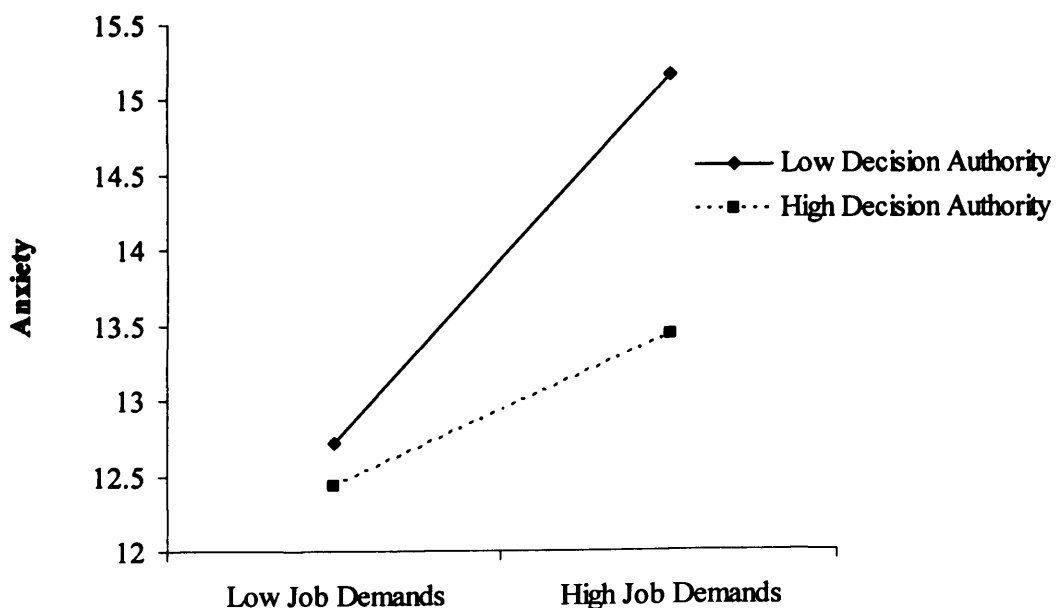
5.8.5.3 Efforts and rewards against anxiety and depression

Table 16 shows regressions of intrinsic reward, and extrinsic and intrinsic effort, against anxiety and depression, including an interaction between intrinsic efforts and rewards as shown below in Plot 2. Intrinsic reward significantly predicted lower levels of anxiety and depression, extrinsic effort significantly predicted higher anxiety and depression, and intrinsic effort predicted increased levels of depression.

Intrinsic effort and intrinsic reward also significantly interacted, as seen in plot 2, which shows that for individuals with low levels of intrinsic effort, those with high intrinsic rewards are likely to show lower levels of anxiety than those with low intrinsic reward, however at high levels of intrinsic effort, those with both low and high levels of reward report very similar levels of anxiety.

For the anxiety regression, intrinsic reward was the most important variable by std. beta weight (although in a non-interactive anxiety regressions, intrinsic effort is by far the most important by std. beta) and in depression, intrinsic effort was the most important variable. The above variables accounted for 39% of the variance in anxiety and 33.8% of the variance in depression scores (compared to 21.4% of anxiety and 22.4% in depression with demands, control and social support).

Table 16: Regressions of intrinsic reward and extrinsic and intrinsic effort, against anxiety and depression

Anxiety	Beta Weight	Std. Error	Standardised Beta weight	t	Sig.
(Constant)	9.656	1.255		7.693	.001
Intrinsic Reward	-.069	.014	-.344	-4.942	.001
Extrinsic Effort	.027	.006	.142	4.245	.001
Intrinsic Effort	.029	.021	.175	1.404	.161
Intrinsic effort x Intrinsic reward	.001	.000	.251	2.105	.036
Model: R = .624, R^2 = .390				F: 123.5	.001
Depression	Beta Weight	Std. Error	Standardised Beta weight	T	Sig.
(Constant)	5.568	.572		9.738	.001
Intrinsic Reward	-.043	.005	-.262	-8.103	.001
Extrinsic Effort	.022	.005	.143	4.082	.001
Intrinsic Effort	.046	.005	.339	10.025	.001
Model: R = .582, R^2 = .338				F: 132.3	.001

Plot 2: Interaction of intrinsic effort and intrinsic reward in predicting anxiety
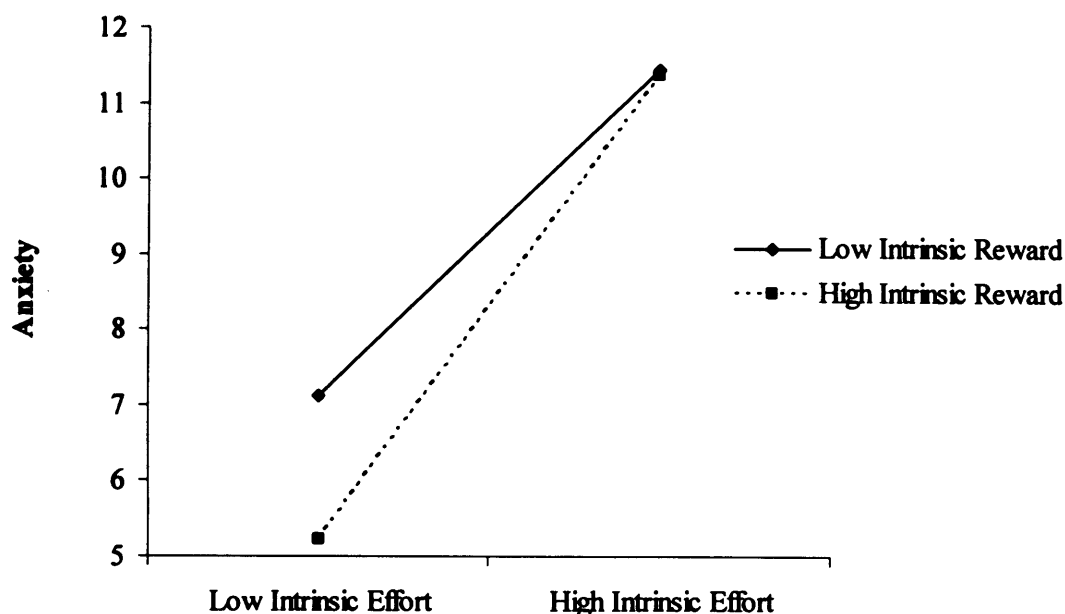
5.8.5.4 Demands, control, support, efforts and rewards against anxiety and depression

Table 17 shows the results of two regressions where job demands, controls, and social support from the DCS model (Karasek & Theorell, 1990) and efforts and rewards from the ERI model (Siegrist, 1996) are simultaneously entered against anxiety and depression.

Intrinsic and extrinsic effort significantly associated with increased anxiety and depression scores, job demands significantly associated with increased anxiety, and social support, skill discretion, and intrinsic reward all associated significantly with reduced anxiety and depression scores. For both anxiety and depression, intrinsic effort was the most important predictor by std. beta weight, followed by skill discretion in anxiety, and social support and skill discretion in depression.

These factors accounted for 41.3% of the variance in overall anxiety scores, and 39% of the variance in depression scores. If a comparison is made with table 15, it can be seen that the unique variance added over demands, control, and social support, by including efforts and rewards, is 18.9% in anxiety (or almost double the total amount of variance explained) and 16.6% in depression (a three-quarter increase in variance explained).

Table 17: Regressions of demands, control, social support, and efforts and rewards against anxiety and depression

Anxiety	Beta Weight	Std. Error	Standardised Beta weight	t	Sig.
(Constant)	9.713	.947		10.251	.001
Job Demands	.017	.007	.079	2.426	.016
Social Support	-.015	.005	-.098	-2.925	.004
Skill discretion	-.047	.009	-.148	-5.021	.001
Intrinsic Reward	-.023	.007	-.115	-3.293	.001
Extrinsic Effort	.019	.007	.098	2.749	.006
Intrinsic Effort	.070	.005	.420	12.901	.001
Model: R = .643, R^2 = .413				F: 88.86	.001

Depression	Beta Weight	Std. Error	Standardised Beta weight	T	Sig.
(Constant)	9.129	.727		12.549	.001
Social Support	-.022	.004	-.180	-5.291	.001
Skill discretion	-.043	.008	-.164	-5.495	.001
Intrinsic Reward	-.022	.006	-.137	-3.837	.001
Extrinsic Effort	.019	.005	.122	3.560	.001
Intrinsic Effort	.046	.004	.339	10.300	.001
Model: R = .624, R^2 = .390				F: 97.06	.001

5.8.5.5 DCS, ERI, coping and attributions against anxiety and depression

The final table of regressions (table 18) shows the simultaneous entry of coping styles, attributional styles, demands, control, support, and efforts and reward, against anxiety and depression. The direction of association between significant variables and outcomes are the same as those in previous regressions: Problem focused coping, social support, skill discretion, and intrinsic reward, significantly associate with lower anxiety and depression scores, and self blame and intrinsic effort both significantly associate with higher anxiety and depression scores. Additionally, seeking advice and job demands predict significantly increased anxiety scores (extrinsic effort is not significant at .05, but contributed significantly to the overall anxiety regression model) and escape/avoidance and extrinsic effort predict significantly higher depression scores. Finally, internal attributions for positive events predict significantly lower scores in self-rated depression.

By std. beta weight, intrinsic effort was by far the most important predictor in anxiety and depression, followed by self blame for anxiety and social support in depression. All other variables were of similar importance in anxiety and depression by std. beta. The above variables accounted for 47.2% of the variance in anxiety score, and 43.6% of the variance in depression score.

It can be seen by comparison with the regressions in table 17, that the unique overall variance explained over just DCS and ERI by coping style in anxiety and depression, and attributional style in depression (attributional factors failed to be significant predictors in anxiety when DCS, ERI, and coping factors are included) was 4.2% in anxiety (one tenth more variance explained) and 4.6% overall in depression (one eighth more variance explained).

Table 18: Regressions of ways of coping, attributional style, demands, control, support, efforts and rewards, against anxiety and depression.

Anxiety	Beta Weight	Std. Error	Standardised Beta weight	t	Sig.
(Constant)	7.330	1.017		7.208	.001
Problem focused coping	-.027	.009	-.095	-3.052	.002
Seek advice	.014	.006	.067	2.098	.036
Self Blame	.046	.006	.250	7.937	.001
Job Demands	.021	.007	.099	3.035	.002
Social Support	-.016	.005	-.111	-3.261	.001
Skill Discretion	-.033	.009	-.104	-3.494	.001
Intrinsic reward	-.014	.007	-.069	-1.971	.049
Extrinsic Effort	.012	.007	.062	1.745	.081
Intrinsic Effort	.060	.006	.361	10.775	.001
Model: R = .687, R^2 = .472				F: 68.02	.001

Depression	Beta Weight	Std. Error	Standardised Beta weight	T	Sig.
(Constant)	9.156	.982		9.328	.001
Problem focused coping	-.017	.007	-.072	-2.412	.016
Self Blame	.015	.005	.096	2.712	.007
Escape/Avoidance	.022	.007	.101	2.997	.003
Internal attributions for positive events	-.024	.009	-.085	-2.721	.007
Social Support	-.019	.004	-.153	-4.436	.001
Skill Discretion	-.028	.008	-.107	-3.475	.001
Intrinsic Reward	-.019	.006	-.120	-3.298	.001
Extrinsic Effort	.015	.005	.097	2.800	.005
Intrinsic Effort	.042	.005	.310	9.020	.001
Model: R = .660, R^2 = .436				F: 58.81	.001

5.8.5.6 Results of analysis of confounding variables

As stated in section 5.7.5, in addition to the calculations carried out above, a further set of calculations were carried out to assess the possible effect of confounding variables on the results. Full time or part time status, contract type, work pattern, education level, gender, salary, and drinking and smoking behaviour, were each individually placed as the independent variable in regressions against anxiety and depression, and as the independent variable against each relevant IV included as a significant predictor in the regressions shown above in tables 14-18.

Of these possible confounders, only full time/part time work, and contract type significantly associated with anxiety, and only FT/PT work significantly associated with depression. Contract type only significantly associated with escape/Avoidance coping and intrinsic effort. Finally FT/PT significantly associated with escape/avoidance, social support, decision authority, intrinsic effort, extrinsic effort, and intrinsic reward. Therefore, in order to make sure that the confounders did not account for the relationships between IVs and DVs, each regression that contained an IV and a DV that significantly associated with a confounder, was re-run with that confounder as a covariate.

The following regressions were re-run (regression tables for which can be seen in appendix 2.3.1): The anxiety regression in table 14 with FT/PT and contract as covariates; the depression regression in table 14 with FT/PT as a covariate; the anxiety and depression regressions from table 15 with FT/PT as covariate; the anxiety regression from table 16 with FT/PT and contract type as covariates; the depression regression from table 16 with FT/PT as covariate; the anxiety regressions from tables 17 and 18, with both FT/PT and contract type as covariates; the depression regressions from tables 17 and 18 with FT/PT as covariate.

As can be seen from the regression tables in appendix 2.3.1 (in comparison with the original regressions in tables 14-18) the inclusion in the appropriate regressions of full time/part time work and contract type as covariates, had virtually no significant effect on the results. Despite small fluctuations in significance levels of the existing predictors, no previously significant IV became a non-significant predictor with the inclusion of the covariates.

Therefore, as gender, work pattern, education level, salary, and drinking/smoking behaviour, did not significantly associate with either of the DVs,

and as full time/part time status and contract type, when included as covariates had no effect on the significance of the other independent variables, it can be concluded that none of these extraneous variables could have accounted for the relationships between IVs and DVs, and thus do not confound the results.

5.9.1 Discussion

As was shown by the previous study, the results from the factor analysis of the ways of coping checklist were again very similar to the structure found by Vitaliano et al. (1985) which suggests (in line with claims by Dewe and Guest, 1990) that a two-factor conceptualisation of coping is insufficient to capture the variety and complexities in the ways that people cope.

Descriptive statistics showed that overall 27.3% of nurses had clinical self-reported levels of anxiety or depression as measured by the HAD. This compares to the 27% of hospital staff found to be suffering stress and mental ill-health, by Calnan, Wainwright, Forsythe, Wall, and Almond (2001) and the 14 to 18% they found in the general population. It was also shown that 45% of nurses claimed that stress at work had caused, or made an existing illness worse. These figures illustrate the high levels of mental health issues that may face members of this working population.

5.9.2 Hypothesis one

Hypothesis one predicted that there would be significant differences between male and female nurses in levels of depression, anxiety, and coping and attributional styles, specifically with females exhibiting poorer health outcomes and more negative coping and attributions.

However, as in the first study, a one-way ANOVA showed that there were no significant differences between male and female participants in anxiety and depression (appendix 2.3). Also there were no significant differences in any coping styles (study one showed that women were more likely to use wishful thinking and seek advice coping styles) and no differences in attributional styles endorsed. Chi-square tests also showed that there were no significant differences in the frequency of men and women with clinical anxiety and depression scores on the HAD (appendix 2.2).

Therefore hypothesis one cannot be accepted and the null hypothesis cannot be rejected. These results largely confirm the findings of the previous study, and while there are significantly more female participants than male, this data again raises doubts about the finding that women are inherently more likely to suffer from negative mental health outcomes and to use "negative" coping and attributional styles.

5.9.3 Hypothesis two

Hypothesis two predicted that positive coping styles would be associated with low levels of anxiety and depression, and negative coping styles with high levels of anxiety and depression in nurses. The correlations in table 13 show significant relationships between the "negative" coping behaviours of wishful thinking, self blame and, escape avoidance and increased anxiety and depression, and these relationships are supported by the regressions in table 14. No significant correlations were found between the "positive" seek advice variable and anxiety and depression, and problem focused coping only had a small significant negative relationship with depression (and not with anxiety). However, the predicted relationship for seek advice emerged for depression in the regression in table 14 (interestingly the opposite relationship was found for anxiety in table 18) as did the relationship between problem focused coping and anxiety and depression in the multi-factor regression in table 18. The majority of the predictions of the experimental hypothesis are however supported, and therefore the hypothesis can be accepted. These findings support those of many researchers, that problem focused coping associates with improved health outcomes, and negative coping styles associate with poorer health outcomes.

The data showed that negative coping behaviours were more important by std. beta weight in the regressions than positive coping behaviours, a result which was also found in the first study. This finding suggests that the absence of negative coping behaviours, may in fact be more strongly associated with positive mental health outcomes, than the presence of positive coping behaviours, i.e. the most important thing may be avoiding counterproductive coping behaviours.

The fact that problem focused coping was a non-significant predictor in the regressions in table 14, and was significant in both regressions in table 18, may suggest that PFC has some kind of relationship with another of the predictors in table 18 (for example levels of control). Seeking advice was related to a reduction in

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depression in the regression in table 14, which was the same result found as in the previous study. However, also like study one, seeking advice can relate to an *increase* in negative health outcomes, as shown by its association with an increase in anxiety in table 18 (in the first study this variable related to an increase in somatic symptoms in men, see table 9).

As previously stated this may suggest that some forms of advice seeking behaviour are "positive" and may pre-empt negative mental health, but also that those individuals who have high anxiety or depression, may be more likely to seek advice, and thus it is possible that these two associations between seeking advice and outcomes (one positive, one negative) may be being detected in different ways in these various regressions.

5.9.4 Hypothesis three

Hypothesis three predicted that positive attributional behaviours would associate with low levels of depression and anxiety, and negative attributional behaviours would associate with high levels of anxiety and depression in nurses.

Internal and stable attributions for positive events (positive attributions), and global attributions for negative events (negative attribution) correlated significantly in line with the hypothesis for both anxiety and depression. There was further supporting evidence for this hypothesis in the regressions, with stable attributions for positive events significantly associating with reduced anxiety scores (table 14) and internal attributions for positive events significantly associating with reduced depression in the regressions in tables 14 and 18. Indeed this latter factor was more important by std. beta weight than problem focused coping in the depression regression in table 18.

It was also shown that stable attributions for negative events associated significantly with increased anxiety, and global attributions for negative events with increased depression. However, an unpredicted result was found, which was that internal attributions for negative events associated with a significant *decrease* in depression scores in table 14, a factor which was hypothesised to be a negative attributional behaviour. However, internal attributions for positive and negative events are analogous to an internal locus of control (a person's own beliefs about their ability to control events around them, regardless of their positive or negative value)

and there is much evidence that an internal LOC is related to improved mental health outcomes (Spector, 2003), which could help explain this finding.

Therefore there is evidence that positive attributional behaviours tended to associate with lower anxiety and depression scores, and negative behaviours with increased anxiety and depression, so therefore the experimental hypothesis can be accepted and the null rejected. This data supports the relationship between attributional style and negative mental health (as reported in the meta-analysis by Sweeney et al. 1986) and these findings suggest that the way in which an individual views the causes and effects of problems, may be just as important in some circumstances as to how they cope with those problems. This finding is particularly interesting given the paucity of attributional style research in occupational domains.

Both coping and attributional styles accounted for a significant amount of the variance in anxiety and depression outcomes, with ways of coping overall being the more important predictors by std. beta weight.

5.9.5 Hypothesis four

Hypothesis four predicted that job demands would be positively associated with anxiety and depression, and control and social support would be negatively associated with depression and anxiety in nurses. Also, significant interactive effects were predicted between demands and control, and demands and support, in predicting anxiety and depression.

The correlations in table 13, and the regressions in tables 15, 17, and 18, showed that social support, and skill discretion (a sub-factor of control) significantly associated with lower levels of anxiety and depression. Job demands correlated significantly with increased anxiety, and predicted increased levels of anxiety in all regression models. Job demands also predicted increased depression in the regression in table 15. Correlations showed that Decision Authority was significantly associated with reduced anxiety and depression, however it did not emerge as a significant main effects predictor of outcomes in any regression. It did however show a significant buffering effect on job demands in the prediction of anxiety in table 15. This suggests that skill discretion (chance to choose own skills) may have an independent relationship to mental health outcomes, but that decision authority (control over workplace events) is only related to outcomes by its relationship to job demands. This

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finding is interesting and supports the work of van Veldhoven et al. (2005) who found that skill discretion was a more important predictor of health outcomes in a sample of 37,000 Dutch employees than decision authority, which led to the formation of their Demands-Skill-Support model.

However, overall the data supports both parts of the experimental hypothesis as all the variables in either correlations, or one or more regressions were associated with depression and anxiety in the predicted directions, and there is also an interactive effect in the prediction of anxiety as suggested by Karasek's work (1979). Demands-control-support accounted for moderate percentages of the variance in anxiety and depression, with job demands and social support being the most important predictors by std. beta weight.

5.9.6 Hypothesis five

Hypothesis five predicted that extrinsic and intrinsic effort would be associated positively with depression and anxiety, and intrinsic reward would be associated negatively with anxiety and depression in nurses. The hypothesis also predicted significant interactions between extrinsic efforts and rewards, and intrinsic efforts and rewards in predicting anxiety and depression scores.

The correlations in table 13, and the regressions in tables 16, 17, and 18, show that intrinsic and extrinsic effort, and intrinsic rewards all associated with anxiety and depression in the predicted directions. Indeed as shown by tables 15 and 16, efforts and rewards accounted for more of the variance overall in anxiety and depression than DCS factors, and the regressions in table 17 show that by std. beta weight, extrinsic and intrinsic efforts and rewards generally appeared to be as, or more important than DCS variables in the prediction of anxiety and depression. Table 18 shows that intrinsic effort was the most important predictor by beta weight overall for both anxiety and depression. Table 16 (in comparison to tables 14 & 15) shows that efforts and rewards also accounted for the highest stand-alone percentage of variance in anxiety and depression compared to demands, control, support, coping and attributions.

An interaction effect was shown between intrinsic effort and intrinsic reward in the prediction of anxiety, however, as can be seen by plot 2, this is not a buffering effect as predicted, as the anxiety scores at high levels of reward and effort are the

same, and rewards only associate with lower anxiety when intrinsic effort is low. This suggests that in normal circumstances, high rewards associate with improved mental health, but when intrinsic effort is high, levels of reward are irrelevant or perhaps overwhelmed.

Therefore, while the experimental hypothesis can be accepted for the main effect relationships between efforts and rewards and health outcomes, the hypothesis cannot be accepted for a buffering effect of rewards on intrinsic and extrinsic effort in the prediction of outcomes.

5.9.7 Hypothesis six

Hypothesis six predicted that there would be significant interactions between negative job characteristics (job demands and extrinsic effort) and positive individual characteristics (problem focused coping and positive attributional styles) so that positive ICs would moderate the effects of negative JCs in the prediction of mental health outcomes in nurses. However, no significant interactions were found between the above variables in the prediction of anxiety or depression, therefore the experimental hypothesis cannot be accepted.

Hypothesis six was intended to test the aspects of the proposed DRIVE model (see figure 1) which are based on transactional stress models (such as Folkman & Lazarus, 1980). Such models propose that coping behaviour moderates negative perceptions of environmental demand, to result in more positive health outcomes.

5.9.8 Hypothesis seven

Finally, hypothesis seven predicted that coping styles, attributional style, efforts, rewards, job demands, job control, and social support would account for a significant amount of the variance in anxiety and depression, and that ways of coping and attributional style, would significantly add to the explained variance in outcomes, over and above use of DCS and ERI factors alone.

The regressions in table 18 show that variables from all of the experimental constructs (coping, attributions, DCS, and ERI) were represented in the final regression equation for depression, and all but attributional style were represented in anxiety. Comparing the regressions in tables 17 and 18, shows that the total variance

explained in anxiety and depression explained by DCS and ERI factors together are 41.3% and 39% respectively, compared to 47.3% and 43.6% with the inclusion of coping and attributions. This amounts to a 6% increase in the variance in anxiety explained (or a 14.5% improvement) and a 3.6% in depression (a 9.2% improvement).

These data support the assertion that individual difference variables significantly contribute, and account for different percentages of the variance in depression and anxiety, over and above the use of DCS and ERI factors alone. Therefore experimental hypothesis seven can be accepted and the null hypothesis rejected.

5.9.9 Summary of results in reference to the DRIVE model

Referring the above hypotheses to the DRIVE model as shown below, the results showed strong support for relationships 1 and 2, i.e. the main effects of work demands (job demands, extrinsic efforts) and work resources (control, social support, and rewards) from the DCS and ERI models on anxiety and depression.

The results also found moderate support for relationship 3, with significant main effect relationships between many coping style factors and intrinsic efforts, and anxiety and depression in the predicted directions. However there was limited support for the relationship of attributional style, and no relationship between gender and outcomes.

There was no support for relationship 4, on the moderating effect of individual differences on workplace demands; and limited support for relationship five, or the moderating effect of work resources on demands, with only a buffering effect of decision authority on job demands in the prediction of anxiety, and a non-buffering interaction effect between intrinsic effort and intrinsic reward in the prediction of anxiety.

Figure 2: DRIVE model

Figure 2: DRIVE model
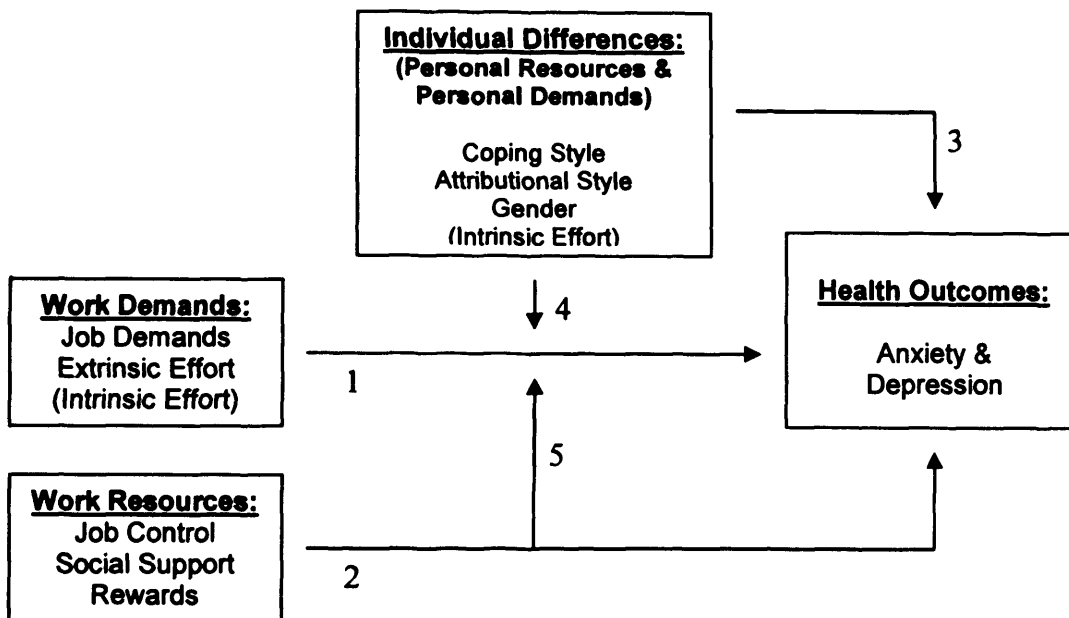
5.10 Implications

All but one of the hypotheses in this study were fully or partially supported. The data from this sample of nurses supports previous findings reported by Karasek (1979), Siegrist (1996), Folkman and Lazarus (1980), Sweeney et al. (1986) and others. Namely, that job demands, intrinsic and extrinsic effort, self blame, escape/avoidance, and stable and global attributions for negative events appeared to be associated with increased levels of negative mental health, and that social support, skill discretion, problem focused coping, rewards, stable attributions for positive events, and internal attributions for positive and negative events, were associated with lower levels of negative mental health. It was also found that high levels of decision authority acted as a buffer on the negative effect of job demands in the prediction of anxiety, as predicted by Karasek and Theorell (1990).

The individual and combined factors regressions, showed that demands, control, support, and efforts and rewards all contributed separately to the overall regression models in tables 17 and 18, with only decision authority failing to significantly contribute to the combined anxiety regression model in table 17 (a finding that supports the results of van Veldhoven et al. 2005) and with only job

demands and decision authority failing to be significant predictors of depression in table 17.

While intrinsic effort appears to be the most significant predictor overall by std. beta weight in any regression it is included in, the other sub-factors of the DCS and ERI models appear to be of approximately similar importance by std. beta. Therefore it is evident that both of these models make distinct and important contributions to the studying of anxiety and depression outcomes, and any study that uses one set of factors to the exclusion of the other, may miss out explaining a significant percentage of the variance in anxiety and depression in similar samples to the current one. This provides good support for models such as the Demand-Induced-Strain-Compensation model (de Jonge & Dormann, 2003) that combined aspects of DCS and ERI models.

While it is evident, both in the stand-alone regressions and in the combined regressions in table 18, that the factors from the DCS and ERI models accounted for the majority of the variance in health depression and anxiety, there is clearly also a significant contribution to be made by the individual characteristics of attributions, and particularly coping style. In the anxiety regression in table 18, apart from intrinsic effort, the coping style of self-blame was by far the most important predictor by std. beta weight over all other factors, and in the combined depression regression in table 18, coping styles, as well as internal attributions for positive events, were of similar importance by std. beta weight as extrinsic effort, rewards, and skill discretion.

Therefore, just as it is important to include both DCS and ERI factors in studies on the association of these models to anxiety and depression, it may also important to include other, more individually-focused factors such as coping and attributions, although of these two, it is clear that coping style plays a larger role in the explanation of variance in anxiety and depression than attributions, particularly when many other independent variables are also entered.

· It was an unexpected finding that individual difference factors did not significantly interact with the workplace demands of extrinsic effort and job demands (particularly coping) in the prediction of health outcomes, as these hypothesised moderating effects are often seen as a central aspect of transactional stress models. However, it is arguable that this study only tested the relationships between workplace demands and coping in the prediction of outcomes, and not interaction effects between the subjective and *affective* perceptions of demands (including costs,

consequences, etc) and coping, as specified during primary appraisal of some transactional models. Nevertheless, more research should be carried out on the relationships between individual differences and workplace demands.

It was also unexpected that there were no significant differences between male and female nurses on any of the factors investigated (although these results do support the findings of the previous study) particularly given the high levels of stress and mental health issues that nurses are faced with. However, it is possible that stress in the workplace for nurses may be so acute, that a ceiling effect is reached for both male and female nurses. It could also be possible that male nurses become *feminised* in their reactions to stressors, due to working in an environment that is dominated by female co-workers, in the same way that women managers may become *masculinised* in male dominated environments (Still, 1994). Finally it is possible men with certain types of personal qualities or personalities will be more likely to apply for or succeed in nursing jobs, and these men may have stereotypically feminine coping, attribution, and stressor perceptions characteristics.

This study contributes to the literature, because while there is a significant amount of research on the relationship between mental health outcomes and demands, control, support, efforts, rewards, and coping where these factors are considered in isolation, there is little research that considers them simultaneously. Also there is very little research on the relationship between attributional style and mental health in occupational domains. However, such simultaneous multi-factor research is exactly the kind of work that some (for example, Long, Kahn, and Schutz, 1992) claim is necessary, in order to enable comparison of the relative importance of constructs and their sub-factors in the prediction of health outcomes. It also allows for investigation of any interactive effects that may be present.

The results of the research are important in that they provide support for many aspects of the DRIVE model. This simple framework for workplace stress is not unique in the specific predictions it makes (i.e. the direction of relationships between the subfactors with anxiety and depression) but it significant in that it combines aspects of several important stress models, and encourages their simultaneous investigation in the same population.

Unlike transactional stress models, this framework does not attempt to explain or understand the actual mental processes occurring as represented by the

relationships and associations (in the form of arrows or moderating effects) but rather is a framework for studying which independent variables predict which outcomes and how much each contributes.

Also, although this data is cross-sectional and not causal, the support for the model, and more research of this type in the future (with the demonstration of the relative importance of particular variables) could be useful for providing empirical support for multi-factor organisational interventions that aim to have beneficial effects at both primary (organisational/job characteristic) and secondary (individually focused) levels. It may be especially useful when resources for intervention are limited and targets must be prioritised. For example, it was shown that intrinsic effort (or overcommitted persons) and those with negative coping strategies (particularly for anxiety) and low social support (particularly for depression) were most likely to be anxious or depressed, then these could be a primary interventional target, e.g. by training to try and reduce negative coping and enhance positive coping behaviours, to discourage over-commitment at work, and to enhance levels of social support and organisational feedback mechanisms.

This research also showed that the more traditionally researched factors of job demands, extrinsic effort, intrinsic rewards, problem focused coping, and control, while still significant, were often less important than intrinsic effort, low social support, and negative coping styles in the prediction of outcomes. The fact that this research supports individual factors as important in the stress process, could also be particularly pertinent in occupations where the reduction of demands is not a realistic option (e.g. stockbrokers, fire-fighters, doctors, police etc).

5.11 Comparison of results with first study

While it would be unwise to draw too much from differences in results between the samples in the two studies so far conducted (due to differences in sampling method etc) a comparison of levels of anxiety and depression between these groups can be conducted.

The results show that in the nursing sample, the mean anxiety score for the sexes combined was 7.99, compared to a score of 6.00 in the general population sample group from the first study, and the mean depression score was 4.87 for nurses, compared to 4.36 in depression for the first study. Independent samples t-tests showed

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that the scores for anxiety and depression for nurses were significantly higher than those in the general population sample from the first study (see appendix 2.4)

Also when comparing the frequency of participants who scored over the clinical cut off for anxiety (15.8% in the first study population, and 25.2% in the nursing population) there is a significant difference using a Chi-square test (see appendix 2.5). However there are however no significant differences in the frequency of depressed individuals between the two groups. The former result is also found when the male participants are removed from the general population sample of the first study, to match the overwhelmingly female number of participants in the nursing sample. This suggests that nurses are not only significantly more anxious and depressed than a general population sample, but that nurses are also significantly more likely to show clinical levels of anxiety.

Another interesting comparison between the two sample populations comes from the regressions of coping styles against anxiety and depression. As seen in tables 5 and 6, coping accounted for 35.4% of the variance in anxiety and 31.8% of the variance in depression in the first sample population (about 40% in men, 30% in women). However (as seen in table 14) in the nursing sample, both coping and attributional style *together* only accounted for 24.5% of the variance in anxiety, and 22.3% of the variance in depression, or almost 1/3 less variance explained. Again while too much should not be concluded between comparisons between these samples, this data suggests that individual characteristics (i.e. coping and attributions, using the same measures) appear to explain significantly less variance in anxiety and depression in nurses than in the general population sample. It is possible therefore that anxiety and depression are related more to other non-individual factors in nurses (such as job characteristics) than in a general population sample.

5.12 Limitations of Experimental Method

There were some limitations with the methodology used in this study, for example, 90% of the sample were female, and while an ANOVA calculation showed that there were very few significant differences between genders on the independent and dependent variables used, it is evident that there may be significant differences between male and female nurses in ways not covered by this study, and thus any conclusions drawn from this data may not be applicable to male nurses.

Also while requests for participants were sent to 4000 nurses, there was only a response rate of around 22%. While there are not usually considered any hard rules concerning acceptable response rates (Dennis, 2003) most would argue that this is a low figure. This could have the consequence of respondents being non-representative of the population, for example, perhaps only those who were experiencing stressful conditions would have been motivated to respond, leading to an inflation of results.

However, Kelley, Clark, Brown, and Sitzia (2003) state that "cold" postal questionnaire response rates are typically low, usually around 20%. These authors also state that a large sample using this method is required, so that the obtained sample demographics are as representative of the population as possible. Indeed, the Royal College of Nursing's annual Labour Market Review in 2005, stated that the average age of the nursing community in the UK was 44, and in this study it was 44.8. One advantage of the sampling method used, was that the 4000 postal requests were sent out were a random sample of the nursing population as provided by the Royal College of Nursing, even if an imbalance in respondents was caused by self-selection.

In addition, while a non-representative sample is an issue for making conclusions about the entire nursing population based on this sample, or in comparing nurses to other occupational groups, as long as there is enough variance within the sample, an over-representation of stressed or anxious/depressed nurses does not lessen the validity of results or conclusions about stressed nurses gained within that context. This study was also cross sectional, thus only associations between variables can be discussed and no conclusions about directions of causality can be made. The questionnaires were quite long, and could take 20-30 minutes or more, which may have had an effect on results, particularly items from the latter stages of the questionnaire, and no counterbalancing was carried out to minimise this.

Also due to exclusive use of self-report methods, common method variance could have affected the results. This is where the use of a single type of method could have caused systematic biases to result in an over-inflation of results, through mechanisms such as negative affect, social desirability, consistency motif, etc (Podsakoff, 1993). However, as each questionnaire also had different responding methods (circling numbers, reverse item coding, ticking boxes, and each with different formats and lengths of likert-scale) then common scale-format biases are unlikely. While it is possible that common method variance could have influenced the results, Spector (2006) claims that the impact of CMV is often overstated, and that

there is mixed or little evidence that social desirability or NA biases results in any significant way, or indeed if NA is even a "bias" at all.

There is also a question as to the validity and reliability of the attributional style questionnaire used. While the content of the scale was based on the well validated original ASQ, due to the student-oriented nature of the original items, they were reworded or altered to be applicable to a working population. Internal reliability was fair for the new subscales, but this scale has not been independently validated, or compared to other similar measuring scales, which is a possible problem for the accuracy of the results, and if the scale actually measures what it purports to measure.

On the matter of confounding variables, while there were some analyses to control for certain confounding factors, there are clearly more possible confounders that were not accounted for that could have affected the results, as well as other workplace characteristics, such as bullying and role conflict that could also have contributed to the variance in outcomes.

Kirkcaldy and Martin (2000) found that different types of nursing wards had different levels of job satisfaction (with maternity the highest and surgical the lowest). As there was no item in the questionnaire which asked what sector of nursing the participants worked in, there was no way of telling if one sector or grade of nursing was overrepresented in the sample.

While the limitations described for this experiment could lead to the results being treated with caution, it is hoped that any biases from these sources will not have given rise to Type I errors. These are all areas that could be improved upon in future work.

5.13 Improvements and Future Directions

Some possible improvements in future work relate directly to the criticisms above, for example, the following changes could be made: the use of questionnaires that focus more specifically on the nursing sector; a more balanced gender ratio; different formats of response (e.g. open ended questions or interviews); more objective measures of work environment and health outcomes; comparisons of different nursing specialisations; more dependent variables, such as absence behaviour, job satisfaction, organisational commitment, work-life balance or role conflict issues; better controls

for experimental effects like counterbalancing, NA, and social desirability, and controlling for more possible confounding effects.

Another important future direction could be to test the framework of the model proposed in this study in another population, preferably with a sample with a more evenly distributed gender ratio, and also perhaps by adding some other outcome variables. Finally, to enable a better understanding of the causal relationships between variables, and to provide empirical support for organisational interventions, future work could be carried out using a longitudinal methodology. For example by assessing the individual characteristics and mental health of individuals as they are due to start their working careers (e.g. recently graduated students) and then to retest participants after they are exposed to job stressors, to see if the predictions made from the first sampling are borne out.

5.14 Conclusion

The results of this study show that there are robust associations between ways of coping, attributional style, 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 also supports the results of much past research, however some of the expected trends (such as sex differences in mental health) were not found and require further research.

The simultaneous use of multiple theoretical constructs and individual differences from various stress models and research traditions adds something new to the existing body of workplace stress research. The results showed that no one group of factors emerged overall as being the most important in accounting for variance in anxiety and depression, and each construct of DCS, ERI, coping, and attributions added something unique and valuable to the study of anxiety and depression in nurses.

The workplace is a complex environment, and stress at work is a very complex process. The fact that different individuals can respond to the same stressors in different ways, shows that an understanding of how different ID factors and job characteristics compare, interact, and influence one another is very important. Understanding of these relationships, and the relative importance of factors is important for both theoretical and applied reasons. This work also provided good

support for many aspects of the DRIVE framework, and future research should focus on testing, expanding, and providing more support for this model.

The result that nearly 45% of nurses believed that work stress had directly influenced their health, shows the importance of studying stress in this population, and it is likely that the best way to help both employees and employers alike, is through multi-factor stress research, based on a range of models that use a variety of variable types.

5.15 Summary of chapter 5 and links to chapter 6

The study described in chapter 5 built on the built on the preliminary work of the first study, and described the development of a new stress model which combined aspects of well known theories into the same framework. The broad structure of this framework was then tested, and much of it was supported. This research therefore enables the carrying out of further research to test the DRIVE model. The research described in chapter 6 attempts to carry out more research to support the DRIVE model, in a different working population with a more balanced gender ratio, and with another dependent variable.

Chapter 6

Study Three: Occupational Stress, Job Characteristics, Coping, and Attributional Style in University Employees

6.1 Summary Rationale

The study described in chapter five found strong relationships between individual differences, coping styles, job characteristics and health outcomes, and provided good support for these associations under the framework of the work stress viewpoint labelled the DRIVE model.

The purpose of the next study that was carried out, was to provide more theoretical support for the DRIVE model by using a similar methodology in a different occupational sample (of university employees) as well as to use job satisfaction as a dependent variable in addition to anxiety and depression. The purpose was also to examine the relationship between sex and outcomes in a sample with a more balanced gender ratio, and to re-test for any interactive effects between negative job characteristics and positive personal characteristics, that were predicted but not found in the previous study in chapter 5. Some of the measures taken were also used in a general population sample, in order to compare them to those from the university sample. This study is described in detail below.

6.2 Abstract

This study investigated the associations between job demands, control, social support, efforts, rewards, coping, gender, and attributional style, in predicting anxiety, depression, and job satisfaction in sample of 307 university employees from the UK. Results from this sample were compared to those from a sample of 120 members of the general population. Hypotheses predicted that negative coping and attributional behaviours, workplace demands, and intrinsic and extrinsic effort, would be associated with high levels of depression and anxiety, and low job satisfaction in university employees. Also 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 experimental

hypotheses were supported by the results, with social support, intrinsic effort, rewards, self blame and escape/avoidance coping, particularly important in predicting outcomes. A significant buffering effect of decision authority on job demands was also found in the prediction of depression. It was also found that university employees were significantly more likely than members of the general population to suffer clinical levels of self-reported anxiety and depression. The study is important in supporting the aspects of the proposed DRIVE model, in adding to adding to the growing research on university samples. It has possible implications for intervention to help identify at risk individuals in this population.

