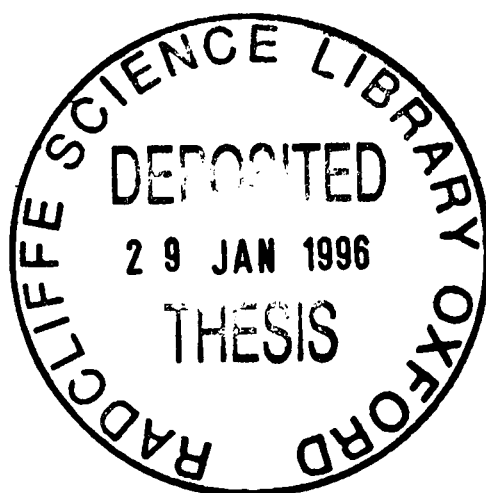

**THE STRESS PROCESS IN OCCUPATIONAL SETTINGS:
THE ROLE OF PSYCHOSOCIAL FACTORS**

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In loving memory of my mother, Ann

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Abstract

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D. Phil. Thesis
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The stress process in occupational settings: the role of psychosocial factors

This thesis is concerned with the direct and indirect mechanisms through which psychosocial stressors affect well-being, within the framework of the Michigan Model (House, 1981). An additional aim is to examine the stress process during workplace transitions. Empirical studies were conducted in three occupational settings: a cross-sectional pilot study with a sample of white-collar employees of several companies (N=144), and two longitudinal studies with samples drawn from a single retail chain, the “manager study” (N=261) and the “relocation study” (N=175).

Although statistical control for individual differences (including response style) attenuated associations between work characteristics and strain outcomes, in all three samples work characteristics jointly contributed to the explanation of job satisfaction and psychological distress. More specifically, perceptions of control and social support were associated with job satisfaction, while work demands played a significant role in explaining symptom report. Furthermore, symptom levels predicted work absence in a combined sample of retail employees (N=221).

In addition to direct effects, mediation and moderation patterns were examined. Results suggested that work perceptions partially mediated relations between personality (specifically locus of control beliefs and neuroticism) and strain. A similar pattern of mediation was apparent for social support. However, evidence for moderation of the stress process by individual and work characteristics was equivocal. Cross-sectional analyses using the manager sample data revealed significant interactions of control and Type A behaviour with work characteristics, but these interactions were not consistent in form with theory and past research. In contrast, in the longitudinal relocation study interactions were consistent with expectations: the negative impact of change was buffered by social support from senior colleagues and perceptions of control.

Longitudinal analyses also demonstrated negative effects of workplace change; decreasing job satisfaction was observed during organisational restructuring, and transfer to a new branch was associated with increased psychological distress. Furthermore latent variable models revealed that changes in support, role ambiguity, and control over time were predictive of changes in job satisfaction.

Overall, the present studies emphasise the need to examine simultaneously the joint influences of individual and work characteristics in occupational stress research. In this way the direct and indirect mechanisms through which psychosocial factors influence strain may be more fully understood, and strain-reducing interventions devised.

Extended Abstract

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Nuffield College

D. Phil. Thesis
Trinity Term 1995

The stress process in occupational settings: the role of psychosocial factors

This thesis examines the roles of psychosocial factors on well-being within occupational settings. More specifically, the research aims to clarify the direct and indirect mechanisms through which individual differences and work characteristics affect well-being, as a better understanding of these processes can be applied in redesigning jobs to reduce work-related strain. The thesis commences with an overview of theoretical models of the stress process, and a review of past research into proposed influences on strain, using the Michigan Model (House, 1981) as a guiding framework. This is followed by a critique of past occupational stress research methods. The remainder of the thesis describes the empirical research. Three studies were undertaken: a cross-sectional pilot study and two longitudinal studies. The two main studies were conducted with employees of a large retail chain. Therefore the conclusions drawn in the final chapter pertain most closely to the stress process in a retailing domain, although the similarity of results to those of previous research suggests that the findings may also have wider application.

In Chapter 1 several popular theories of work stress are described. In particular, it is argued that psychological models of work stress, based on a transactional approach, better represent the stress process than simpler stimulus-based and response-based models. Furthermore, of the psychological models, the Michigan Model provides the most encompassing framework to guide research, as it incorporates more specialised models, such as Role Stress Theory (Kahn et al., 1964), the Demand-Control Model (Karasek, 1979) and the Stress Antidote Model (Sutton and Kahn, 1987). Moreover, the Michigan

Model specifies more clearly testable research hypotheses than the Person-Environment Fit Model (Van Harrison, 1978) or the Transactional Model (Lazarus, 1966).