6.3 Stress in Academia

While there is much research on the occupations that are typically seen as stressful, such as those with low status, control, or reward, as well other demanding occupations such as nursing (McVicar, 2003) police work (Healy & McKay, 2000) and teaching (Taris, Schreurs, & Van Iersel-Van Silfhout, 2001) there is significantly less research on stress in higher education staff (Abouserie, 1996). Abouserie (1996) writes that academics willingly study other groups, yet seldom study themselves. Perhaps this is due to the perception that while academic work is not highly paid, it is seen as highly autonomous (Winefield & Jarrett, 2001) and control is often seen as a buffer to work stress (Karasek, 1979).

Winefield and Jarrett (2001) state that stress levels in academic fields are high compared to many other populations, and have increased significantly over the last 15 years, and Singh and Bush (1998) state that the persistent demands of academic life are likely to lead to negative consequences for academic staff. Blaxter, Hughes, and Tight (1998) also claim that academic environments are likely to increase the risk of emotional exhaustion. Abouserie (1996) states that academics have a large number of competing roles, such as teaching, research, seeking funding, writing papers, and meeting seminar and tutorial commitments, and found that 74% of staff were moderately stressed, and nearly 15% were seriously stressed. Work was by far the most significant cause of stress in academics lives (compared to home and family sources) with lecturers being found to be the most negatively affected, followed by research assistants, and then professors. Tytherleigh, Webb, Cooper, and Ricketts (2005) also found differences in stress-related effects in different employee

categories, with academic and research staff the most stressed overall, with administrative and clerical staff the least stressed.

Fisher (1994) states that academic salaries are falling and workloads are increasing, and Gillespie, Walsh, Winefield, Dua, and Stough (2001) citing Association of University Teachers (AUT) figures from 1990, stated that 49% of UK university employees had stressful jobs. Indeed this situation appears to be worsening, as an AUT study in 2003, as cited by Tytherleigh, et al. (2005) found that 93% of AUT members had suffered work related stress, with high levels of dissatisfaction with pay and workload. Gillespie et al. (2001) identify several key factors that commonly associate with stress in academic staff. These include work overload, time pressure, lack of prospects, poor levels of reward and recognition, fluctuating roles, poor management, poor resources and funding, and student interactions. Other stressors identified from the literature by Gillespie et al. (2001) include high expectations, low job security, lack of communication, inequality, and lack of feedback.

Winefield and Jarret (2001) report that in a sample of over 2000 Australian university staff, 43.7% were classified as clinical cases on the General Health Questionnaire, suggesting high levels of anxiety and depression. The most distressed individuals were those involved in academic research and teaching, with seeking funding sources found as the biggest source of stress. Interestingly in this sample, job satisfaction was still relatively high, despite high levels of psychological distress.

Sharpley, Reynolds, Acosta, and Dua (1996) found that stress was a significant problem for 25% of staff, with reports of increased anxiety, absence, injuries, illnesses, and poorer physical health. Bowen and Schuster (1985, cited in Gillespie et al. 2001) reported that stress had a negative impact on staff morale, and many of the interviewed academics were "angry, embittered and felt devalued and abandoned". Tytherleigh et al. (2005) found evidence that university staff exhibited significantly less organizational commitment compared to other private and public sector workers, as well as being more stressed by lack of control and resources, and worries about low pay and benefits. Blix, Cruise, Mitchell, and Blix (1994) also showed that the emotional exhaustion aspect of burnout was particularly closely related to high stress at work in university employees.

Lease (1999) states that the effect of stress in university staff is not just of consequence to employees themselves, but can have serious consequences for

students as well. Indeed, Blix et al. (1994) report that 84% of their sample of 400 university staff reported that their productivity at work had been negatively affected by stress, and 33% felt it suffered at least 50% of the time. Boyd and Wylie (cited in Gillespie et al. 2001) found that workload and stress resulted in less time spend on research, publishing, and development, with lower teaching standards, as well as having negative effects on staff relationships, and emotional health, family relationships, and leisure activities. Barnes, Agago, and Coombs (1989) and Blix et al. (1994) showed that job stress significantly increased the likelihood of staff intending to leave academia, and Blix et al. (1984) found that 48% of staff reported some health problems resulting from work stress.

6.4 Gender effects in Academic Stress

There is much evidence from psychological literature that men and women may face different forms of stressors at work, as well as using different forms of appraisal and coping behaviours, for example, women are often reported to use more "emotion-focused" types of coping, and men to use more "problem-focused" coping behaviours (Jick & Mitz, 1985). However, the evidence for gender differences in health outcomes and work stress is mixed in the literature of academic samples. For example, such differences were not found in the previous two studies described in this thesis.

Mintz (1992, cited in Lease, 1999) claimed that female faculty may experience more role stressors (e.g. work-family) as well as facing greater demands from being in a male domain, however, Lease (1999) found no significant difference between men and women for stressors or strains. Winefield and Jarrett (2001) and Abouserie (1996) found no gender differences in stress reporting between men and women, however Blix et al. (1994) reports more stress symptoms in female academics, greater likelihood of considering changing jobs, as well as less ability to manage work stress. However, Smart (1990, cited in Carlson & Dua, 2002) found that men were more likely to leave an institution than women, and Hogan, Carlson and Dua (2002) found no gender differences at work, but found that females showed more non-work related stress. Dua (1994) found that men suffered from more workload stress, and women more stress from workplace politics. Finally, Richard and Krieshok (1989) found that as academic rank increased, strain is likely to increase in females and decrease in males, but found no gender differences in role stressors or coping.

As well as gender effects in stress related research, a final variable which may be important in predicting outcomes is that of age. Gadzella, Ginther, Tomcala, and Bryant (1990) proposed that younger professionals experienced more stress-producing events at work, and had higher stress reporting. Blix et al. (1994) found that junior staff were most at risk from burnout, and perceived stressful events were lowest in those with more than 20 years experience in academia. Dua (1994) found that younger staff reported more job stress, and Hogan et al (2002) found that older staff reported less stress on and off the job. Finally Abouserie (1996) found no age differences in job satisfaction, but younger university staff showed more anxiety.

There appears to be good evidence that stressful work environments can have negative effects on university employees, and as described above, many of these environments exhibit stressors that include high workloads and time pressures, lack of recognition, low job security, poor communication and support (Gillespie et al. 2001) lack of control and resources, and concerns about pay and benefits (Tytherleigh et al. 2005).

Many of the above stressors play important roles in two of the main psychosocial stressor models already discussed, namely the Demand-Control-Support model (DCS: Karasek & Theorell, 1990), and Effort-Reward imbalance model (ERI: Siegrist, 1996). As described previously, these two models have been found to be good predictors of physical and psychological health outcomes, including heart disease, mortality, and depression (Van der Doef & Maes, 1999) in many occupational groups. Therefore these two models are suitable for studying many of the kinds of stressors that university employees are exposed to.

As has been previously stated, the principle of much of the research described in the current work is the joint investigation of psychosocial stressors and individual differences. As in the research in chapter five on nurses, in addition to the factors of job characteristics and intrinsic efforts, the individual difference factors of coping style (Folkman, et al. 1986) and attributional style (Sweeney, Anderson, & Bailey, 1986) will be considered in the prediction of health outcomes in a university employee sample.

6.5 Rationale

The available evidence suggests that stress-related ill health is high in university staff, however this population remains far less researched that other stereotypically stressed populations, particularly in the UK, and as Tytherleigh et al. (2005) state, the majority of such research comes from the USA, New Zealand, and Australia.

The relationships between anxiety, depression and job satisfaction, and the psychosocial variables of job demands, control, social support, rewards, extrinsic efforts, intrinsic efforts, ways of coping, and attributional style, will be investigated in a university population, and some of these factors will be compared between men and women. This will be carried out in order to compare the relative importance of each factor in accounting for levels of the outcome variables, and to test for any relevant interaction effects between these factors, particularly any proposed buffering effects between work demands and individual characteristics - that were expected but not found in the previous work.

Many of these same measures will be used in a sample of the general population, to see if in comparison, the university employee sample suffer from similar or increased levels of job demands, stress, and health. No formal hypotheses will be made about the relationships between age and outcomes, but it will be included as a covariate in some regressions as a point of interest.

The work characteristic variables (demands, control, support, extrinsic efforts, and rewards) have been selected for their popularity and strength in associating with health outcomes in occupational literature. Coping style has been selected for its centrality in the clinical literature and importance in transactional models, and attributional style due to its novelty in occupational research and place in clinical depression literature. The university sample is also expected to have a more balanced gender ratio than the previous study in nurses, to provide more evidence on any possible sex differences between men and women in stress and health outcomes.

It is hoped that the current study will add to the literature by providing information on the levels of mental health and satisfaction in university employees, as well as investigating the combined effects of job stressors and individual differences on mental health outcomes, and to provide additional support for the previously proposed DRIVE framework.

6.6 Hypotheses

Hypothesis one:

The experimental hypothesis predicts that university staff will report significantly higher levels of depression, anxiety, lower job satisfaction, and significantly different patterns of job characteristics, intrinsic efforts, coping, and attributions, compared to members of a general population sample.

Hypothesis two:

The experimental hypothesis predicts that there will be a significant difference in self-rated anxiety, depression, and job satisfaction scores, between male and female university staff, and that men and women will endorse significantly different types of coping and attributional styles.

Hypothesis three:

The experimental hypothesis predicts that in university staff, the "positive" coping styles of problem focused coping and seeking advice, will be associated significantly with low levels of depression and anxiety, and high job satisfaction, and that the "negative" coping styles of self-blame, escape/avoidance, and wishful thinking, will be associated with high levels of anxiety and depression, and low job satisfaction.

Hypothesis four:

The experimental hypothesis predicts that positive attributional style behaviours will be associated with low levels of anxiety, depression and job satisfaction in university staff, and negative attributions will be significantly associated with high anxiety, depression, and low job satisfaction.

Hypothesis five:

The experimental hypothesis predicts that high job demands will be significantly associated with high depression, anxiety and low satisfaction in university employees, and high levels of decision authority, skill discretion, and social support will be associated with low levels of anxiety, depression and high job satisfaction. Also that control and social support will significantly buffer the effect of demands in predicting anxiety, depression, and job satisfaction.

Hypothesis six:

The experimental hypothesis predicts that high extrinsic and intrinsic effort will be significantly associated with high depression, anxiety and low satisfaction in university employees, and high levels of intrinsic reward will be associated with low levels of anxiety, depression, and high job satisfaction. Also that rewards will significantly buffer the effects of intrinsic and extrinsic effort in predicting anxiety, depression, and job satisfaction.

Hypothesis seven:

The experimental hypothesis predicts that positive attributions and coping styles will significantly interact with the negative job characteristics of high job demands and extrinsic efforts, so that positive individual characteristics will buffer the effect of negative job characteristics in the prediction of anxiety, depression, and job satisfaction.

Hypothesis eight:

The experimental hypothesis predicts that coping and attributional style, intrinsic and extrinsic effort, rewards, demands, skill discretion, decision authority, social support, and gender will account for a significant amount of the variance in anxiety, depression and job satisfaction in university employees. It is also predicts that the addition of coping and attributional style will significantly increase the explained variance in anxiety, depression and satisfaction, over the use of DCS and ERI variables alone.

6.7 Method

6.7.1 Participants

The participants were a sample of 307 university employees, and 120 members of the general population. The university sample were 73.6% female, with a mean age of 41.9 (SD = 10.68) and an average working week of 38 hours. The general population sample were 68.9% female with a mean age of 45.6 (SD = 11.49) and an average working week of 35 hours. The samples also were comprised of a similarly well distributed range of occupational roles (see table 19).

A bulk email was sent to all academic and administrative staff at Cardiff University in the UK (approximately 2,800 – an 11% response rate) requesting participants for a study on stress and health at work. Those who responded with their details were sent further information about the aims and methodology, as well as a questionnaire pack with freepost return envelope.

The general population sample participants were contacted from a pool 340 potential participants (35% response rate) who had previously taken part in psychological research at the University, and had indicated that they would be willing to participate in future research.

An a-priori power analysis (*Gpower*: Buchner, Faul & Erdfelder, 1992), showed that at a significance level of .05, and a small effect size of .3, 307 participants would give an experimental power of approximately .80.

Table 19: Occupations of university staff and general population samples.

Uni	Admin/ Secretary	Lecturer	Professor		Research	Manager		Library/ IT/ Residences/ Other	
%	21.8%	25.7%	3.9%		18.2%	17.9%		12.4%	
N	67	79	12		56	55		38	
Non-Uni	Admin/ Secretary	I.T.	Teacher/ Lecturer	Nursing/ Health	Sales/ Shop	Manager	Council/ social worker/ public	Other
%	20.8%	4.2%	11.7%	13.3%	6.7%	10.8%	8.3%	24.2%
N	25	5	14	16	8	13	10	29

6.7.2 Materials

A 24 page questionnaire booklet was produced, which contained an instruction page informing participants as to the purposes of the experiment, their right to withdraw, and the anonymous treatment of data.

The questionnaire pack contained demographic questions as well as many of the questionnaires previously used. These include the Hospital Anxiety and Depression scale (HADS: Zigmond & Snaith, 1983) a 14-item self-report scale with two 7 item subscales that measure anxiety and depression (for more detail refer to section 4.4.2). Cronbach α scores were calculated as .87 for anxiety, and .80 for depression subscales.

The factor analysed 40-item version of the Ways of Coping Checklist as calculated used in the previous two studies (see section 4.4.2) was again used, which is based on Vitaliano, Russo, Carr, Maiuro, and Becker's (1985) 42-item revised version of the WCCL (from Aldwin et al. 1980). The Five subscales measure: problem focused coping, seeking advice, self blame, wishful thinking, and escape/avoidance coping styles. Cronbach α scores ranged from .73-.88 for all subscales.

The Effort Reward Imbalance and Job Characteristics Questionnaires, as described in the previous study (section 4.4.2) were again used, with the ERI measuring extrinsic and intrinsic (or overcommitment) effort, and rewards (Kuper, Singh-Manoux, Siegrist, & Marmot, 2002) and the JCQ (Karasek, et al. 1998) measuring job demands, job control (from decision authority, and skill discretion) and social support. Cronbach α scores were calculated as .78-.87 for the ERI subscales, and .72 - .89 for the JCQ subscales.

The same modified version of the Attributional Style Questionnaire (Peterson et al. 1982) was used as described in the previous study (section 4.4.2). The scale has 6 subscales measuring locus of attributed cause (internal/external), stability of cause (future events/just this event) and globality of cause (happens with other events/just this event). Calculated reliabilities ranged from .64-.78, with the internal attribution for negative events subscale at .53.

Finally job satisfaction was measured using the satisfaction subscale of the Copenhagen Psychosocial Questionnaire (COPSOQ: Kristensen, Hannerz, Høgh, & Borg, 2005). It is comprised 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 4-point likert scale, with responses from "very satisfied" to "highly unsatisfied". Total scores were out of 12, with Cronbach α reliability was found to be .78.

6.7.3 Procedure

Those who indicated they were willing to participate (either by email or letter) were sent a questionnaire package with a freepost return envelope. Completion time was approximately 20-30 minutes, and all instructions were given as specified by (or adapted from) original questionnaire authors.

The anonymous treatment of data was emphasised, and it was stated that queries or requests for further information could be made by contacting the research team. Ethical approval for measures and methods used were granted by Cardiff University Psychology ethics committee, in accordance with APA and BPS ethical guidelines.

6.7.4 Analysis

Statistics were performed using SPSS, and these included Pearson correlations between anxiety, depression and satisfaction, and work characteristics, efforts, coping, and attributions. ANOVAs were used to compare university staff with general population samples, and men with women across all factors. Multiple regressions were used to predict anxiety, depression, and satisfaction outcomes from all above variables.

Like the previous study, the results of the current work could potentially have been affected by confounding variables. However, due to the fact that no confounding effects were found from a wide range of tested variables in the previous study, and that as all of the participants came from the same occupational domain, the potential confounding effects of many socio-economic and demographic variables should be minimised (Van Vegchel, 2005). The two major potential confounders of age and gender however, were still entered as independent variables for most analyses.

6.8 Results

6.8.1 Comparison of University Employees and General Population

Table 20 shows that for self-rated anxiety scores on the HAD, 31.6% of university employees scored over the clinical cut-off point (a score of 11: Zigmond & Snaith, 1983) indicating that they could be potential clinical cases, compared to 18.3% of the general population. A chi-square calculation (see appendix 3.1) showed that this difference was significant. For depression, 7.8% of the university staff showed clinical scores, compared to 5.8% of the general population, however this difference was found to be non-significant.

Table 20: Percentages of university staff and general population with clinical HAD scores, and work-related illness.

	% with clinical anxiety scores	% with clinical depression scores
University	31.6% (97 of 307)	7.8% (24 of 307)
General population	18.3% (22 of 120)	5.8% (7 of 120)

ANOVA calculations were carried out to compare university employees and general population samples across all variables, the significant results of which can be seen in Table 21. University staff showed significantly higher levels of anxiety, depression, job demands, extrinsic and intrinsic effort, and lower levels of reward, as well as higher levels of decision authority (control over work situations) and skill discretion (more chances to use personal competencies). University staff were also significantly more likely to make stable attributions for the causes of positive and negative events (akin to a "nothing changes" attitude). There were found to be no significant differences for: job satisfaction; levels of social support; attributed locus of for positive/negative events; global/local attributions; problem focused coping; seeking advice; self blame; escape/avoidance; and wishful thinking.

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Table 21: ANOVAs comparing academics and general population samples, on job characteristics and individual difference variables.

	Sample	Mean	SD	F.	Sig.
Anxiety	University	8.36	4.36		
	General Pop	6.91	4.07	9.90	.002
Depression	University	4.95	3.46		
	General Pop	4.04	3.49	5.88	.016
Job Demands	University	64.98	22.15		
	General Pop	54.76	24.51	17.15	.001
Skill discretion	University	73.28	17.16		
	General Pop	65.17	21.06	16.73	.001
Decision Authority	University	64.12	19.46		
	General Pop	56.74	25.04	10.44	.001
Extrinsic Effort	University	30.03	21.28		
	General Pop	24.78	20.94	5.30	.022
Intrinsic Effort	University	21.77	22.15		
	General Pop	13.33	18.38	13.71	.001
Reward	University	81.37	20.52		
	General Pop	88.01	13.99	10.64	.001
Stable attributions Positive event	University	5.33	.798		
	General Pop	5.13	.771	4.99	.026
Stable attributions Negative event	University	4.66	1.02		
	General Pop	4.41	.900	5.09	.025

As part of their questionnaire packages, participants were asked to indicate (either yes or no) whether they felt that any illness in the past year had been caused or made worse by stress, and what the illness was, and these results are shown in Table 22 below. It can be seen that 40% of university staff reported that work was related to one or more past or current health complaints, compared to 25.8% of the general population. This difference is significant (see chi-square test in appendix 3.2). Of all health-related problems reported, stress-related mental health was the most common complaint in university staff (28.5% of all complaints). Gastrointestinal problems and musculoskeletal pain were second and third most common for university staff. However, in the general population, gastrointestinal and musculoskeletal complaints were the most common, with stress-related mental health third. All other illnesses appeared to be similarly common between the two groups. All further calculations in this section are based on university employee data only

Table 22: Health complaints participants claimed were caused or made worse by work

Type of illness	% (N) of health complaints in university staff*	% (N) of health complaints in general population*
Stress/anxiety/depression	28.5% (43)	14.2% (5)
Gastrointestinal problems	11.9% (18)	23.5% (8)
Muskuloskeletal pain	10.6% (16)	23.5% (8)
Colds/Flu	9.3% (14)	8.8% (3)
Tiredness	9.3% (14)	8.8% (3)
Headaches/Migraines	7.3% (11)	5.9% (2)
Skin complaints	6.0% (9)	0
Breathing/Asthma problems	3.3% (5)	0
Sleep disruption	2.7% (4)	0
Cardiac related problems	0.7% (1)	2.94% (1)
Other	10.6% (16)	8.8% (3)
Participants with 1 or more health complaint.	40.1% (123 of 307)	25.8% (31 of 120)

Multiple complaints from 1 participant were recorded in breakdowns of complaints.

6.8.2 ANOVA Comparison of male and female university employees

Table 23 shows a set of one-way ANOVA calculations that compare male and female university staff for all dependent and independent variables. It shows that females score significantly higher for anxiety, seeking advice, self blame, and wishful thinking behaviours, and males score significantly higher for decision authority and skill discretion forms of control. There were no significant sex differences on any other factors.

Table 23: ANOVA table comparing men and women across all variables.

	Sample	Mean	SD	F.	Sig.
HAD – Anxiety	Males	7.1728	4.22134		
	Females	8.7911	4.34514	8.385	.004
Skill discretion	Males	73.5940	9.27673		
	Females	70.1885	9.82873	7.354	.007
Decision Authority	Males	72.4279	16.11216		
	Females	64.8639	16.75095	12.402	.000
Seek Advice	Males	1.1795	.49947		
	Females	1.5119	.58406	20.141	.000
Self Blame	Males	.8903	.64101		
	Females	1.1437	.70506	7.907	.005
Wishful Thinking	Males	.7418	.58542		
	Females	.8187	.61282	5.387	.021

6.8.3 Correlations of factors from University sample

Table 24 shows the results of significant correlations between independent variables, and anxiety, depression, and job satisfaction for university employees.

Similarly to the results shown in table 13 for nurses, it can be seen that "positive" coping, attributional behaviours, and work characteristics including problem-focused coping, internal and stable attributions for positive events, social support, decision authority, skill discretion, and reward, tend to show negative correlations of small to moderate sizes with anxiety and depression, and positive correlations with job satisfaction.

It can also be clearly seen that the "negative" characteristics, such as self blame, wishful thinking, and escape/avoidance coping, internal and global attributions for negative events, job demands, and extrinsic and intrinsic effort, largely show significant positive relationships with anxiety and depression, and negative relationships with job satisfaction. Correlations range from .11 to .68 and most are significant in excess of .01. However, seeking advice, global attributions for positive events, and stable attributions for negative events, show no significant correlations with the outcome variables.

Table 24: Significant correlations between anxiety, depression, satisfaction, and coping, attributions, and job characteristics.

	HAD-A	HAD-D	Satisfaction
Problem-F Coping		-.117*	.164**
Self Blame	.468**	.342**	-.230**
Wishful Thinking	.353**	.281**	-.299**
Escape/Avoidance	.363**	.345**	-.307**
Internal attributions, Positive event	-.169**	-.228**	.190**
Internal attributions, Negative event	.146*		
Stable attributions, Positive event	-.157**	-.120*	.161**
Global attributions, Negative event	.129*	.152*	-.132*
Job Demands	.408**	.360*	-.112*
Social Support	-.308**	-.437**	.444**
Skill Discretion		-.118*	.366**
Decision Authority	-.266**	-.284**	.435**
Extrinsic Effort	.476**	.479**	-.193**
Intrinsic Effort	.604**	.549**	-.221**
Intrinsic Reward	-.332**	-.395**	.682**

** = sig at .01, * = sig at .05

Table 25 shows the significant correlations between all factors but split for male and female university staff. While the correlations between independent and dependent variables are in most cases similar for male and female participants there are some notable divergences. For example, in men, problem focused coping associates significantly with reduced anxiety and depression, and increased job satisfaction, however it has no significant associations in women. All other coping styles show similar relationships with outcomes for men and women.

Internal attributions for positive events (similar to an internal locus of control) related to significantly lower anxiety scores in men, but had no significant relationship with depression scores, and also significantly predicted increased job satisfaction. However for women, this factor associated with significant reductions in anxiety and depression, but did not associate with significant increases in satisfaction.

Internal attributions for negative events significantly associated with increases in anxiety and depression in women, but not in men, and stable attributions for positive events associated with significantly lower anxiety and depression, and higher satisfaction scores in men, but not in women.

Global attributions for negative events associated with significantly increased anxiety and reduced satisfaction in men, and the same factor did not show these associations, but instead predicted increased depression in women.

Finally, job demands associated with significantly reduced job satisfaction in women, but had no significant relationship in men. All other correlations were of similar size and direction as those reported above.

Table 25: Significant correlations between anxiety, depression, satisfaction, and coping, attributions, and job characteristics, men and women combined.

	Sex	HAD-A	HAD-D	Satisfaction
Problem-F Coping	M	-.252*	-.320**	.326**
Problem-F Coping	F			
Self Blame	M	.552**	.364**	-.292**
Self Blame	F	.424**	.342**	-.199**
Wishful Thinking	M	.420**	.393**	-.378**
Wishful Thinking	F	.315**	.253**	-.266**
Escape/Avoidance	M	.397**	.438**	-.307**
Escape/Avoidance	F	.348**	.317**	-.304**
Internal attributions, Positive	M	-.227*		.360**
Internal attributions, Positive	F	-.146*	-.239*	.117
Internal attributions, Negative	M			
Internal attributions, Negative	F	165*	.141*	-.065
Stable attributions, Positive	M	-.353**	-.316**	.354**
Stable attributions, Positive	F			
Global attributions, Negative	M	.240*		-.241*
Global attributions, Negative	F		.137*	-.093
Job Demands	M	.436**	.260*	
Job Demands	F	.404**	394**	-.153*
Social Support	M	-.232*	-.368**	.437**
Social Support	F	-.353**	459**	.461**
Skill Discretion	M			.375**
Skill Discretion	F			.360**
Decision Authority	M	-.251*	-.313**	.458**
Decision Authority	F	-.239**	-.286**	.419**
Extrinsic Effort	M	.552**	.486**	-.298**
Extrinsic Effort	F	.461**	477**	-.185*
Intrinsic Effort	M	.587**	.530**	-.298**
Intrinsic Effort	F	.618**	557**	-.188*
Intrinsic Reward	M	-.316**	-.368**	.710**
Intrinsic Reward	F	-.336**	-.407**	.671**

** = sig at .01, * = sig at .05

6.8.4 Multiple regressions for coping and attributional style in predicting outcomes in University Sample

Regressions were carried out to investigate the associations of multiple independent variables to anxiety, depression and satisfaction in university staff. Variables were included in final regression models by manual backwards selection (by significance level and standardised beta weights) and all calculations are for male and female university staff combined. Age and gender were included as independent variables before backwards selection in all of the following regressions, however they did not emerge as significant predictors in many of the tests. Therefore age and gender could not have confounded any of the significant relationships between independent and dependent variables, as they were either included as significant predictors, or did not

associate with the DV and thus could not be confounders. Intercorrelations of independent variables showed none over .8, suggesting no multicollinearity.

The regression shown in table 26 shows coping styles against anxiety, depression, and job satisfaction for male and female university employees. Most of the significant predictors show directions of effect as suggested by the above correlations. Problem focused coping associated with significantly lower anxiety and depression scores, and significantly higher job satisfaction. Self blame and escape/avoidance coping associated with significant increases in anxiety and depression, and seeking advice, wishful thinking, and escape/avoidance all predicted significantly lower job satisfaction. In anxiety, self blame was the most important predictor by standardized beta weight, for depression, self blame and escape/avoidance were the most important, and for job satisfaction, problem focused coping was the most important predictor. Therefore, different patterns of coping styles were most important for different dependent variables. These variables accounted for 27.6% of the variance in anxiety scores, 19.4% of the variance in depression scores, and 20% of the variance in job satisfaction score, and all calculations were significant to $p < .001$.

Table 26: Regressions of Ways of coping against health outcomes and satisfaction.

Anxiety	Beta Weight	Std. Error	Standardised Beta weight	t	Sig.
(Constant)	5.566	.924		6.025	.000
Problem Focused Coping	-1.180	.527	-.123	-2.237	.026
Self Blame	2.208	.379	.353	5.825	.000
Escape/Avoidance	1.306	.434	.181	3.010	.003
Model: R = .505, R^2 = .255				F: 24.67	.001

Depression	Beta Weight	Std. Error	Standardised Beta weight	t	Sig.
(Constant)	3.787	.744		5.091	.000
Problem Focused Coping	-.708	.414	-.092	-1.710	.088
Self Blame	1.114	.314	.223	3.548	.000
Escape/Avoidance	1.290	.363	.224	3.554	.000
Model: R = .407, R^2 = .165				F: 19.10	.001

Job Satisfaction	Beta Weight	Std. Error	Standardised Beta weight	t	Sig.
(Constant)	7.509	.535		14.033	.000
Problem Focused Coping	1.089	.310	.205	3.511	.001
Seek Advice	-.573	.247	-.136	-2.318	.021
Wishful Thinking	-.726	.253	-.186	-2.867	.004
Escape/Avoidance	-.768	.259	-.192	-2.968	.003
Model: R = .395, R^2 = .156				F: 13.39	.001

Table 27 shows the results of a regression for attributional style against anxiety, depression and job satisfaction. The only significant predictors when attributional style variables were presented alone were internal attributions for positive events (the belief that positive events were under individual control) and global attributions for negative events (the belief that negative events will continue to occur in the future). Internal attributions for positive events predicted lower anxiety and depression scores, and higher job satisfaction scores, and global attributions for negative events showed the opposite relationships with outcomes. In all three regressions, internal attributions for positive events was the most important predictor by std. beta weight. These two independent variables only accounted for 4.9% of the variance in anxiety, 6.9% of the variance in depression, and 5.6% of the variance in job satisfaction. Therefore (compared to table 26) coping accounts for more of the variance in outcomes than attributional style.

Table 27: Regressions of attributional style against health outcomes and satisfaction.

Anxiety	Beta Weight	Std. Error	Standardised Beta weight	t	Sig.
(Constant)	10.661	1.690		6.309	.000
Internal attribution: Positive event	-.872	.284	-.181	-3.070	.002
Global attribution: Negative event	.460	.221	.123	2.083	.038
Model: R = .221, R^2 = .049				F: 7.03	.001
Depression	Beta Weight	Std. Error	Standardised Beta weight	t	Sig.
(Constant)	7.207	1.331		5.413	.000
Internal attribution: Positive event	-.830	.224	-.216	-3.712	.000
Global attribution: Negative event	.427	.174	.143	2.457	.015
Model: R = .262, R^2 = .069				F: 10.16	.001
Job Satisfaction	Beta Weight	Std. Error	Standardised Beta weight	t	Sig.
(Constant)	5.718	.924		6.190	.000
Internal attribution: Positive event	.522	.155	.197	3.360	.001
Global attribution: Negative event	-.263	.121	-.128	-2.179	.030
Model: R = .237, R^2 = .056				F: 8.19	.001

Table 28, shows the results of three regressions, with coping, attributional style, age and sex entered using backwards selection against anxiety, depression, and job satisfaction. The regressions support many associations shown in the correlations. Self blame, escape/avoidance, global attributions for negative events, and female sex, all had positive relationships with anxiety, and global attributions for positive events had a negative relationship with anxiety. By standardised beta weight, self blame was the

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most important factor, followed by escape/avoidance, attributions, and gender. These factors accounted for 27.6% of the variance in anxiety scores.

For depression as an outcome, self blame and escape/avoidance had positive relationships with depression, and internal attributions for positive events showed 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% of the variance in depression score.

For job satisfaction, only problem-focused coping and global attributions for positive events were associated with an increase, however wishful thinking, escape/ avoidance, global attributions 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% of the variance in job satisfaction score.

It can be seen by comparison to table 26, that attributional style, and age/sex increased the variance explained in outcomes over coping styles alone by 2% in anxiety, 3% in depression, and 4% in job satisfaction.

Table 28: Regressions of Ways of Coping, attributions, age and sex, on mental health and satisfaction in university staff.

Anxiety	Beta Weight	Std. Error	Standardised Beta weight	t	Sig.
(Constant)	4.607	1.145		4.024	.001
Self Blame	2.234	.392	.359	5.702	.001
Escape/Avoidance	1.235	.443	.173	2.787	.006
Global attribution: Positive event	-.572	.270	-.143	-2.121	.035
Global attribution: Negative event	.540	.257	.144	2.105	.036
Sex (female)	1.064	.528	.108	2.014	.045
Model: R = .525, R² = .276				F: 20.05	.001
Depression	Beta Weight	Std. Error	Standardised Beta weight	t	Sig.
(Constant)	4.055	1.431		2.833	.005
Self Blame	.866	.332	.175	2.610	.010
Escape/Avoidance	1.569	.374	.276	4.199	.001
Internal attribution: Positive event	-.579	.220	-.151	-2.631	.009
Age	.036	.019	.110	1.933	.050
Model: R = .440, R² = .194				F: 15.86	.001
Job Satisfaction	Beta Weight	Std. Error	Standardised Beta weight	t	Sig.
(Constant)	7.507	.735		10.207	.001
Problem focused coping	.930	.320	.176	2.909	.004
Seek Advice	-.641	.249	-.154	-2.572	.011
Wishful Thinking	-.696	.258	-.181	-2.703	.007
Escape/Avoidance	-.766	.262	-.195	-2.924	.004
Global attribution: Positive event	.436	.157	.198	2.770	.006
Global attribution: Negative event	-.417	.148	-.202	-2.824	.005
Model: R = .446, R² = .199				F: 10.87	.001

6.8.5 Multiple regressions for demands, control, support, and efforts and rewards in predicting outcomes in University Sample

Table 29 shows the results of regressions of the DCS model factors of job demands, skill discretion (opportunity to use skills), decision authority (opportunity to make workplace decisions) and social support against anxiety, depression, and job satisfaction. As shown in the correlations in table 25, job demands predicted higher anxiety and depression scores, and lower job satisfaction, and social support and decision authority predicted significantly lower anxiety and depression and increased job satisfaction. Skill discretion also predicted significantly lower anxiety and higher job satisfaction. Job demands was by far the most important factor in predicting anxiety, with social support the most important factor by std. beta weight for depression and job satisfaction. These factors accounted for 29.5% of the variance in anxiety, 32% of the variance in depression, and 36.4% of the variance in job satisfaction.

Table 29 : Job Demands-Control-Support on mental health and satisfaction:

Anxiety	Beta Weight	Std. Error	Standardised Beta weight	t	Sig.
(Constant)	9.869	1.171		8.430	.000
Job Demands	.086	.011	.439	8.154	.000
Social Support	-.029	.009	-.157	-3.042	.003
Skill Discretion	-.033	.015	-.130	-2.194	.029
Decision Authority	-.044	.013	-.194	-3.497	.001
Model: R = .543, R^2 = .295				F: 30.98	.001

Depression	Beta Weight	Std. Error	Standardised Beta weight	t	Sig.
(Constant)	7.513	.856		8.779	.000
Job Demands	.048	.008	.310	6.373	.000
Social Support	-.049	.007	-.340	-6.862	.000
Decision Authority	-.039	.009	-.219	-4.481	.000
Model: R = .566, R^2 = .320				F: 46.79	.001

Job Satisfaction	Beta Weight	Std. Error	Standardised Beta weight	t	Sig.
(Constant)	1.469	.620		2.370	.018
Job Demands	-.015	.006	-.140	-2.733	.007
Social Support	.033	.005	.323	6.586	.000
Skill Discretion	.032	.008	.228	4.026	.000
Decision Authority	.035	.007	.275	5.206	.000
Model: R = .603, R^2 = .364				F: 42.38	.001

Table 30 shows the results of the ERI model factors of extrinsic efforts (external pressures) intrinsic efforts (internal motivations/overcommitment) and intrinsic rewards, against the three outcome variables. Intrinsic efforts predicted significant

increases in anxiety, depression, and lower job satisfaction, and rewards predicted lower anxiety and depression, and increased job satisfaction. Finally extrinsic efforts only predicted significantly higher depression scores. Intrinsic effort/overcommitment was the most significant predictor by std. beta weight for anxiety and depression, but interestingly, for job satisfaction, rewards were by far the most important predictor by beta weight. These variables accounted for 40.9% of the variance in anxiety, 39.6% of the variance in depression, and 47.2% of the variance in job satisfaction scores. By comparison to table 29, it can be seen that the amount of variance accounted for by the ERI factors, was higher than the percentages in outcomes accounted for by the Demand-Control-Support factors.

Table 30: Effort reward imbalance

Anxiety	Beta Weight	Std. Error	Standardised Beta weight	t	Sig.
(Constant)	9.736	.869		11.205	.000
Intrinsic Effort/Overcommitment	.110	.009	.559	12.393	.000
Intrinsic Rewards	-.046	.010	-.216	-4.789	.000
Model: R = .640, R^2 = .409				F: 105.03	.001
Depression	Beta Weight	Std. Error	Standardised Beta weight	t	Sig.
(Constant)	6.736	.726		9.273	.000
Extrinsic Effort	.027	.010	.163	2.646	.009
Intrinsic Effort/Overcommitment	.059	.010	.376	6.078	.000
Intrinsic Rewards	-.048	.008	-.282	-6.140	.000
Model: R = .629, R^2 = .396				F: 66.05	.001
Job Satisfaction	Beta Weight	Std. Error	Standardised Beta weight	t	Sig.
(Constant)	.990	.456		2.172	.031
Intrinsic Effort/Overcommitment	-.009	.005	-.080	-1.869	.063
Intrinsic Rewards	.079	.005	.666	15.578	.000
Model: R = .687, R^2 = .472				F: 135.33	.001

Table 31 shows three regressions, where the DCS factors of job demands, skill discretion, decision authority, and social support, were entered simultaneously with the ERI factors of intrinsic efforts, extrinsic efforts and rewards, as well as age and sex, in the prediction of anxiety, depression, and job satisfaction.

The table shows that for anxiety, job demands, intrinsic effort, and female sex were associated with significantly increased scores, and social support, decision authority and increases in age, were associated with lower anxiety scores. Skill discretion contributed significantly to the model, but was not itself a significant predictor. Intrinsic effort was by far the most significant factor by standardised beta weight in the prediction of anxiety, followed by job demands and social support.

Decision authority, age, and sex, all contributed similarly, and these factors accounted for nearly 51% of the variance in anxiety scores, or 10% more variance explained (a 1/4 increase) than just ERI factors alone.

In the second regression, social support, skill discretion, and intrinsic reward associated significantly with reductions in depression. Job demands, intrinsic effort and extrinsic effort associated with significant increases in depression score. Intrinsic effort accounted for the most variance in depression by standardized beta weight, followed by social support, extrinsic effort, and rewards and job demands. These factors accounted for 47% of the variance in depression scores, or 7% more variance explained (approx 1/6 more variance explained) than ERI factors alone.

Finally, job demands was the only factor that significantly predicted a reduction in job satisfaction, with increases in social support, skill discretion, decision authority, and intrinsic rewards, all predicting significantly higher satisfaction. These factors accounted for nearly 55% of the variance in satisfaction, with intrinsic rewards as important as all other factors put together by standardised beta, or 8% more variance explained (1/6 more variance explained) than ERI factors alone.

Table 31: Demands, control, social support, age, sex, and efforts and rewards, against anxiety, depression and satisfaction in university staff.

Anxiety	Beta Weight	Std. Error	Standardised Beta weight	t	Sig.
(Constant)	9.330	1.266		7.369	.001
Job Demands	.042	.010	.215	4.329	.001
Social Support	-.026	.008	-.141	-3.187	.002
Skill Discretion	-.025	.013	-.097	-1.874	.062
Decision Authority	-.024	.011	-.106	-2.181	.030
Intrinsic Effort/Overcommitment	.095	.009	.486	10.376	.001
Age	-.040	.018	-.098	-2.255	.025
Sex (female)	1.205	.428	.122	2.818	.005
Model: R = .713, R^2 = .508				F: 42.86	.001

Depression	Beta Weight	Std. Error	Standardised Beta weight	t	Sig.
(Constant)	8.348	.889		9.388	.001
Job Demands	.018	.009	.114	2.024	.044
Social Support	-.034	.007	-.236	-4.737	.001
Skill Discretion	-.022	.011	-.107	-2.038	.042
Decision Authority	-.016	.009	-.089	-1.755	.080
Extrinsic Effort	.024	.011	.145	2.126	.034
Intrinsic Effort/Overcommitment	.050	.009	.321	5.324	.001
Intrinsic Rewards	-.019	.009	-.114	-2.188	.029
Model: R = .689, R^2 = .474				F: 37.37	.001

Job Satisfaction	Beta Weight	Std. Error	Standardised Beta weight	T	Sig.
(Constant)	-1.042	.575		-1.812	.071
Job Demands	-.010	.005	-.093	-2.133	.034
Social Support	.012	.005	.115	2.503	.013
Skill Discretion	.027	.007	.187	3.899	.001
Decision Authority	.018	.006	.142	3.071	.002
Intrinsic Rewards	.062	.006	.521	10.944	.001
Model: R = .741, R^2 = .549				F: 71.05	.001

6.8.6 Interactive regressions

Interactive regressions were carried out between job demands and controls and support, and rewards with intrinsic and extrinsic efforts. However, the only significant regression found is shown in table 32, which shows a significant interaction between job demands and decision authority, and significant main effects of job demands and social support against depression.

Social support predicted significantly lower depression scores, and job demands predicted significantly higher depression scores. While the main effect of decision authority was non-significant, the interaction term between job demands and decision authority was significant. Skill discretion contributed significantly to the overall model, but was not a significant predictor itself. Demands, support, skill discretion, decision authority, and the interaction term accounted for nearly 34% of the variance in depression score.

The interaction effect is shown in Plot 3, and shows that for low job demands, those with both high and low decision authority showed low levels of depression (with high DA individuals slightly less depressed). However, as job demands increased to high levels, those with low DA showed a large increase in depression score, but those with high DA showed only a small increase in depression. Therefore this constitutes a buffering effect of DA on job demands in the prediction of depression.

Table 32: Interactions between job demands and decision authority in the prediction of depression.

Depression	Beta Weight	Std. Error	Standardised Beta weight	t	Sig.
(Constant)	4.513	1.968		2.293	.023
Job Demands	.107	.028	.690	3.848	.001
Social Support	-.046	.007	-.315	-6.268	.001
Skill discretion	-.022	.012	-.110	-1.896	.059
Decision Authority	.025	.030	.139	.833	.405
Demands x Decision Authority	-.001	.001	-.483	-2.007	.046
Model: R = .579, R^2 = .336				F: 29.8	.001

Plot 3: Decision authority and job demands against depression.
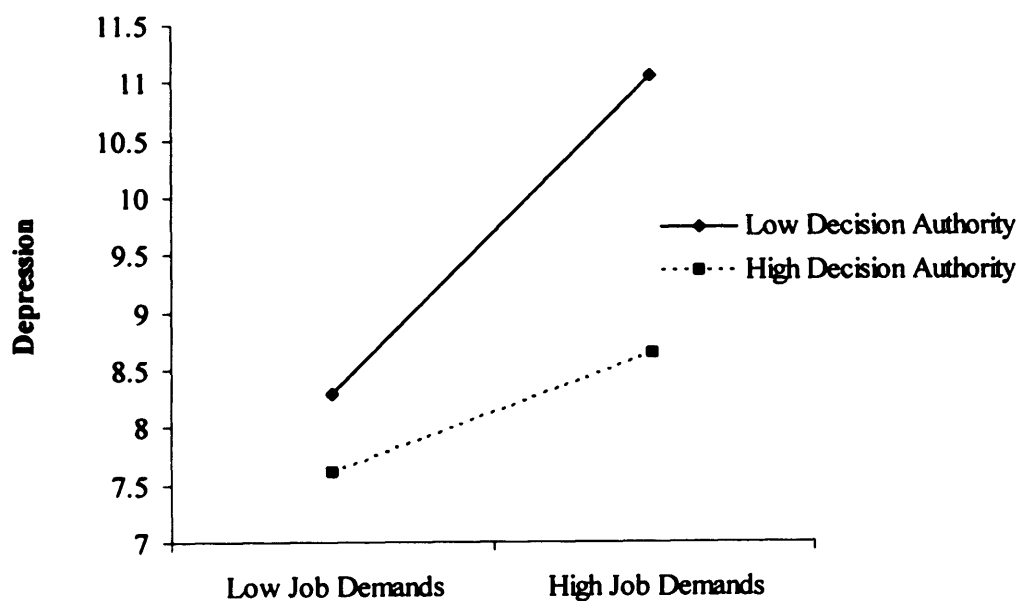
6.8.7 Multiple regressions for all independent variables simultaneously in predicting outcomes in University Sample

Table 33 shows the three final regressions where the results were determined by backwards selection using all work characteristics and individual difference variables, and age and sex simultaneously (both of which failed to be significant predictors in the final regressions) against anxiety, depression and job satisfaction. Self blame, wishful thinking, job demands, and intrinsic effort significantly predicted increased anxiety scores, and problem focused coping, social support, and decision authority associated with lower anxiety scores. Intrinsic effort shows the strongest association with anxiety by standardized beta weight, followed by job demands and self blame,

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with all other factors showing similar standardised betas. These factors account for 55% of the variance in anxiety.

For depression, escape/avoidance, job demands, and extrinsic and intrinsic effort, related to a significant increase in score, and internal attributions for positive events, social support, skill discretion, and intrinsic rewards 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% of the variance in depression scores.

Finally, seeking advice, escape/avoidance, and global attributions for negative events, significantly associated with lower job satisfaction, and social support. Skill discretion, decision authority, global attributions for positive events, and intrinsic reward, significantly associated with increases in job satisfaction. These factors accounted for 57% 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 standardized beta weights.

Comparison to table 31 Shows that the inclusion of coping style, and attributions accounted for increases in explained variance over DCS and ERI factors alone, with 4% in anxiety (1/12 extra variance explained), 4% in depression (1/11 extra explained) and 2% in satisfaction. (1/25 extra explained).

Table 33: All job characteristics and individual differences, against anxiety, depression, satisfaction in university staff.

Anxiety	Beta Weight	Std. Error	Standardised Beta weight	T	Sig.
(Constant)	5.742	1.170		4.908	.001
Problem focused coping	-.920	.447	-.096	-2.061	.040
Seek Advice	.668	.354	.087	1.887	.060
Self Blame	1.086	.356	.174	3.051	.003
Wishful Thinking	.764	.378	.109	2.019	.045
Job Demands	.039	.009	.197	4.170	.001
Social Support	-.024	.009	-.129	-2.797	.006
Decision Authority	-.021	.010	-.094	-2.049	.041
Intrinsic effort/Overcommitment	.080	.010	.415	8.135	.001
Model: R = .742, R^2 = .551				F: 39.61	.001

Depression	Beta Weight	Std. Error	Standardised Beta weight	t	Sig.
(Constant)	8.579	1.138		7.539	.001
Escape/Avoidance	.848	.256	.150	3.314	.001
Internal attribution: Positive event	-.386	.161	-.103	-2.400	.017
Job Demands	.019	.009	.120	2.167	.031
Social Support	-.035	.007	-.245	-5.044	.001
Skill Discretion	-.020	.010	-.101	-2.093	.037
Extrinsic Effort	.022	.011	.138	2.097	.037
Intrinsic effort/Overcommitment	.042	.009	.276	4.680	.001
Intrinsic Rewards	-.019	.008	-.113	-2.298	.022
Model: R = .719, R^2 = .517				F: 37.41	.001

Job Satisfaction	Beta Weight	Std. Error	Standardised Beta weight	t	Sig.
(Constant)	-.693	.839		-.826	.410
Seek Advice	-.350	.180	-.083	-1.949	.052
Escape/Avoidance	-.448	.170	-.114	-2.635	.009
Global attribution: Positive event	.258	.121	.118	2.128	.034
Global attribution: Negative event	-.325	.127	-.158	-2.565	.011
Social Support	.015	.005	.142	2.886	.004
Skill Discretion	.015	.006	.108	2.342	.020
Decision Authority	.013	.006	.102	2.092	.037
Intrinsic Reward	.060	.006	.512	10.200	.001
Model: R = .754, R^2 = .569				F: 37.87	.001

6.9 Discussion

6.9.1 Hypothesis one

Hypothesis one predicted significantly different levels of mental health, job characteristics, satisfaction, attributions and coping between university staff and the general population.

Table 20 shows that for self-reported anxiety, 31.6% of university staff scored over the clinical cut-off compared to only 18.3% for the general population. For depression 7.8% for university staff scored at clinical levels, compared to 5.8% of the

general population. While there was no significant difference in the incidence of clinical depression between the groups, a chi-square test showed that there were significantly more clinically anxious university staff (appendix 3.1)

The results of the ANOVA in Table 21 show that university staff had significantly higher anxiety and depression scores, as well as higher job demands and extrinsic effort. They were significantly more likely to be overcommitted from intrinsic effort, and to report lower levels of intrinsic reward (economically and in terms of recognition). However they did also report significantly more control over work situations (decision authority) and more chances to use personal competencies (skill discretion). The groups showed no significant differences in job satisfaction, coping behaviours, or most attributional styles. However university employees were significantly more likely to see both positive and negative events as stable, which could be described as a "nothing changes" attitude. Forty percent of university staff also claimed that stress at work had caused or made an illness worse, compared to 26% of the general population sample, a difference that was significant (appendix 3.2). Of those participants who claimed that work had caused or made an illness worse, University staff were also far more likely to complain of stress-related illness, with the general population sample more likely to complain of gastro-intestinal and musculoskeletal pain.

The above data suggest that university staff appeared to differ little from the general population in coping styles endorsed, and did not differ significantly for most attributional styles, and but that despite having significantly more control over work, they appeared to have more demanding jobs, feel less rewarded, were no more or less satisfied with work, and appeared far more likely to report increased or even clinical levels of anxiety and depression compared to a general population sample.

Experimental hypothesis one can therefore be accepted and the null hypothesis rejected. These results support the work of Abouserie (1996), Winefield and Jarrett (2001) Gillespie et al. (2001) and others, that academic staff suffer high levels of stress in comparison to other professions.

6.9.2 Hypothesis two

Hypothesis two predicted that male and female university staff would differ significantly in levels of self-rated anxiety, depression, and job satisfaction, and would endorse significantly different types of coping and attributional style behaviours. Table 23 shows the results of significant ANOVA calculations comparing men and women, and these data show that women had significantly higher anxiety scores, and claimed that they had significantly lower skill discretion and decision authority in their work (whether this is a perceptual or actual difference is unknown) and women were significantly more likely to use seek advice, self blame, and wishful thinking coping styles.

The correlational results in table 25 also differ slightly for men and women, with problem focused coping associating with all outcomes in men but not women, which (as there are no significant differences in level in PFC between the sexes) suggests that PFC may not be as effective a coping style in women. Conversely, internal attributions for positive events was significantly related to anxiety for both sexes, but also significantly for satisfaction in men, but not depression, and vice versa for women. This suggests that the variable relates to different outcomes differently between the sexes. Internal attributions for negative events also associated with higher anxiety and depression in women, but not men, suggesting also that this attributional style has different associations with negative mental health between the sexes. Finally, it appears that job demands had no association with job satisfaction for men, but that in women, demands associated significantly with reduced job satisfaction. Finally, echoing the results of the ANOVA, the regressions in table 28 and 31 showed that female sex associated with significant increases in anxiety, although sex failed to be a significant predictor in the final regression with all dependent variables entered in table 33.

In sum, there do appear to be differences between male and female university employees, with men appearing to have better mental health, more workplace control, and to be less likely to use "negative" coping styles. Positive methods of coping may also be more effective in men. Therefore, data collected on sex differences in mental health, coping, and attributions, as well as sex differences in the amount of association between independent and dependent variables, supports the hypothesis that there are

significant differences in mental health, coping, and some attributions, between men and women, and therefore experimental hypothesis two can be accepted.

6.9.3 Hypothesis three

Hypothesis three predicted that the positive coping behaviours of problem focused coping and seek advice, would be significantly associated with lower scores in anxiety and depression and higher job satisfaction, and that negative coping (self blame, escape/avoidance, wishful thinking) with higher anxiety and depression, and low job satisfaction.

Problem focused coping was found to associate with lower depression and increased satisfaction in the correlations in table 24, lower anxiety and depression, and increased satisfaction in the regressions in table 26, as well as increased satisfaction in the regression in Table 28, and lower anxiety in Table 33. Self blame, wishful thinking, and escape/avoidance, also consistently showed significant positive relationships with anxiety and depression, and negative relationships with job satisfaction in the correlations and regressions in tables 24, 26, 28, and 33. Self blame, PFC, and escape/avoidance were all important in the coping only regressions in table 26 by standardized beta weight. Also Both positive and negative coping behaviours figured highly in importance in predicting outcomes by standardized beta weight, when included in multi-construct regressions, with self blame the third most important sub-factor in predicting anxiety in Table 33, with only job demands and intrinsic effort more important, with escape/avoidance third most important in predicting depression. Table 26 shows that these variables accounted for small to moderate amounts of the variance in anxiety (25.5%) depression (16.5%) and satisfaction (15.6%).

It is interesting that seeking-advice associated with a significant reduction in job satisfaction in tables 26 and 28, and a significant increase in anxiety in Table 33, but with a significant *increase* in satisfaction in table 33. As has been mentioned previously, this different pattern of association between seeking advice and outcomes (sometimes with healthy outcomes and sometimes with unhealthy outcomes) may reflect two different contexts of advice-seeking behaviour being detected in the different regressions i.e. either as a positive coping behaviour used pro-actively to

cope with problems; or because those who are already more anxious or have low satisfaction are more likely to seek advice.

The results in the correlations and regressions above show that (as is the case for nurses) coping behaviours have significant associations with anxiety, depression, and job satisfaction in university employees, and were in the predicted directions in all but one regression (for seeking advice). The data therefore support the experimental hypothesis and the null hypothesis can be rejected.

6.9.4 Hypothesis four

Hypothesis four predicted that positive attributional behaviours would be associated with low depression and anxiety, and high job satisfaction, and negative attributional behaviours with high anxiety, depression and low satisfaction. The correlations in tables 24 show that internal and stable attributions for positive events, and global attributions for negative events, associated with the outcomes in the predicted directions, internal attributions for negative events also associated with anxiety as predicted. The regressions in table 27 showed that internal attributions for positive events (a positive attributional style) and global attributions for negative events (a negative attributional style) associated with anxiety, depression, and satisfaction in the predicted directions, but accounted for very low percentages of the variances in comparison to coping styles. Tables 28 and 33, 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, Spector, 1982) predicted low depression, and global-negative attributions predicted low satisfaction and high anxiety.

In the anxiety and depression regressions, in table 28 attributional behaviours appeared less important than coping behaviours by standardized beta weight, however for job satisfaction, attributions appeared *more* important, indeed in the regression in table 33, where all job characteristics and individual variables were entered simultaneously, global attributions for positive and negative events were second and fourth most important in predicting satisfaction by standardized beta weight, with intrinsic reward first and social support third.

Therefore, while not all attributions are significant predictors, and predicting low percentages of the variance compared to other independent variables, overall

there is evidence that positive attributional behaviours tend to significantly associate with low anxiety, and depression, and high job satisfaction in university employees, and negative attributions with increased anxiety, depression, and decreased satisfaction. Thus experimental hypothesis four can be accepted and the null rejected.

6.9.5 Hypothesis five

Hypothesis five predicted that job demands would significantly associate with high depression, anxiety and low satisfaction, and decision authority, skill discretion, and social support would associate with low levels of anxiety and depression, and high job satisfaction. It was also predicted that control and social support would significantly interact with demands in predicting anxiety, depression, and job satisfaction.

The correlations in tables 24 and 25, as well as the regressions in Tables 29, 31, 32, and 33, showed that the negative job characteristic of job demands associated with increased anxiety, depression, and reduced satisfaction, and the positive characteristics of social support, skill discretion, and decision authority, associated with reduced anxiety and depression, and increased satisfaction. Job demand was particularly important by standardized beta weight in the prediction of anxiety, with social support particularly important in depression and satisfaction outcomes. Skill discretion and decision authority were of similar importance in the prediction of job satisfaction, however as can be seen in the various regression tables, decision authority tended to be a more significant predictor of anxiety, and skill discretion tended to be the more significant predictor of depression (although not in the regression in table 32). However, it is clear that these data strongly support the first part of the experimental hypothesis.

In the prediction of depression, a significant interaction was also found between decision authority and job demands as shown in Table 32 and plot 3. It can be seen from the figure that this interaction is indeed a buffering effect, and thus supports the second part of the experimental hypothesis and the work of Karasek (1979). Therefore both parts of the hypothesis can be accepted and the null rejected, with job demands, controls, and support accounting for moderate percentages of the variance in outcomes.

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6.9.6 Hypothesis six

Hypothesis six predicted that high extrinsic and intrinsic efforts would associate with depression, anxiety and low satisfaction, and high intrinsic reward would associate with low anxiety, depression, and high satisfaction. Also that rewards would significantly interact with efforts to buffer their effects in predicting outcomes.

The correlations in tables 24 and 25, show significant associations between intrinsic and extrinsic efforts and rewards, and the outcomes in the predicted directions. The regressions in table 30 show that while all variables predicted depression in the hypothesised directions, for anxiety and job satisfaction, only intrinsic effort and intrinsic rewards significantly associated with the outcomes. These trends are supported by the regressions in tables 31 and 33, which show that only intrinsic effort significantly predicted anxiety score, and only intrinsic reward predicted job satisfaction, but that extrinsic and intrinsic efforts, and reward, all significantly predicted depression score.

For both anxiety and depression, when all variables were entered into the regression in Table 33, intrinsic effort was the most important variable overall by standardized beta weight, and for job satisfaction, intrinsic reward was the most important predictor overall. Efforts and rewards accounted for a good percentage of the variance in outcomes for all dependent variables.

These results appear to largely support the first part of the experimental hypothesis, therefore it can be accepted and the null rejected. However, the predicted interaction between efforts and rewards was not found, thus the second part of the experimental hypothesis cannot be accepted.

6.9.7 Hypothesis seven

Hypothesis seven predicted that positive attributions and problem focused coping would interact with high job demands and extrinsic efforts, so that positive individual characteristics would buffer the association between negative job characteristics and anxiety, depression, and job satisfaction. However, no significant interaction effects were found between these variables, and thus the experimental hypothesis cannot be accepted.

6.9.8 Hypothesis eight

Hypothesis eight predicted that coping and attributions, efforts, rewards, demands, controls, and social support would account for a significant amount of the variance in anxiety, depression and job satisfaction in university employees. It was also predicted that the addition of coping and attributional style would significantly increase explained variance in outcomes, over the use of DCS and ERI variables alone.

The regressions in table 33 show that sub-factors 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% in anxiety, 52% in depression, 57% in satisfaction) and the inclusion of coping behaviours in all regressions, and attributions in depression and satisfaction, show 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 important overall, and escape/avoidance third most important by standardized beta in depression. Finally global attributions for positive and negative events were 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 satisfaction outcomes in university employees, and despite attributions accounting for low percentages of the variance compared to other variables, are as important, or in some cases more important by std. beta weight than some DCS and ERI variables. Therefore experimental hypothesis eight can be accepted and the null hypothesis rejected.

6.10 Implications

Seven of the eight hypotheses presented in this study were partially or fully supported, showing strong relationships between outcomes, and coping, attributional style, gender, job characteristics and efforts, in university employees.

Data showed that there were some significant differences between university and general population samples, with university employees showing more anxiety and depression (even up to clinical levels). It was also shown that university staff were more likely to claim that workplace conditions had caused or made an illness worse,

and were twice as likely to complain of stress or anxiety and depression related illness. While these groups were sampled in different ways, they were similar for demographic factors, and for distribution of job types as shown in table 19. It was also shown that the groups did not differ significantly in coping behaviours, and little on attributional behaviours. This suggests the possibility that the difference in work-related mental health outcomes, may be due to differential exposure to stressors, rather than differences in susceptibility to stress, especially as university staff had more control at work, but had more job demands and felt less rewarded.

The regressions showed that nearly all of the sub-factors from DCS and ERI models of stress were important in contributing to the variance in mental health outcomes, with different patterns of variables between anxiety and depression. However, intrinsic effort/overcommitment was particularly important, illustrating the significance of understanding the relation between this factor and outcomes. For job satisfaction, despite the contribution of other factors, intrinsic reward was by far the most important predictor, suggesting that regardless of levels of demands, controls, and efforts etc, those who feel rewarded (either with money, security, or prestige) are also the most likely to be satisfied.

While DCS and ERI variables generally appeared to account for more variance overall in outcomes than coping and attributional variables, the latter were still important and added to the regression models, making good contributions by beta weight, suggesting that more accurate prediction of outcomes can be made when DCS and ERI variables are not used in isolation.

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 sub-factors in predicting outcomes in a single sample, as well as any interactions that may be present (Long, Kahn, and Schutz, 1992) and many of the results found using this method in nurses, were also supported in this study. Research such as this

could also be used to identify which individuals are most at risk, on the basis of their job characteristics and individual characteristics.

The finding that there were numerous significant differences between men and women in the university sample (particularly that women scored higher on anxiety) was interesting as few such differences were found in the previous two studies. With reference to the nursing sample, the lack of sex differences there may have been due to the "feminized" nature of nursing environments. However, the more balanced gender ratio found in the university sample may be more representative of other typical working environments, and indeed these differences support many of the gender differences in coping and mental health as found in a great deal of past research (see Jick & Mitz, 1985 for a review).

The finding that women were more likely to use wishful thinking and advice seeking coping was also found in the first sample study, reinforcing the strength of this particular finding, and the correlations that show different relationships for men and women between some of the coping and attributional styles and health outcomes, also supports claims for gender variations in individual characteristics and health outcomes.

While the additional variance explained by coping, gender, and attributional style over DCS and ERI factors is admittedly small, this does not invalidate the important *theoretical* observation that factors from these latter constructs were significant in the final regression equations, particularly when their inclusion in the multi-construct regression in table 33 saw the exclusion of several factors from DCS and ERI models. Models such as the Demand-Skill-Support model (van Veldhoven et al. 2005) were developed to minimise the factors used to explain the majority of variance in outcomes, and while parsimony can be a virtue, in the many situations where modification of job characteristics may not be possible, these alternative predictors may hold considerable value, and aside from the low levels of variance accounted for by attributional style, such factors may play an important role in future models.

While these data were cross-sectional and not causal, they could be useful for providing a theoretical basis for organisational interventions, as they help to show which independent variables are most strongly associated with outcomes. Possible interventions based on these results could include: Provision of improved social

support systems; training in problem-focused coping methods, and discouragement of negative coping such as self-blame and escape-avoidance; enhancement of reward systems, particularly in terms of praise or recognition; skills training for the enhancement of decision authority and skill discretion; awareness training on the dangers of becoming "overcommitted" to work and having negative beliefs about the causes of events.

Such multi-modal interventions could not be recommended on the basis of job characteristics research alone, because such research can only recommend empirically-based interventions based on job characteristics factors. As described for the study in nurses, the information from this study could also be particularly useful in situations where resources for intervention are limited, and only variables most strongly related to outcomes can be targeted, or where certain types of intervention are not feasible.

There was only one interaction effect found in the data, and the failure of hypothesis seven to be supported (moderating effects of positive individual characteristics on negative work characteristics) echoed the similar results found in nurses, and suggest that perhaps these possible relationships should be investigated in a new way.

6.11 Comparisons of outcomes to previous study

A comparison of the levels of anxiety and depression between the university and nursing samples shows that there are no significant differences between the mean anxiety and depression scores of nurses and university staff (see appendix 3.4). In other words, both populations display high levels of anxiety and depression compared to members of general population samples (i.e. from the sample in the first study, and the general population sample in the third study).

A chi-square (appendix 3.3) showed that there were no significant differences in frequency of nurses and university employees with clinical depression scores. This surprising result (it may be expected that nurses suffer higher levels of clinical depression) was compounded by the finding that significantly *more* university staff in the sample population suffer from clinical levels of anxiety, compared to the sample of nurses (appendix 3.3). This result suggests that levels of (self-reported) clinical

depression are of similar levels in nurses and university employees, and that clinical anxiety may be more common in university employees than in nurses.

As will be described in a future interview study (see chapter 8) when a participant who was a university employee but had previously been a nurse, was asked as to her opinion of this finding, she responded with several interesting statements, including that while nursing involved more stressful environments, the work was more satisfying, and that stress was expected as part of the job. She also stated that her university colleagues tended to complain far more about stress than her nursing colleagues had done, despite the latter having much more stressful work. More on the results of the interview data will be discussed in due course.

6.12 Results of study three in reference to DRIVE model:

Despite minor differences in levels of health outcomes and some significant sex differences in the university staff sample, nearly all of the relationships between workplace demands and resources, and individual characteristics and health outcomes, were consistent with those found in the previous study on nurses, as well as to the first study in regards to coping style. The results of the most recent study to do with job satisfaction are also consistent with the previous findings for depression and anxiety (i.e. satisfaction as a positive outcome, shows the opposite relationships with independent variables to anxiety and depression). Also in university staff, the significant buffering effect of decision authority on demands in predicting anxiety was not found, but a significant buffering effect of DA on job demands in predicting depression was found instead.

The results of this study therefore provide the same support for the DRIVE model (as shown in figure 2, section 5.9.9) as the results from the previous study, which include main effects between work demands, work resources, and individual differences (individual demands and resources) and health outcomes, as well as a buffering effect of DA on job demands, however with no support for moderating effects of personal resources on work demands.

The results also reinforce the assertion that workplace based psychosocial stressors do not necessarily have theoretical primacy over individual characteristics. The lack of moderating effects of individual difference characteristics on psychosocial

academic and administrative staff, only 307 completed questionnaires were returned (11% of those initially contacted). It is possible that the sample is therefore unrepresentative, e.g. perhaps only the least stressed had time to respond, or perhaps only the most stressed were interested in participating. However, Kelley, Clark, Brown, and Sitzia (2003) state that "cold" requests for questionnaire participants often yield low response rates, and this may have been reduced further due to lack of pre-contacts or follow ups (Sheehan, 2001).

Also, different sampling methods were used to gain participants from the two populations, and this could have led to different distributions of individuals in the two samples, perhaps giving rise to some bias in comparing them. For example, while self-selection would have occurred in both sample groups, in the university sample the request was sent to all members of the population (Cardiff university staff) however the "general population" sample used, were from members of a pool of potential participants who had been used for past research, and had indicated they would participate again (these were not the same participants as those in the first study on coping in chapter 4) and as such these had been sampled in a variety of ways for past experiments. However despite this, respondents from both groups were from a range of job roles, and were quite similar in terms of job distribution, average age and gender ratios.

While significant gender differences in many variables were found, it is not known if these differences may have been confounded by other factors. For example, for the higher levels of skill discretion and decision authority reported by men in the ANOVA table in section 6.8.2 (table 23) it is not known if men only perceived higher control, or if their personal characteristics *caused* them to actually have more control, or if men and women were likely to have different types of jobs (such as admin, professorial, lecturer, researcher) etc, for which different levels of control and stressors are inherent. Future research could use job type as a covariate to examine

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this possibility. Indeed, apart from age and gender, there was also a lack of controlling for potential confounding variables, unlike in the study described in chapter 5. However due to the extra complexity of the current study (i.e. another DV and two sample groups) and the fact that no confounding effects were found in the previous research, the decision was taken to omit these other potential confounds from the statistical analysis. Therefore it is possible that potential confounding effects could have affected the results, and thus results should be treated with some caution.

It has been mentioned that there were a lack of moderating effects of individual characteristics on workplace demands, however, only job demands and extrinsic efforts were used as a measure of psychosocial workplace stressors. It is possible that not only do high levels of job demands/efforts constitute psychosocial stressors, but also low levels of job resources may also constitute psychosocial stressors. Given the important role of job resources in predicting outcomes, it is likely that low levels of positive work characteristics, may be as negative as high levels of negative characteristics, however this possibility was not tested in the interactive regressions.

This study was cross-sectional, and therefore cause and effect conclusions about relationships between variables cannot be made. Also as the results were self-report, they may have been open to biases from negative affect or social desirability. There were no methods of data collection other than questionnaires, and thus results were not confirmed by alternate or more objective sources. The questionnaires packages were also quite long, and took up to 30 minutes to complete, and this could have affected responses in the latter part of the questionnaire pack, and no counterbalancing was carried out to counteract this. Finally, each scale used a different method of giving responses, with different lengths and formats of likert-scale, such as circling responses, ticking boxes, etc, which could have caused confusion for some participants.

6.14 Improvements and Future Directions

Many of the improvements that could be applied to this study are related to correcting methodological problems, for example a larger and more representative sample. Also the use of alternative methods of data collection, such as qualitative measures, interviews, supervisor ratings, absence data, or workload by some other more

objective measure. Better controls for order effects of the questionnaires could also be implemented, such as counterbalancing, and more controls against NA, and social desirability effects. More investigation could be done to see if there were any differences between those with different job roles, as work by Winefield and Jarrett (2001) and others, suggests that different roles may give rise to differing levels of stressors, e.g. professors, lecturers, research staff.

As well as testing interactions between negative job characteristics and individual differences, interactive effects between job resources (social support, control, rewards) and individual differences should be tested in future research, to see if individual differences moderate the effects of low levels of job resources (which as mentioned may also be a form of stressors)..

To enable better understanding of causal relationships between the variables, and to support causative elements in the DRIVE model, a longitudinal method could be used in future research, looking at similar organisational and individual variables, but with some kind of intervention stage, to see if predicted improvements to outcomes could be found.

6.15 Conclusion

While the use of university employees and academic samples is growing in occupational stress literature, there is far less research on this population than in other occupational groups, yet the data presented here shows there to be evidence that this group may suffer from high levels of anxiety, depression, and stress-related illness, especially compared to general population samples, and even compared to "high stress" nursing samples.

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. However, the overall influence of attributional style was marginal compared to the other independent variables, and perhaps in future research, locus of control may be a more robust individual difference variable, and the use of this variable would also be compatible with the structure of the DRIVE model.

The gender differences found in several important factors (notably anxiety) which were not found in nursing samples, supports many findings in the literature that

gender differences can exist in many aspects of coping and mental health, but that they may not be found in certain sample groups.

The finding that aspects of both workplace and individual demands and resources are all important in health outcomes, and that the importance of each type (by standardized beta weight) varies according to the dependent variable, shows how necessary it is to consider different types of variables (including variables that are not considered in the current discussion). This demonstrates the need for more flexible approaches rather than just using traditional models such as the ERI and DCS models in the prediction of work stress. Approaches such as those based on the Job-Demands-Resources model (Xanthopoulou, Bakker, Demerouti, and Schaufeli, 2007) and the currently described DRIVE model can be useful frameworks to help guide such research.

Regardless of any issues with measurement scales or theoretical models, it is a powerful finding that of those university employees sampled, 40% believed that workplace stress had negatively affected their health, and 28% of these claimed that this had been manifested in some form of stress-related mental health problem. Also, with 32% showing possibly clinical levels of anxiety, and 8% showing clinical depression scores, this group is clearly an important population to study, not only for the effect on university employees themselves, but also due to the potential consequences for students.

6.16 Summary of chapter 6 and links to chapter 7

The research in chapter 6 expanded on that in chapter 5 by further supporting many aspects of the DRIVE model, and by finding gender differences between many of the researched factors. Interesting results were also found from the addition of job satisfaction as a dependent variable. Chapter 7, based both on the work in chapters 5 and 6, and on the rationale laid out in chapter 3, proposes a more complex version of the DRIVE model, which includes a mediating pathway for subjective perceptions of job/work stress, between work characteristics and health outcomes. This model is then tested and its implications are discussed.

Chapter 7

Study Four: Formulation and testing of an enhanced DRIVE model

7.1 Introduction

In chapter 3 it was argued that stimulus-response type models such as the DCS and DSS may be too simple to properly explain individuals' different experiences of stress, and that transactional models which hypothesise discrete stages that individuals experience (primary and secondary appraisals, coping, feedback etc) during the stress process, may be both overcomplex *and* too proscribed. From this perspective, the DRIVE model was proposed, which considers aspects of different models in the same framework. The research above supported many of the important aspects of the proposed model and illustrates some of the key relationships between psychosocial stressors and individual differences in the prediction of health outcomes, however other key aspects of the model have so far not been supported.

Despite being more complex than the DCS, DSS, and ERI models, it could be argued that the DRIVE model as previously proposed is still relatively simplistic in representing the complexities of the workplace-individual stress process, and in particular in one key way. Although hypothesising possible individual effects in the "pathway" between environment and outcome (some of which were not supported by the results so far) this process is described without reference to conscious or *affective* perceptions of psychosocial stressors, a process which is specified in the appraisal stages of transactional models. Without resorting to the concrete stages described by Folkman et al. (1986) and Cox (1987) the DRIVE model may benefit from some way of accounting for how individuals subjectively feel about their exposure to supposed psychosocial stressors, because without inclusion of a specifically affective component, the DRIVE model could fall foul of the oversimplification assumption.

As described in chapter 3 (section 3.4) the oversimplification assumption is the notion that the presence of an environmental stressor (such as job demands) is automatically experienced as "stressful" by an individual and as such must be coped or dealt with is some form, failure of which leads to negative outcomes. However, it is possible that demands (such as a high workload) not only have no relationship with

health outcomes in some individuals, but that these individuals don't even view such demands as stressful (Briner et al. 2004), or indeed may just see them as part of the job. While it is implicit in the current DRIVE model that individuals may not view supposed "stressors" as stressful, this subjective and affective process is buried somewhere in the relationship between environment and outcome.

Therefore in order to include such an affective component, the current model must be altered in a way that is consistent with those results already gained, but with the potential to be more ecologically valid, and to draw on some of the theoretical advantages of transactional models, without specifying a rigid structure for these mental processes.

7.2 Enhanced DRIVE model

The research carried out so far, as well as research previously conducted in the literature, have helped informed the structure of the prospective stress model below. This model has similar basic principles to the simpler DRIVE model (section 5.5) however there is a major change with the inclusion of a "perceived job stress" variable.

It is proposed that this variable is measured simply by asking an individual if they feel that their work makes them feel stressed. The use of a single question: "In general, how do you find your job?" with responses indicated on a 5-point likert scale (0 = not at all stressful; 1 = mildly stressful; 2 = moderately stressful; 3 = very stressful; 4 = extremely stressful) has been shown to be a very accurate indicator of perceived stress, that measures this factor as well as longer questionnaires (Smith, Johal, Wadsworth, Davey Smith, & Peters, 2000).

As shown in the new model below (figure 3) perceived job stress is proposed to mediate the relationship between work demands/work resources and health outcomes. As mentioned in the literature review in section 2.9.3, mediation is a process that transmits an effect, but does not change the magnitude or direction of an effect (Baron & Kenny, 1986). Rather it is theoretically proposed to be a causal pathway between two variables. An example given earlier in section 2 was that of a mediating effect as proposed by Nolen-Hoeksema et al. (1993) where the relationship between stressors and negative health outcomes is mediated by rumination, so that stress causes worry, which in turn causes negative health outcomes.

In the model as proposed below, experienced or perceived stress is hypothesised to be the mechanism by which levels of workplace psychosocial demands and resources can affect health outcomes. In other words, a psychosocial stressor (such as extrinsic effort) won't transmit its stressful potential to lead to negative health outcomes, if the person does not perceive their work conditions *to be* stressful. Further, it is proposed that individual differences can not only moderate the relationship between environmental factors and perceived stress (in a process that is not unlike primary appraisal) but that they can also moderate the relationship between perceived stress and health outcomes (a process not unlike secondary appraisal and coping in transactional stress models). Likewise, individual differences (personal demands and resources) are proposed to have independent main effects on perceived job stress and health outcomes.

In a sense the model below is a three stage model of: input → perceptions → output, with individual differences affecting the perceptions and output stages. This compares to the two stage input → output DCS model, and multi-stage iterative transactional models.

Examples of the range of possible types of environmental, individual and outcome variables that could be included in the model are shown below.

Work Demands: Job demands, extrinsic efforts, workload, low social support, low levels of control, low levels of reward, workplace bullying, lack of job security, negative management style, etc.

Work Resources: High levels of job control, high social support (or supportive work environment) high levels of reward, opportunities for feedback, positive management style, positive organizational health, etc.

Personal Resources: Positive coping styles, positive attributional styles, self efficacy, internal locus of control, positive personality traits (e.g. optimism, conscientiousness, openness) supportive home environment, experience, etc. Demographics (such as sex and age could be included).

Personal Demands: Intrinsic effort, negative coping styles, negative attributional styles, neuroticism, Type A personality, poor work/life balance, role conflict, etc.

Outcomes: Anxiety, depression, job satisfaction, organizational commitment, musculoskeletal disorders, gastro-intestinal disorders, heart disease, etc

Figure 3: Enhanced DRIVE model
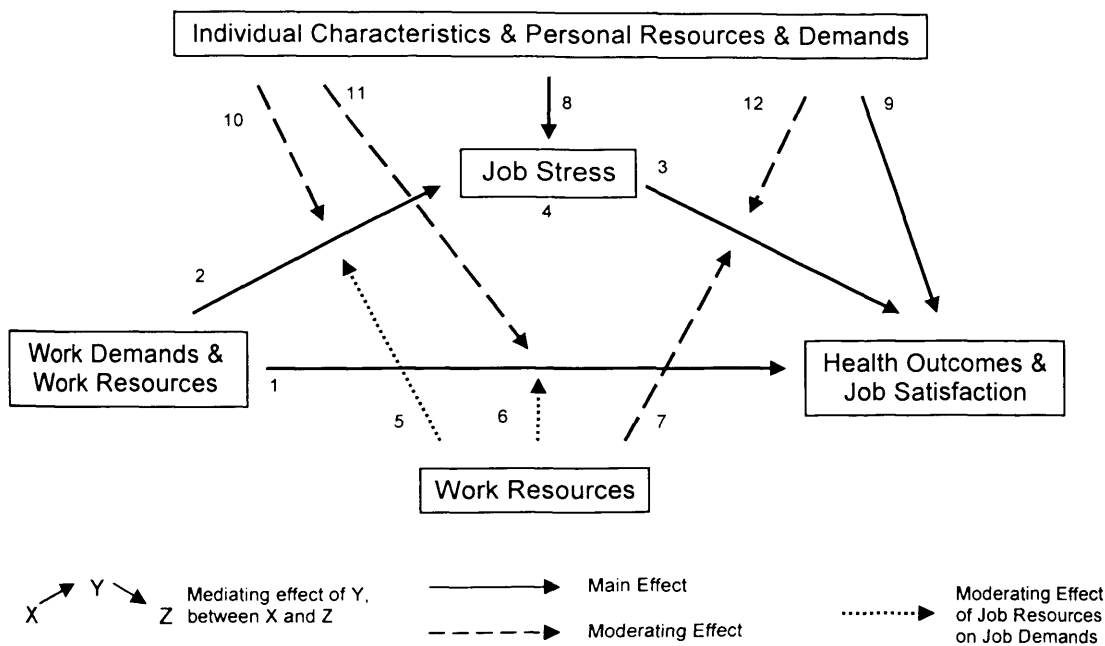
1) Work demands and work resources will be significantly related to outcomes.

2) Work demands and resources will be significantly related to perceived job stress.

3) Level of perceived job stress will be significantly related to outcomes.

4) Level of perceived job stress will significantly mediate the relationships between Job Demands/Resources and outcomes.

5) Work resources will significantly moderate the effect of work demands in the prediction of perceived job stress.

6) Work resources will significantly moderate the effect of work demands in the prediction of health outcomes.

7) Job resources will significantly moderate the effect of perceived job stress in the prediction of health outcomes.

8) Individual differences in the form of personal demands and resources, will be significantly related to perceived job stress.

9) Individual differences will be significantly related to outcomes.

10) Individual differences will moderate the effect of job demands on perceived stress.

11) Individual differences will moderate the effect of job demands on outcomes.

12) Individual differences will moderate the effect of perceived stress on outcomes.

7.3 Rationale

The enhanced DRIVE model above (hereafter referred to as the DRIVE model), has been proposed in order to expand upon the simpler model shown in figure 1, to try and present a more ecologically valid conceptualisation of the relationships between stress, individuals and health and satisfaction outcomes. It is hoped that the model proposed in figure 3, if empirically supported, will provide a balanced framework for the study of stress related health at work, which integrates key factors from several stress models, and has sufficient complexity to represent the stress process, while still being simple enough to be empirically testable and applicable to a variety of situations. Like the JDR model (Xanthopoulou et al. 2007) this model is not intended at this stage to be a *predictive* model, but rather a theoretical framework into which any relevant variables can be introduced, and one which could provide a suitable guide for undertaking risk-assessments and future empirical research.

The DRIVE model will be tested using a large number of statistical calculations including correlations, mediated correlation calculations, moderated multiple regressions, and stepwise multiple regression procedures. Unlike previous results, the comparative "importance" of the various independent variables in predicting outcomes is less of interest than the presence and direction of significant relationships. The results therefore, are hoped to provide support for the new framework itself, to form a basis for future research. For these reasons, and for similar reasons to the work in the previous chapter, controls were not carried out for the potential confounding effects of socio-demographic or other extraneous factors.

7.4 Hypotheses

The following hypotheses are based on the proposed relationships between variables in the model as specified above in section 7.2. Predictions about the relationships

between independent variables (from DCS, ERI, ways of coping, and attributional style) and dependent variables will be couched in terms of workplace demands and resources, and individual demands and resources, with intrinsic effort being specified as an individual demand. Despite the presence of some differences between men and women in the university employee study, gender will not be included as an independent variable in the following calculations, and references to job satisfaction as a DV will only apply to the university sample, as this data was not collected in the nursing sample.

Hypothesis one:

Work demands (extrinsic efforts, job demands) will be significantly associated with higher anxiety, depression, and low job satisfaction.

Hypothesis two:

Work resources (high social support, high rewards, high control) will be significantly associated with low anxiety, low depression, and high job satisfaction.

Hypothesis three:

Work demands will be significantly associated with increased levels of perceived job stress, and work resources will be associated with decreased levels of perceive job stress.

Hypothesis four:

High levels of perceived job stress will be significantly associated with high anxiety and depression, and low job satisfaction.

Hypothesis five:

Perceived job stress will significantly mediate the relationship between work demands and resources (extrinsic efforts, job demands, social support, rewards, control) and anxiety, depression, and job satisfaction.

Hypothesis six:

Work resources will significantly moderate the effect of work demands on perceived stress, specifically rewards will moderate extrinsic efforts, and control and social support will moderate job demands.

Hypothesis seven:

Work resources will significantly moderate the effect of work demands on health outcomes: Rewards will moderate extrinsic effort; control and support will moderate job demands.

Hypothesis eight:

Work resources (rewards, support, control) will significantly moderate the effect of perceived work stress on health outcomes.

Hypothesis nine:

Personal demands (intrinsic efforts, negative coping and attributions) will be significantly associated with increases in perceived stress, and personal resources (positive coping and attributions) will be significantly associated with decreased perceived stress.

Hypothesis ten:

Personal demands (negative coping and attributions) will be significantly associated with higher anxiety and depression scores, and lower job satisfaction, and personal

resources (positive coping and attributions) will be significantly associated with decreased anxiety and depression, and increased satisfaction.

Hypothesis eleven:

Personal resources and demands, will significantly moderate the effects of work demands (job demands, extrinsic efforts, *low* social support, low rewards, and low levels of control) on perceived stress.

Hypothesis twelve:

Personal resources and demands, will significantly moderate the effects of perceived stress, on anxiety, depression, and job satisfaction.