Chapters 2 and 3 draw on the Michigan framework to organise a discussion of empirical research findings in the occupational stress literature. Chapter 2 reviews the evidence for the pathway in which objective and perceived work characteristics give rise to short-term responses and more enduring health outcomes. Many psychosocial features of the work environment have been associated with symptoms of strain in published work. In particular, work demands, role conflict and ambiguity, personal control, and social support have been identified as job characteristics for which there is substantial evidence of an influence on individual well-being. In addition, workplace change has been widely proposed to result in “transition stress”. However, research evidence of the negative impact of change has been more descriptive than scientifically rigorous. Short-term responses to stress are discussed under three headings: physiological, psychological and behavioural outcomes. It is noted that specific outcomes are predicted by different stressor combinations. Links between short-term responses and more enduring outcomes, such as heart disease and psychiatric illness are also reviewed. Finally, a brief overview of feedback processes within the Michigan Model is presented.

The Michigan Model proposes mechanisms through which individual and work characteristics might modify the stress process as outlined above. Chapter 3 evaluates the evidence for indirect, modifying effects. Two indirect roles are distinguished: moderation and mediation. Moderation (incorporating interaction and buffering effects), has received considerable attention in the stress research literature: for example, the moderating role of personal control is central to the Demand-Control Model and Stress Antidote Model. Social support has also been proposed as a buffer of stressor-strain relations. Interaction of individual differences and environmental characteristics are also consistent with predictions

of the Person-Environment Fit Model. Unfortunately, despite intensive research into moderation effects, evidence of these effects is equivocal and interactions account for only a small percentage of the variance in strain outcomes. In contrast, until recently relatively few empirical studies have examined the role of work perceptions as mediators of relations between psychosocial stressors and outcomes. The available evidence suggests that a better understanding of these pathways may add substantially to our knowledge of how stressors and strain are related.

Chapter 4 presents a detailed discussion of methodological critiques of stress research in work settings, divided into issues of measurement, research design, and statistical analysis. Occupational stress research has tended to rely unduly on self-report methods to measure individual and situational characteristics as well as strain outcomes. This methodology can result in inflated correlations between proposed independent and dependent variables due to common method variance and dispositional response bias. One way in which this difficulty can be addressed is by the addition of independent, objective measurements, particularly of the work environment; however such measures may be difficult and costly to obtain. Alternatively, statistical control for relevant personality traits, such as negative affectivity, can be used to reduce artificially inflated correlations. In relation to research design, the most commonly employed method in occupational stress research has been the cross-sectional survey. It is argued that longitudinal designs, particularly those which incorporate objective differences between research conditions, are superior for making causal inferences. In particular, quasi-experimental field research combines more rigorous experimental design with the external validity of a field setting. Finally, the use of multivariate statistics to assess the joint influences of psychosocial factors is discussed, together with techniques for statistically controlling for measurement error and analysing change.

Chapter 5 describes a cross-sectional pilot study, carried out with individuals working in a range of white collar work environments, mostly in professional and managerial roles. One aim of this study was to examine the psychometric properties of the selected questionnaire scales, so that modifications could be made, if necessary, before their use in the main studies. In addition, hierarchical multiple regression was used to explore relationships among individual differences, work characteristics, and strain responses. The results of these analyses are discussed in light of relevant past research with professional and managerial samples. After statistical control for individual differences, work characteristics explained significant incremental variance in job satisfaction and anxiety.

Chapters 6, 7, and 8 report the results of a study involving junior, middle, and senior managers of a large retailing company, the manager study. Half of the managers surveyed worked in the company's retailing division, while the remainder fulfilled head office functions. Chapter 6 describes the background to the study, reviewing published stress research in retail environments, and providing information about the company, its employees, and the survey methods.

Chapter 7 reports analyses of the first wave of the manager survey. Multivariate analysis of variance was used to assess differences between the two work locations (head office and retail divisions), and three levels of management. Job characteristics were found to be jointly determined by management grade and location, including a significant interaction effect. Likewise employees in different job categories showed significant differences in personality. Finally, and consistent with past research, the junior employees reported higher levels of strain than their more senior counterparts. Therefore in subsequent analysis of the roles of individual and work characteristics as predictors of strain, job grade was taken into account, to control statistically for confounding with other independent variables.

Multiple regression was used to assess the relative contribution of individual differences and work characteristics in explaining differences in job satisfaction and psychological distress. The major predictor of psychological distress was personality, whereas job satisfaction was more strongly influenced by work characteristics. Hierarchical regression further revealed indirect mediation, suppression, and confounding effects. Patterns of moderation of stressor-strain relations by individual and situational characteristics were tested using multivariate multiple regression. The moderators examined were control, social support, locus of control, neuroticism, and Type A behaviour. A significant multivariate demand-control interaction was revealed; however the univariate interactions were only partially consistent in form with Karasek's proposed model. This lack of consistency may be attributed to sampling differences: demand and control appear to operate differently for managerial employees as compared with more general samples of the population. Evidence for other moderation effects was weak. Of the several interactions tested, few were statistically significant, and these only explained a small percentage of the variance in outcomes. It is concluded that additive models of direct effects provide a more parsimonious explanation of strain outcomes than more complex moderation models.