Hypothesis thirteen:

Personal resources and demands, will significantly moderate the effects of work demands (job demands, extrinsic efforts, low social support, low rewards, and low levels of control) on anxiety, depression, and job satisfaction.

Hypothesis fourteen:

Work demands and resources, personal demands and resources, and perceived job stress will account for a significant percentage of the variance in anxiety, depression, and job satisfaction.

7.5.1 Participants, Method, and Materials

The testing of the model will be based on the same datasets as those already used for the studies described in chapters five and six. While a number of the predictions and relationships relating to this model are wholly new, and as such these data can be used again to test new hypotheses, several of the "new" hypotheses are in fact the same as those already tested. In such cases therefore, the relevant results from previous

sections will be collated and re-presented in the same manner as the new results, and notification to this effect will be given in the text.

For more information and descriptive statistics on the sample of nurses used, refer to section 5.7.1, and for more information on the sample of university employees, refer to section 6.7.1. The methods used for the data collection are the same as those described for the studies on nurses and university employees as described in chapters 5 and 6, as are the materials and reliability statistics for the questionnaires (see sections 5.7.2 and 6.7.2).

7.5.2 Mediation Calculations

As stated previously, a mediating variable is one that is proposed to provide or transmit a relationship (based on covariance) between two other variables (Jose, 2004). The Sobel test (1982, cited in Baron & Kenny, 1986) is an important method of calculating whether there is a significant mediating effect between variables. To calculate a Sobel test, three sets of calculations must be carried out: raw correlations among the three variables; a linear regression with the proposed mediator as the dependent variable and the independent variable as the IV in the regression; and a multiple regression, where the independent variable and the mediator are the IVs, and the dependent variable is the DV in the regression (Jose, 2004).

Once these calculations for the relevant variables were carried out, they were entered into the computer programme "Medgraph" (Jose, 2004) for the calculation of the Sobel test. This software outputs the type and size of mediation (none, partial, full) with a Sobel Z value, significance level, as well as standardised correlational values for the direct and indirect relationship between the independent and dependent variables. Due to the large amount of data and hypotheses to be tested, the results, and the discussion of the results, will both be presented in the following section.

7.5.3 Results and Discussion

The tables below show Pearson correlations between all independent and dependent variables (table 34) and between perceived job stress and all independent variables in nurses and university staff (table 35). The results of table 34 have been presented previously in separate tables, but are here presented for ease of reference.

Table 34: All IVs correlated with anxiety, depression, and job satisfaction

| | Nurses | | University Staff | | |
	HAD-A	HAD-D	HAD-A	HAD-D	Satis
Problem-F Coping	-.049	-.111	-.100	-.117*	.164**
Seek Advice	.044	-.080*	.087	-.014	-.056
Self Blame	.478**	.384**	.465**	.341**	-.265**
Wishful Thinking	.335**	.283**	.402**	.302**	-.291**
Escape/Avoidance	.353**	.378**	.313**	.321**	-.311**
Internal, Positive event	-.191**	-.269**	-.169**	-.228**	.190**
Internal, Negative event	.043	.035	.146*	.097	-.040
Stable, Positive event	-.122**	-.156**	-.157**	-.120*	.161**
Stable, Negative event	.090*	.083*	-.023	.072	-.007
Global, Positive event	-.017	-.030	-.027	.010	.057
Global, Negative event	.133**	.155**	.129	.152	-.132*
Job Demands	.333**	.257**	.404**	.352**	-.088
Social Support	-.344**	-.400**	-.326**	-.454**	.485**
Skill Discretion	-.214**	-.260**	-.102	-.120*	.371**
Decision Authority	-.205**	-.235**	-.280**	-.304**	.449**
Extrinsic Effort	.426**	.397**	.483**	.477**	-.205**
Intrinsic Reward	-.406**	-.425**	-.314**	-.378**	.667**
Intrinsic Effort	.565**	.482**	.563**	.580**	-.180**

** = p > .001
* = p > .05

Table 35: All IVs correlated with perceived job stress in nurses and university staff

| | Job Stress: | |
	Nurses	University Staff
Problem-F Coping	.01	-.045
Seek Advice	-.011	-.026
Self Blame	.259**	.181**
Wishful Thinking	.189**	.141*
Escape/Avoidance	.268**	.175**
Internal attributions, Positive event	-.111*	-.029
Internal attributions, Negative event	-.059	-.034
Stable attributions, Positive event	-.001	-.007
Stable attributions, Negative event	.103*	-.16
Global attributions, Positive event	.044	-.008
Global attributions, Negative event	.131**	.077
Job Demands	.415**	.587**
Social Support	-.29**	-.329**
Skill Discretion	-.071	.121*
Decision Authority	-.202**	-.158**
Extrinsic Effort	.504**	.605**
Intrinsic Effort	.392**	.599**
Intrinsic Reward	-.401**	-.24**

** = p > .001
* = p > .05

7.5.4 Hypotheses one and two

Hypothesis one predicted that work demands in the form of extrinsic efforts and job demands would significantly associate with higher anxiety, depression, and low job

satisfaction scores. Hypothesis two predicted that work resources in the form of social support, decision authority, skill discretion, and rewards, would associate with significantly lower anxiety and depression scores, and higher job satisfaction.

These two hypotheses relate to relationship 1) as shown in DRIVE model in section 7.2. These main effects hypotheses have been shown to be well supported by the data previously presented. For example, in the correlations shown above in table 34, there were significant correlations in the predicted directions between virtually all work demands and resources and anxiety, depression and job satisfaction, that ranged from -.12 to .58. Only correlations between job demands and job satisfaction in university staff, and skill discretion and anxiety in university staff were non significant.

Likewise, these results are supported by the numerous regression calculations as presented in chapters 5 and 6, and as described in sections 5.9 and 6.9 where work demands and resources showed strong relationships with outcomes in the directions as predicted by the hypotheses.

Therefore it has been previously demonstrated that there is support for the assertion that work demands predict higher anxiety and depression and lower job satisfaction, and work resources predict lower anxiety and depression, and higher job satisfaction. The results of the research previously presented therefore, support hypothesis one and two, which are represented by relationship 1) of the DRIVE model, as shown in section 7.2.

7.5.5 Hypothesis three

Hypothesis three predicted that work demands and work resources would predict levels of perceived work stress. This hypothesis relates to relationship 2) as specified in the DRIVE model in section 7.2. Table 35 of correlations shows that job demands, extrinsic efforts, rewards, and decision authority all correlated with perceived stress in the predicted directions, with resources associating with low stress, and demands with high stress. However, while skill discretion showed no significant correlation with stress in nurses, it correlated positively with stress in university staff. In other words as skill discretion increases, stress also increases.

Table 36 shows the results of two regression analyses, with work demands predicting increases in stress in nurses and university staff, and accounting for 28.3%, and 44.4% of the variance in perceived stress.

Table 37 shows two regressions where decision authority, social support, and rewards predict decreases in stress in nurses, as do decision authority and support in university staff (reward was itself a non significant predictor in university staff but still contributes overall to the regression model). However, in both groups, skill discretion associated with significant *increases* in perceived stress, echoing the correlational results. This latter finding was unexpected, and the fact that it was found in both samples suggests it is not the result of the peculiarities of one particular employment sector. It is possible that having control over how to use ones own skills and competencies to complete tasks places more pressure or stress on individuals at work, as failure is more their own responsibility. It is easy to see how this could occur in nurses where life and death matters are at stake. The above variables account for 18% of the variance in perceived stress in nurses, and 18.7% in university employees.

The results in appendix 4.1 show that work demands and resources when combined, accounted for 33% of the variance in perceived job stress in nurses, and 49% of the variance in stress in university employees.

The data presented supports the hypothesis that work demands predict significant increases in perceived work stress, and the resources of social support, decision authority and rewards (the latter in nurses only) significantly predict decreases in perceived work stress. Therefore for these variables the hypothesis can be accepted, however, it can not be accepted for the proposed "resource" of skill discretion, because for perceived stress as a dependent variable, skill discretion associated with an increase in stress.

Table 36: Perceived work stress regressed against work demands in nurses and university employees.

Nurses: Work Stress	Beta Weight	Std. Error	Standardised Beta weight	t	Sig.
(Constant)	.854	.098		8.708	.000
Job Demands	.358	.052	.234	6.868	.000
Extrinsic Effort	.505	.046	.376	11.049	.000
Model: R = .532, R^2 = .283				F: 160.99	.001
University Staff: Work Stress	Beta Weight	Std. Error	Standardised Beta weight	T	Sig.
(Constant)	.410	.132		3.101	.002
Job Demands	.513	.078	.350	6.539	.000
Extrinsic Effort	.572	.078	.394	7.357	.000
Model: R = .666, R^2 = .444				F: 140.49	.001

Table 37: Perceived work stress regressed against work resources in nurses and university employees.

Nurses: Work Stress	Beta Weight	Std. Error	Standardised Beta weight	t	Sig.
(Constant)	3.458	.187		18.492	.000
Skill Discretion	.166	.077	.073	2.141	.033
Decision Authority	-.138	.048	-.101	-2.895	.004
Social Support	-.137	.049	-.107	-2.773	.006
Intrinsic Reward	-.477	.055	-.333	-8.708	.000
Model: R = .426, R^2 = .181				F: 44.18	.001
University Staff: Work Stress	Beta Weight	Std. Error	Standardised Beta weight	t	Sig.
(Constant)	2.499	.261		9.559	.000
Skill Discretion	.516	.109	.279	4.734	.000
Decision Authority	-.265	.103	-.161	-2.581	.010
Social Support	-.405	.082	-.300	-4.927	.000
Intrinsic Reward	-.155	.091	-.110	-1.713	.088
Model: R = .432, R^2 = .187				F: 17.02	.001

7.5.6 Hypothesis four

Table 38: Perceived Job Stress correlated with Anxiety, Depression and satisfaction

	Nurses		University Staff		
	HAD-A	HAD-D	HAD-A	HAD-D	Satis
Job Stress	.474**	.416**	.545**	.506**	-.284**

** = p > .001
* = p > .05

Hypothesis four predicted that perceived job stress would associate with anxiety, depression, and lower job satisfaction. The correlations in table 38 support this prediction, with significant positive correlations between perceived stress and anxiety and depression in nurses (.474 and .416 respectively) and anxiety, depression, and satisfaction in university staff (.545, .506, and -.284 respectively). These results

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therefore support the above hypothesis, which relates to relationship 3) as shown in the enhanced DRIVE model in section 7.2.

7.5.7 Hypothesis five

Hypothesis five predicted that perceived job stress would mediate the relationship between work demands and resources, and anxiety, depression, and satisfaction. This is a key prediction of the enhanced DRIVE model, because it proposes that perceived stress is the cognitive mechanism by which psychosocial stressors are transmitted into mental health and satisfaction outcomes. This hypothesis relates to relationship 4) as shown in the enhanced DRIVE model in section 7.2.

A total of 30 Sobel calculations were carried out using *Medgraph* (Jose, 2004) which specifically tested mediating relationships between Work demands and resources (Job demands, extrinsic efforts, decision authority, skill discretion, intrinsic reward, and social support) and outcomes (anxiety, depression, and satisfaction) via the effect of perceived job stress. Table 39 shows these calculations for anxiety, table 40 for depression, and table 41 for job satisfaction in university staff.

Table 39: Table of results for mediation effect of job stress between work demands and resources and anxiety

| | | Correlations with Anxiety | | | Mediated by perceived job stress | | |
		Total r	Direct r	Indirect r	Sobel Z	Mediation	sig.
Nurses:	Job Demands	.333	.169	.164	8.798	Partial	.001
Uni Staff:		.404	.126	.278	6.693	Partial	.001
Nurses:	Extrinsic Effort	.426	.254	.172	8.509	Partial	.001
Uni Staff:		.483	.242	.241	6.026	Partial	.001
Nurses:	Social support	-.344	-.228	-.116	-7.264	Partial	.001
Uni Staff:		-.326	-.162	-.164	-5.159	Partial	.001
Nurses:	Skill Discretion	-.214				None	
Uni Staff:		-.102				None	
Nurses:	Decision Auth	-.205	-.116	-.089	-5.503	Partial	.001
Uni Staff:		-.280	-.199	-.081	-2.714	Partial	.007
Nurses:	Rewards	-.406	-.256	-.150	-8.387	Partial	.001
Uni Staff:		-.314	-.199	-.115	-3.960	Partial	.001

All correlations significant to $p < .05$

Table 39 shows that perceived job stress significantly mediated the relationship between all work demands and resources and anxiety in nurses and university staff, except for skill discretion, where there were no significant effects in either sample.

All of these effects were partial, meaning that only a part of the relationship between the independent variable and anxiety was via the perceived job stress pathway.

For example, for job demands in nurses, the "total" correlation between JD and anxiety for nurses was .333. Of this total, .169 was direct from JD to anxiety, and .164 was via the mediation pathway. In other words, half the amount of explained variance in anxiety was explained by the direct pathway, and half was by the indirect (mediated) pathway. In order for full mediation to occur, the direct correlation should drop to a non-significant level when the indirect pathway is taken into account, meaning that nearly all of the total correlation is explained by the indirect mediated pathway.

For the university employee sample for job demands, it can be seen that of the total correlation of .404, .278 of that came from the indirect pathway, meaning that two thirds of the relationship between job demands and anxiety was via the perceived job stress pathway.

For skill discretion, the lack of significant mediation means that virtually all of the relationship between IV and DV was from the direct and non-mediated pathway. However, all other calculations were significant and as can be seen from the table, the mediated pathway explained between two fifths and two thirds of the total r between each IV and anxiety. All directions and sizes of relationship were similar between the two sample groups (nurses and university) and all Sobel effects except one were significant in excess of $p < .001$.

The direction of the sign also shows the direction of the relationship between IV, job stress, and anxiety, with the work demands associating with increases in perceived stress, which associated with increases in anxiety, and work resources associating with low levels of perceived stress, which associated with low levels of perceived anxiety.

Table 40: Table of results for mediation effect of job stress between work demands and resources and Depression

| | | Correlations with Depression | | | Mediated by perceived job stress | | |
		Total r	Direct r	Indirect r	Sobel Z	Mediation	sig.
Nurses:	Job Demands	.257	.104	.153	8.293	Partial	.001
Uni Staff:		.352	.084*	.268	6.392	Full	.001
Nurses:	Extrinsic Effort	.397	.241	.156	7.724	Partial	.001
Uni Staff:		.477	.268	.209	5.231	Partial	.001
Nurses:	Social support	-.400	-.308	-.092	-6.706	Partial	.001
Uni Staff:		-.454	-.323	-.131	-.4.829	Partial	.001
Nurses:	Skill Discretion	-.260	-.236	-.024	-2.063	Partial	.039
Uni Staff:		-.120	-.183	.063	2.084	Partial	.037
Nurses:	Decision Auth	-.235	-.163	-.072	-5.327	Partial	.001
Uni Staff:		-.304	-.229	-.075	-2.694	Partial	.007
Nurses:	Rewards	-.425	-.310	-.115	-7.395	Partial	.001
Uni Staff:		-.378	-.274	-.104	-3.876	Partial	.001

* = non significant

For comparisons of the mediating effects of perceived stress between demands and resources and levels of depression (table 40) the results are largely similar to those for anxiety. Significant mediating effects for perceived stress were found between all work demands and resources (including skill discretion) and depression, and all directions of mediating relationship (apart from SD) were the same as for the anxiety comparisons (i.e. demands associate with higher perceived stress, which associates with higher depression score, and vice versa for work resources). In both samples for depression, the mediated perceived stress pathway amounted to between one third and three quarters of the relationship between the various independent variables and depression.

The table above also shows a full mediation effect for perceived stress between job demands and depression in university staff. This means that virtually all of the relationship between job demands and depression in university staff was via the mediated or indirect pathway, so that when the indirect pathway is taken into account, the direct relationship becomes non-significant.

Skill discretion is slightly different to the other variables in that for university staff, while it associated with a direct effect decrease in depression score overall, in the mediated pathway via work stress it associated with a slight *increase* in depression. This is because in the mediated pathway an increase in skill discretion associated with an increase in work stress in university staff, and this associated with an increase in depression. This latter trend can be seen in the correlations in table 34

for university staff, and the regressions in table 37 for both samples, where skill discretion associated with higher levels of work stress. This could be because having more skill discretion itself leads to more stress, or because the kind of jobs that are likely to have more skill discretion, are also inherently more likely to be stressful. Therefore these mixed results suggest that skill discretion typically associates with improved mental health, but not when it relates to increases in perceived stress.

Table 41: Table of results for mediation effect of job stress between work demands and resources and job satisfaction in university staff

| | | Correlations with Satisfaction | | | Mediated by perceived job stress | | |
		Total r	Direct r	Indirect r	Sobel Z	Mediation	sig.
Uni Staff:	Job Demands	-.088*				None	
Uni Staff:	Extrinsic Effort	-.205	-.052*	-.153	-3.519	Full	.001
Uni Staff:	Social support	.485	.438	.047	-2.461	Partial	.014
Uni Staff:	Skill Discretion	.371	.413	-.042	-2.025	Partial	.043
Uni Staff:	Decision Auth	.449	.414	.035	2.348	Partial	.019
Uni Staff:	Rewards	.667	.637	.030	2.386	Partial	.017

Finally for the relationship between demands and resources and level of job satisfaction in university staff, there were significant mediation effects via perceived stress for all IVs except job demands, including a full mediation effect from extrinsic effort. However, apart from extrinsic effort, in comparison to the size of the indirect correlations in the previous two tables, and the size of the Sobel Z values, the mediation effect via stress was a lot smaller for job satisfaction than for the other dependent variables, with most of the relationship between IVs and satisfaction accounted for by the main direct effect. Skill discretion again had an unpredicted result on satisfaction via stress, resulting in a reduction in satisfaction levels via the mediated pathway, but this may have occurred for the same reasons as those described above for the depression comparisons.

However, apart from skill discretion and the non significant mediated effect between demands and satisfaction (because there is no significant direct effect correlation) all other demands and resources show mediated effects that are significant, and in the expected directions.

The large number of significant mediating effects of perceived job stress between work demands and resources, and anxiety, depression, and job satisfaction, mean that the experimental hypothesis five can be accepted, as perceived job stress does indeed

appear to form one of the pathways by which some of the effect of work demands and resources relate to health outcomes. This is an important finding for the support of the DRIVE model, as it would appear that the perception of how stressed an individual feels or claims to be, may well be an important mental and affective mechanism by which stressful conditions are transmitted to health outcomes. However, as full mediation was not found for most independent variables, this suggests that there are other mechanisms (either direct, or mediated by other variables) that may relate resources and demands, and outcomes.

7.5.8 Hypothesis six

Hypothesis six predicted that work resources would moderate the effect of work demands on perceived stress. This is similar to the predictions made in previous studies about the DCS and ERI models, where control, social support, and rewards, were hypothesised to moderate the effect of job demands and extrinsic efforts on health outcomes, however in this case the dependent variable is perceived stress. This hypothesis relates to relationship 5) as expressed in the enhanced DRIVE model in section 7.2.

However, a number of regression analyses found no evidence for interactive effects of work resources on work demands in the prediction of perceived job stress. While this was not a key prediction of the model, it would have been interesting to find that positive work conditions would make individuals more likely to perceive work conditions as less stressful. However, it appears that the relationship between work demands and perceived stress, did not vary according to the level of work resources, and therefore hypothesis six cannot be accepted.

7.5.9 Hypothesis seven

Hypothesis seven predicted that work resources would moderate the effects of work demands on health outcomes, specifically that levels of control and social support will moderate the effect of job demands on outcomes, and that reward would moderate the effect of extrinsic effort. This prediction relates to relationship 6) as shown in section 7.2. Like hypotheses one and two, this hypothesis has already been explored and discussed with these sample groups as described in chapters 5 and 6. Results from the

previous studies have shown that decision authority control significantly buffered the effect of job demands in the prediction of anxiety in nurses, and buffered job demands in the prediction of depression in university staff (see sections 5.8.5.2 and 6.8.6). However, no further interactions between work demands and resources were found. This hypothesis tested some of the major predictions of the DCS (Karasek & Theorell, 1990) and ERI (Siegrist, 1996) models that were integrated into the DRIVE model. However, these predictions aren't central to the latter model, with more emphasis placed on main effects of the various factors, and possible interactions between work characteristics and individual difference factors.

Therefore hypothesis seven can be accepted for the relationship between job demands and decision authority, but cannot be accepted for the relationships between other resources and demands.

7.5.10 Hypothesis eight

Hypothesis eight predicted that work resources would significantly moderate the effect of perceived job stress in the prediction of health outcomes. This prediction relates to relationship 7) of the DRIVE model as shown in section 7.2. Interactive regressions were carried out between perceived job stress and social support, decision authority, skill discretion, and rewards, in the prediction of anxiety, depression, and job satisfaction. Significant buffering effects were found for social support in the prediction of depression and job satisfaction in university staff (see appendix 4.2). These buffering effects are shown in the two plots below.

Plot 4 shows that while depression increased as job stress increased in both the low and high social support groups, it increased noticeably more in the low social support group, hence showing a buffering effect of social support on relationship between stress and depression in university employees. Plot 5 shows that job satisfaction decreased markedly as perceived job stress increased in those with low social support, however in those with high levels of social support, job satisfaction stayed virtually the same as job stress increased, showing that social support buffered the effect of high job stress on job satisfaction.

Plot 4: Significant buffering effect of social support on the effect of perceived job stress on depression in university employees.
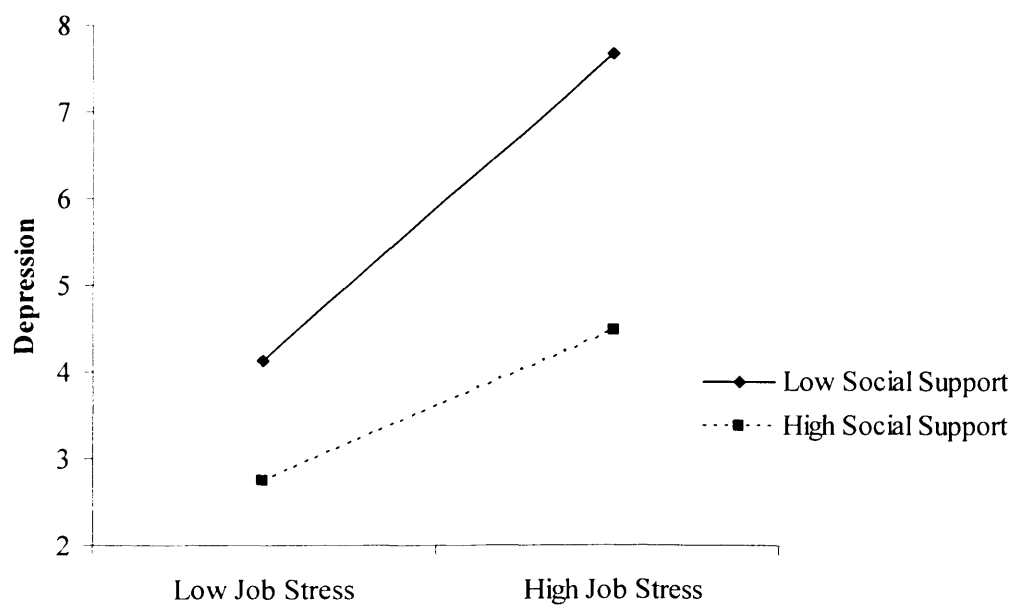
Plot 5: Significant buffering effect of social support on the effect of perceived job stress on job satisfaction in university employees.
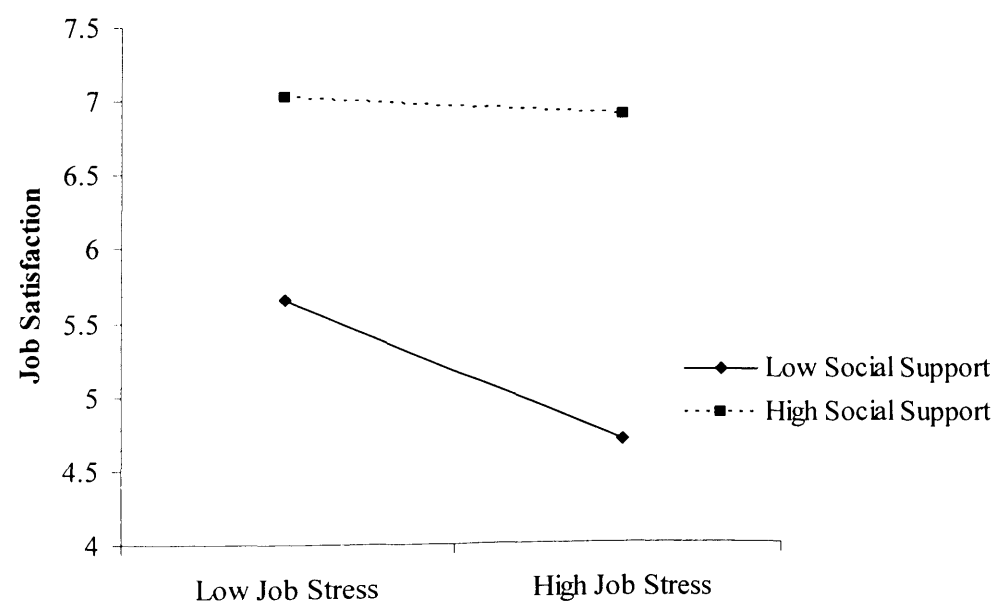
Therefore, hypothesis eight can be accepted for depression and job satisfaction for the work resource of social support in the university sample. However, the other work resources show no buffering effects in either university or nursing samples, and for these factors the experimental hypothesis cannot be accepted.

7.5.11 Hypothesis nine

Hypothesis nine predicted that personal resources and demands would be significantly associated with perceived stress, with personal resources (positive coping and attributions) associating with lower perceived stress, and personal demands (intrinsic effort, negative ways of coping, and attributions) associating with higher perceived job stress. This hypothesis relates to relationship 8) of the DRIVE model in section 7.2.

The correlations in table 35 show that positive coping methods (problem focused coping and seeking advice) did not correlate significantly with job stress in either sample group, and only internal attributions for positive events had a small significant correlation with perceived stress in nurses. By contrast the "negative" coping methods of self blame, wishful thinking, and escape/avoidance, all showed significant positive correlations with perceived stress for both samples, with correlations ranging from between .14 to .27. Intrinsic effort also significantly positively correlated with perceived stress, with correlations of .392 in nurses, and .599 in university employees. Stable and global attributions for negative events, also showed small significant positive correlations with perceived stress in nurses.

Therefore, while there was little evidence for significant relationships between personal resources and perceived stress, there was good evidence for significant relationships between personal demands and perceived stress, and all relationships were in the predicted directions. Therefore the hypothesis can be accepted for personal demands, but it cannot be accepted for personal resources.

7.5.12 Hypothesis ten

Hypothesis ten predicted that personal demands would be associated with higher levels of anxiety and depression and lower satisfaction, and personal resources would be associated with lower anxiety and depression, and higher job satisfaction. This prediction relates to relationship 9) of the DRIVE model as shown in section 7.2. Like hypotheses one, two and seven, this hypothesis has already been tested numerous times in the preceding research. Table 34 shows significant correlational evidence for the relationships between outcome variables and the personal demands of negative

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coping styles and intrinsic efforts, as do the regressions in tables 14, 16, 18, 26, 27, 28, 30, and 31, and all of these results were in the predicted directions for university employees and nurses. Also, while the evidence for the relationships between negative attributional styles and outcomes was not strong from the correlational data, a number of the regression calculations in the above tables showed that global, stable, and internal attributions for negative events have variously associated with negative outcomes in both sample groups.

While the correlational data for the relationships between personal demands and outcomes was good, there was mixed correlational support for the relationships between personal resources and outcomes. While internal and stable attributions for positive events showed small but significant correlations in table 34 in the predicted directions for all outcomes for both samples, problem focused coping only significantly associated with depression and satisfaction in university staff. However, results from the numerous multiple regression calculations shown in sections 5.8 and 6.8, showed that there were consistent main effect relationships between problem focused coping and the outcomes in the predicted directions, for both sample groups.

Therefore, as previously discussed in chapters 5 and 6, there is strong evidence for the relationships between personal demands and health outcomes, and mixed but fairly consistent support for the relationships between personal resources and outcomes. Therefore hypothesis ten can be accepted for personal demands in both sample populations, and can be tentatively accepted for personal resources on the basis of the mixed findings, however more research needs to be done in this area.

7.5.13 Hypothesis eleven

Hypothesis eleven predicted that personal resources and demands would moderate the effect of work demands on perceived stress. This prediction relates to relationship 10) of the DRIVE model (see section 7.2) and this hypothesis was used to test the idea that individual differences can affect the relationship between workplace demands, and levels of perceived stress i.e. to see if personal resources buffered the effect of work demands on perceived stress, or if personal demands exacerbated the effect of demands on perceived stress. This was a fairly important prediction of the model in section 7.2, and is a conceptual stage that is akin to primary appraisal. However, of the moderated regression analyses between work demands and personal

demands/resources in the prediction of perceived stress, only three interactive effects were found. The regression tables for these can be found in appendix 4.3, and the plots and descriptions of the relationships follow below.

Plot 6: Interaction of Decision Authority and Escape/Avoidance in prediction of Job Stress in nurses
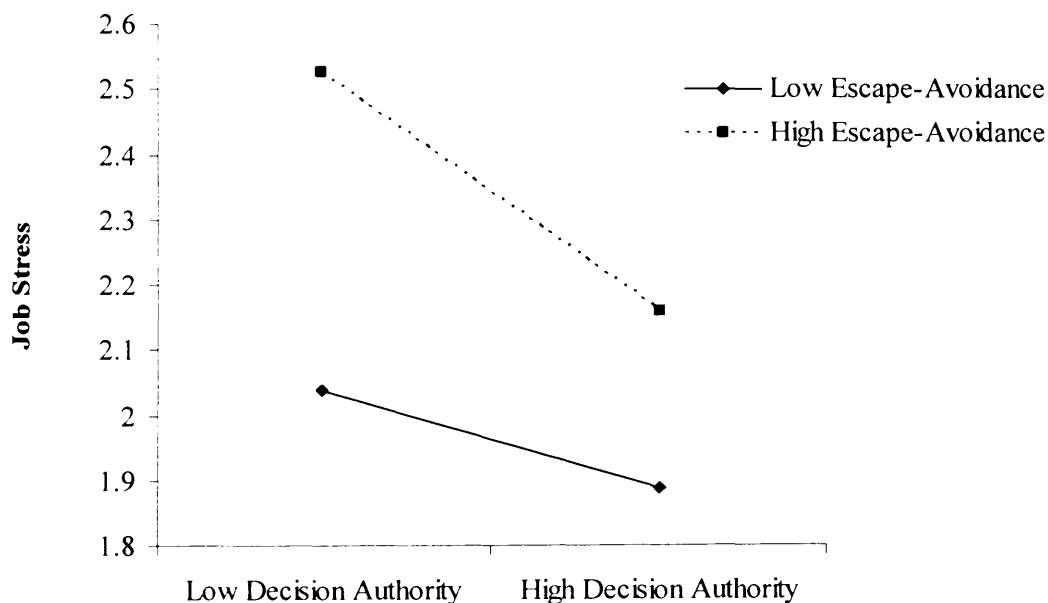
As can be seen in the above plot, those nurses with high escape-avoidance coping suffered from higher perceived stress than those with low escape/avoidance coping, however this effect was enhanced in those with low decision authority control at work. Therefore the negative coping method of escape-avoidance appeared to exacerbate the relationship between low decision authority and job stress. This relationship was not found in the university sample.

Plot 7: Interaction of skill discretion and problem focused coping in the prediction of Job Stress in university employees
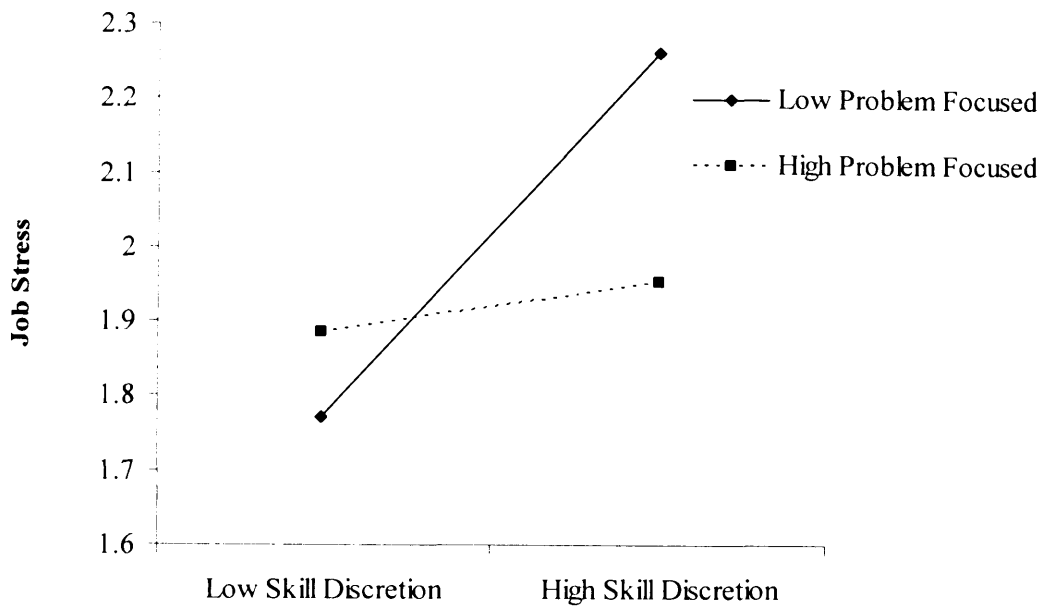
This plot is interesting because it shows that those with high levels of problem focused coping had more perceived stress than those with low problem focused coping in conditions of low skill discretion. This suggests that those who typically used positive, planful coping or problem solving, were more stressed than those who used low problem focused coping, when they were not given the control to use their own skills to perform tasks.

For both high and low problem focused coping users, more skill discretion associated with increases in stress in university employees (these relationships were found in numerous previous statistics, see section 7.5.5) however the increase in those with high problem focused coping was marginal, but the increase in those with low problem focused coping was much larger. This suggests that those who were allowed a large amount of skill discretion to perform tasks, but didn't use (or have access to) problem focused coping, found work much more stressful than those who did use problem focused coping in conditions of high skill discretion. This relationship was not found in university employees.

Plot 8: Interaction of extrinsic effort and stable attributions for negative events in nurses
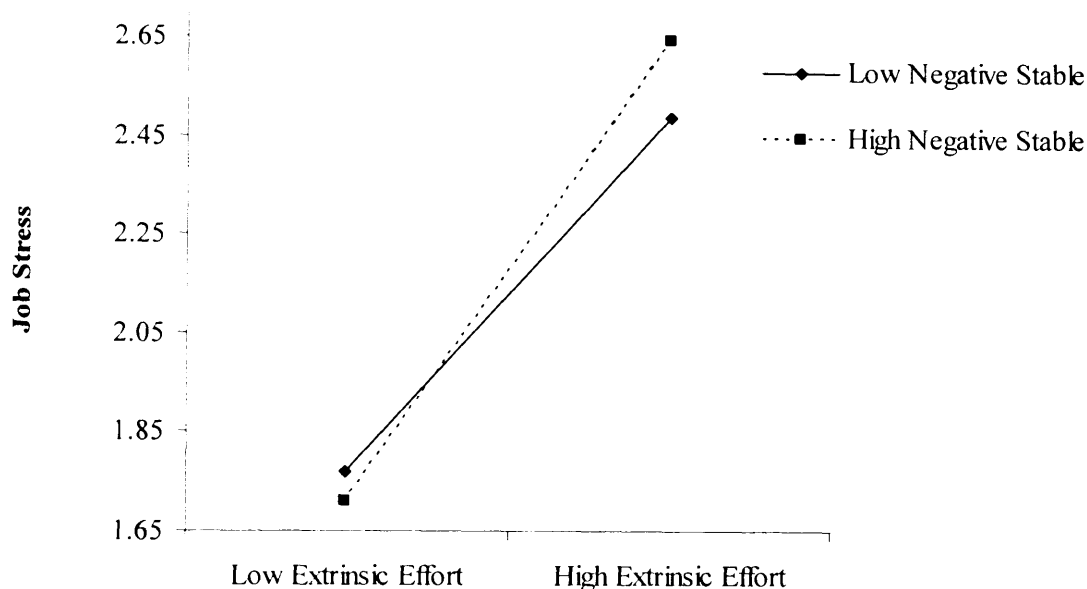
Finally, this plot for the interaction between extrinsic effort and stable negative attributions, suggests that when extrinsic effort was low, there was little difference in perceived stress between those with low and high stable negative attributions. However, when extrinsic effort (or external pressures) was high, those with high levels of stable negative attributions perceived more job stress (while this trend appears small on the graph, it is statistically significant). Therefore stable negative attributions exacerbated the negative relationship between extrinsic effort and perceived job stress in nurses. This relationship was not found in university employees.

Therefore, while there were several significant examples of the way in which personal resources and demands could moderate the relationship between work demands and perceived stress in certain samples (in this case low levels of work resources are treated as demands) these effects were found to be few in comparison to the large amount of non-significant interactive relationships found. Also, none of the three interactive effects were found to be replicated in other sample groups. So for the particular examples given above, the experimental hypothesis can be accepted (and indeed it is important to accept that individual differences *can* moderate the effect of work characteristics on subjective perceptions) however for the majority of possible

moderating effects of personal resources and demands on work resources and demands, the experimental hypothesis cannot be accepted.

7.5.14 Hypothesis twelve

Hypothesis twelve predicted that personal resources and demands would moderate the effects of perceived stress on anxiety, depression and job satisfaction. This prediction is represented by relationship 12) in the DRIVE model as shown in section 7.2. Only two significant interactive effects were found between perceived stress and personal demands/resources in the prediction of outcomes. These were significant interactions between stress and intrinsic effort in the prediction of depression in nurses, and between stress and self blame in the prediction of depression in university staff. Neither of these interactions were found for other samples or dependent variables. The regression data for these interactions can be found in appendix 4.4 and the interaction plots are shown below.

Plot 9: Interaction of stress and intrinsic effort in the prediction of depression in nurses.
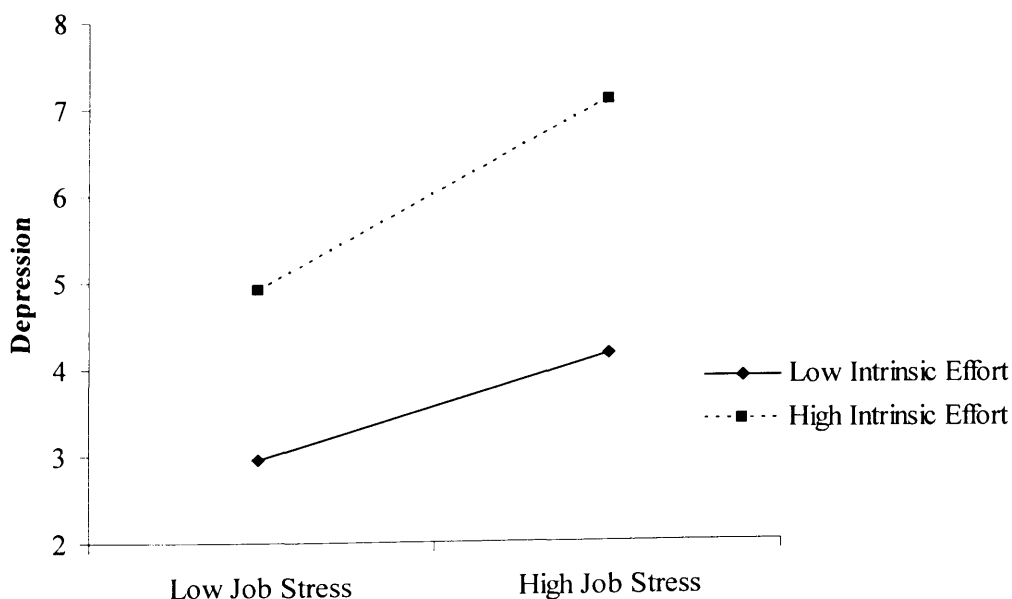
This plot shows that depression was higher for those with high levels of intrinsic effort, and that while depression increased in conditions of high perceived stress in both low and high intrinsic effort conditions, there was significantly more of an

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increase in depression, in high intrinsic effort individuals in conditions of high perceived job stress. This suggests that high levels of intrinsic effort exacerbated the effect of perceived job stress on depression.

Plot 10: Interaction between perceived job stress and self blame in the prediction of depression in university staff.
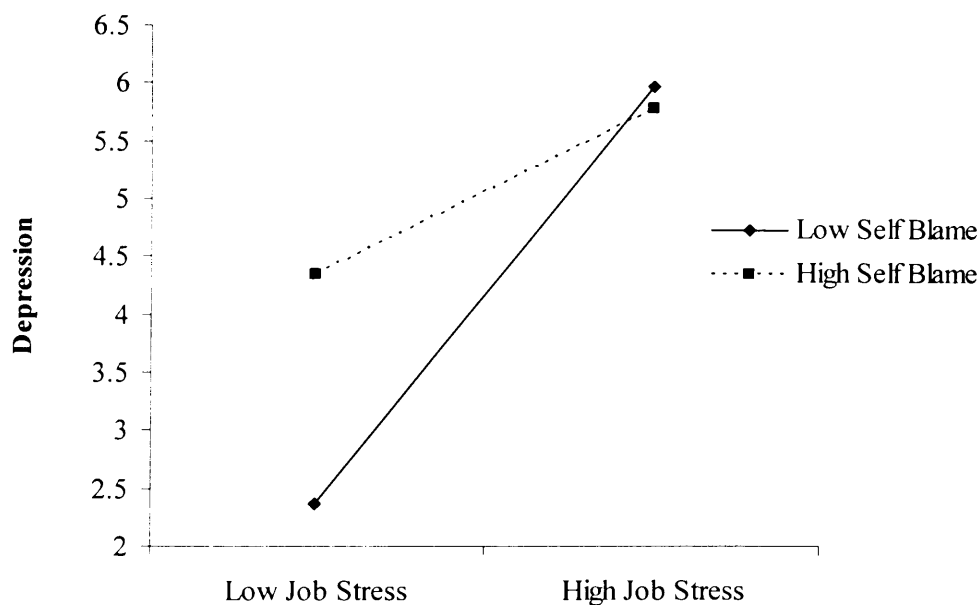
This plot shows that in conditions of high perceived stress in university staff, both those with low and high levels of self blame suffered high levels of depression. However, in conditions of low perceived stress, those with high self blame were significantly more likely to be more depressed than those with levels of low self blame coping. Perhaps some kind of ceiling effect was reached in depression when perceived stress was high, so that the possible effect of self blame was perhaps overridden, however in circumstances of low perceived stress, those who used self blame coping, suffered significantly higher levels of negative mental health.