In Chapter 8 mediation in the stress process is further examined using latent variable modelling. The model developed with Time 1 data from the manager study was consistent with neuroticism, social support, and perceived control exerting both direct and mediated influences on job satisfaction and mental health. Analysis of the three-wave longitudinal data revealed a significant peak in symptom report at Time 2; in contrast, job satisfaction decreased over the three survey waves. Changes in some job characteristics (role clarity and social support) over time were also noted. Furthermore, longitudinal structural models were developed in which the stability of work characteristics and of strain over time was

statistically controlled. Changes in job satisfaction were associated with changes in social support, role ambiguity, and control. However, changes in work characteristics did not explain changes in mental health in a longitudinal model.

Chapter 9 describes a study involving all levels of branch personnel. Employees from three retail branches, who had been selected for transfer to new stores, were surveyed before and after relocation to examine the impact of this workplace change on well-being. A comparison sample of employees, drawn from similar stores not involved in relocation, was also surveyed. Cross-sectional analyses of the Time 1 data revealed findings consistent with those of the manager study: job satisfaction was closely linked to perceptions of control and social support, while psychological distress and report of physical symptoms were related to work demands and personality characteristics, particularly neuroticism. Furthermore, path analysis using multiple regression revealed that, after controlling for initial symptom levels, psychological distress at Time 2 was predicted independently by relocation and work demands. Although it was not possible to account for differences in outcomes between new and comparison store samples in terms of changes in work characteristics measured in the present study, the negative impact of relocation was found to be buffered by perceptions of control and social support.

Prediction of work absence as an outcome of the stress process was attempted in Chapter 10. As absence measures are not normally distributed, Tobit analysis was used in preference to ordinary least-squares regression. After controlling for prior absence behaviour, significant predictors of absence were self-report of somatic symptoms, job level, and education. However, no effects of work perceptions were observed in these analyses, although published research suggests that these may occur. Further research is needed to investigate in more detail the causal mechanisms, including mediating factors, through which education and job level are associated with work absence.

In the final chapter (Chapter 11) research findings from the three studies are summarised, and conclusions drawn about the extent to which the present research provides evidence for the direct, moderated, and mediated roles of psychosocial factors, as described in the Michigan Model. Direct effects of work demands and neuroticism on mental health, and control and social support on job satisfaction, were consistently found in all three studies. Mediated effects of individual differences and work characteristics were also revealed in some analyses. Specifically, the influences of locus of control and neuroticism on strain were shown to be partially mediated by work perceptions. Furthermore, social support from senior colleagues was found to have mediated as well as direct influences on job satisfaction. Role ambiguity and perceived control played important roles as mediators. It is concluded that evidence in the present study for moderation of stressor-strain relations is equivocal. Although some specific interaction effects were found, these accounted for a relatively small percentage of the variance in outcomes. In addition, more general tests of moderation failed to reach acceptable levels of statistical significance.

In Chapter 11 the methodological strengths and weaknesses of the present studies are also discussed, with a view to future research. It is recommended that confirmatory tests of mediation models should be conducted with large longitudinal samples in which a wider range of key work characteristics are included, with greater emphasis on objective measures. Chapter 11 concludes with a discussion of potential intervention studies, which could serve both to enhance understanding of causal stress processes, and to alleviate work-related strain.

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1. The Stress Process

1.1 Introduction

Over the second half of the 20th century, awareness of stress as a significant occupational hazard has increased (Ensel and Lin, 1991), and in 1992 stress-related illness was estimated to cost British industry £7bn per annum (*The Guardian*, October 31 1992). Consequently there has been a realisation of the need for preventative measures, in line with general health care policy. Although many factors, both at work and beyond, have the potential to influence individual well-being, the focus of the present research is on work conditions, with a view to stress-reducing intervention at a company level.

The effects of physical working conditions have been widely examined, with past research findings now widely incorporated in health and safety legislation (Cox and Fergusson, 1994; Theorell, 1991a). In contrast, theories regarding the more abstract realm of the psychosocial work conditions are less well established. Issues of psychosocial work stress have only received wide-spread attention since the 1970s, having grown out of the broader life-stress research tradition. Psychosocial work conditions include social and organisational aspects of the job, as well as job content and certain operational aspects of work tasks (Sauter, Murphy and Hurrell, 1990). According to Sauter et al. (1990), psychosocial conditions are of potentially greater importance than physical hazards, as psychosocial factors respect no occupational boundaries, and so the potential for exposure to this class of health risk is ubiquitous.

Much of the literature in this area suggests that factors such as the provision of personal control, or the promotion of a supportive work environment, may act to reduce adverse outcomes associated with demanding work requirements (Karasek, 1979; House

1981). The influence of individual differences in this process, for example in terms of coping style or belief systems, is also of great significance (Van Harrison, 1978). Furthermore, although workplace change is widely cited as a potential source of stress, the processes underlying transition stress and resistance to change are not well understood. Thus, the present research programme aims to investigate the relationships among objective and perceived work environments, individual differences, and symptoms of strain: particular attention is given to the stress process over a period of occupational change.

1.2 What is stress?

1.2.1 Problems of definition

The popular press, and indeed many academic writers, appear to assume a common definition of the word “stress” that is unambiguously understood by their audiences. However, when defining the concept in a scientific manner, this assumption of convergence is unwarranted. McCrae (1990, p 237), recognised this problem in his discussion of stress measurement; he noted, “stress...can mean an external event, an internal perception, or a complex physiological reaction.” Several academic writers have questioned the usefulness of using the word “stress” at all, as its multiple definitions may add more confusion than clarity to any discussion, and so many choose to avoid the term altogether (e.g. Fleming, Baum and Singer, 1984; Perrewe and Ganster, 1989). In comparison, others retain the word as an umbrella term, referring to a broad domain of research that investigates the relationships between people and their environments, and how this relationship influences well-being (e.g. Lazarus and Folkman, 1984; Fisher, 1989; Jackson, 1989). Most agree that “stress” implies a negative experience, and use other words, such as “pressure” or “challenge” to connote neutral or positive aspects of demanding work experiences (e.g. Cox, 1985; Cooper, 1992): this convention is followed here.

Furthermore, to avoid potential confusion of terminology, except where quoting other writers, in this thesis the term "stress" will be reserved for the general area of research, or the process as a whole. Objective and perceived conditions in the environment are referred to as "stressors" or “potential stressors”, and "strain" refers to measured outcomes or responses. In order to lend further conceptual clarity to this area, Cox (1978) proposed an heuristic for classifying models of the stress process, in which he described three

theoretical approaches to this area of research: the engineering, medical and psychological models of stress. This system of classification has also been used by other researchers working in the field (e.g. Folkman, 1984; Perrewe and Ganster, 1989).

1.2.2 Engineering model of stress

This approach to the study of stress has its origins in models of the physical world and much of the terminology used in the stress literature is borrowed directly from the physical sciences. Specifically, the human stress experience is seen as analogous to the deformation of solids, as described by Hooke's Law. An individual is seen to be able to bear or accommodate a certain amount of pressure, returning to his or her normal state once the load has been removed; however beyond a certain (elastic) limit, residual strain remains. In the same way that different physical materials can tolerate different amounts of physical pressure without permanent deformation, individual people differ in their resistance to stress.

In this conception, "stress" is an external, noxious force, acting upon the person. For this reason, these types of model are sometimes also referred to as stimulus-based models, as research based upon this framework casts "stress" as the independent variable. The engineering model has been a useful analogy for clarifying stress theory and suggesting directions for empirical research (Sutton and Kahn, 1987). However, although the engineering model accounts for individual differences in the stress process, it does not explain the observed negative responses to undemanding or boring situations. According to this type of model, low demand environments should be free of strain. In contrast, Welford (1973) among others has suggested that departures from some optimum level are stress-provoking; implying a curved U-shaped relationship between load and outcome, such that

both very low and very high levels of load may be experienced negatively. Thus, in contrast with the laws of the physical sciences, there is some difficulty in establishing which psychosocial stimuli will be experienced as noxious (or “stressful”), and which are benign.

1.2.3 Medico-physiological approach to the study of stress

The medical model of stress is response-based, with the main focus being the reaction of the individual. This model has its origins in the work of Selye (1956), who saw “stress” as a non-specific (physiological) response to aversive stimuli, which follows a “general adaptation syndrome” as the individual adapts to chronic stressors over time. Thus wherever this particular pattern of response is observed, a preceding source of stress is inferred. “Stress” is therefore the outcome measure or dependent variable in this model. More recent developments of non-specific response theory (Kagan and Levi, 1971) suggest that the physiological response is determined by the psychological impact of the stimulus, rather than its objective presence, and includes a role for genetic and other individual differences.

One criticism of this type of model is the principle of non-specificity of response. It has been noted that responses such as high blood pressure may arise from several conditions, for example pregnancy, the experience of strong emotion, or exercise. According to this model, all such conditions are stressful by definition. Not only is this problematic in terms of meeting with general acceptance, but it leads to a certain circularity in establishing a priori what is and is not a source of stress (McGrath, 1970). Furthermore, evidence for a straightforward correlation between the components of the general stress response across individuals or situations has not been forthcoming (Cox, 1978).