While the above two interaction effects support the hypothesis, the large number of non-significant interaction effects do not support it. Therefore while the hypothesis can be accepted for the above comparisons, it cannot be accepted for the rest (and majority) of the individual differences and perceived stress interaction effects.

7.5.15 Hypothesis thirteen

Hypothesis thirteen predicted that personal resources and demands would moderate the effects of workplace demands and resources on anxiety, depression and job satisfaction. This prediction relates to relationship 11) of the DRIVE model as specified in section 7.2. Aspects of this hypothesis have been tested in these samples already as previously reported in chapters 5 and 6, however, previously only interactions between work demands (job demands and extrinsic efforts) and personal resources (positive coping and attributions) were tested to find any possible buffering effects. It was not tested to see if low levels of personal resources (which can be said to be a form of work demands) interact with personal resources, nor was it tested if work demands or resources interact with personal demands. A series of interactions investigating these relationships were carried out for all dependent variables and twenty four separate interactive regressions were found to be significant across both university and nursing samples.

Plots for these interactions can be found in appendices 4.5.1 to 4.5.24 and due to the number of significant tests, only a short summary of the findings for each regression will be included in the following text. All interactions are significant to at least p < .05, with most significant to p < .01.

Extrinsic effort x self blame → job satisfaction in university employees

In high self blame conditions, satisfaction was low for both low and high extrinsic effort, however in low self blame conditions, satisfaction was far higher for low extrinsic effort individuals. Therefore high self blame exacerbated the negative effect of high extrinsic effort on job satisfaction. See appendix 4.5.1 for plot.

Extrinsic effort x intrinsic effort → depression in nurses

Depression was significantly higher both in conditions of high extrinsic and intrinsic effort (compared to low extrinsic and intrinsic effort) however the negative effect of extrinsic effort on depression in nurses was particularly acute in conditions of high intrinsic effort. Hence high intrinsic effort exacerbated the effect of extrinsic effort on depression. See appendix 4.5.2.

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Decision authority x problem focused coping → job satisfaction in university employees

When there was low decision authority, satisfaction was equally low in conditions of both low and high problem focused coping. However, in high decision authority, satisfaction increases were significantly greater in those who used high levels of problem focused coping. Therefore high problem focused coping significantly positively moderated the positive effect of decision authority on job satisfaction in university staff. See appendix 4.5.3.

Decision authority x problem focused coping → depression in university employees

In conditions of low decision authority, depression was high regardless of level of problem focused coping. Depression scores decreased as decision authority increased in both high and low PFC groups, however depression decreased significantly more in those with high PFC. Therefore high PFC positively moderated the effect of decision authority on depression in university employees. See appendix 4.5.4

Decision authority x problem focused coping → depression in nurses

The interaction is the same comparison as the above regression but in a nursing sample, however the results were somewhat different. In those with high decision authority, depression was low in both those with high and low problem focused coping. However in conditions of low decision authority, those with high problem focused coping were far less likely to be depressed compared to those with low problem focused coping. Therefore PFC had little effect on the relationship between DA and depression when DA was high, but it had a significant buffering effect on the relationship between low decision authority and depression. See appendix 4.5.5.

Decision authority x escape/avoidance → depression in nurses

Low levels of decision authority and high levels of escape/avoidance coping associated with high levels of depression in nurses. However, the relationship between low decision authority and depression was significantly stronger when

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escape/avoidance coping was high. Therefore EA coping significantly exacerbated the relationship between low decision authority and depression in nurses. See appendix 4.5.6.

Decision authority x self blame → depression in nurses

The relationship between these variables in predicting depression in nurses is identical to the relationship between DA and EA in the above comparison. Low DA and high SB associated with high depression, and the relationship between low DA and depression was stronger when self blame was high. Therefore SB coping significantly exacerbates the relationship between low DA and depression in nurses. See appendix 4.5.7.

Decision authority x wishful thinking → depression in nurses

The relationship between these variables in the prediction of depression was again very similar to those above. As can be seen from the plot in appendix 4.5.8, low decision authority associated with significant increases in depression score, and this relationship was stronger in those with high levels of wishful thinking.

Decision authority x stable negative attributions → depression in university staff
Decision authority x global negative attributions → depression in university staff

The relationships between stable and global attributions for negative events and decision authority in the prediction of depression in university staff showed similar plots, as can be seen from appendices 4.5.9 and 4.5.10. In conditions of high decision authority, both high and low levels of stable and global negative attributions had little effect on the relationship between DA and depression, and levels of depression were low. However, when decision authority was low (which constitutes a workplace demand) levels of depression were significantly higher in those with high levels of global and stable attributions about negative events. Therefore global and stable negative attributions exacerbated the negative relationship between low levels of DA and depression in university staff.

Intrinsic reward x problem focused coping → depression in nurses

As seen in appendix 4.5.11, in those with high levels of reward, depression was low in those with both high and low levels of problem focused coping. However, in conditions of low reward, those with high problem focused coping were significantly less likely to show high depression scores. Therefore high levels of PFC appeared to buffer the effect of low rewards (a demand) on depression in nurses.

Intrinsic reward x escape/avoidance → anxiety in nurses
Intrinsic reward x self blame → anxiety in nurses
Intrinsic reward x wishful thinking → anxiety in nurses

As seen in appendices 4.5.12, 4.5.13, and 4.5.14, all three of the above significant interactions showed almost identical relationships. The plots show that anxiety is lower in those with high levels of intrinsic reward, and higher in those with high levels of the negative coping style (EA, SB, & WT). However, in conditions of high intrinsic reward, anxiety was significantly lower in those with low levels of negative coping. Therefore, negative coping styles and rewards interacted significantly, so that nurses with high rewards and levels of negative coping were by far the least likely to suffer from anxiety.

Intrinsic reward x internal positive attributions → anxiety in nurses

The regression plot shown in appendix 4.5.15, shows that nurses with high rewards appeared to suffer lower levels of anxiety. Also that in conditions of low rewards, there was little difference between those with high and low levels of internal attributions for positive events, but in conditions of high rewards, those with high levels of internal attributions for positive events were significantly lower in levels of anxiety. Therefore the positive effect of rewards on anxiety were increased in conditions of positive internal attributions.

Skill discretion x stable negative attributions → anxiety in university employees
Skill discretion x stable negative attributions → depression in university employees

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As can be seen from appendices 4.5.16 and 4.5.17, the interactive regression plots for both of the above regressions show similar patterns. It can be seen that for both anxiety and depression, in those who had low levels of stable attributions for negative events, increasing skill discretion predicted increased anxiety and depression.

However, in those with high levels of stable attributions for negative events, the opposite was true, i.e. that negative mental health decreased as levels of skill discretion increased. This is interesting, as it appears to show that those who believed negative events were stable, had far better mental health when they had control of events, but higher anxiety and depression, when they felt they had no control.

By contrast, those who believed that negative events were unstable (low levels of stable negative attributions) were *more* anxious and depressed as their beliefs in their ability to control events increased.

Skill discretion x global positive attributions → satisfaction in university employees

The plot in appendix 4.5.18, shows that satisfaction increased as skill discretion increased, however, those with low skill discretion and high positive global attributions had lower satisfaction than those with low skill discretion and low levels of positive global attributions. Furthermore, those with high positive global attributions and high skill discretion had *higher* satisfaction than those with low positive global attributions but low skill discretion. In other words, when control was low, those who believed good things happen only in the present domain were more satisfied, and when control is high, those who believed good things happen in all domains were more satisfied.

Skill discretion x seek advice → depression in university employees

The significant regression plot in appendix 4.5.19 shows that in individuals with low levels of advice seeking, levels of depression were the same, regardless of level of skill discretion, however, in those with high levels of seeking advice, low control predicted high levels of depression, and high control predicted low depression. High levels of advice seeking was only beneficial in university employees therefore, when they had control over how to use their skills.

Social support x global negative attributions → depression in nurses.
Social support x stable negative attributions → depression in nurses.

The plots shown in appendices 4.5.20 and 4.5.21 show that these two regressions display identical relationships between support, and global and stable attributions for negative events in the prediction of depression in nurses. Both plots show that increased levels of social support predicted lower levels of depression. Also, that at high levels of social support, there was no difference in depression between those of high and low negative global/stable attributions, however, that in conditions of low social support, those with high levels of negative attributions (i.e. stable and global attributions for negative events) were significantly more likely to be depressed. Therefore, high levels of negative attributions exacerbated the effect of low social support (a work demand) on depression in nurses.

Social Support x stable positive attributions → anxiety in university employees
Social Support x stable positive attributions → depression in university employees

The appendices 4.5.22 and 4.5.23 again show very similar patterns for the above two interactive regressions. In both plots, levels of negative mental health (anxiety and depression) were equally high in conditions of low social support, for both those with high and low levels of stable attributions for positive events. However in conditions of high social support, anxiety and depression were significantly lower in those with high levels of stable attributions for positive events. Therefore high levels of stable attributions for positive events, positively moderated the positive effect of social support on depression and anxiety in university employees.

Social support x wishful thinking → anxiety in university employees

Finally, the plot in appendix 4.5.24 shows that anxiety decreased as social support increased in both those with high and low levels of wishful thinking coping, but that decreases in anxiety were far greater as social support rose in those with low levels of wishful thinking compared to those with high wishful thinking, i.e. the positive effect of social support was far greater when university employees didn't use wishful thinking coping.

All of the above interactive regression plots relate to hypothesis thirteen. The large amount of regressions above indicate that there is significant support for the prediction that individual difference variables (personal resources and demands) interact with work demands and resources in the prediction of anxiety, depression, and satisfaction. Indeed many of these individual effects were moderators in that they reduced or increased the "effect" of independent variables in the prediction of health outcomes. These results are almost exclusively in the directions that would be expected: with personal resources relating to increases in the positive effect of work resources on outcomes (for example appendix 4.5.3 where problem focused coping increased the positive effect of decision authority on job satisfaction); personal resources related to decreases in the negative effect of work demands on outcomes, (for example appendix 4.5.5 where PFC buffered the negative effect of low control on depression); and personal demands related to increases in the negative effect of work demands (for example appendix 4.5.2 where intrinsic effort increased the effect of extrinsic effort on depression); and where personal demands decreased the beneficial effects of work resources on outcomes (e.g. appendix 4.5.9 where high negative stable attributions reduced the beneficial effect of decision authority on depression).

These data therefore provide strong support for the proposed interactions between personal resources and demands, and work resources and demands in the prediction of anxiety, depression, and job satisfaction in nurses and university employees. These predictions (which correspond to relationship 11) as specified in the DRIVE model in section 7.2) were previously investigated in the studies described in chapters 5 and 6, however, due to the less exhaustive combinations of interactions tested, little evidence for these effects were initially found. These findings are important for supporting this key aspect of the DRIVE model, and show that individual characteristics can have very significant effects on influencing the strength and directions of effect of workplace characteristics on health outcomes.

7.5.16 Hypothesis fourteen

Hypothesis fourteen was the final hypothesis tested, which predicted that all independent variables (work demands and resources, personal demands and resources, and perceived job stress) would account for a significant percentage of the variance in anxiety, depression, and job satisfaction when entered into the same regression

equation. Three sets of hierarchical multiple regression analyses were conducted to test this hypothesis for anxiety, depression, and job satisfaction, as shown below in tables 42, 43, and 44. The university employee and nursing samples were combined to give the largest sample size and power, and to give the broadest sample for the comparison of multiple independent variables.

For the anxiety, depression, and satisfaction regressions, the work demands and resources of job demands, extrinsic efforts, decision authority, skill discretion, social support, and rewards were entered in stage one of the regression by stepwise selection. Perceived job stress was entered in stage two, and the personal resources and demands of positive and negative coping and attributional styles were entered by stepwise selection in stage three. Predictors made non significant by the entry of subsequent variables were then removed to give the final regression equations which are shown below.

For the anxiety regression, stepwise selection automatically entered the variables in the following order: Extrinsic effort; Reward; Job demands; Skill discretion; Social support; Perceived job stress; Intrinsic effort; Self blame; Problem focused coping; Seeking advice; Wishful thinking. Extrinsic effort was made a non-significant predictor by the inclusion of intrinsic effort, and was removed in the final stage to derive the final regression table for anxiety. Rewards, Skill Discretion, Social Support, and Problem Focused Coping associated with lower anxiety scores, and all other variables associated with higher anxiety scores.

Table 42: Anxiety, regressed against personal and workplace demands and resources, and perceived job stress, for nursing and university employee samples combined.

Anxiety	Beta Weight	Std. Error	Standardised Beta weight	t	Sig.
(Constant)	5.357	.784		6.831	.000
Intrinsic Reward	-.313	.186	-.047	-1.683	.093
Job Demands	.583	.191	.083	3.047	.002
Skill Discretion	-1.032	.240	-.107	-4.299	.000
Social Support	-.494	.170	-.081	-2.910	.004
Perceived Job Stress	.940	.132	.201	7.125	.000
Intrinsic Effort	1.894	.151	.341	12.508	.000
Self Blame	1.333	.183	.213	7.280	.000
Problem Focused Coping	-.902	.232	-.096	-3.890	.000
Seek Advice	.496	.179	.070	2.773	.006
Wishful Thinking	.304	.155	.055	1.968	.049
Model: R = .719, R² = .516				F: 101.17	.001

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It can be seen that by std beta weight, intrinsic effort was the most significant predictor, followed by self blame, perceived stress, skill discretion, and problem focused coping. It is interesting that perceived stress was a better predictor of anxiety, than is the more "objective" variable of job demands. Intrinsic rewards were not found to be a significant individual predictor, but contributed significantly to the overall regression model. No attributional style variables were significant predictors. These variables account for 51.6% of the variance in anxiety for the combined nurses and university employee population, with the overall regression significant to p < .001.

For the depression regression, stepwise selection entered the variables in the order: Rewards; Extrinsic effort; Social support; Skill discretion; Job demands; Perceived job stress; Intrinsic effort; Escape/avoidance; Internal attributions for positive events; Self blame; Problem focused coping. Job demands was made a non-significant predictor by the inclusion of perceived stress so it was removed in the final stage. Rewards, social support, skill discretion, internal attributions for positive events, and problem focused coping significantly associated with low depression scores, with all other variables predicting higher depression.

Table 43: Depression, regressed against personal and workplace demands and resources, and perceived job stress, for nursing and university employee samples combined.

Depression	Beta Weight	Std. Error	Standardised Beta weight	t	Sig.
(Constant)	7.347	.762		9.639	.000
Intrinsic Reward	-.569	.155	-.106	-3.673	.000
Extrinsic Effort	.329	.156	.063	2.101	.036
Social Support	-.761	.139	-.153	-5.467	.000
Skill Discretion	-.788	.197	-.101	-4.001	.000
Perceived Job Stress	.657	.110	.174	5.966	.000
Intrinsic Effort	1.386	.129	.309	10.775	.000
Escape Avoidance	.617	.201	.085	3.063	.002
Internal attributions: Positive	-.310	.100	-.078	-3.110	.002
Self Blame	.392	.147	.077	2.665	.008
Problem Focused Coping	-.477	.183	-.063	-2.599	.009
Model: R = .701, R^2 = .491				F: 91.69	.001

Intrinsic Effort was again found to be the most important predictor by std beta weight by some margin, followed by perceived stress, social support, and intrinsic reward. These variables accounted for 49% of the variance in depression outcome, with the regression significant to p < .001.

Finally, for job satisfaction in university staff, stepwise selection was again used in three stages, with the significant independent variables emerging in the order: Skill discretion; Social support; Intrinsic reward; Problem focused coping; Seek advice; Escape/avoidance; Stable attributions for negative events; Global attributions for positive events; Global attributions for negative events. Therefore attributional behaviours were more important predictors in job satisfaction, than for the other dependent variables, suggesting that while these factors were less important in predicting negative health outcomes, they appeared to play a more important role in the prediction of positive outcomes like job satisfaction.

Table 44 Job satisfaction, regressed against personal and workplace demands and resources, and perceived job stress, for university employees

Satisfaction	Beta Weight	Std. Error	Standardised Beta weight	t	Sig.
(Constant)	- 060	.724		-.082	.934
Skill Discretion	.485	.174	.124	2.790	.006
Social Support	.560	.147	.189	3.797	.000
Intrinsic Reward	1.485	.151	.491	9.867	.000
Problem Focused Coping	.371	.204	.083	1.812	.041
Seek Advice	-.496	.164	-.140	-3.029	.003
Escape Avoidance	-.523	.180	-.130	-2.897	.004
Stable Attributions: Negative	.195	.094	.100	2.075	.039
Global Attributions: Positive	.187	.103	.103	1.811	.071
Global Attributions: Negative	-.248	.107	-.144	-2.311	.022
Model: R = .701, R^2 = .491				F: 91.69	.001

Intrinsic rewards was the most important predictor of satisfaction by std. beta weight, followed by social support, global attributions for negative events, and advice seeking. These factors accounted for 49% of the variance in job satisfaction scores for university staff, and the regression was overall significant to $p < .001$.

Therefore the above three regression tables show, that the independent variables of personal and work demands and resources, and perceived job stress, accounted for a significant percentage of the variance in anxiety, depression, and job satisfaction (around 50% in each, with R values of > .70). All variables associate with the dependent variables in directions very similar to those found in previous regressions in this chapter, and in chapters 5 and 6. Therefore hypothesis fourteen can be accepted and the null hypothesis rejected.

7.6 General implications of results

The results of study four as described above are important because they add to the results found in previous studies, both by examining previously proposed relationships in new ways, and in testing entirely new associations between variables, such as the mediating effects of perceived stress.

As found in previous studies, workplace demands and resources were good predictors of health outcomes, and these factors were also found to be good predictors of perceived work stress. Also, individual difference factors in the form of positive and negative coping and attributional styles (or personal demands and resources) were again shown to be important predictors of health outcomes, with intrinsic efforts the most potent predictor in anxiety and depression, and rewards and attributional behaviours in particular good predictors of job satisfaction.

It is interesting to note that perceived job stress in many instances was a stronger predictor of health outcomes than job demands and extrinsic efforts, which are often treated as equivalent to objective job stressors. This supports the work of many, such as Briner et al. (2004) who have stated that a stressor is not a stressor unless it is perceived as such. Indeed this is also an important finding as perceived job stress was measured using a single 5-point response item, which is considerably faster and easier to administer than more detailed stress questionnaires. Such a question could be an important indicator of which individuals and workplaces may require more detailed measurement and intervention.

7.7 Implications of results as relating to the enhanced DRIVE model

As previously mentioned, the results for the study in the present chapter were not (unlike the studies in chapters 5 and 6) primarily intended to ascertain the relative importance of independent variables in the prediction of health outcomes, nor to determine which independent variables are better at predicting particular dependent variables. Rather, the current study and its hypotheses were used to test the enhanced DRIVE model, and to see which, if any of its predictions were supported.

By referring back to the model and its initially proposed 12 relationships in section 7.2 and the results sections above, it can be seen that strong support was found

for all aspects of the relationships below, except for relationship 8, for which strong support was found for the personal demands aspect only:

1) Work demands and work resources were significantly related to outcomes.
2) Work demands and work resources were significantly related to perceived job stress.
3) Levels of perceived job stress were significantly related to outcomes.
4) Perceived job stress partially or fully mediated the relationships between Job Demands and Resources and outcomes.
9) Individual differences in the form of personal demands and resources significantly related to outcomes.
11) Individual differences had many interactive effects with job demands and resources (with low levels of resources seen as akin to demands) in the prediction of outcomes.
8) Individual differences in the form of personal demands and resources, will be significantly related to perceived job stress.

No support at all was found for relationship 5, and for the interactive relationships 6, 7, 10, and 12 from section 7.2, only limited support was found, with between one and three significant interactions found per prediction. Therefore there was not deemed enough evidence to include predictions 5, 6, 7, 10, and 12 in the final DRIVE model. However it is possible that future research may support the inclusion of these relationships, or those using different workplace and personal demands and resources.

5) Work resources will significantly moderate the effect of work demands in the prediction of perceived job stress.
6) Work resources will significantly moderate the effect of work demands in the prediction of health outcomes.
7) Job resources will significantly moderate the effect of perceived job stress in the prediction of health outcomes.
10) Individual differences will moderate the effect of work demands on perceived stress.
12) Individual differences will moderate the effect of perceived stress on outcomes.

Therefore, including only those predictions for which there was strong support, the final empirically supported version of the enhanced DRIVE model is shown below.

Figure 4: Empirically supported version of the Enhanced DRIVE model
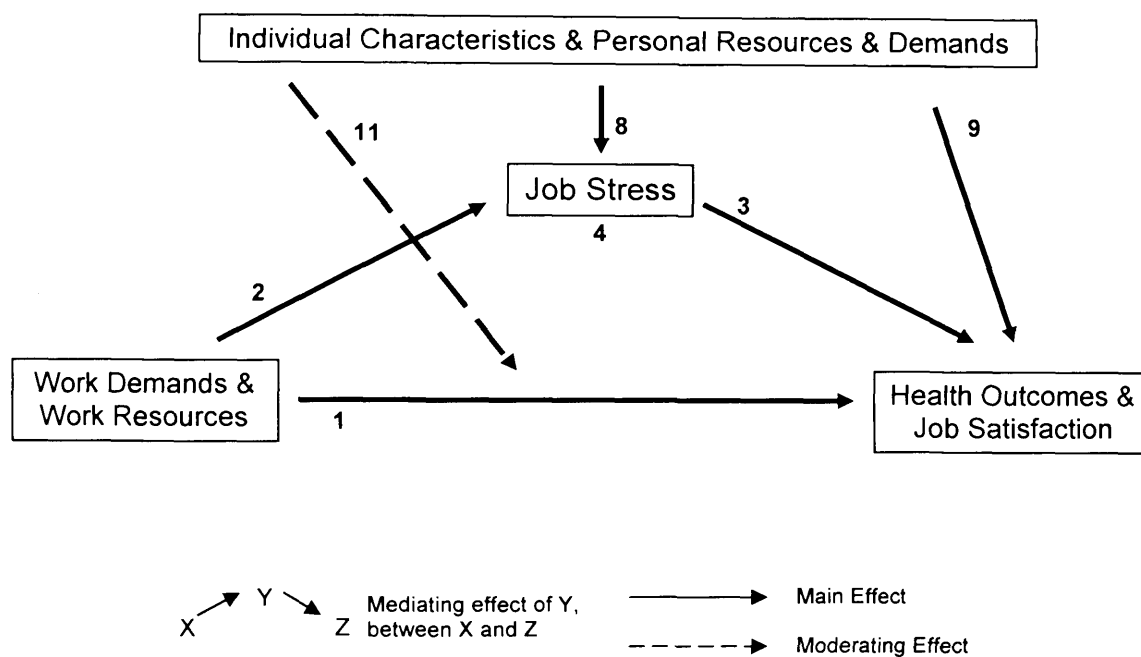
The relationships shown in the above model were supported by a large amount of statistical tests performed on a large number of sample participants. While the structure of the model as suggested above may not be found in other populations, it is hoped that the results and the model are a good representation of the relationships between the tested variables in the two sample populations.

Many of the results were based on the data from previous studies, or were expected from results in the literature, however it was an important finding that there were a large number of interactive effects found between personal characteristics and work demands and resources as depicted above by relationship 11) as these results support the case for the key role that individual differences can have, in moderating the strength or direction of the relationship between workplace conditions and mental health outcomes and satisfaction.

Also, a new key observation from the results, was the finding that perceived stress mediated the relationship between work demands and resources and outcomes. While these effects were largely partial (although full mediating effects were found between job demands and depression, and extrinsic effort and satisfaction in university employees) it is still an important finding that how people feel about the

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stressful (or not stressful) nature of their work environment, can be just as important a pathway towards health outcomes, as is the direct effect of those work environments. This finding also supports the work of many authors, such as Payne, Jick, and Burke (1982) and Briner et al. (2004) who state that subjective perceptions of work environments, rather than just the objective nature of those stressors, must be taken into account. Similarly, it is a key finding that personal characteristics have main effects on both perceived job stress, as well as on health outcomes, and have moderating effects on the relationship between workplace demands/resources and health outcomes..

The addition of a subjective perceived stress aspect to the model both adds to the more simple DRIVE model, and integrates the important aspect of subjective perceptions from transactional stress models, whilst avoiding some of the problems associated with the oversimplification hypothesis. It is suggested that the empirically supported DRIVE model as shown in figure 4, strikes a good balance between integration of aspects of job characteristics models such as the DCS, as well as aspects from the ERI model, and important developments from transactional stress models, while still maintaining a balance between simplicity and complexity.

Finding empirical support for so many aspects of the proposed DRIVE model is an important step, because it provides a strong framework that illustrates how psychosocial and individual variables can interact and influence one another, as well as the central role played by subjective perceptions in this process. It also provides a strong basis for the development of future work, and provides a characterisation of the stress process that is dynamic and may have comparable or better ecological validity than many existing stress frameworks.

7.8.1 Limitations of Experimental Method

Many of the limitations in the methods used in the above study are the same as those already given in the previous studies in sections, 4.7.7, 5.12, and 6.13. These include issues with samples such as non-random and self-selection sampling methods, poor response rates, lack of counter-balancing, issues with common method variance and cross sectional data, and a lack of controlling for some possible confounders. Also a better range of independent and dependent variables could have been used, and some

constructs, such as attributional style, failed to be important predictors in the larger regression equations for anxiety and depression.

7.8.2 Familywise Error Rate

Another criticism that could be levelled against the methods used in this thesis, particularly in the last study, is the problem of the multiple comparison error rate, or the familywise error rate. Familywise error rate relates to the likelihood of finding false positives in your results. Using a significance level of .05 means that one in twenty of your results may be a false positive. If you were to conduct 100 experiments using the same dataset then it is likely that 5 of your significant comparisons are due to chance alone. Often a Bonferroni correction is used to account for familywise error rate, where the p value is divided by the number of comparisons, for example, using two experiments would dictate a minimum p value of .025.

There are many dozen separate statistical tests that have been carried out in the above thesis, particularly for the last paper, and if a Bonferroni correction were applied to them all, then this would mean that a number may not be significant. However this is not considered a problem for several reasons. Firstly, familywise error rate is not supposed to apply to all comparisons made on the same dataset, but only those from the same dataset that are based on the same *family* of comparisons, i.e. ones where at least one independent variable and the dependent variable are common (onlinestatbook.com, 2007). Therefore, identical comparisons made in both the nursing and university samples above, are not in the same family, and likewise for comparisons where the dependent variable is different.

If this criteria is adopted for the results presented in chapter 7, then out of all significant calculations presented, no main effect regressions become non-significant (as all are already significant in excess of $p < .001$) and only two significant interactive regressions become non-significant based on their p value. These are skill discretion x seek advice, in the prediction of depression in university employees (section 7.5.15, appendix 4.5.19) and skill discretion x stable attributions for negative events in predicting anxiety in university staff (section 7.5.15, appendix 4.5.16). If a familywise Bonferroni correction were applied, the first of these would need a $p < .00385$, and achieves only $p = .041$, and the second would need $p < .005$, and achieves only .013.

There could be an argument therefore for removing these two interactive regressions. However, the Bonferroni method itself has been criticised for being too conservative, because it controls for the chance of *any* false positives, and is very likely to lead to incorrectly rejected significant results (Scheid, 2002). A less conservative method of error correction method is the False Discovery Rate (Benjamini & Hochberg, 1995) which refers to the expected proportion of truly null hypotheses among all the rejected null hypotheses. The software *Q-value* (Storey, 2004) was used to calculate adjusted p values (called q values) relative to the overall number and value of other familywise p values. By this less conservative error correction method, the two comparisons above were found to be significant and are thus included in the results.

7.9 Future directions

The supporting of many aspects of the enhanced DRIVE model provides a good basis for the development of future research. As previously stated, different variables could easily be inserted into the framework and tested, particularly for some of the relationships shown in the prospective model in section 7.2, that were not found to be significant in the current investigation. Different variables that could be included for testing in this framework include many of those relating to psychosocial stressors or resources, such as bullying, role conflict, security, management style, opportunities for feedback, organisational health etc. Also additional personal characteristics could be used, such as locus of control, personality, type A, hardiness, demographics, and other individual difference variables mentioned the introduction to the thesis in section 2.9. Finally, other individual or organisational dependent variables could be used, such as musculoskeletal disorders, gastrointestinal disorders, absence behaviour, turnover, heart disease, etc.

Testing new dependent and independent variables and their relationships to one another, as guided by the structure of the prospective and empirically supported DRIVE models, could not only provide more information about the way that individual and psychosocial variables interact in the prediction of outcomes, but would also hopefully provide extra support for the structure of the proposed model, or indeed could suggest new revisions to the models proposed. If more data could be provided for the development and support of models such as the DRIVE model, then

it is likely that such frameworks could provide a powerful guide for organisational interventions, by showing how alteration of one aspect of the model may affect other parts of it, and to help co-ordinate single or multi-level interventions that focus on one or more of primary, secondary, and tertiary levels.

Another step could be to use the data gained from this research to design and test similar methods in longitudinal frameworks. This would be useful for understanding causal relationships between variables and would provide additional support and information for revision of the model.

7.10 Summary of chapter 7 and links to chapter 8

The work in chapter 8 is the most important research described in the current thesis. It builds on the foundations of the research in chapters 4, 5, and 6, and develops the arguments and rationale laid out in chapter 3. The description and testing of the enhanced DRIVE model is considered important, because the model represents an attempt to combine aspects of models, that come from quite different dimensions of the stress research canon. Even accounting for models such as the JD-R (Xanthopoulou et al. 2007) which attempts something similar, the mediating pathway and explicit role for subjective stress perceptions makes the enhanced DRIVE model currently unique.

Chapter 8 takes a different approach to the work described in previous chapters, and attempts to round off the research in the thesis using qualitative methods rather than quantitative. A set of semi-structured interviews were carried out, to find out more about what participants from a working population think and have experienced, in regards to stress in the workplace.

Chapter 8

Study Five: Interview study on work related stress of university employees

8.1 Introduction

While the majority of the research carried out for this thesis was quantitative as described above, a final piece of research was conducted, where qualitative methods were used to try and understand more about university employees' perceptions of stress and what they feel the term actually means. The method was also used to try and uncover more about some of the relationships between stressful work conditions and health, that was not captured by the previous studies.

As part of the questionnaire package in the study carried out on university employees (see chapter 6) there was an optional section asking participants if they would be willing to take part in future research. Those who were interested, were asked to fill out a form with their name and contact details. After the questionnaires were collected, the pages with participants' personal details were removed.

Contact details were selected at random for twenty individuals, and an email was sent to each (see appendix 5.1) which requested their participation in a short interview on work related stress, as a follow-up to the previous questionnaire study.

Of the twenty individuals contacted, nine responded (45% response rate) indicating they would be willing to participate, and these were seven women and two men (M = 49.8 years). Of those interviewed, six were university lecturers, and three were researchers. No administrative staff, IT staff, or professors were interviewed. Interviews were either conducted at the participant's place of work, or at the office of the interviewer (at the preference of the interviewee).

8.2 Method

A semi-structured interview method was used, which was based on ten main points of interest, with further questions on these ten main topics being asked ad-lib to further the discussion as appropriate.

At the start of the interview, the following statement was read aloud to all participants: "I am interested in the experiences and views of university employees

about the topic of work stress. Your name won't be recorded. Participation is confidential and voluntary, and you can refuse to answer any questions if you don't feel comfortable. You can also withdraw from the interview at any time. Is it alright if I record the conversation for analysis?" After the interview, participants were informed that they could ask any questions about the study, or could contact the interviewer at a later date if they had any future enquiries, and that their data would be kept anonymously and destroyed after analysis.

There were multiple areas of interest for the interviews and these included: A focus on what the participants felt work stress actually was and if they had experienced it; What the causes of stress were for the participants, and the consequences to the individual and the group; How participants tried to deal with stress or its consequences, and their opinions on why some people can cope with stress and others can't; Finally they were asked who they felt was responsible for dealing with stress at work and what could be done about it.

To analyse the data, the recorded conversations were listened to, and all relevant responses or any other interesting or key comments given, were noted for each participant on a spreadsheet. This enabled comparisons of responses for each participant across each question, as well as easy reference for any other significant statements or opinions. The ten specific questions asked are shown below, as well as descriptions of the general and interesting responses given across the sample.

8.3 Results

The ten primary questions are shown below. "Cues" were also used if participants had difficulty in answering the questions, or were shy about responding.

1) First I would like to ask you, what you think the term "work stress" actually means?

The responses to this question varied among the participants with some describing the causes of stress, and others the symptoms. Several participants cited an inability to cope with problems or work tasks as a sign or symptom of stress, as well as negative emotions manifested through excess crying or fear of going to work. Several participants described stress as problems caused by work conditions, or when work

negatively affects feelings. Other issues mentioned that relate to stress included job insecurity, overwork or high workload, feeling uncomfortable with work situations and circumstances, taking work worries home, sleep problems, exclusion from cliques, family conflict, and low control.

2) Have you ever experienced work stress yourself?
Cue: Have you seen other people stressed?

In response to this question, all nine participants said that they had either in the past or were currently experiencing stress at work, and of these, two claimed to be experiencing stress constantly. One participant claimed to have experienced it in the past, but not currently. Eight participants claimed to have seen evidence of stress in co-workers, and one participant said "Everybody is stressed, but it's how people differ in responding to it that matters".

3) What do you think it was that made you stressed?
Cues: A specific incident, or general day to day hassles. Any other examples?

Three participants gave examples of specific causes or incidents that had given rise to significant stress and ill health for them. For one participant, the source of stress was a difficult boss, who constantly shouted and "terrorised" her employees, and who according to the participant was constantly arrogant and short with colleagues. This caused friction, fear, and a bad atmosphere at work, and led to the participant being afraid to go into work, to have constant crying spells and poor performance. In the end the participant claimed that she felt she had no course other than to leave her job at the end of her contract.

Another participant's major source of stress was the slow and inefficient procedure for the renewal of a short term work contract. The contract was due to end the week after participation in the interview, and no decision had yet been made as to whether the contract would be renewed. The participant claimed that this had caused her to worry about money and mortgage repayments, and had caused frustration, constant anxiety and crying, sleep problems, and problems with her partner. She was further incensed that her stress should have been totally avoidable, and was due to the

slow and inefficient nature of the renewal process, that in her view showed no respect for employees.

Finally, the third participant claimed that the cause of her stress occurred when two university departments were merged, and she had been demoted to a job that she had held twelve years previously. She also no longer had her own office, and was doing the same job as people she had previously been in charge of. She claimed that the stress associated with this incident had caused two to three years of physical and mental health problems, and she "had never really recovered".

In addition to these three specific incidents, there were a large number of everyday problems and hassles that many participants cited as contributing to stress, over time the build-up of which had serious consequences for some participants. Examples of stressful circumstances and conditions were many and varied, and one participant alone cited *all* of the following as stressors they had experienced in the past: Bad management and unprofessional or inept bosses and line managers; selfish co-workers who didn't take account of others; short term contracts and lack of security; long hours; bullying at work and aggressive, violent, or threatening colleagues; the pressure to publish papers, carrying out teaching, finding funding, and juggling these different roles; work-family conflict; a lack of job control; and unhelpful workplace mentors.

Many of the above stressors were cited repeatedly by other participants, particularly issues to do with lack of communication with colleagues. Other common stressors mentioned by participants included exclusion from the decision making process, constantly changing assessment procedures with no guidance, unfair distribution of work, excessive paperwork and bureaucracy, "changing goalposts", lack of support, and moaning or complaining colleagues. Several participants noted that workload stress did not come from absolute level of workload, as they stated that high workloads were to be expected, but that unexpected or last minute increases in workload, that disrupted previous plans or goals were very stressful. Indeed these events were described by two participants as particularly stressful when they were imposed by superiors who had known about the work in advance, but had not informed the employee.

However, there was one kind of stressor that eclipsed all others, both in frequency of being mentioned, and in intensity of consequences, and this stressor was to do with poor management. Seven of the nine participants claimed that they had in

the past or were currently suffering stress due to managers who had poor management skills. These criticisms included managers who allegedly knew less about their job or department than their employees, who were aggressive, violent, or abusive, who deliberately avoided dealing with stress-related issues, who gave no social support, who openly had favourites among their subordinates, or who took no notice of employee needs. The majority of participants agreed that these problems were directly related to the fact that university managers are not *trained* managers, i.e. they are very often academics who are good at managing research, but are often unsuited to the task of managing individuals

Two participants had come from medical or nursing backgrounds, and claimed that the level of stress in university employment was significantly lower than had been in their previous jobs. One of these participants claimed that despite suffering from some stress, her job was "a party" in comparison to the stress levels she had suffered from as a nurse, and claimed that her co-workers "didn't know what stress really was".

4) What were the consequences to you of work stress?
Cues: Any effects on physical health, mental health, or home life?

The consequences for participants of workplace stressors were as varied as the types of stressors themselves. Stress related outcomes for participants included physical and mental problems, problems with work-life balance, and absence behaviours. The most common consequence given by participants were problems or difficulty with sleeping, either from inability to sleep, restlessness from worry, or staying up late to work. Other examples given included: Being afraid of going into work; arguments with partners; money worries; excessive drinking; several participants described increased incidence of illness, particularly flu and colds; irritability and a shortening of temper; inability to stop thinking about work; feeling burnt out; crying; feelings of frustration and being alone; resentfulness; hyperactivity; excessive tiredness; poor performance and increased incidence of making mistakes at work; an inability to relax; and depression.

5) How do you normally try and deal with stress at work?

Cues: Problem focused coping, speaking to people, ignoring it, not taking work home?

The most commonly cited way of trying to deal with stress related problems was related to seeking social support and talking about the problem. Seven of the participants gave "talking to colleagues" as their primary way of dealing with problems at work. Usually the content of this was related to seeking support or advice on how to fix problems, or for confirmation that a problem issue had occurred. Participants appeared to favour talking to colleagues as a first step, and talking to managers afterwards. However, one participant stated that she never talked about work problems to colleagues as they "moaned constantly" and were no help, so she instead sought support from her family. Several other participants also stated that they regularly sought support from family as well as colleagues. Two participants did not mention seeking support at all, and favoured self-reliant problem-focused approaches, such as putting things into perspective, avoiding aggression, or getting on with things and working overtime. Other examples of dealing with stress included the setting of personal deadlines, keeping informed, prioritising workload and planning, and making lists. One participant cited the use of alternative therapies as important to her in dealing with work stress, and another participant said that he and his colleagues had set up regular working lunches and coffee breaks to discuss workplace problems and seek solutions, and claimed that this was a very effective method of dealing with problems before they escalated.

6) Why do you think some people can deal with stress and others can't so well?

Cues: Age, gender, or personality differences?

All of the participants thought that there were individual differences in ability to deal or cope with stressful situations at work. Around half of the participants believed that older or more experienced individuals were better equipped to cope with stress, because they were more confident or had "seen it all before". Four participants believed that men were less likely to get stressed than women, and either were more laid back, more in control, or let it just "go over their heads", but one participant claimed that men were more aggressive and more likely to be "Type A" and thus

create their own stress. Other participants said that there are differences in ways of coping that affect stress, such as being better at time management or having good planning skills. One participant said that some people are "natural worriers" who are likely to internalise stress and make matters worse for themselves.

7) Who do you think is responsible for dealing with stress?
Cues: Employees themselves, management, the university, departments, supervisors?

Most participants said that there was a broad spread of responsibility for dealing with stress, with several being adamant that it was a line manager's responsibility to detect stress in employees and support them. However most claimed that it was the individual who was most responsible for confronting their own stress (or "taking ownership" of it as one participant stated) and to go about seeking ways to relieve it. Two participants claimed that it was the university's responsibility to provide more information about stress, so that people could avoid being stigmatised, and would be less likely to worry about being labelled. Several other participants said that the primary responsibility lay with schools or departments to provide resources to help.

8) What do you think could be done to help deal with stress? Both generally, and in your work situation.

There were various suggestions made about how to help avert or deal with stress in the workplace, and most of these centred around communication and better training and selection of management. Several participants believed that the university should be treated more like a business, with professional managers advised by professors. Nearly all of the participants were unsatisfied with the current method of selecting management on the basis of academic merit. One participant stated that there should be more opportunity for feedback to discuss problems, and that the exclusion of employees from the decision making process was "a joke", and if there was such a system in place, that it was not publicised. One participant had asked for help from the university, and was told to speak to her manager, when in fact the cause of her stress was related to conflict with her manager.

Another participant said that she believed that there was a counselling service in place for employees, but she didn't know how to use it or where to go, and she

would have definitely used such a service had she known of it when she had been suffering from severe work stress. Most participants said they had no idea if there were any counselling or support systems in place for stress-related problems.