1.2.4 *Psychological approach to stress research*

A logical improvement on stimulus-based and response-based conceptions of the stress process, is to combine the two in a transactional or interactional approach. Lazarus (e.g. Lazarus, 1966) has described stress as the result of a problematic transaction between a person and the environment. Considering the individual in relation to his or her environment, rather than attempting to make generalisations about people or situations, accounts for more of the available data (Cox and Mackay 1981). A common thread in these approaches to stress is that attention is drawn to the cognitive and perceptual processes of appraisal: stress arises when an individual *perceives* that the demands of the situation outweigh his or her capacity to meet those demands (Lazarus and Folkman, 1984; McGrath, 1970). If appraisal of both the situation and the individual indicates a “lack of fit” between the two, stress is the resultant internal process. This type of model has come to dominate the psychological stress literature over the last 2 decades, and is examined here.

Although Cox (1978) included several combined models under this single classification, others make a finer distinction between process-oriented transactional models of stress (e.g. Lazarus, 1966) and more structural or interactional models (e.g. House, 1981; French, Caplan and Van Harrison, 1982). Specifically, Lazarus (1991) criticised structural approaches, maintaining distinct differences between these models and his own. In the following sections, several current psychological stress models, both structural and transactional, are outlined.

1.3 Psychological models of the (work) stress process

In the following section, two general models of the stress process, Lazarus' Transactional Model and the Michigan Model are described. In addition three more specific models of aspects of the work stress processes, Role Stress Theory, the Person-Environment Fit Model, and Karasek's Demand-Control Model are outlined. In Section 1.4, comparisons between these models are drawn, revealing the extent to which the apparently distinct models overlap. Also in this summary section, limitations of the different models are noted.

1.3.1 *Lazarus' Transactional Model*

Richard Lazarus has been a prolific and influential writer in the stress and coping literature since the 1960s (e.g. Folkman, Lazarus, Dunkel-Schetter, DeLongis and Gruen, 1986; Lazarus 1966; Lazarus 1991; Lazarus and Folkman, 1984). Rather than viewing stress as a property of either the individual or the environment, his cognitive-phenomenological theory of stress posits that stress arises when there is a conjunction between a particular kind of environment and a particular kind of person that leads to a threat appraisal (Lazarus, 1991). According to this theory the person and environment elements in a situation join together through a process of cognitive appraisal (of the environment, by the individual). Appraisal occurs in two stages: in primary appraisal the individual evaluates whether the encounter is relevant to his or her well-being; in secondary appraisal coping options are evaluated. Coping is defined as a person's cognitive and behavioural efforts to manage those demands that are appraised as taxing or exceeding that person's resources. As the individual's coping efforts may act to alter the environment and/or appraisals, stress is characterised as a *process*

in which there are reciprocal and bi-directional transactions between the person and environment.

It is the emphasis on process that Lazarus and his colleagues see as distinguishing this theory from other person-environment models of stress, which are more static in character. Furthermore, the transactional theory views coping as contextual, influenced by the appraisal of actual demands of a specific situation, whereas other models often view coping in terms of traits and *usual* patterns of behaviour (Lazarus, 1991). Finally, Lazarus and his colleagues make no assumptions about what constitutes good or bad coping. They suggest that where such assumptions are made researchers risk confounding coping efforts with outcomes of coping. Two main types of coping are distinguished: problem-focused coping, in which efforts are directed at altering the actual person-environment relationship, and emotion-focused coping, where the intention is to regulate emotional distress. Thus, cognitive appraisal and coping mediate the relationship between the individual and their environment (Folkman et al. 1986).

Lazarus recommends a longitudinal intraindividual approach to stress research. He is critical of traditional normative research methods, which are particularly common in work settings and treat environment or person variables as separate causal antecedents of stress and distress. He suggests that an understanding of stress in the workplace requires fine-grained analysis of individual patterns of response in order to generate knowledge about the kinds of persons who are more or less vulnerable to divergent sources of stress. One such approach is the use of critical incident analysis, described by O'Driscoll and Cooper (1994) as a means of assessing the role of coping in the stress process. To do otherwise, Lazarus asserts, is "to do lip service to the most advanced theories of the stress process." (Lazarus, 1991, p 7)

1.3.2 Michigan Model

A group of researchers at the Institute of Social Research in the University of Michigan, conceptualise stress as a "process in which individual and environmental characteristics interact to produce a variety of outcomes" (Israel, Schurman and House, 1991, p 258). These outcomes include behavioural, psychological, and physiological responses. The “Michigan Model” of the stress process was originally presented by Katz and Kahn (1966), and has been subsequently extended and refined by James House and colleagues (House, 1974, 1981; Israel et al., 1991; Israel, Schurman, Hugentobler and House, 1992). This model brought together many previous models of different parts of the overall stress process. Although the focus of House’s research is upon social support as a conditioning or modifying variable in the work stress process, the paradigm is a general one, which can encompass any stressor, response or modifying variable. The Michigan Model includes direct, mediated and moderated pathways for both person and environmental factors influencing short and long-term outcomes: it is presented diagrammatically in Figure 1.1.

House (1981, p 37) describes the model as follows: “The paradigm...posits that people perceive stress in response to certain objective social conditions. Conditions are usually perceived as stressful when the demands on people exceed their abilities or when they are unable to fulfil strong needs or values....That is, people’s needs or abilities are incongruent with their social environment in significant and consequential ways. Except perhaps for extreme situations...no objective social or occupational situation will *necessarily* produce perceptions of stress or resultant physiological, psychological, or behavioural outcomes in all people exposed to the situation. Rather, how people perceive a given situation depends on other individual and situational factors, labelled conditioning [or modifying] variables”.

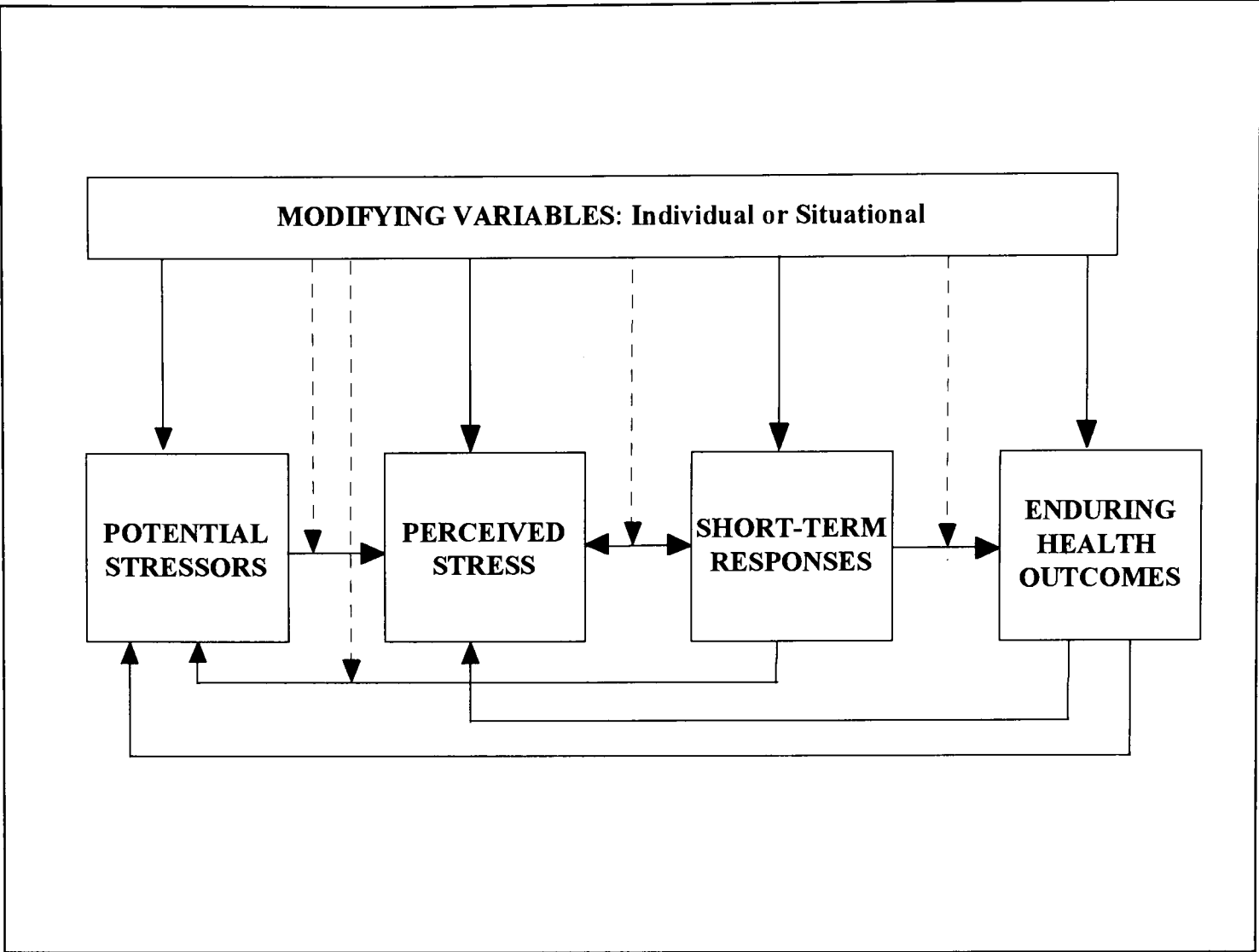


Figure 1.1 The Michigan Model

A paradigm for stress research, adapted from Israel et al. (1992). Following House's (1981) terminology, each box represents a set of variables and the solid arrows indicate presumed causal relationships among variables. The dashed arrows, which intersect solid arrows, represent interactions between modifying variables and the variables in the box at the beginning of the solid arrow.