Several participants stated that communication was the key issue, and there had to be more face to face communication, and less electronic or paper communication, as well as people to talk to for help who were independent of management and university bureaucracy. Others stated that there was too much paperwork, when workloads were already high, and that more efficient practices or a smaller amount of paperwork was needed, or else that others should be employed to do paperwork so that university staff could "get on with the jobs they were supposed to be doing".

That the university and professors didn't care about employee welfare was a common feeling, with much resentment directed at line managers and departmental heads. Several participants suggested that University departments needed to work harder to foster an inclusive culture where stress wasn't stigmatised, and to give more information about how to detect stress, and where you could go for help.

9) Do you think your job is more or less stressful than the average in the UK?
Cues: What kind of jobs do you think are the most stressful?

Despite all of the participants claiming that they had suffered from work-related stress in academia, seven of the participants stated that their job was generally average in terms of stress, and with the exclusion of very specific stressful events (such particular frictions with a boss, or a lack of contract renewal) with none stating that it was more stressful than average. Only two participants stated that their job was less stressful than average, with both of these coming from healthcare backgrounds. One of these participants stated that anything to do with public service was far more stressful than academia, and gave the examples of police work, the fire service, and nursing.

10) What do you think are the effects on the university of stressed out staff?
Cues: Affects students, home life?

Several participants stated that stress at work caused morale problems in the workplace, with colleagues being "dragged down", and about half of the participants agreed that students may suffer as a result due to worse teaching and absent staff. One participant said that she only went to her GP for help with stress after her students expressed their concern for her deteriorating health. Others stated that stress caused problems with teamworking, as well as resentment from other staff who receive extra work as a result of the stress-related absence of a colleague.

8.4 Discussion of interview results

The responses given to the above questions give important information about many aspects of stress and stressors that could not have been gained from the questionnaires used, or from any other quantitative methods. For example, the mixed responses given as to what participants thought the definition of stress was, are interesting as they reflect the definitional debates in psychology as whether "stress" is the cause of problems, or if it is the response. Also the range of views expressed highlight that there is no fixed definition of stress, particularly in the public domain. However most individuals seemed to describe stress as related to their emotional or affective feeling or response, rather than the presence of psychosocial stressors per se.

The fact that all of the participants claimed to either to have, or were currently experiencing stress, illustrates how widespread stress at work can be, even in a sample not traditionally seen as stressed like university employees. Indeed, two participants stated that despite suffering from stress, this was a normal thing that everyone had to deal with, and one participant stated that a little bit of stress was good for motivation. This suggests that university employees and perhaps many people in other working domains, may accept moderate stress as a normal feature of working life.

It is also important to note, that in some cases a single event or poor relationship gave rise to high levels of stress and negative outcomes (which lasted for many months in two participants) when for these participants, all other aspects of their jobs were not stressful. Indeed, traditional measures of psychosocial stressors (such as levels of workload, control, or reward) may not detect conflict with a boss, or job

security fears. This illustrates the need to be aware that there may be stressors present for individuals that traditional quantitative measures may not detect.

This also provides support for the use of a single "how stressful do you find you job" measure, as a good way of initially detecting conditions or issues that may put individuals at risk of stress-related problems. Indeed such a method could be useful for both indicating where more investigation is needed, as well as setting in motion the processes to head-off potential stress problems, rather than just detecting its presence by measuring the levels of absence, negative health, or other stress-related outcomes.

The wide range of stressors described shows the complexity and number of stressful situations that employees can be faced with, which is particularly striking given that all of the current participants work in a similar area of academic employment. Despite the broad range of stressors given, which included stressful interactions with colleagues, bullying, having to juggle multiple roles, etc, it was surprising that the most commonly cited stressors were not the "traditional" stressors of job demands or workload, but were far more related to communication and social interaction at work. Most participants accepted that high workloads were just part of being an academic, and thus were not really regarded as a particular stressor. However, unexpected workloads, changing deadlines, or extra work *were* mentioned as being particularly stressful by several participants. This suggests that as long as workloads are predictable, then they did not often pose a particular problem for the participants, but that work or workloads that are "sprung upon" participants could cause issues.

While some participants were frustrated at being excluded from the decision making process, which is related to a lack of control, this was often framed in terms of a communication issue. Indeed, no participants cited a lack of control over their own work as a problem, but rather a lack over control over the larger work environment, to do with policy and how things were run. Poor communication, particularly with managers in the form of being "kept out of the loop" seemed to be a key issue for most of the participants.

Many of the consequences of stress at work described by participants related to anxiety and other symptoms of worry. Trouble sleeping was a common problem, as were issues relating to taking work worries home, which is related to overcommitment or intrinsic effort from the ERI model. Only two participant stated

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that they had suffered depression as a result of stress, with all participants citing anxiety as a problem (however it is possible that chronic anxiety could lead to depression outcomes for some) and frustration and annoyance at work problems were also common. However, consequences for job satisfaction were rarely mentioned by participants, and an enquiry about how stress affects satisfaction should in hindsight, possibly have been mentioned as a cue.

It is interesting that while the most common stressor mentioned by participants was a lack of communication and conscientiousness from colleagues and managers, the most common method of trying to deal with stress was by seeking social support and advice from colleagues. In other words, the most common stressor and the most common coping mechanism were in the same domain. This echoes the predictions made by the Demand-Induced-Stain-Compensation model (de Jonge et al. 2000) which proposed that each kind of demand would be "compensated" by resources in the same domain, for example, social demands by social resources, emotional demands by emotional resources, cognitive demands, by cognitive resources, etc.

Most participants believed that getting other perspectives and sympathy regarding work problems was the most effective means of dealing with problems, particularly if talking to co-workers could provide a solution. This is interesting, given the lack of "seeking advice" as a strong predictor of health outcomes in the qualitative research. Either seeking advice as operationalised in the coping questionnaire was not an accurate representation of advice seeking in the interview sample, or advice seeking as a positive coping mechanism may be confounded with advice seeking as a behavioural response to stress, that is not related to positive coping.

While other more problem-focused coping methods such as prioritising, making plans and maintaining self-reliance were mentioned, they were not seemingly as popular as communication-type approaches. The method of setting up regular communications by using working lunches and coffee breaks to talk about problems, as suggested by one participant, sounds like an appealing and inclusive coping method, because if a lack of communication is a stressor in itself, such methods could not only be useful for dealing with existing stressors, but could also pre-empt potential problems.

Regarding individual differences between ability to cope with stress, participants all agreed that these differences did exist, but most did not specify how or why, other than suggestions that men cope better, or that more experience leads to

better coping ability. Participants had more divided opinions on who was responsible for dealing with stress at work. With some maintaining that individuals were responsible on their own, and others that managers should be better at detecting stress. However nearly all participants agreed that the university needed to do more to highlight the problems of stress for employees, and that more should be done to make employees aware of where they could go for help and what services were available. This is related to what many participants believed could be done to help deal with stress, with most agreeing that more needed to be done, particularly with dissemination of information about stress, better and more transparent communication, and better training and selection of managers and those in charge of departments.

The observation that all participants had experienced stress, but that all either claimed their job was average or less than average in stress, again raises the interesting point that many people think that stress is a normal part of everyday work today.

8.5 Results in relation to previous work

While the interviews conducted were only on a small percentage of the participants used in the questionnaire study, they provide important information about the experiences and views of stress-related health in a university staff population. However, due to the relatively open-ended nature of interviews, and thus the specific and individual nature of the responses, it is doubtful whether the results from these interviews would have any applicability to other samples, for example in nurses, where the "emotional labour" aspect of stress could make for significantly different types of stressor.

The interview responses of participants showed that there were some important psychosocial stressors, that were not specifically covered in the independent variables as used in the previous studies. For example the strong contribution of management style, communication, and employee inclusion in the decision making process to levels of stress in the workplace. It was also an interesting finding that it was not overall level of workload that seemed to contribute to stress for employees, but rather unpredicted workload, or where rules and policies governing workload or performance were changed without employee input. Also the

contribution of management style and training, and bullying or aggression in managers and co-workers, to stress and negative health outcomes was not covered in the independent variables from the previous studies. Results showed that while the majority of independent variables (coping, job demands, control, social support, intrinsic effort) did appear to have contributions to make for individual experiences of stress, other variables used in the quantitative research were not mentioned as much, however this may in part be due to the lack of specific questioning about attributions, beliefs, rewards, job satisfaction, etc.

While there is no doubt that the number of independent variables used in the quantitative research is greater than in the majority of similar work stress research, the results of the interviews shows that there are still many important potential stressors that were not included as independent variables, at least as for university employees. Perhaps some of the variance in the outcomes not accounted for by the included IVs may be attributable to such factors, and this possibility could be explored in future research. Indeed, it is likely that had the qualitative interviews been carried out in the initial stages of the research rather than the latter stages, the quantitative work in this thesis may have benefited by way of better selection of variables.

The use and results of the interview methods here therefore, illustrate that while questionnaire methods are typically more general and are thus applicable to a wider range of different populations, qualitative studies can give an extra dimension to results, and can provide key information about stressors and outcomes that questionnaires based on traditional stress models can not.

8.6 Results in relation to DRIVE model

While the results of the interview study show that there are certain important points not covered in the questionnaire studies, this does not raise doubts about the structure of the empirically supported DRIVE model as shown in figure 4 (section 7.7). This is because the use of broad general purpose variables, such as job demands, ways of coping, intrinsic rewards, etc, are still applicable to a wide variety of occupations (although some specific stressors from university populations may have not been included). However, as has been mentioned several times, the DRIVE model is proposed to be a general purpose framework, and relevant variables for specific populations can be inserted as applicable. For example in future research, university

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job role, management style, bullying etc, may be important independent variables that could be placed into the model. Indeed using interviews to guide the use of questionnaire selection, which could then be analysed in line with the structure of the DRIVE framework could be an important direction in future research on specific populations.

Therefore the interview study described above gives some extra insights into stress and health outcomes in university lecturers and researchers, particularly the importance of management and communication in the workplace, and that interviews could be used in addition or previous to questionnaire studies, to target stressor-health outcomes in specific populations. The results also show how important it is to be aware that many factors can contribute to stress and ill-health at work, and that general purpose factors such as workload-related job demands, ways of coping, etc, may be applicable in a general sense to a wide variety of populations, but that specific independent variables can be as, or even more important in specific populations.

Chapter 9

Thesis summary, discussion and conclusion

This chapter will attempt to describe the development of the thesis, in terms of the aims that were held in regards to each chapter, and how well these aims were fulfilled. Also described, will be how the results and methods in each chapter influenced the development of subsequent work, and contribute to the overall global aim of the thesis. Finally, this concluding chapter will outline the possible implications of the results, both for the literature, and for future research and practice.

The overall global aim of the thesis, was to carry out research that contributed to a greater understanding of the relationship between workplace stressors, individuals, and health and job satisfaction outcomes, and to use that understanding (if possible) to develop a framework for the understanding of stress, that integrated aspects of existing stress models, whilst avoiding some of their pitfalls.

9.1 Chapter two: The literature review

After the brief introductory chapter one, a literature review was carried out in chapter two. The first part of the review described how changes in the nature of many workplaces can give rise to negative psychosocial stressors. The review described some of the significant economic and mental health problems that may be related to these stressors, as well as outlining some of the different definitions and ways of looking at "stress".

The review then described some of the key models and frameworks used for studying the stress process, including the historically influential P-E fit and Michigan models, the simple but popular DCS and ERI models, the complex and relational transactional models of Cox and colleagues, and Lazarus and Colleagues, and the newest wave of models including the DSS, DISC, and JD-R models.

Chapter two then discussed the importance of individual differences in the stress process, and how differences in personal characteristics may influence the relationship between psychosocial stressors and health outcomes. It was argues that while some models allow for the impact of individual differences in the stress process, their influence is often not clearly specified, and that many models (such as the DCS,

DSS, and ERI) hardly account for individual characteristics at all. Individual characteristics and behavioural styles were discussed in more detail, including how many of these may influence the stress process by moderation and mediation.

The purpose of this chapter was to provide the background to the thesis and to draw attention to the issues that would play important roles in the forthcoming research, particularly the need for research that takes account of both workplace and individual characteristics.

9.2 Chapter three: A future direction

This short chapter drew attention to how numerous and variable in focus the different stress models in the field are, and suggests that despite the large number of different viewpoints, there still are significant problems with many approaches. Specifically, that many of the popular stress models in the field suffer from either under or over-complexity, and that consequently, individual differences and subjective perceptions of stressors are either neglected in stress models, or are included as part of an overly complex and stratified process, that may not accurately depict how individuals actually think and behave.

It was suggested that research which prioritises the environment *and* the individual equally, could be useful in helping to determine which factors are important in the prediction of stress-related health outcomes, and could provide a balanced and ecologically valid picture of this process.

On the basis of this, it was suggested that a good future research approach, may be one that takes aspects of many popular stress models, such as the DCS, ERI, and transactional models, and tries to combine them in the same methodology and sample, but without hypothesising which variables (workplace or individual) will be the most important in predicting outcomes such as anxiety, depression and job satisfaction.

It is researching such an approach that forms the basis of much of the work described in this thesis. The chapter concluded by outlining the general variables that could be used in such work, and suggests the use of demands, controls, social support, intrinsic and extrinsic efforts, rewards, coping and attributional styles, and gender.

9.3 Chapter four: Preliminary study

The study described in this chapter forms the first part of the research on the approach as suggested above. This study was used to carry out some preliminary research on the links between the individual difference factors of coping styles and gender, and negative health outcomes in a general population sample, and to gain experience of various statistical techniques which would be useful in forthcoming research.

A popular coping inventory (the WCCL) was factor analysed, the results of which were compared to outcomes for anxiety, depression, cognitive difficulties, somatic symptoms and fatigue, as well as how all of these factors differed between men and women. At this stage of the research, only a basic idea of the possible content of the "DRIVE" model was held.

Results showed strong links between coping styles and health outcomes, particularly anxiety and depression, with positive coping styles associating with positive health outcomes and vice versa, but no strong gender differences were detected in health outcomes or coping.

9.4.1 Chapters five and six: Nursing and University studies

The research described in chapters five and six were two large scale questionnaire studies that formed the bulk of the research carried out for the thesis, and this work aimed to expand upon the basis formed by the first study, and to develop and test a simple model of work stress, based on the rationale for a future direction explicated in chapter three.

The first of these studies was based on a large sample of nurses, and after outlining some of the stress-related problems in UK healthcare staff, the chapter presented a rationale for the selection of variables, which included traditional work stress factors and individual difference variables.

In the next section of the chapter, the initial version of the DRIVE model was presented. This exploratory model was based on combining some of the key features from existing stress models, such as the DCS and ERI, and to add a range of individual difference variables (coping, attributional styles, and gender) with anxiety and depression as outcomes. It was also informed by the newest iteration of the JD-R

model which presents job and individual characteristics in the form of personal and workplace demands and resources.

The thesis examined whether the relationships between the variables as suggested in the model in figure 1 (section 5.5) including moderating effects of personal and workplace resources on workplace demands, would be supported by the research in nurses. It also examined whether the results gained would enable further development of the model.

The results were generally in support of the main effect predictions of the model, however few of the expected gender differences were found, and no moderating effects of personal resources on work demands were found. However a moderating effect of decision authority on job demands was found. Therefore while certain aspects of the results were encouraging, it was clear that more research needed to be done on some aspects of the model (more detail on the overall findings of the nursing and university studies will be summarised at the end of this section).

On the basis of the results found in the nursing sample, another study was conducted using similar methods. The aim of this study was to confirm the findings of the study in nurses, but to compare gender differences in a sample with a more evenly balanced gender ratio (from the 90% female of the nursing study) and to add another outcome variable of job satisfaction. In addition, the same measures were used in a general population sample, to compare them for levels of mental health and job satisfaction.

The results of the study in university employees largely confirmed those of the previous study, with similar relationships between workplace and individual demands and resources and health outcomes. Predicted main effects were also found for job satisfaction outcomes, with reward and attributions particularly important. A moderating effect for decision authority on job demands was again found, and again no significant moderating effects were found for personal resources on workplace demands. Also the university employee sample were found to have significantly higher demands, anxiety and depression, and control, and feel less rewarded than a general population sample, but had no differences in job satisfaction. Finally, in the university employee sample, significant gender differences *were* found for anxiety, and negative ways of coping, with females having higher negative levels on all these variables.

The results of this study therefore again supported many aspects of the proposed DRIVE model, and also found differences between the sample group and a general population sample of mixed occupations, as well as a moderating effect of job control on demands and significant gender differences. The results for job satisfaction were also an important expansion over the previous study, and the data showed that different patterns of independent variables were important in predicting different dependent variables (for example, rewards and attributions far more important in satisfaction compared to anxiety and depression).

The data also (like the nursing study) demonstrated that it is possible to carry out multi-factor stress research, and that despite individual differences not adding vastly to the explained variance in outcomes, a balance of individual and job characteristics factors provided the best prediction of outcomes. Also individual differences were in some cases as important or more important by std. beta weight, and offer possibilities for the supporting of secondary level organisational interventions.

However, while this study offered support for many features of the DRIVE model, a key prediction of the model had still failed to find support, which was the lack of significant interactions found between personal and workplace characteristics. Another perceived shortcoming of the model, was that while being more complex than many models such as the DCS, ERI, and DSS, and of similar complexity to the JD-R, the DRIVE model had no explicit variable to represent subjective or affective perceptions of workplace demands and resources. While the ERI model, and Cox and Lazarus' transactional models imply such perceptions, in the ERI model such a variable is not explicitly accounted for, and in the latter models it is buried somewhere in the processes of primary and secondary appraisal.

To attempt to address these shortcomings, in the next study, the interactive links between workplace and individual demands and resources were investigated further, and the DRIVE model was enhanced to try and account for the role of a subjective perception variable, as well as how individual differences and workplace demands may relate to this in the prediction of outcomes.

9.4.2 Summary of results of Nursing and University studies

Due to the large number of analyses presented in chapters five, six, seven, and eight, summaries of the results (in bullet point form) will be presented after each section of this conclusion, in order to remind the reader of the key results from each chapter. These start below with results from chapters five and six:

- The research demonstrated that Nurses and University staff have high levels of mental ill-health compared to general population samples, some of which may be related to stressful working conditions.

- Up to 45% of nurses and university staff reported that workplace stress had caused or made an existing illness worse.

- Workplace demands (job demands, extrinsic effort) were significantly related to increases in negative mental health, and lower job satisfaction, and work resources (control, rewards, social support) were significantly related to improved mental health and satisfaction outcomes (the latter in university staff).

- Forms of job control (decision authority) may have a buffering effect on job demands in the prediction of anxiety and depression.

- Individual demands (negative coping and attributions) tended to relate to increases in anxiety and depression and lower job satisfaction, and individual resources (problem focused coping and positive attributions) tended to relate to lower anxiety and depression and increased job satisfaction.

- Differences between men and women in terms of coping style and levels of mental health were observed in some samples (such as university employees, where women were higher for anxiety, self blame, wishful thinking, and seeking advice) but were not found in nursing populations.

- Effort-reward imbalance factors typically explained more variance in outcomes for all samples than demand-control-support factors, particularly intrinsic effort and

rewards in job satisfaction. Demand-control-support and effort-reward-imbalance factors, typically explained more variance in health outcomes in all samples, than coping style, gender, and attributional style.

- University samples were more likely than general population samples to claim that work stress has caused or made and illness worse, and were far more likely to claim that this illness was stress or mental-health related. General population samples were more likely to claim such illness was related to musculoskeletal or gastrointestinal problems.

- No single type of factor (workplace related or individual) were exclusively more important in the prediction of health outcomes, and the level of importance of particular independent variables differed across sample populations and different dependent variables.

- Therefore models that consider only one type of factor (environmental or individual) are insufficient to *fully* explain the relationships between stressful work conditions and health outcomes. However, even regressions using the largest number of independent variables, typically explain no more than 50% of the variance in outcomes.

- A simple DRIVE model was proposed and research provided support for many features of this model.

9.5.1 Chapter seven: Enhanced DRIVE model study

As stated in section 9.4, the study summarised in this section aimed to expand upon the previous work by adding to the DRIVE model and by carrying out further and novel statistical tests on the data to test these new additions to the model. Prior to this study, the main aims of testing the DRIVE model were to support the general structure and "location" of the types of variables in the model, as well as to compare the relative strength of associations between variables and outcomes, and to compare the different patterns of variables in predicting different outcomes. However in this study, due to the extra complexity of the enhanced model, the aims were more related

to the former goal i.e. to try and support the structure of the model by focusing on the way in which variables (and types of variables) related to each other and outcomes, rather than their relative predictive power.

Due to the fact that the enhancements to the model occurred relatively late in the research process, and the fact that most of the additions implied research techniques and comparisons that had not previously been conducted on the existing datasets, the decision was taken to test the enhanced model on the same results that had already been gathered, although ideally, wholly new data would have been collected for this purpose. For this reason, in the results section of chapter seven, for those hypotheses where data testing had already been done to test the common hypotheses from the enhanced and original DRIVE models, results were reproduced from earlier sections, or the reader was directed to refer to these previous sections.

One of the main changes in the analysis in chapter seven to the previous research, was the addition of testing of a mediated pathway between job demands and resources and outcome variables, by the variable of perceived job stress. A significant partial or full mediated pathway was found for virtually every workplace demand and resource, relating to anxiety, depression, and satisfaction in university employees. This key result provided strong support for the enhanced structure of the model, and showed that in many cases, between a third and *all* of the variance in outcomes was accounted for by the mediated perceived job stress pathway.

This finding was also interesting, because this variable was measured by a single 5-point likert scale item relating to how stressful the individual finds their job, which in some cases predicted outcomes better than the supposedly more "objective" workplace characteristics. This question was included in the original questionnaire items, but was not used in the studies described in chapters five and six. It was also an important finding that negative personal characteristics (coping styles etc) could have a direct effect on subjective perceptions, that is independent or work characteristics.

Another significant finding in the current study, was that while in the other main studies, the interactions between workplace and individual differences had only been tested using work demands (job demands and extrinsic efforts) and personal resources (positive coping and attributions) in this study, interactions between both work demands and resources, and personal demands and resources were carried out.

This resulted in over thirty significant interaction effects in the prediction of outcomes, which provided strong support for this section of the model, and showed

that positive individual characteristics could have a key effect in buffering the negative effects of work demands on outcomes, and in enhancing the positive effect of work resources, and that negative individual characteristics also appeared to both reduce the positive effect of work resources on outcomes, and to exacerbate the negative effect of work demands on outcomes.

Therefore the study described in chapter seven builds upon the work presented in chapters five and six, by helping to support many key aspects of the enhanced DRIVE model, and by testing the data in a new way, to give some new and exciting results on the relationships between variables, that could have important implications for the study of the stress process. It is important to note, that even including workplace and individual characteristics and perceived stress in the regression models, there was still a significant percentage of the variance in outcomes not accounted for by these factors. This indicates that more work on individual and workplace characteristics, and their relationships to perceived stress and health and satisfaction outcomes, is needed in future research.

9.5.2 Summary of results of enhanced DRIVE model study

In addition to the summary results given in section 9.5.1, the novel results found for the study described in chapter seven are shown below:

- Work demands and resources were significantly related to perceived job stress.

- Levels of perceived job stress were significantly related to anxiety, depression and job satisfaction.
- Perceived job stress significantly mediated the relationship between work demands and resources and anxiety, depression, and job satisfaction.

- Individual demands and resources (in the form of coping and attributional styles) significantly moderated the effects of many job demands on anxiety, depression, and satisfaction.

- Personal demands (e.g. negative coping styles) were significantly related to perceived job stress, but personal resources had a less clear relationship to perceived stress.

- An enhanced DRIVE model was proposed and research provided support for many features of this model, key among which were the findings related to the important mediating effect of perceived stress, and the direct effect of individual differences on perceived stress, and their moderating effect on work demands and resources.

9.6.1 Chapter eight: Interview study summary

The work described in chapter eight was the final piece of research conducted in the thesis. Its purpose was to round off the quantitative work, by presenting an alternative qualitative perspective, to help provide the broadest overall picture of some of the issues touched upon elsewhere in the thesis.

As stated in section 8.2, nine university lecturers and researchers were used in a semi-structured interviewed technique, on ten main points of interest. While the guide questions were relevant to the thesis as a whole, they were not aimed specifically to provide information to do with the structure of the DRIVE model. The main use of the interview results were to confirm the findings that university employees suffer from stress-related illness, and that both stressful workplace characteristics and differences between individuals can affect health outcomes (or at least perceptions of different outcomes).

The interview results were also important for confirming that different individuals had differing views on which workplace characteristics were the most stressful, and also that there was a significant difference between level of workload as a stressor, and level of unexpected workload. Also that management style and training may play a big part in leading to stressful workplaces (at least in universities) and that social support and communication are the most commonly used form of dealing with stressors, a finding that was less evident in the quantitative results.

Finally, the interview results showed that while quantitative data can give a good range of data regarding stressful conditions and individual reactions and outcomes, qualitative data can be vital in providing another perspective, and that this method should preferably be used earlier in the research process rather than later, to

help guide measures and methods, a practice which in hindsight would have benefited the current work.

9.6.2 Summary of results of interview study

- Interview results revealed a range of viewpoints on the meaning of stress in university lecturers and researchers, with causes, and affective experiences both mentioned.

- Experiences of stress in university employees are widespread, with the vast majority of interviewees claiming to have suffered or experienced stress.

- A certain amount of stress was accepted as a normal part of the job by many university employees, and a small amount is seen as a motivator by some.

- Even in otherwise non-stressful jobs, a single event or persistent single individual/conflict can cause high levels of stress and negative health outcomes.

- The most commonly cited stressors were related to communication and social interactions, particularly with managers and colleagues. Other key stressors were lack of input into the decision making process, unpredictable workload, juggling many roles, bullying and conflict.

- There were many stress-related outcomes cited, particularly loss of sleep, anxiety, poor performance, and taking work worries home.

- The most common method of dealing with stress related to seeking advice and social support, as well as planning, time management, and "just getting on with it".

- Participants believed that men, older workers, or those with more experience tended to cope better with stress.

- The individual was cited as the party most responsible for detecting and initially dealing with stress, but that this had to be backed up by managers, and university and departmental policy and support systems.

- Better selection, training, and communication with managers was cited as a major way of improving problems with stress, as was better provision and advertising of university support systems for those with stress related problems at work.

- Most participants believed their job was of average stressfulness, with several believing that it was less stressful than average.

- Interviewees believed that stressful conditions at work have effects on the quality of student teaching, morale, and teamworking issues.

9.7 Discussion and Conclusion

The aim of the work described in this thesis was to carry out a programme of research, that would help to build a picture of which processes and characteristics relate to the link between the workplace and mental health outcomes. Specifically, how (and which) positive and negative workplace psychosocial conditions have an impact on individual health and satisfaction outcomes, and how (and which) characteristics of individuals are likely to influence perceptions of these stressors, or may reduce or exacerbate the stressful potential of workplace psychosocial conditions.

A new psychosocial framework of stress was developed to guide this research, and to represent many of these processes and relationships. This framework was labelled the DRIVE model, and has its roots in many existing stress models from varying research traditions. The finding of empirical support for many of the predictions of this model is a key outcome of the work described, and this along with the large amount of data collected on the relationships between variables and outcomes in several populations, have implications for future research and practice.

The empirical data described could be of benefit to future research, as few such complex studies have previously been conducted, and the relationships between variables and their relative power in predicting outcomes could provide background

support for the development of new research, and could also shed light on existing theory and models that may not have been exhaustively researched.

The DRIVE model could also have important implications in future research, as it provides an empirically supported framework that like the JD-R model, sees workplace and individual characteristics in terms of demands and resources. Other variables could easily be plugged into this framework, for example the use of other risk factors for negative health outcomes, such as those provided by the HSE (2007) management standards, or other individual characteristics related to personality, levels of control, or factors that may influence subjective perceptions or coping with stressors, etc.

The model could thus help to guide future work and theory development, and is a useful way of viewing the stress process that balances complexity with explanatory power, in a way that current stress models are unable to do.

This research is relevant to future work in terms of methodology and measurement issues, because it demonstrates that multi-factor stress research is possible and valuable, and that only looking at the characteristics from a single domain (job characteristics, subjective perceptions, individual differences, and outcomes) is not sufficient to capture the complexity of the stress process and what individuals actually perceive and feel in regards to their stress experiences and beliefs.

The above point, as well as the research described, also have implications relating to practice and practitioners, both in terms of job design, and in terms of potential organisational interventions for combating work stress. For example, existing job characteristics models only have implications for job design (and by extension interventions to improve workplaces) that relate to the limited job characteristics they consider a priori. A demands-resources framework such as the DRIVE model has no such restrictions, and a stress audit based on this model, with key variables and factors relevant to the needs of individual workplaces, is a far more flexible approach to take.

The research has also shown that there can be a difference between "stressful" job characteristics and subjective perceptions of stress, which demonstrates the need to distinguish between these (i.e. to avoid the oversimplification assumption). Indeed the latter may sometimes predict outcomes better than the former. Also the research suggests that knowledge of levels of individual characteristics can aid prediction of

outcomes, and knowledge of how these factors may relate in terms of mediation and moderation, can give key insights into what types of interventional steps to take.

Despite the suggested contributions of the work described, there were some shortcomings in the research, both in design (cross-sectional, lack of counterbalancing, limited populations, etc) and in some of the variables chosen for study. While the selection of the latter were based on sound theory and research, it was the case that some key variables were not included (such as those that came out of the interview data, e.g. management style, bullying, etc) which could perhaps have benefited the research.

Another key focus of future research could be the use of more powerful research designs, such as longitudinal or interventional studies that could provide a causal aspect to the data collection, which could enhance the predictive validity of the proposed model. It could also be interesting in future work to further explore the possible value of attributional style as an independent variable, because while not emerging as a very powerful predictor (although it was important in predicting job satisfaction) theoretically, this should be a key factor in the "making of meaning" in terms of appraisal mechanisms. It is possible that the method of measuring attributions in the above work suffered from poor construct validity, and this construct should be measured in an alternative way in future research.

In conclusion, it is suggested that the work described in this thesis contributes to the literature in terms of positive implications for future research, practice, and intervention, and that the aims of the work were largely fulfilled, as a new stress framework was successfully developed, and much was learned about the relationships between psychosocial work environments and health outcomes, and how individual characteristics may influence these relationships.

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Appendices

Appendix 1.1: Eigenvalues of WCCL items for factor analysis, Chapter 4

	Wishful Thinking	Problem Focused Coping	Escape /Avoidance	Seek Advice /Support	Self Blame
WCCL1		.628			
WCCL2		.571			
WCCL3		.564			
WCCL4		.404			
WCCL5		.306			
WCCL7		.472			
WCCL8		.544			
WCCL9		.611			
WCCL10		.430			
WCCL11		.518			
WCCL12		.405			
WCCL13		.641			
WCCL14		.525			
WCCL16				.637	
WCCL17				.571	
WCCL18				.728	
WCCL19				.741	
WCCL20				.778	
WCCL21				.551	
WCCL22					.736
WCCL23					.771
WCCL24					.758
WCCL25	.512				
WCCL26	.541				
WCCL27	.605				
WCCL28	.626				
WCCL29	.740				
WCCL30	.790				
WCCL31	.740				
WCCL32	.794				
WCCL33			.550		
WCCL34					.390
WCCL35			.728		
WCCL36			.622		
WCCL37			.380		
WCCL38			.579		
WCCL39			.313		
WCCL40			.570		
WCCL41			.669		
WCCL42			.395		

Appendix 1.2: Items and factors for factor analysis of WCCL, Chapter 4

WISHFUL THINKING

25 Hoped a miracle would happen
26 Wished I was a stronger person – more optimistic and forceful.
27 Wished that I could change what had happened.
28 Wished I could change the way that I felt.
29 Daydreamed or imagined a better time or place than the one I was in.
30 Had fantasies or wishes about how things might turn out.
31 Thought about fantastic things to make myself feel better (like finding a million pounds).
32 Wished the situation would go away or somehow be finished.

POSITIVE THINKING/ACTION

1 Bargained or compromised to get something positive from the situation.
2 Concentrated on something good that could come out of the whole thing.
3 Tried not to burn my bridges behind me, tried to leave things open.
4 Changed myself to be a better person.
5 Made a plan of action and followed it.
7 Came out of the experience a better person than when I went in.
8 Tried not to act too hastily.
9 Changed something so things would turn out all right.
10 Just took things one step at a time.
11 I knew what had to be done, so I tried harder to make things work.
12 Came up with a couple of different solutions to the problem.
13 Accepted my strong feelings, but didn't let them interfere with other things too much.
14 Changed something about myself to deal with the situation better.

Factor 3 ESCAPE AVOIDANCE

33 Went on as if nothing had happened.
35 Kept my feelings to myself.
36 Slept more than usual.
37 Got angry at the people or things that caused the problem.
38 Tried to forget the whole thing.
39 Tried to make myself feel better by eating, drinking, smoking, or taking medication.
40 Avoided being with other people.
41 Didn't tell others how bad things were.
42 Refused to believe it had happened.

SEEK ADVICE/SUPPORT

16 Talked to someone to find out more about the situation
17 Accepted sympathy and understanding from someone.
18 Got professional help and did what they recommended.
19 Talked to someone who could do something about the problem.
20 Asked someone I respected for advice and followed it.
21 Talked to someone about how I was feeling.

SELF BLAME

22 Blamed myself.
23 Criticized or lectured myself.
24 Realised I brought the problem on myself.
34 Felt bad that I couldn't avoid the problem.

Appendix 1.3: Chi Squares comparing men and women for clinical anxiety and depression scores on the HAD, Chapter 4

Anxiety Crosstab

| | | Gender | | Total |
		Female	Male	
Clinical Anxiety	No	113	87	200
	Yes	21	17	38
Total		134	104	238

Anxiety Chi-Square

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	.020(b)	1	.888		
Continuity Correction(a)	.000	1	1.000		
Likelihood Ratio	.020	1	.888		
Fisher's Exact Test				1.000	.513
Linear-by-Linear Association	.020	1	.888		
N of Valid Cases	238				

a Computed only for a 2x2 table
b 0 cells (.0%) have expected count less than 5. The minimum expected count is 16.61.

Depression Crosstab

| | | Gender | | Total |
		Female	Male	
Clinical Depress	No	124	95	219
	Yes	11	9	20
Total		135	104	239

Depression Chi-Square

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	.020(b)	1	.889		
Continuity Correction(a)	.000	1	1.000		
Likelihood Ratio	.020	1	.889		
Fisher's Exact Test				1.000	.535
Linear-by-Linear Association	.020	1	.889		
N of Valid Cases	239				

a Computed only for a 2x2 table
b 0 cells (.0%) have expected count less than 5. The minimum expected count is 8.70.

Appendix 1.4: ANOVA comparing men and women for all variables, Chapter 4

		Sum of Squares	df	Mean Square	F	Sig.
Wishful thinking (WCCL)	Between Groups	2.603	1	2.603	4.126	.043
	Within Groups	148.249	235	.631		
	Total	150.851	236			
Problem Focused (WCCL)	Between Groups	.009	1	.009	.037	.847
	Within Groups	53.008	232	.228		
	Total	53.017	233			
Escape Avoidance (WCCL)	Between Groups	.030	1	.030	.097	.755
	Within Groups	72.671	237	.307		
	Total	72.701	238			
Seek Advice (WCCL)	Between Groups	1.921	1	1.921	4.503	.035
	Within Groups	100.682	236	.427		
	Total	102.603	237			
Self Blame (WCCL)	Between Groups	.378	1	.378	.767	.382
	Within Groups	115.787	235	.493		
	Total	116.165	236			
Cognitive Difficulties (PFRS)	Between Groups	93.254	1	93.254	.642	.424
	Within Groups	33711.246	232	145.307		
	Total	33804.500	233			
Fatigue (PFRS)	Between Groups	100.143	1	100.143	.478	.490
	Within Groups	49203.123	235	209.375		
	Total	49303.266	236			
Somatic Symptoms (PFRS)	Between Groups	263.419	1	263.419	1.969	.162
	Within Groups	31176.904	233	133.806		
	Total	31440.323	234			
HAD Anxiety	Between Groups	.615	1	.615	.037	.847
	Within Groups	3871.385	236	16.404		
	Total	3872.000	237			
HAD Depression	Between Groups	2.693	1	2.693	.174	.677
	Within Groups	3676.362	237	15.512		
	Total	3679.054	238			

Appendix 1.5: Intercorrelations of coping style independent variables for multicollinearity in Chapter 4

	Problem Focused Coping	Escape/ Avoidance	Seek Advice	Self Blame
Wishful Thinking	.102	.534**	.182**	.603**
Problem Focused Coping		-.026	.467**	.141*
Escape/Avoidance			-.003	.447**
Seek Advice				.199**

** = sig. to .01
* = sig. to .05

Appendix 2.1: Revised version of the ASQ

Please try to imagine yourself in the following situations. Then look at the example causes given in part a) and circle a number on the scale that represents how much you agree with the suggested cause (1= totally agree with the left side comment, 7 = totally with the right, 4 = both equally likely, or any number in between that matches your feeling). Then for that same cause answer parts b) and c) circling the appropriate number.

1a) A friend at work compliments you on your appearance. Is the cause likely to be due to:

(Your friend being polite)   or   (You looking good)

1   2   3   4   5   6   7

b) In similar situations in the future how likely is it that this explanation will again be true:

(Will rarely be true)   or   (Will often be true)

1   2   3   4   5   6   7

c) Does this explanation have an influence on just this situation, or does it affect other situations:

(Influences just this situation)   or   (Influences many other situations)

1   2   3   4   5   6   7

2a) You have been looking for a job unsuccessfully for some time. Is this likely to be due to:

(A bad job market)   or   (You needing more skills/experience)

1   2   3   4   5   6   7

b) In similar situations in the future how likely is it that this explanation will again be true:

(Will rarely be true)   or   (Will often be true)

1   2   3   4   5   6   7

c) Does this explanation have an influence on just this situation, or does it affect other situations:

(Influences just this situation)   or   (Influences many other situations)

1   2   3   4   5   6   7

3a) You become very successful and well-paid. Is this likely to be due to:

(You having good luck)   or   (Hard work and determination)

1   2   3   4   5   6   7

b) In similar situations in the future how likely is it that this explanation will again be true:

(Will rarely be true)   or   (Will often be true)

1   2   3   4   5   6   7

c) Does this explanation have an influence on just this situation, or does it affect other situations:

(Influences just this situation)   or   (Influences many other situations)

1   2   3   4   5   6   7

4a) You go to a colleague for help but they don't help you. Is this likely to be due to:

(Them being too busy)   or   (You not being a good enough friend)

1   2   3   4   5   6   7

b) In similar situations in the future how likely is it that this explanation will again be true:

(Will rarely be true)   or   (Will often be true)

1   2   3   4   5   6   7

c) Does this explanation have an influence on just this situation, or does it affect other situations:

(Influences just this situation)   or   (Influences many other situations)

1   2   3   4   5   6   7

5a) You give a talk in front of co-workers but they react negatively. Is this likely to be due to:

(Them being impatient and busy)   or   (You being poorly prepared)

1   2   3   4   5   6   7

b) In similar situations in the future how likely is it that this explanation will again be true:

(Will rarely be true)   or   (Will often be true)

1   2   3   4   5   6   7

c) Does this explanation have an influence on just this situation, or does it affect other situations:

(Influences just this situation)   or   (Influences many other situations)

1   2   3   4   5   6   7

6a) You do something at work which is highly praised. Is this likely to be due to:

(The work being easy)   or   (Your hard work and effort)

1   2   3   4   5   6   7

b) In similar situations in the future how likely is it that this explanation will again be true:

(Will rarely be true)   or   (Will often be true)

1   2   3   4   5   6   7

c) Does this explanation have an influence on just this situation, or does it affect other situations:

(Influences just this situation)   or   (Influences many other situations)

1   2   3   4   5   6   7

7a) A colleague you like acts in a hostile way towards you. Is this likely to be due to:

(Them being in a bad mood)   or   (You annoying them)

1   2   3   4   5   6   7

b) In similar situations in the future how likely is it that this explanation will again be true:

(Will rarely be true)   or   (Will often be true)

1   2   3   4   5   6   7

c) Does this explanation have an influence on just this situation, or does it affect other situations:

(Influences just this situation)   or   (Influences many other situations)

1   2   3   4   5   6   7

8a) You can't get all the work done that others expect of you. Is this likely to be due to:

(You being given too much work)   or   (Your lack of time planning)

1   2   3   4   5   6   7

b) In similar situations in the future how likely is it that this explanation will again be true:

(Will rarely be true)   or   (Will often be true)

1   2   3   4   5   6   7

c) Does this explanation have an influence on just this situation, or does it affect other situations:

(Influences just this situation)   or   (Influences many other situations)

1   2   3   4   5   6   7

9a) A colleague buys you a present. Is this likely to be due to:

(Him/Her being in a good mood)   or   (You having been extra nice to them)

1   2   3   4   5   6   7

b) In similar situations in the future how likely is it that this explanation will again be true:

(Will rarely be true)   or   (Will often be true)

1   2   3   4   5   6   7

c) Does this explanation have an influence on just this situation, or does it affect other situations:

(Influences just this situation)   or   (Influences many other situations)

1   2   3   4   5   6   7

10a) You apply for a promotion that you want and you get it. Is this likely to be due to:

(Lack of other qualified applicants)   or   (The strength of your application/CV)

1   2   3   4   5   6   7

b) In similar situations in the future how likely is it that this explanation will again be true:

(Will rarely be true)   or   (Will often be true)

1   2   3   4   5   6   7

c) Does this explanation have an influence on just this situation, or does it affect other situations:

(Influences just this situation)   or   (Influences many other situations)

1   2   3   4   5   6   7

11a) A meeting goes badly with a superior you wanted to impress. Is this likely to be due to:

(The other person having a bad day)   or   (Them being unimpressed with you)

1   2   3   4   5   6   7

b) In similar situations in the future how likely is it that this explanation will again be true:

(Will rarely be true)   or   (Will often be true)

1   2   3   4   5   6   7

c) Does this explanation have an influence on just this situation, or does it affect other situations:

(Influences just this situation)   or   (Influences many other situations)

1   2   3   4   5   6   7

12a) You get a raise. Is this likely to be due to:

(Everyone getting a raise)   or   (Your hard work and commitment)

1   2   3   4   5   6   7

b) In similar situations in the future how likely is it that this explanation will again be true:

(Will rarely be true)   or   (Will often be true)

1   2   3   4   5   6   7

c) Does this explanation have an influence on just this situation, or does it affect other situations:

(Influences just this situation)   or   (Influences many other situations)

1   2   3   4   5   6   7

Appendix 2.2 Chi Square comparing male and female nurses for clinical anxiety and depression scores, Chapter 5

Anxiety Crosstab

		Gender male	Gender female	Total
Clin Anx	No	57	555	612
	Yes	15	203	218
Total		72	758	830

Anxiety Chi-Square

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	1.201(b)	1	.273		
Continuity Correction(a)	.914	1	.339		
Likelihood Ratio	1.256	1	.262		
Fisher's Exact Test				.327	.170
Linear-by-Linear Association	1.200	1	.273		
N of Valid Cases	830				

a Computed only for a 2x2 table
b 0 cells (.0%) have expected count less than 5. The minimum expected count is 18.91.