From this description it is clear that *perceptions* are of central importance in the stress process, and that the path from objective environment to long-term outcome is a complex one. Furthermore, in one recent formulation of the model (Israel et al., 1992), there is an allowance for reciprocal causation and feedback within the process, thus addressing one of Lazarus' criticisms regarding the static nature of this paradigm. However, in practice these pathways have rarely been examined empirically. In Chapters 2 and 3, the different facets of the Michigan Model are elaborated, clarifying similarities between this, and other models of the stress process. In particular, Role Stress Theory, the Person-Environment Fit

Model, and Karasek's Demand-Control Model, may be seen as subsets of the overall Michigan Model.

1.3.3 Role Stress Theory

Kahn (Kahn, Wolfe, Quinn, Snoek, and Rosenthal, 1964; Kahn, 1976) proposed a model of work stress that focuses on a person's work role, and their perceptions of this role, as the major source of work stress. A role is defined as a set of expectations applied to the incumbent of a job position, both by the incumbent and by others within and beyond the organisation. As such, the role may be influenced by individual differences, and features of the organisation (Jackson and Schuler, 1985; Van Sell, Brief and Schuler, 1981).

Three aspects of the work role act as potential stressors: these are role overload, role conflict and role ambiguity, often jointly referred to as "role stress". Role overload refers to excessive workload, demands or pressures. Role conflict refers to the degree to which an individual receives inconsistent or incompatible instructions in their work; conflict arises particularly when an individual occupies multiple work roles. Role ambiguity occurs when there is a discrepancy between the amount of information a person has, and the amount required to perform his or her role adequately, that is when expectations and accountabilities are unclear. Role Stress Theory states that where there is role conflict, ambiguity or overload the role incumbent will display job dissatisfaction, reduced mental health, and poorer work performance (Rizzo, House and Lirtzman, 1970).

Role Stress Theory was particularly popular in the early work stress literature of the 1960s and 1970s, however it has been criticised as confounding subjective perceptions of work roles with more objective features of the work environment. Furthermore, overload,

conflict and ambiguity are now recognised as only three of a much wider set of psychosocial conditions that might be conducive to negative responses. Although originally proposed as a separate theory, it is now recognised that role conflict and ambiguity should be considered in a multivariate context, such as the framework of Michigan Model. More recently, models incorporating role conflict and ambiguity suggest that these factors mediate relationships between work stressors and strain outcomes (e.g. Dompierre, Lavoie and Perusse, 1993; Schaubroeck, Cotton and Jennings, 1989), or may be moderated by individual and work characteristics (Jackson and Schuler, 1985).

1.3.4 Person-Environment Fit Model

The central hypothesis of the Person-Environment Fit Model (P-E Fit) is that misfit between person and environment leads to strain (Edwards and Van Harrison, 1993). In particular, “A job is stressful to the extent that it does not provide supplies to meet the individual’s motives, and to the extent that the abilities of the individual fall below demands of the job which are prerequisite to receiving supplies. In both cases, the individual’s needs and values will not be met by supplies in the job environment.” (Van Harrison, 1978, p 178)

The P-E Fit Model is presented diagrammatically in Figure 1.2. There are four central elements to the model: the objective environment, the subjective environment, the objective person and the subjective person. Misfit between the person and environment can occur at either the objective or the subjective level, but it is subjective misfit that affects strain outcomes. Two types of misfit are distinguished (a) when environmental demands are not met by individual competencies (*demands-abilities fit*: e.g. when a person lacks the requisite ability to complete the work assigned), and (b) when individual values are not met by

environmental supplies (*supplies-values fit*: e.g. when remuneration or career opportunities are not considered adequate by the employee). As in the Michigan Model, each box in the diagram represents a whole class of variables, rather than an individual measure.