Depression Crosstab

		Gender male	Gender female	Total
Clin Dep	.00	66	718	784
	1.00	5	44	49
Total		71	762	833

Depression Chi-Square

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	.189(b)	1	.664		
Continuity Correction(a)	.029	1	.865		
Likelihood Ratio	.179	1	.672		
Fisher's Exact Test				.600	.408
Linear-by-Linear Association	.188	1	.664		
N of Valid Cases	833				

a Computed only for a 2x2 table
b 1 cells (25.0%) have expected count less than 5. The minimum expected count is 4.18.

Appendix 2.3: ANOVA comparing all IVs and DVs for men and women, Chapter 5

		Sum of Squares	df	Mean Square	F	Sig.
Anxiety	Between Groups	16.347	1	16.347	1.054	.305
	Within Groups	12841.417	828	15.509		
	Total	12857.764	829			
Depression	Between Groups	.643	1	.643	.061	.805
	Within Groups	8743.566	831	10.522		
	Total	8744.209	832			
Problem	Between Groups	1.704	1	1.704	.009	.924
Focused	Within Groups	157601.060	834	188.970		
Coping	Total	157602.764	835			
Seek	Between Groups	563.308	1	563.308	1.557	.212
Advice	Within Groups	308551.341	853	361.725		
	Total	309114.649	854			
Self	Between Groups	1262.484	1	1262.484	2.858	.091
Blame	Within Groups	374559.845	848	441.698		
	Total	375822.329	849			
Wishful	Between Groups	442.511	1	442.511	.801	.371
Thinking	Within Groups	471607.333	854	552.233		
	Total	472049.844	855			
Escape/	Between Groups	79.053	1	79.053	.338	.561
Avoidance	Within Groups	198651.239	849	233.983		
	Total	198730.293	850			
Job	Between Groups	115.611	1	115.611	.365	.546
Demands	Within Groups	268009.307	846	316.796		
	Total	268124.918	847			
Social	Between Groups	59.611	1	59.611	.089	.765
Support	Within Groups	570982.053	853	669.381		
	Total	571041.663	854			
Skill	Between Groups	71.103	1	71.103	.472	.492
Discretion	Within Groups	127612.301	847	150.664		
	Total	127683.404	848			
Decision	Between Groups	138.783	1	138.783	.335	.563
Authority	Within Groups	349829.096	844	414.489		
	Total	349967.879	845			
Intrinsic	Between Groups	731.481	1	731.481	1.917	.167
Reward	Within Groups	312842.036	820	381.515		
	Total	313573.516	821			
Extrinsic	Between Groups	178.120	1	178.120	.415	.520
Effort	Within Groups	357610.802	833	429.305		
	Total	357788.922	834			
Intrinsic	Between Groups	1622.225	1	1622.225	2.952	.086
Effort	Within Groups	470405.315	856	549.539		
	Total	472027.540	857			

POS_IE	Between Groups	44.828	1	44.828	.352	.553
	Within Groups	106708.654	838	127.337		
	Total	106753.482	839			
POS_SU	Between Groups	17.132	1	17.132	.133	.715
	Within Groups	107041.303	832	128.655		
	Total	107058.435	833			
POS_GL	Between Groups	128.865	1	128.865	.576	.448
	Within Groups	183605.234	821	223.636		
	Total	183734.099	822			
NEG_IE	Between Groups	58.169	1	58.169	.508	.476
	Within Groups	95104.726	831	114.446		
	Total	95162.895	832			
NEG_SU	Between Groups	12.103	1	12.103	.069	.794
	Within Groups	144697.38	819	176.676		
	Total	144709.48	820			
NEG_GL	Between Groups	3.206	1	3.206	.013	.908
	Within Groups	194909.42	817	238.567		
	Total	194912.633	818			

Appendix 2.3.1 Regressions including covariates for the testing of confounding effects, Chapter 5

Anxiety and ID factors with FT/PT as covariate (see table 14 in text).

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	7.227	1.174		6.158	.000
	PFC_SC	-.621	.304	-.066	-2.040	.042
	Self_Blame	2.427	.233	.388	10.433	.000
	Escape_Avoid	1.208	.330	.135	3.661	.000
	POS_SU	-.416	.172	-.086	-2.417	.016
	NEG_IE	-.308	.174	-.059	-1.774	.076
	NEG_SU	.382	.146	.090	2.613	.009
	full or part time	-.742	.259	-.091	-2.869	.004

a. Dependent Variable: HAD_ANX

Anxiety and ID factors with contract type as covariate (see table 14 in text).

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	7.019	1.169		6.006	.000
	PFC_SC	-.486	.306	-.051	-1.589	.112
	Self_Blame	2.428	.233	.388	10.438	.000
	Escape_Avoid	1.239	.329	.138	3.771	.000
	POS_SU	-.454	.173	-.093	-2.632	.009
	NEG_IE	-.330	.173	-.063	-1.907	.057
	NEG_SU	.406	.146	.096	2.771	.006
	contract_type	-1.449	.475	-.097	-3.052	.002

a. Dependent Variable: HAD_ANX

Depression and ID factors with FT/PT as covariate (see table 14 in text).

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	6.667	1.010		6.604	.000
	Seek_Advice	-.593	.188	-.105	-3.154	.002
	Self_Blame	1.304	.201	.255	6.493	.000
	Escape_Avoid	1.303	.281	.175	4.640	.000
	POS_IE	-.632	.140	-.153	-4.507	.000
	NEG_IE	-.343	.142	-.080	-2.418	.016
	NEG_GL	.293	.098	.098	3.000	.003
	full or part time	-.623	.215	-.093	-2.905	.004

a. Dependent Variable: HAD_DEP

Anxiety and DCS factors with FT/PT as covariate (see table 15 in text).

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	7.951	1.682		4.726	.000
	JD1	3.356	.672	.457	4.993	.000
	SS1	-1.237	.207	-.205	-5.979	.000
	SD1	-1.573	.353	-.149	-4.455	.000
	DA1	1.360	.845	.213	1.609	.108
	JD_DA	-.830	.382	-.317	-2.173	.030
	full or part time	-.784	.257	-.097	-3.053	.002

a. Dependent Variable: HAD_ANX

Depression and DCS factors with FT/PT as covariate (see table 15 in text).

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	9.933	.790		12.580	.000
	JD1	1.076	.195	.179	5.525	.000
	SD1	-1.562	.290	-.179	-5.392	.000
	DA1	-.409	.179	-.078	-2.282	.023
	SS1	-1.369	.170	-.274	-8.074	.000
	full or part time	-.648	.210	-.097	-3.086	.002

a. Dependent Variable: HAD_DEP

Anxiety and ERI factors with FT/PT as covariate (see table 16 in text).

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	9.576	1.257		7.621	.000
	IR1	-2.295	.466	-.344	-4.923	.000
	EE1	.909	.213	.143	4.262	.000
	IE1	.985	.692	.178	1.424	.155
	IE_IR	.563	.267	.252	2.105	.036
	full or part time	.149	.234	.018	.637	.524

a. Dependent Variable: HAD_ANX

Anxiety and ERI factors with contract type as covariate (see table 16 in text).

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	9.606	1.253		7.666	.000
	IR1	-2.238	.465	-.336	-4.814	.000
	EE1	.912	.213	.144	4.284	.000
	IE1	1.034	.691	.186	1.497	.135
	IE_IR	.522	.267	.233	1.953	.051
	contract_type	-.837	.422	-.056	-1.980	.048

a. Dependent Variable: HAD_ANX

Depression and ERI factors with FT/PT as covariate (see table 16 in text).

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	5.587	.578		9.659	.000
	IE1	1.548	.157	.339	9.884	.000
	EE1	.735	.182	.141	4.036	.000
	IR1	-1.418	.177	-.260	-8.021	.000
	full or part time	-.076	.200	-.011	-.382	.703

a. Dependent Variable: HAD_DEP

Anxiety and DCS/ERI factors with FT/PT as covariate (see table 17 in text).

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	9.627	.948		10.151	.000
	JD1	.564	.238	.078	2.372	.018
	SS1	-.580	.199	-.097	-2.911	.004
	SD1	-1.537	.308	-.147	-4.981	.000
	IR1	-.756	.231	-.114	-3.272	.001
	EE1	.630	.227	.099	2.776	.006
	IE1	2.338	.182	.424	12.843	.000
	full or part time	.099	.231	.012	.430	.667

a. Dependent Variable: HAD_ANX

Anxiety and DCS/ERI factors with contract type as covariate (see table 17 in text).

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	9.832	.946		10.398	.000
	JD1	.563	.236	.078	2.383	.017
	SS1	-.605	.199	-.101	-3.046	.002
	SD1	-1.538	.308	-.147	-5.002	.000
	IR1	-.752	.230	-.113	-3.269	.001
	EE1	.631	.226	.099	2.792	.005
	IE1	2.290	.180	.415	12.726	.000
	contract_type	-.902	.411	-.061	-2.195	.028

a. Dependent Variable: HAD_ANX

Depression and DCS/ERI factors with FT/PT as covariate (see table 17 in text).

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	9.149	.733		12.477	.000
	SD1	-1.427	.259	-.164	-5.511	.000
	SS1	-.877	.168	-.177	-5.224	.000
	IE1	1.533	.151	.337	10.123	.000
	EE1	.639	.179	.122	3.562	.000
	IR1	-.743	.194	-.136	-3.832	.000
	full or part time	-.068	.194	-.010	-.349	.727

a. Dependent Variable: HAD_DEP

Anxiety and all factors with FT/PT as covariate (see table 18 in text).

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	7.103	.978		7.262	.000
	PFC_SC	-.798	.275	-.087	-2.908	.004
	Seek_Advice	.474	.207	.070	2.298	.022
	Self_Blame	1.554	.186	.253	8.339	.000
	JD1	.693	.228	.096	3.041	.002
	SD1	-1.052	.303	-.100	-3.474	.001
	SS1	-.685	.195	-.115	-3.514	.000
	IE1	2.050	.182	.370	11.290	.000
	EE1	.332	.221	.052	1.499	.134
	IR1	-.441	.225	-.067	-1.963	.050
	full or part time	.003	.223	.000	.015	.988

a. Dependent Variable: HAD_ANX

Anxiety and all factors with contract type as covariate (see table 18 in text).

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	7.257	.972		7.462	.000
	PFC_SC	-.730	.274	-.079	-2.663	.008
	Seek_Advice	.463	.205	.068	2.254	.024
	Self_Blame	1.562	.185	.254	8.444	.000
	JD1	.677	.226	.094	2.994	.003
	SD1	-1.062	.302	-.101	-3.523	.000
	SS1	-.717	.194	-.121	-3.698	.000
	IE1	2.009	.179	.362	11.245	.000
	EE1	.331	.220	.052	1.506	.133
	IR1	-.439	.224	-.066	-1.963	.050
	contract_type	-1.037	.400	-.070	-2.594	.010

a. Dependent Variable: HAD_ANX

Depression and all factors with FT/PT as covariate (see table 18 in text).

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	9.079	.963		9.423	.000
	PFC_SC	-.526	.222	-.070	-2.374	.018
	Self_Blame	.505	.178	.101	2.846	.005
	Escape_Avoid	.830	.248	.113	3.340	.001
	POS_IE	-.373	.122	-.093	-3.046	.002
	SD1	-.924	.260	-.107	-3.549	.000
	SS1	-.764	.166	-.156	-4.616	.000
	IE1	1.375	.154	.304	8.926	.000
	EE1	.478	.179	.091	2.669	.008
	IR1	-.571	.193	-.105	-2.963	.003
	full or part time	-.090	.192	-.014	-.469	.639

a. Dependent Variable: HAD_DEP

Appendix 2.4: Independent samples t-test for anxiety and depression between nurses and general population (from chapter 4)

		t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference
HAD_ANX	Equal variances assumed	6.845	1070	.000	1.99161	.29095
HAD_DEP	Equal variances assumed	2.029	1074	.043	.50636	.24952

Appendix 2.5: Chi Square comparing nurses clinical anxiety and depression frequencies with general population sample (from chapter 4)

Anxiety Crosstab

| | | Sample | | Total |
		General	Nurses	
Clin Anx	No	200	615	815
	Yes	38	219	257
Total		238	834	1072

Anxiety Chi-Square

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	10.762(b)	1	.001		
Continuity Correction(a)	10.205	1	.001		
Likelihood Ratio	11.504	1	.001		
Fisher's Exact Test				.001	.001
Linear-by-Linear Association	10.752	1	.001		
N of Valid Cases	1072				

a Computed only for a 2x2 table
b 0 cells (.0%) have expected count less than 5. The minimum expected count is 57.06.

Depression Crosstab

| | | Sample | | Total |
		General	Nurses	
Clin Dep	.00	219	788	1007
	1.00	20	49	69
Total		239	837	1076

Depression Chi-Square

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	1.958(b)	1	.162		
Continuity Correction(a)	1.561	1	.211		
Likelihood Ratio	1.845	1	.174		
Fisher's Exact Test				.178	.108
Linear-by-Linear Association	1.956	1	.162		
N of Valid Cases	1076				

a Computed only for a 2x2 table
b 0 cells (.0%) have expected count less than 5. The minimum expected count is 15.33.

Appendix 3.1: Chi Square comparing frequency of clinically anxious and depressed university staff and general population samples, Chapter 6

Anxiety Crosstab

| | | Clinical Anxiety | | |
		No	Yes	Total
	Uni	209	97	306
	General	98	22	120
Total		307	119	426

Anxiety Chi-Square

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	7.649(b)	1	.006		
Continuity Correction(a)	7.000	1	.008		
Likelihood Ratio	8.083	1	.004		
Fisher's Exact Test				.006	.003
Linear-by-Linear Association	7.632	1	.006		
N of Valid Cases	426				

a Computed only for a 2x2 table
b 0 cells (.0%) have expected count less than 5. The minimum expected count is 33.52.

Depression Crosstab

| | | Clinical Depression | | |
		No	Yes	Total
	Uni	282	24	306
	General	113	7	120
Total		395	31	426

Depression Chi-Square

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	.516(b)	1	.473		
Continuity Correction(a)	.261	1	.609		
Likelihood Ratio	.538	1	.463		
Fisher's Exact Test				.540	.312
Linear-by-Linear Association	.515	1	.473		
N of Valid Cases	426				

a Computed only for a 2x2 table
b 0 cells (.0%) have expected count less than 5. The minimum expected count is 8.73.

Appendix 3.2: Chi Square comparing frequency of claims that work had caused or worsened a health complaint, between university staff and general population samples, Chapter 6

Crosstab

		Illness caused by work		
		No	Yes	Total
	Uni	180	123	303
	General	87	31	118
Total		267	154	421

Chi-Square

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	7.510(b)	1	.006		
Continuity Correction(a)	6.905	1	.009		
Likelihood Ratio	7.758	1	.005		
Fisher's Exact Test				.007	.004
Linear-by-Linear Association	7.492	1	.006		
N of Valid Cases	421				

a Computed only for a 2x2 table
b 0 cells (.0%) have expected count less than 5. The minimum expected count is 43.16.

Appendix 3.3: Chi Square comparing frequency of clinically anxious and depressed university employees and nursing samples

Anxiety Crosstab

		nurses	uni	panel general	Total
clina	.00	615	209	98	922
	1.00	219	97	22	338
Total		834	306	120	1260

Anxiety Chi-Square

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	8.248[a]	2	.016
Likelihood Ratio	8.485	2	.014
Linear-by-Linear Association	.002	1	.966
N of Valid Cases	1260		

a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 32.19.

Depression Crosstab

Count

		nurses	uni	panel general	Total
clindep	.00	788	282	113	1183
	1.00	49	24	7	80
Total		837	306	120	1263

Depression Chi-Square

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	1.550[a]	2	.461
Likelihood Ratio	1.481	2	.477
Linear-by-Linear Association	.598	1	.439
N of Valid Cases	1263		

a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 7.60.

Appendix 3.4: T-test of anxiety and depression scores for nurses against university employees.

		N	Mean	Std. Deviation	Std. Error Mean
HAD_ANX	nurses	834	7.9916	3.93509	.13626
	uni	306	8.3627	4.36481	.24952
HAD_DEP	nurses	837	4.8662	3.23576	.11184
	uni	306	4.9477	3.46086	.19784

		t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference
HAD_ANX	Equal variances assumed	-1.370	1138	.171	-.37114	.29095
HAD_DEP	Equal variances assumed	-.370	1141	.711	-.08152	.24952

Appendix 4.1: Perceived work stress regressed against work demands and resources in nurses and university employees.

Variables code list for all following regressions

JD1 = Job demands
SD1 = Skill discretion
DA1 = Decision authority
SS1 = Social support
EE1 = Extrinsic effort
IR1 = Intrinsic effort
PFC = Problem focused coping
NEG_SU = Negative stable attributions
HAD_DEP = Depression
HAD_ANX = Anxiety

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.575[a]	.330	.325	.677
2	.575[b]	.330	.326	.677
3	.574[c]	.330	.326	.676

a. Predictors: (Constant), IR1, SD1, JD1, DA1, SS1, EE1

b. Predictors: (Constant), IR1, JD1, DA1, SS1, EE1

c. Predictors: (Constant), IR1, JD1, DA1, EE1

d. Pop_U_G_N = Nurses

ANOVA

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	176.725	6	29.454	64.265	.000[a]
	Residual	358.411	782	.458		
	Total	535.136	788			
2	Regression	176.717	5	35.343	77.211	.000[b]
	Residual	358.419	783	.458		
	Total	535.136	788			
3	Regression	176.447	4	44.112	96.417	.000[c]
	Residual	358.688	784	.458		
	Total	535.136	788			

a. Predictors: (Constant), IR1, SD1, JD1, DA1, SS1, EE1

b. Predictors: (Constant), IR1, JD1, DA1, SS1, EE1

c. Predictors: (Constant), IR1, JD1, DA1, EE1

d. Dependent Variable: Job_Stress

e. Pop_U_G_N = Nurses

Coefficients

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	1.853	.210		8.825	.000
	JD1	.325	.052	.212	6.201	.000
	SD1	.010	.071	.004	.134	.893
	DA1	-.087	.044	-.064	-1.985	.047
	SS1	-.035	.045	-.028	-.777	.437
	EE1	.399	.048	.298	8.347	.000
	IR1	-.254	.052	-.180	-4.899	.000
2	(Constant)	1.867	.183		10.210	.000
	JD1	.326	.052	.212	6.268	.000
	DA1	-.085	.042	-.063	-2.011	.045
	SS1	-.034	.044	-.027	-.767	.443
	EE1	.400	.048	.298	8.375	.000
	IR1	-.254	.051	-.179	-4.932	.000
3	(Constant)	1.838	.179		10.275	.000
	JD1	.328	.052	.214	6.323	.000
	DA1	-.091	.042	-.067	-2.182	.029
	EE1	.403	.048	.301	8.485	.000
	IR1	-.270	.047	-.190	-5.748	.000

a. Dependent Variable: Job_Stress

b. Pop_U_G_N = Nurses

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Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.701[a]	.492	.482	.679
2	.701[b]	.492	.483	.678
3	.701[c]	.491	.484	.677

a. Predictors: (Constant), IR1, JD1, DA1, SS1, SD1, EE1

b. Predictors: (Constant), IR1, JD1, DA1, SS1, EE1

c. Predictors: (Constant), JD1, DA1, SS1, EE1

d. Pop_U_G_N = Uni Staff

ANOVA

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	131.213	6	21.869	47.464	.000[a]
	Residual	135.458	294	.461		
	Total	266.671	300			
2	Regression	131.212	5	26.242	57.150	.000[b]
	Residual	135.459	295	.459		
	Total	266.671	300			
3	Regression	130.880	4	32.720	71.323	.000[c]
	Residual	135.792	296	.459		
	Total	266.671	300			

a. Predictors: (Constant), IR1, JD1, DA1, SS1, SD1, EE1

b. Predictors: (Constant), IR1, JD1, DA1, SS1, EE1

c. Predictors: (Constant), JD1, DA1, SS1, EE1

d. Dependent Variable: Job_Stress

e. Pop_U_G_N = Uni Staff

Coefficients

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	1.295	.230		5.631	.000
	JD1	.498	.081	.341	6.156	.000
	SD1	-.003	.096	-.001	-.028	.977
	DA1	-.110	.082	-.066	-1.329	.185
	SS1	-.219	.067	-.162	-3.276	.001
	EE1	.515	.077	.356	6.653	.000
	IR1	-.062	.073	-.044	-.846	.398
2	(Constant)	1.293	.222		5.824	.000
	JD1	.497	.077	.340	6.454	.000
	DA1	-.110	.076	-.067	-1.462	.145
	SS1	-.220	.066	-.163	-3.334	.001
	EE1	.515	.077	.355	6.693	.000
	IR1	-.062	.072	-.044	-.851	.395
3	(Constant)	1.232	.210		5.868	.000
	JD1	.492	.077	.337	6.412	.000
	DA1	-.131	.072	-.079	-1.822	.069
	SS1	-.244	.059	-.181	-4.113	.000
	EE1	.524	.076	.362	6.880	.000

a. Dependent Variable: Job_Stress

b. Pop_U_G_N = Uni Staff

Appendix 4.2: Buffering effect of social support on perceived stress in prediction of depression and job satisfaction in university employees

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.603[a]	.363	.357	2.77898

a. Predictors: (Constant), Stress_X_SS, SS1, Job_Stress

b. Pop_U_G_N = Uni Staff

ANOVA

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	1309.749	3	436.583	56.532	.000[a]
	Residual	2293.646	297	7.723		
	Total	3603.395	300			

a. Predictors: (Constant), Stress_X_SS, SS1, Job_Stress

b. Dependent Variable: HAD_DEP

c. Pop_U_G_N = Uni Staff

Coefficients

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	2.597	1.145		2.269	.024
	Job_Stress	2.786	.488	.759	5.707	.000
	SS1	-.285	.509	-.058	-.560	.576
	Stress_X_SS	-.697	.237	-.397	-2.942	.004

a. Dependent Variable: HAD_DEP

b. Pop_U_G_N = Uni Staff

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.515[a]	.266	.258	1.74171

a. Predictors: (Constant), Stress_X_SS, SS1, Job_Stress

b. Pop_U_G_N = Uni Staff

ANOVA

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	325.699	3	108.566	35.789	.000[a]
	Residual	900.962	297	3.034		
	Total	1226.661	300			

a. Predictors: (Constant), Stress_X_SS, SS1, Job_Stress

b. Dependent Variable: Satisfaction

c. Pop_U_G_N = Uni Staff

Coefficients

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	5.343	.724		7.384	.000
	Job_Stress	-.926	.308	-.432	-3.010	.003
	SS1	.654	.321	.226	2.038	.042
	Stress_X_SS	.322	.149	.314	2.162	.031

a. Dependent Variable: Satisfaction

b. Pop_U_G_N = Uni Staff

Appendix 4.3: Interactive effects of JD and IDs in prediction of job stress

Decision authority x escape/avoidance in nurses

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.313[a]	.098	.095	.790

a. Predictors: (Constant), Escape_x_DA, DA1, Escape_Avoid

b. Pop_U_G_N = Nurses

ANOVA

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	56.043	3	18.681	29.962	.000[a]
	Residual	514.999	826	.623		
	Total	571.042	829			

a. Predictors: (Constant), Escape_x_DA, DA1, Escape_Avoid

b. Dependent Variable: Job_Stress

c. Pop_U_G_N = Nurses

Coefficients

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	1.955	.153		12.759	.000
	DA1	-.067	.085	-.049	-.791	.429
	Escape_Avoid	.758	.169	.401	4.476	.000
	Escape_x_DA	-.204	.100	-.191	-2.036	.042

a. Dependent Variable: Job_Stress

b. Pop_U_G_N = Nurses

Skill Discretion x Problem focused coping in university employees

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.178[a]	.032	.022	.931

a. Predictors: (Constant), PFCSC_x_SD, SD1, PFC_SC

b. Pop_U_G_N = Uni Staff

ANOVA

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	8.172	3	2.724	3.146	.026[a]
	Residual	250.252	289	.866		
	Total	258.423	292			

a. Predictors: (Constant), PFCSC_x_SD, SD1, PFC_SC

b. Dependent Variable: Job_Stress

c. Pop_U_G_N = Uni Staff

Coefficients

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	-.003	.834		-.004	.997
	PFC_SC	.898	.504	.432	1.783	.076
	SD1	.971	.373	.530	2.606	.010
	PFCSC_x_SD	-.457	.221	-.683	-2.071	.039

a. Dependent Variable: Job_Stress

b. Pop_U_G_N = Uni Staff

Extrinsic effort x Negative stable attributions in nurses

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.511[a]	.261	.258	.719

a. Predictors: (Constant), NEG_SU_x_EE, NEG_SU, EE1

b. Pop_U_G_N = Nurses

ANOVA

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	144.180	3	48.060	92.977	.000[a]
	Residual	407.835	789	.517		
	Total	552.015	792			

a. Predictors: (Constant), NEG_SU_x_EE, NEG_SU, EE1

b. Dependent Variable: Job_Stress

c. Pop_U_G_N = Nurses

Coefficients

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	1.747	.250		6.996	.000
	EE1	.265	.195	.197	1.357	.175
	NEG_SU	-.077	.057	-.086	-1.357	.175
	NEG_SU_x_EE	.093	.043	.348	2.151	.032

a. Dependent Variable: Job_Stress

b. Pop_U_G_N = Nurses

Appendix 4.4: Interactions between personal resources/demands x perceived stress, in the prediction of outcomes.

Interactive regression of job stress x intrinsic effort in predict of depression in nurses

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.547[a]	.299	.297	2.71657

a. Predictors: (Constant), IE_x_JStress, Job_Stress, IE1

b. Pop_U_G_N = Nurses

ANOVA

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	2607.648	3	869.216	117.783	.000[a]
	Residual	6103.076	827	7.380		
	Total	8710.724	830			

a. Predictors: (Constant), IE_x_JStress, Job_Stress, IE1

b. Dependent Variable: HAD_DEP

c. Pop_U_G_N = Nurses

Coefficients

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	1.477	.513		2.882	.004
	Job_Stress	.483	.249	.124	1.944	.052
	IE1	.820	.383	.178	2.139	.033
	IE_x_JStress	.422	.163	.297	2.585	.010

a. Dependent Variable: HAD_DEP

b. Pop_U_G_N = Nurses

Interactive regression of job stress x self blame in predict of depression in university employees

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.580[a]	.336	.329	2.83822

a. Predictors: (Constant), Blame_x_JStress, Job_Stress, Self_Blame

b. Pop_U_G_N = Uni Staff

ANOVA

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	1214.814	3	404.938	50.269	.000[a]
	Residual	2400.537	298	8.055		
	Total	3615.351	301			

a. Predictors: (Constant), Blame_x_JStress, Job_Stress, Self_Blame

b. Dependent Variable: HAD_DEP

c. Pop_U_G_N = Uni Staff

Coefficients

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	-.842	.650		-1.296	.196
	Job_Stress	2.276	.315	.621	7.216	.000
	Self_Blame	2.282	.518	.452	4.406	.000
	Blame_x_JStress	-.501	.231	-.290	-2.167	.031

a. Dependent Variable: HAD_DEP

b. Pop_U_G_N = Uni Staff

Appendix 4.5: Plots of interactions between personal demands/resources and work demands/resources, in the prediction of anxiety, depression, and job satisfaction in nurses and university employees.

4.5.1: Extrinsic effort x self blame → job satisfaction in university employees
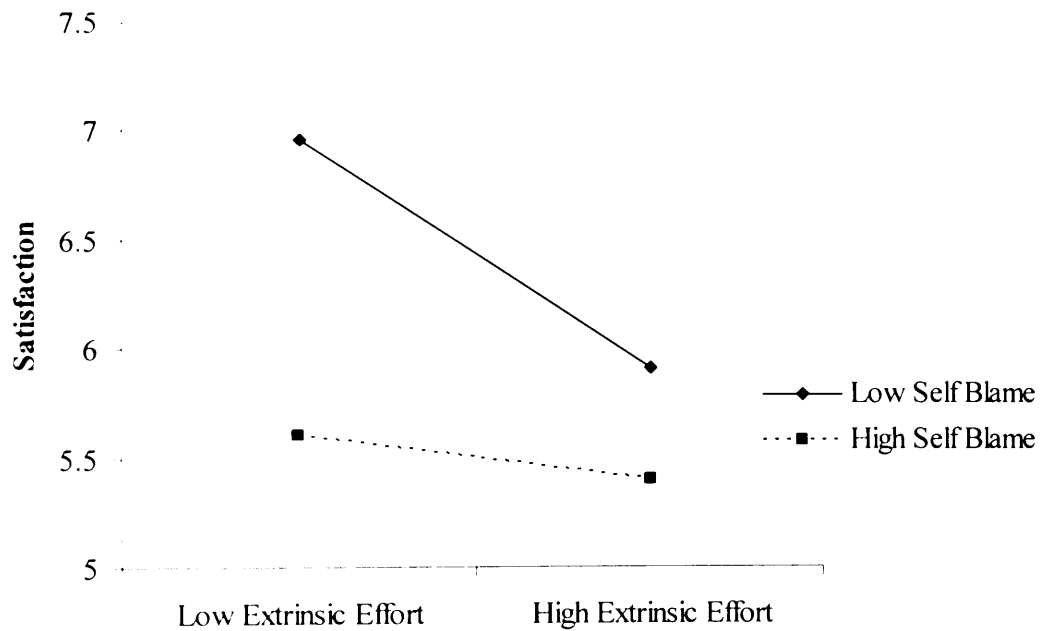
4.5.2: Extrinsic effort x intrinsic effort → depression in nurses
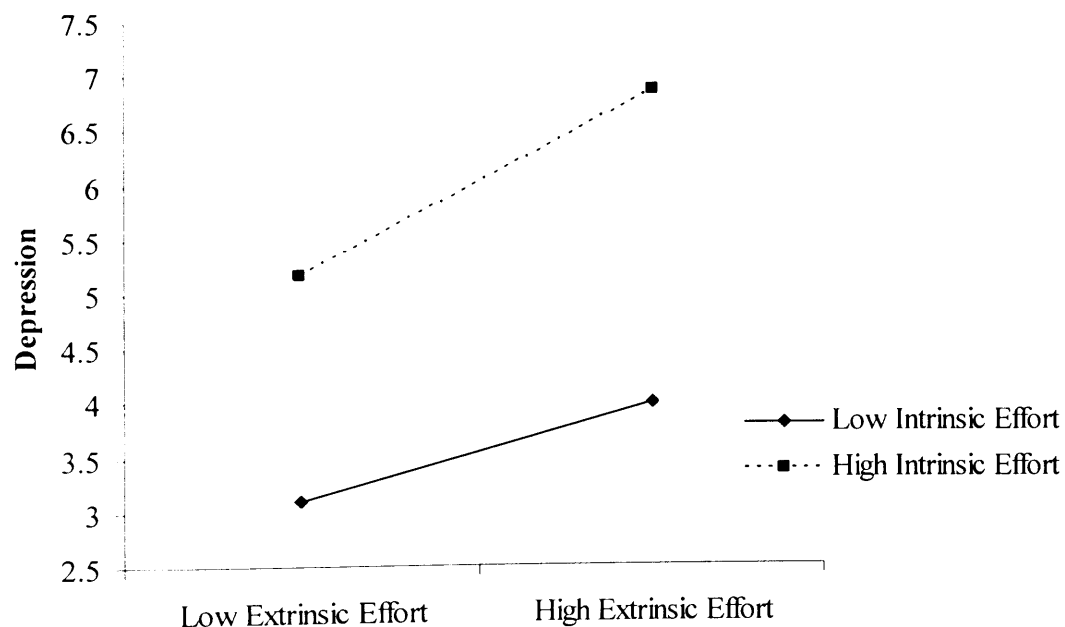
4.5.3: Decision authority x problem focused coping → job satisfaction in university employees
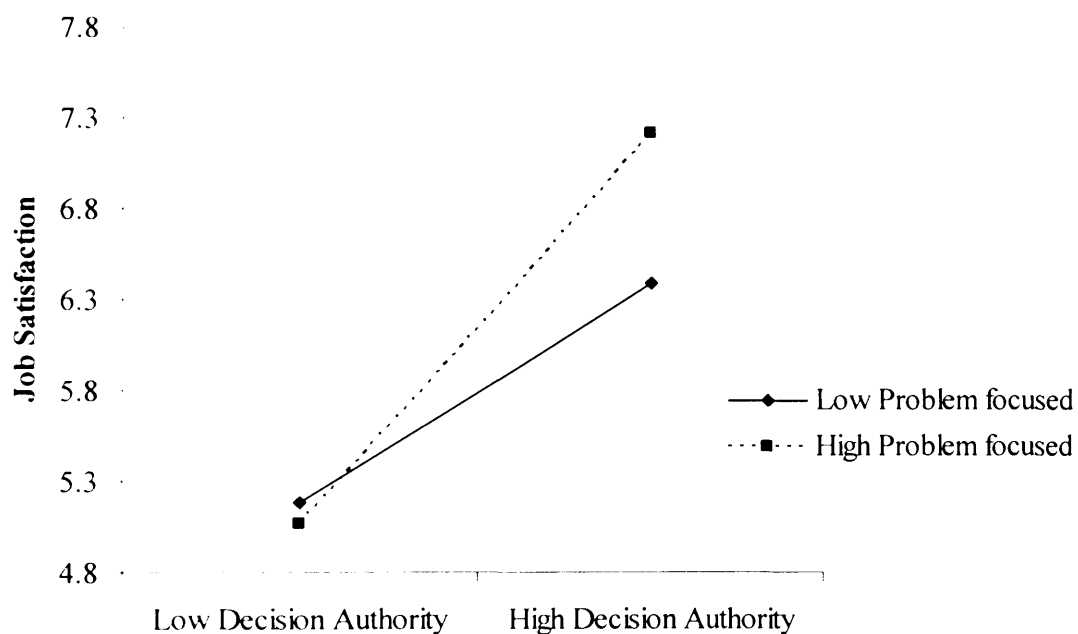
4.5.4: Decision authority x problem focused coping → depression in university employees
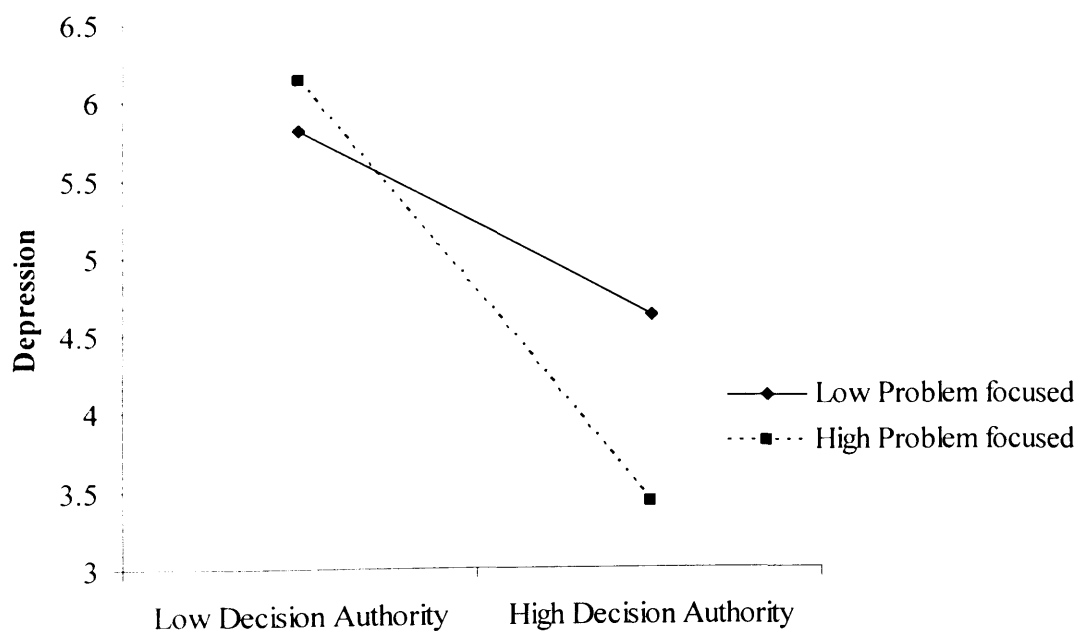
4.5.5: Decision authority x problem focused coping → depression in nurses
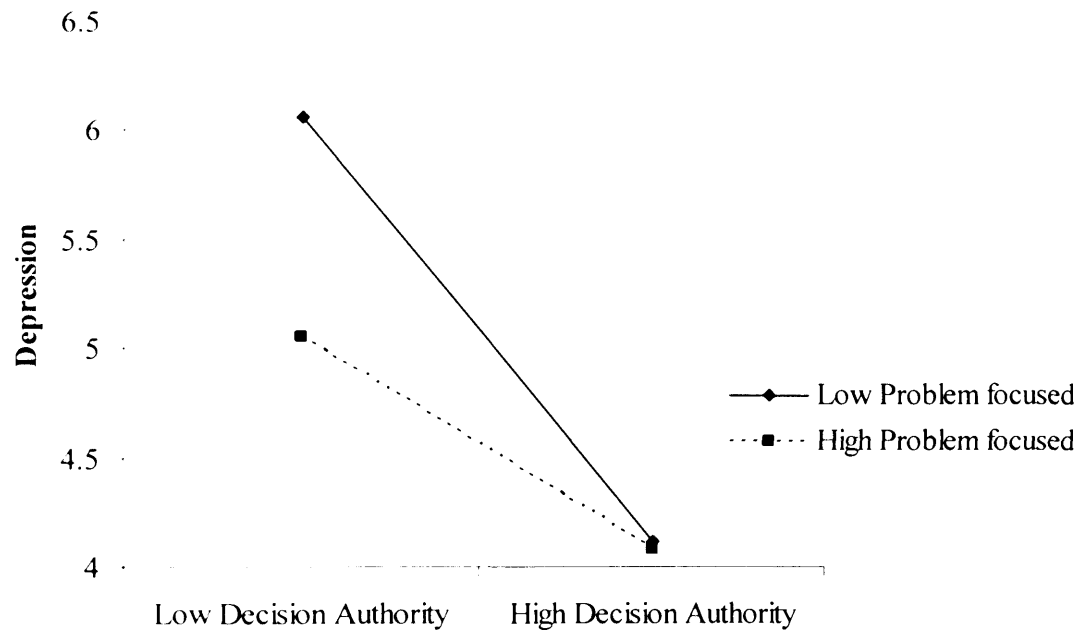
4.5.6: Decision authority x escape/avoidance → depression in nurses
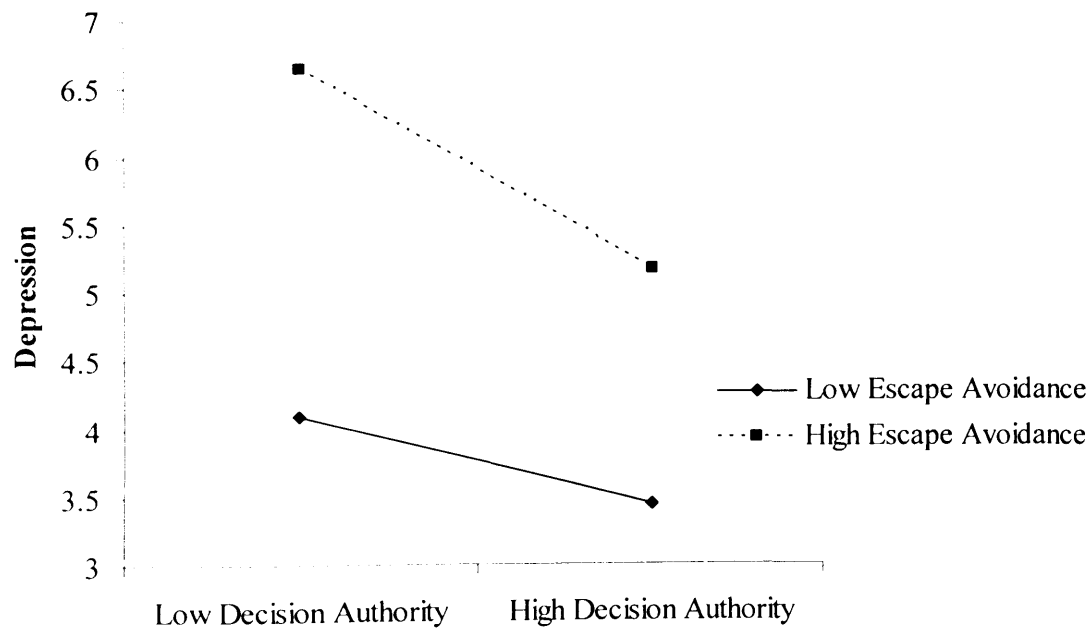
4.5.7: Decision authority x self blame → depression in nurses
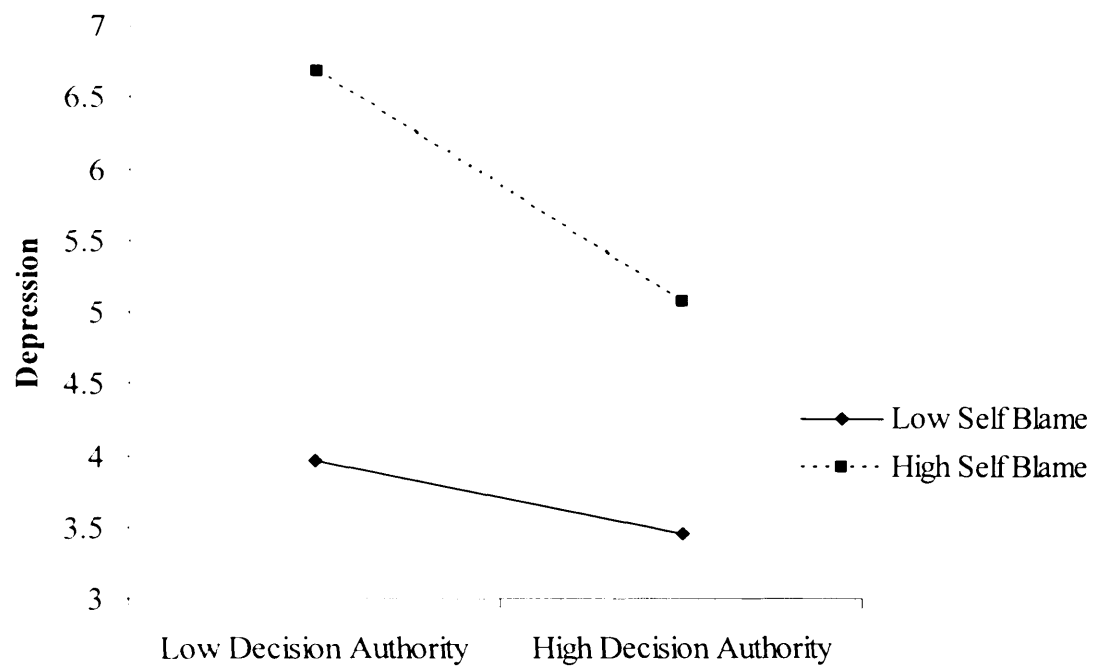
4.5.8: Decision authority x wishful thinking → depression in nurses
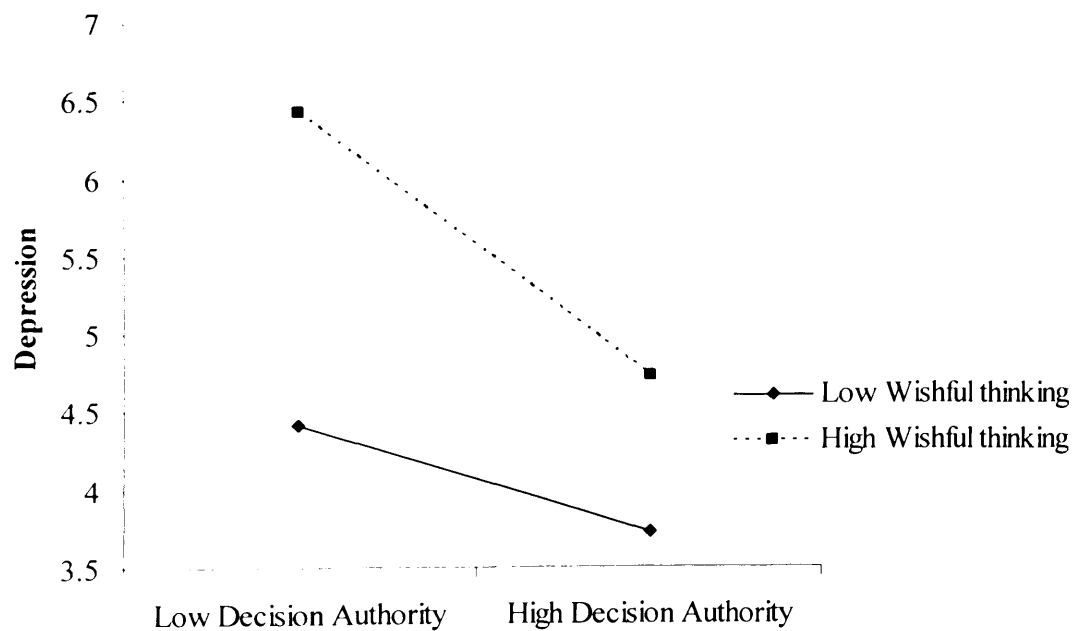
4.5.9: Decision authority x negative stable attributions → depression in university employees.
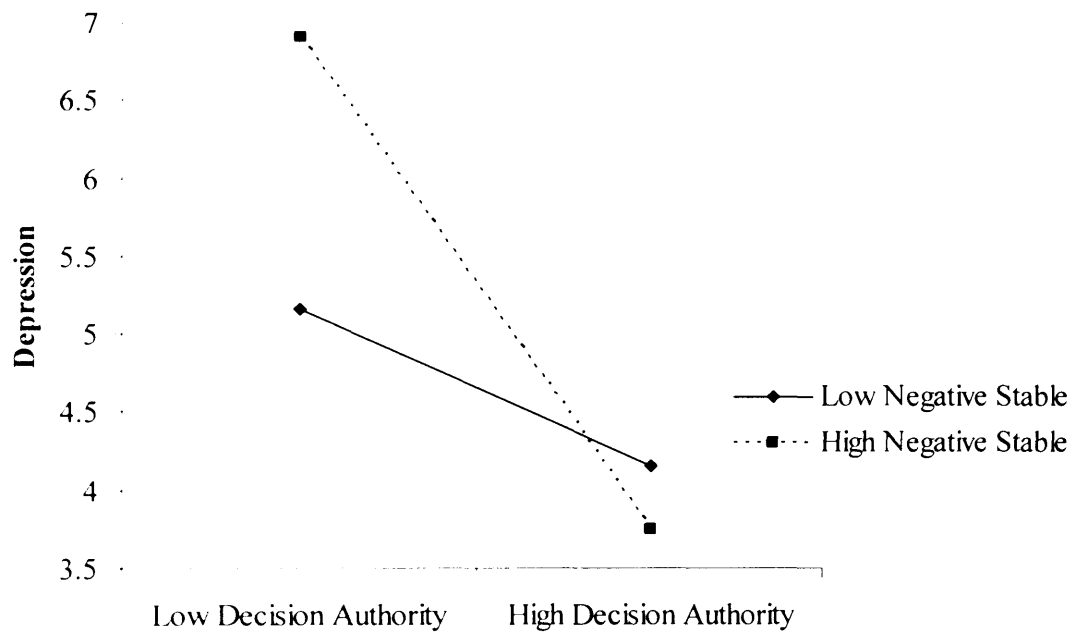
4.5.10: Decision authority x negative global attributions → depression in university employees.
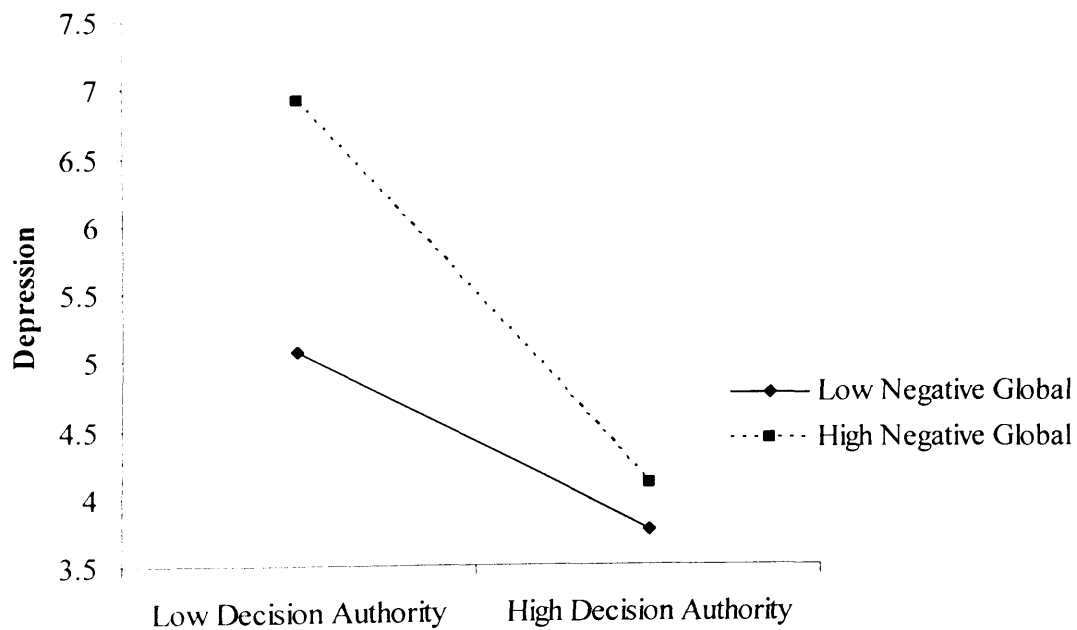
4.5.11: Intrinsic reward x problem focused coping → depression in nurses
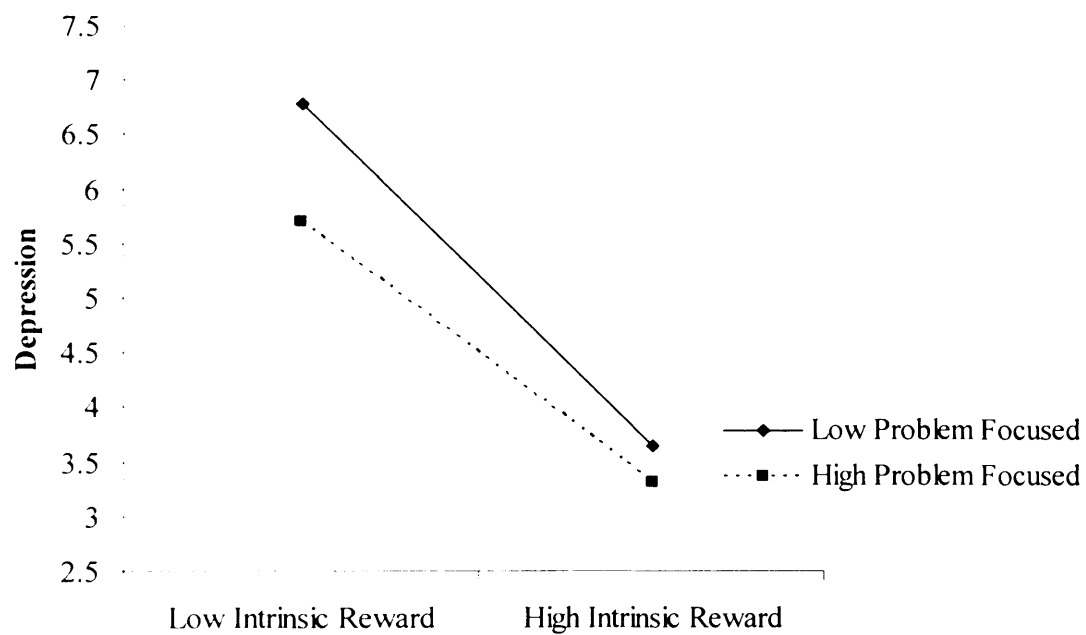
4.5.12: Intrinsic reward x escape/avoidance → anxiety in nurses
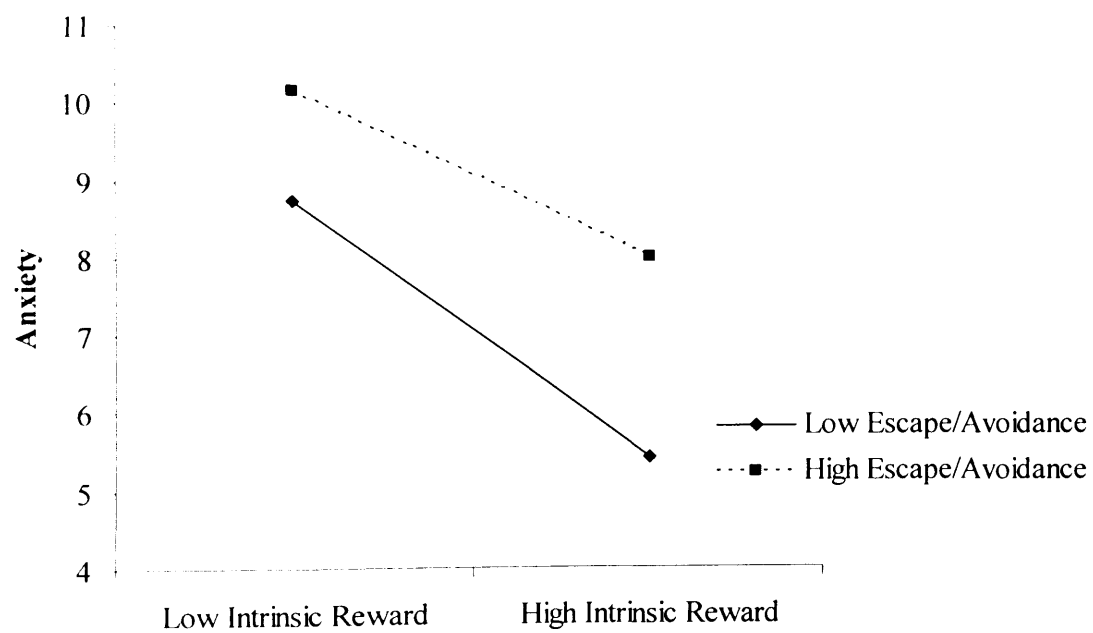
4.5.13: Intrinsic reward x self blame → anxiety in nurses
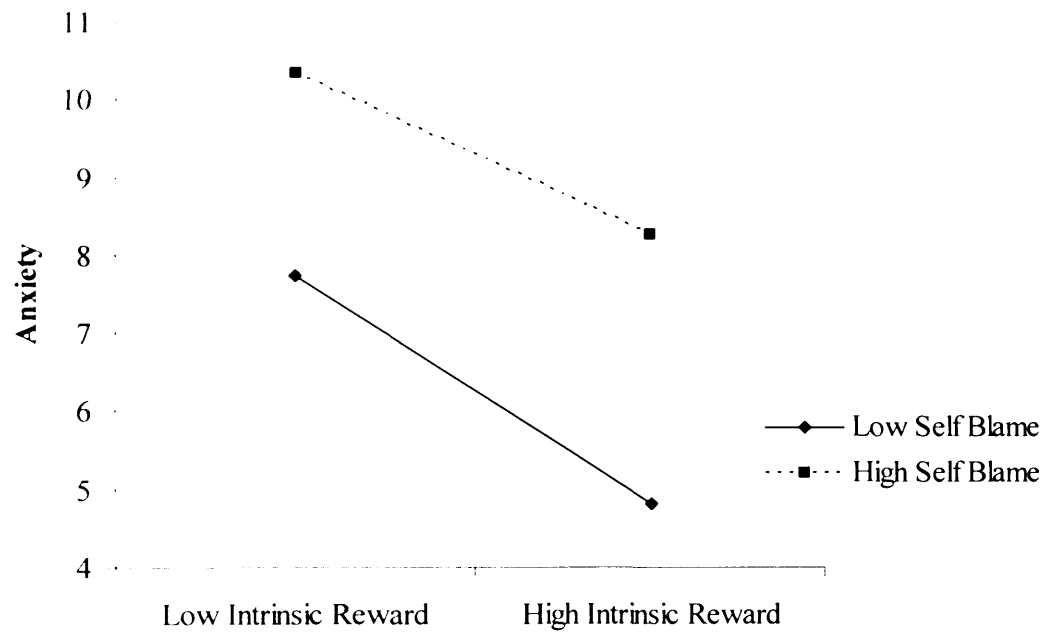
Low Self Blame
High Self Blame

4.5.14: Intrinsic reward x wishful thinking → anxiety in nurses

Low Wishful Thinking
High Wishful Thinking

309

4.5.15: Intrinsic reward x internal positive attributions → anxiety in nurses.

Anxiety

10
9.5
9
8.5
8
7.5
7
6.5
6
5.5
5

Low Intrinsic Reward   High Intrinsic Reward

——◆—— Low Positive Internal
---■--- High Positive Internal

4.5.16: Skill discretion x stable negative attributions → anxiety in university employees

Anxiety

9.5
9
8.5
8
7.5
7

Low Skill Discretion   High Skill Discretion

——◆—— Low Negative Stable
---■--- High Negative Stable
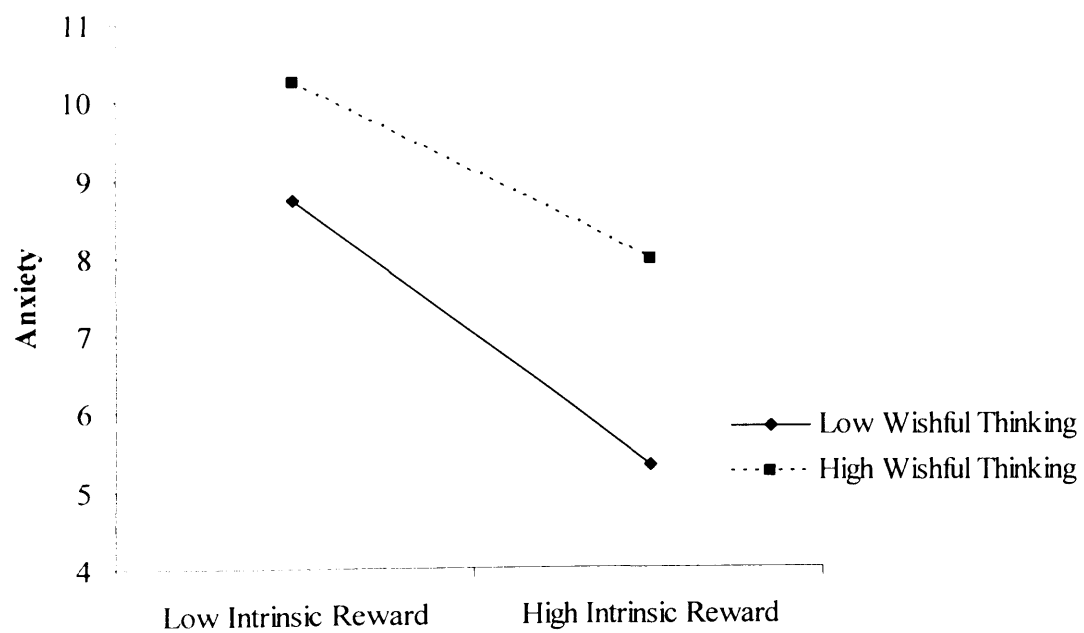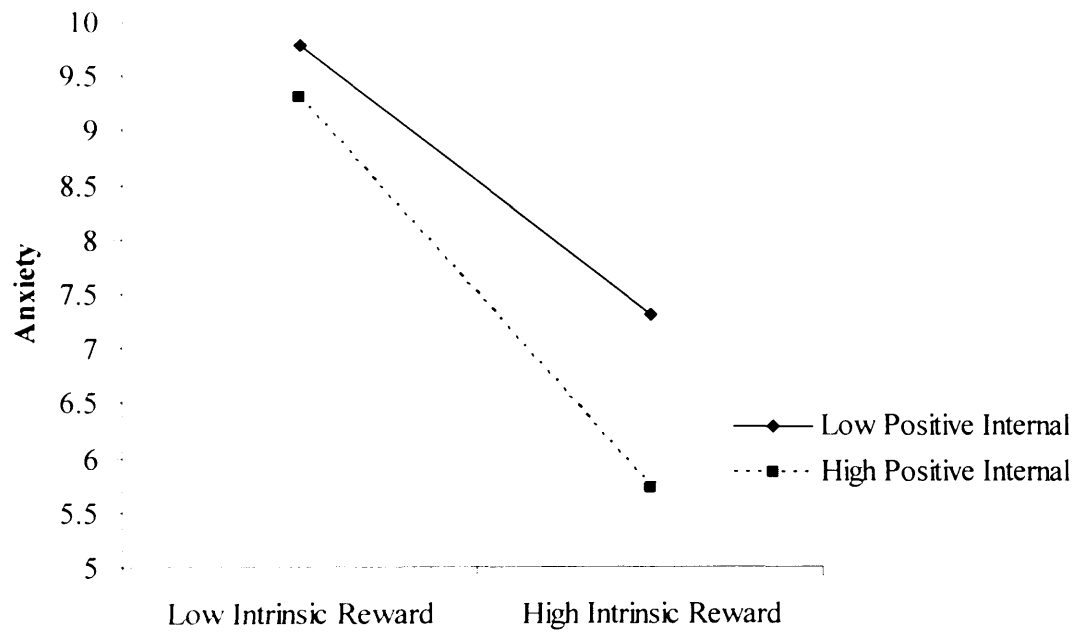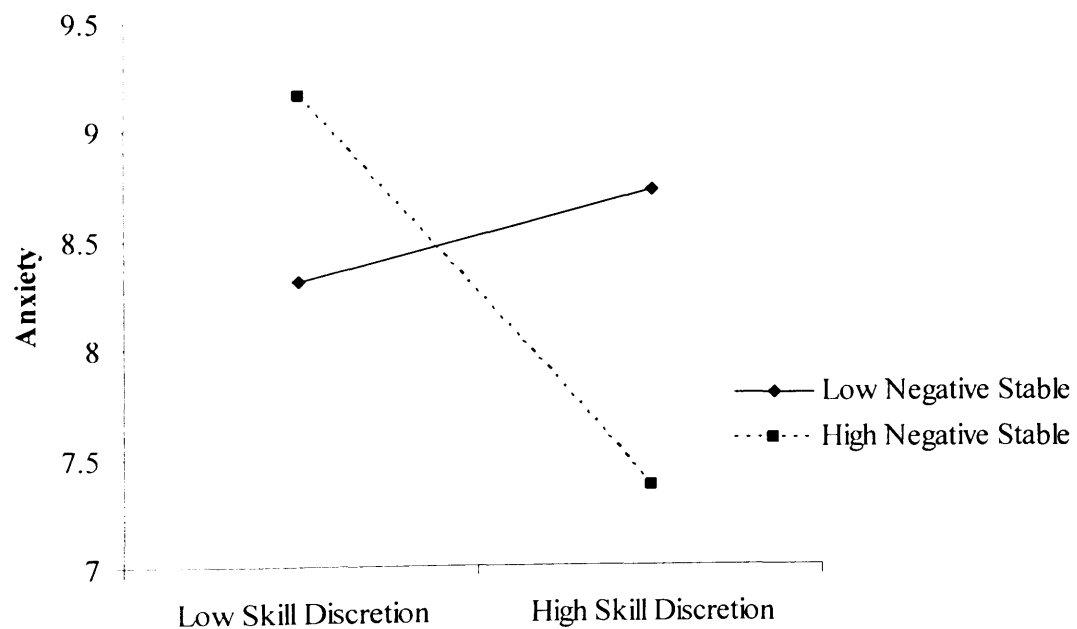
4.5.17: Skill discretion x stable negative attributions → depression in university employees
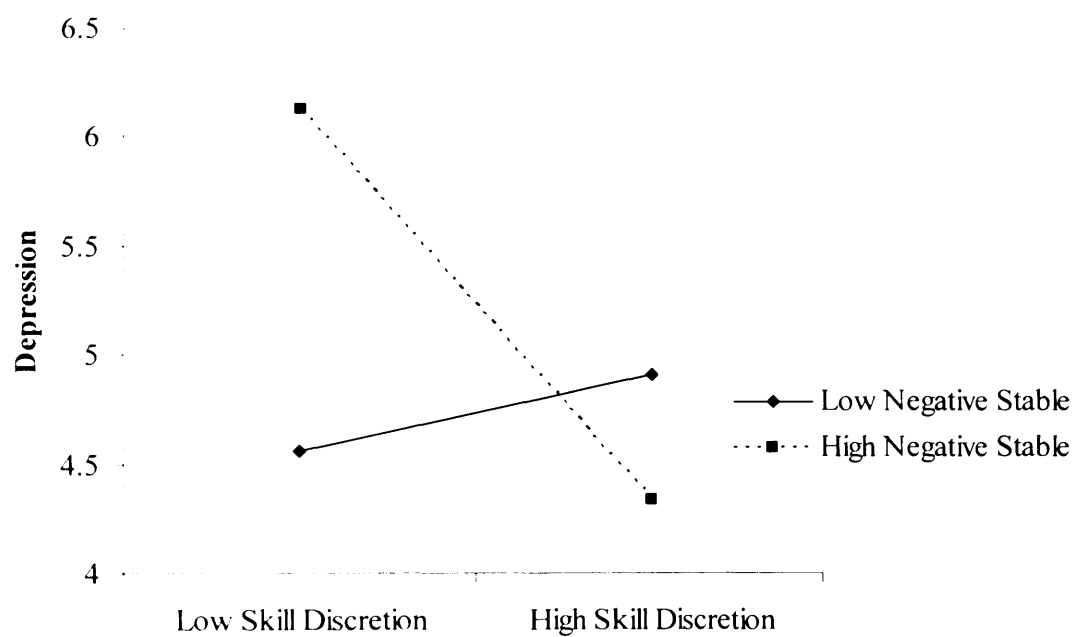
4.5.18: Skill discretion x global positive attributions → satisfaction in university employees
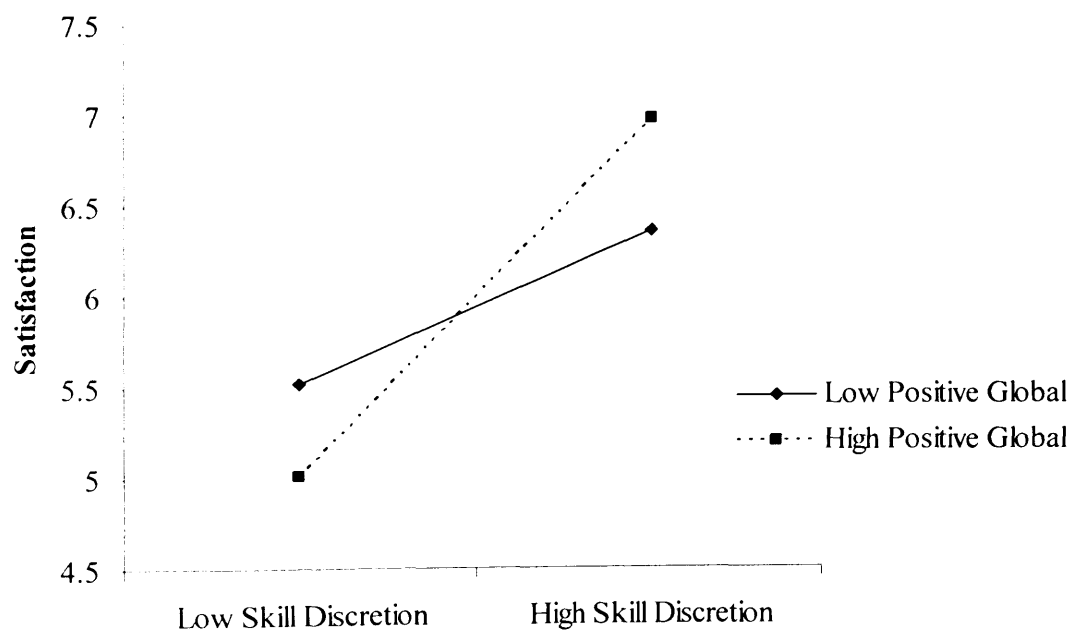
4.5.19: Skill discretion x seek advice → depression in university staff
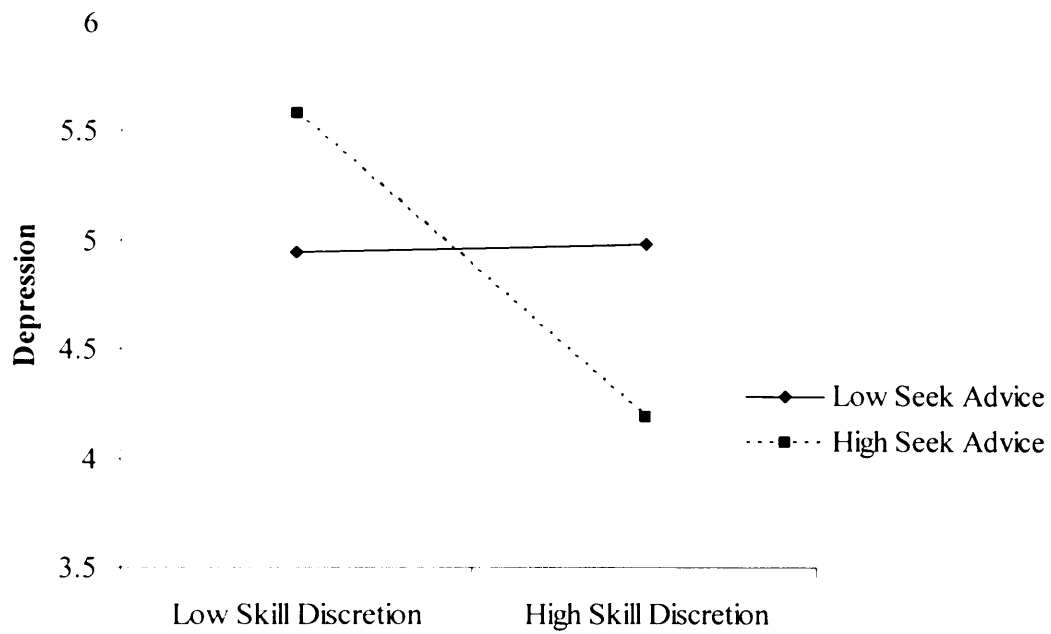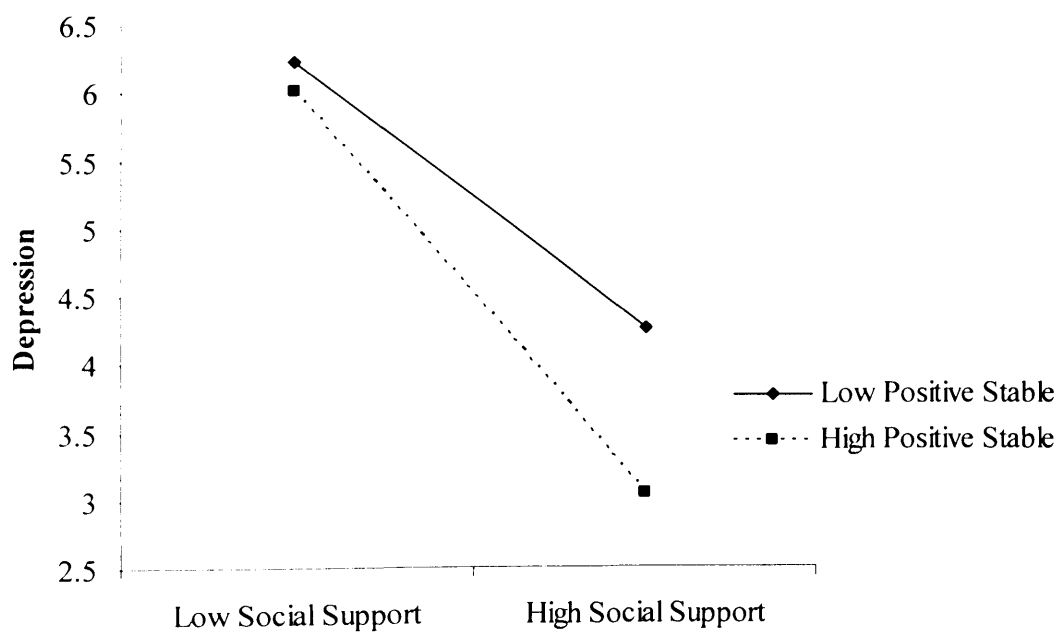

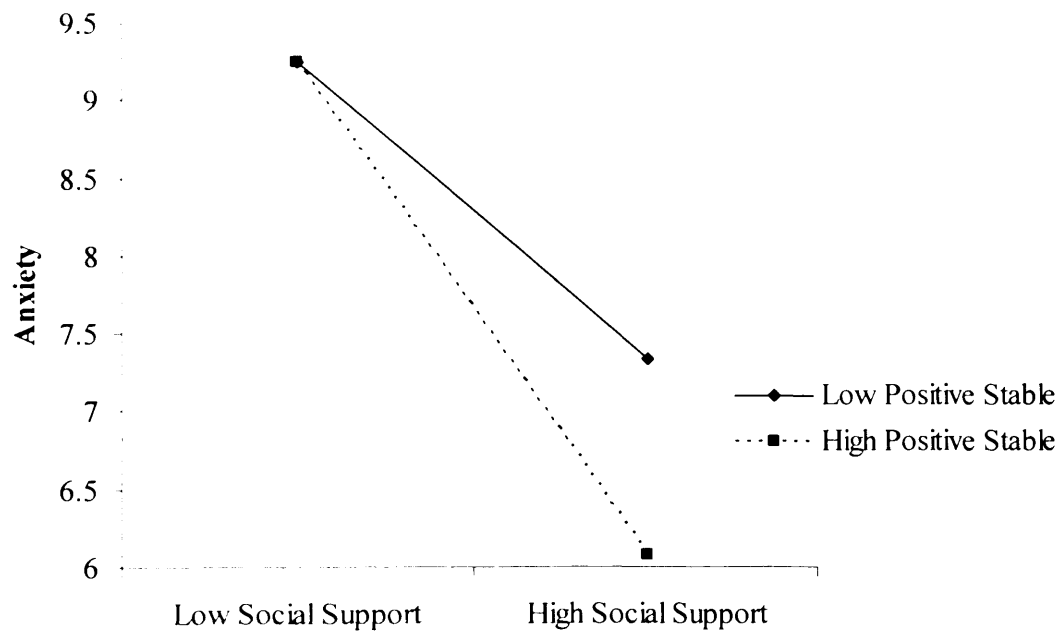## 4.5.20: Social support x global negative attributions → depression in nurses
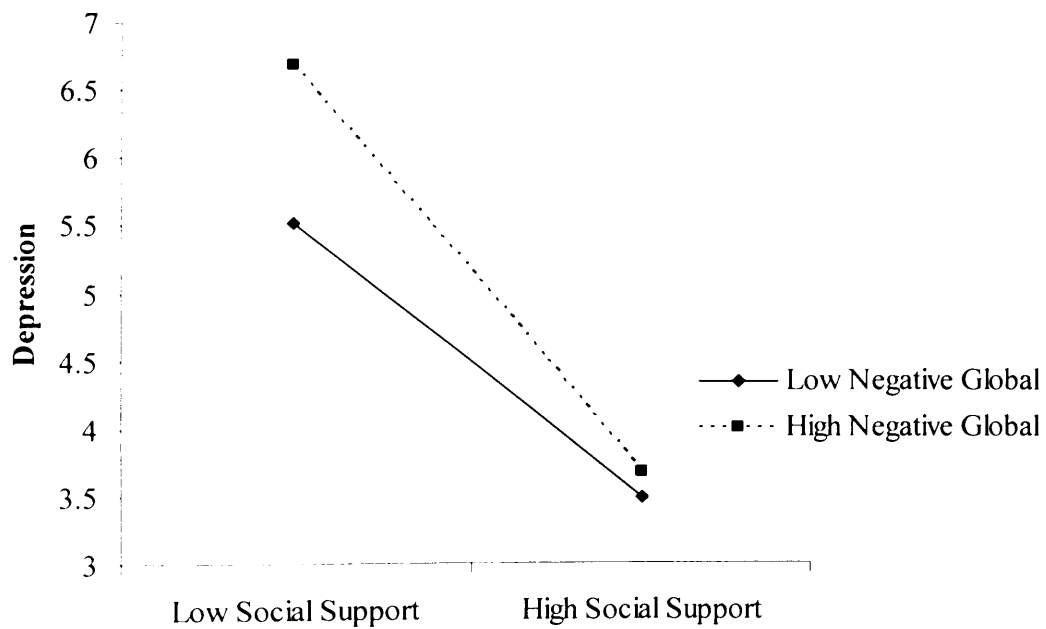
4.5.21: Social support x stable negative attributions → depression in nurses
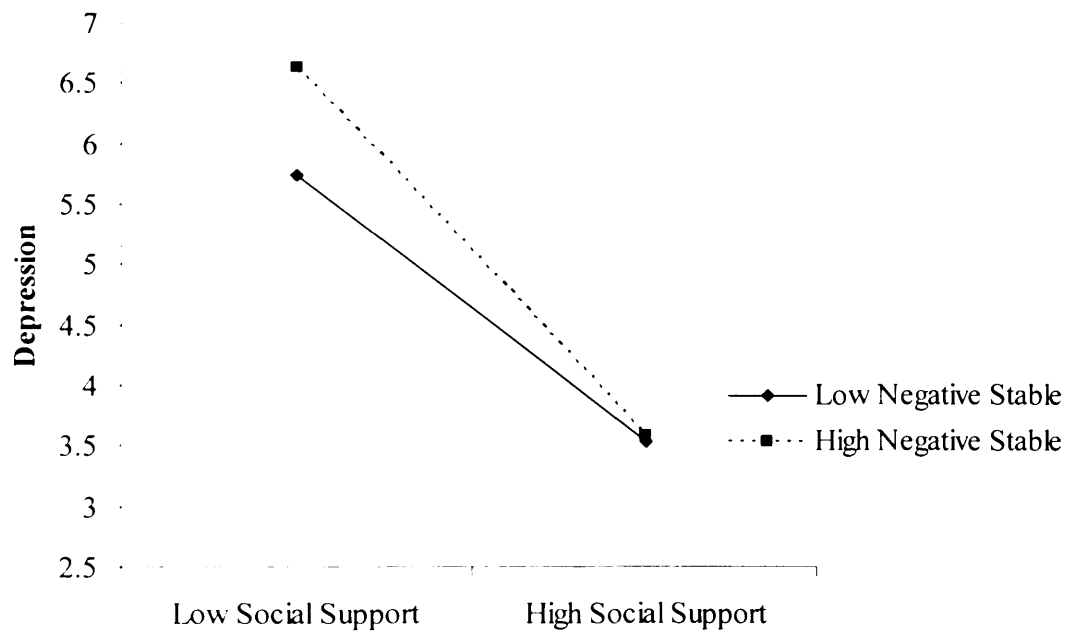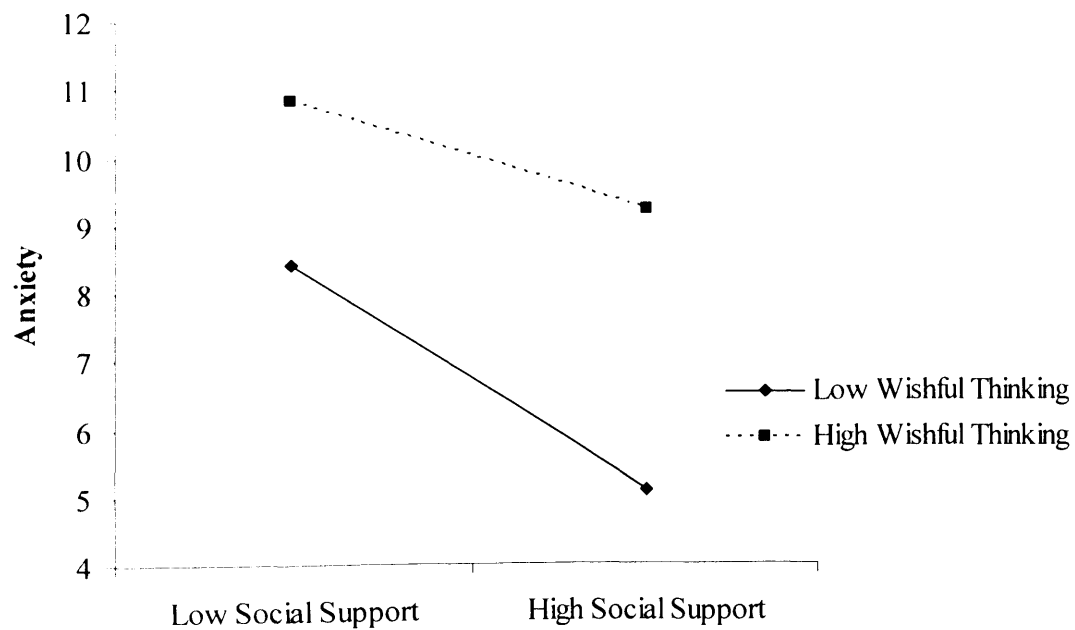

4.5.22: Social support x stable attributions for positive events → depression in university employees

4.5.23: Social support x stable attributions for positive events → anxiety in university employees

4.5.24: Social support x wishful thinking → anxiety in university employees

Appendix 5.1: Copy of email send to prospective participants for qualitative research, Chapter 8

Dear_____

My name is George Mark and I work at the Cardiff University Centre for occupational and health psychology.

   You may remember that you participated in a survey about health and stress in university staff last year. I am conducting a small follow up study, and have your name as someone who indicated that they may be willing to take part in further research on this area. The research would be a short interview (which I would record, but with no reference to your name) that would take 10-15 minutes, on the topic of stress in the workplace: if you have experienced it; what you thought caused it; what could be done about it, etc. If you would be interested in participating, please reply to this email so we can discuss an appropriate time and place to meet.

Thank you very much for your time as well as your participation in the original study,

Regards.