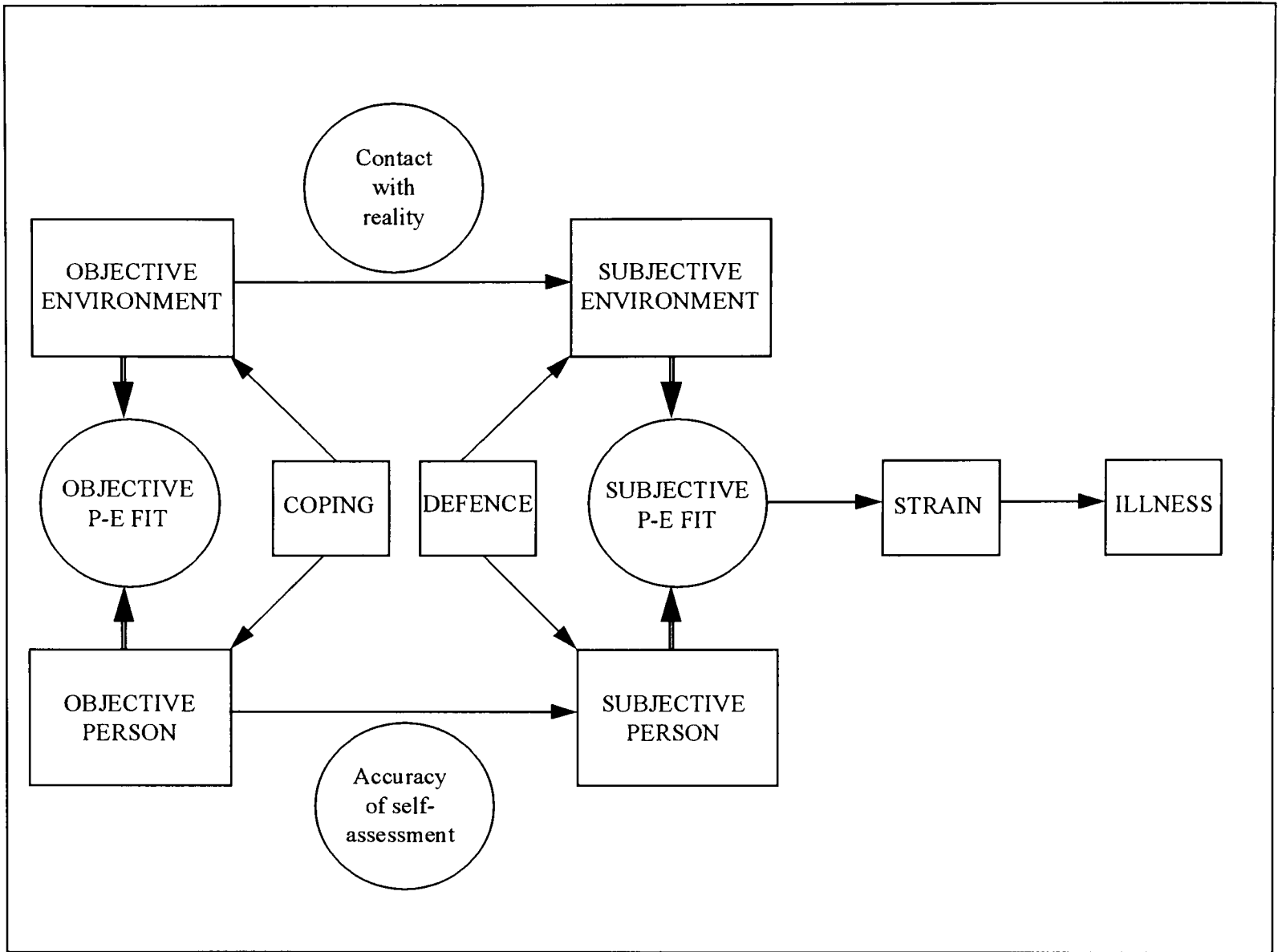


Figure 1.2 The Person-Environment Fit Model

A model describing the effects of psychosocial stress in terms of fit between the person and the environment. Concepts within circles are discrepancies between the two adjoining concepts. Solid lines indicate causal effects. Double lines indicate contributions to interaction effects (Van Harrison, 1978).

This framework has been used to guide many stress research projects in recent years (e.g. Edwards and Van Harrison, 1993; French Caplan and Van Harrison, 1982; Ivancevich and Matteson, 1984; Moos, 1987; O’Brien, 1986). Caplan (1987) has argued the need for commensurate measures of P and E dimensions to assess goodness of fit, and therefore the

P-E Fit Model as a whole. On the individual needs or values side, Caplan suggested that need for autonomy, affiliation, social support, task clarity, and nurturance warrant investigation in this context, and hence corresponding environmental supplies measures of these factors are also required. Similarly, in terms of demands-abilities fit, mathematical, motor, verbal analytical and social skills and requirements should be assessed. Unfortunately, such measures have not been well developed to date, so empirical testing of the model remains problematic (Cox and Ferguson, 1991).

In a recent review, Edwards and Cooper (1990) concluded that empirical evidence for the whole P-E Fit Model has not been convincing. They identified two specific difficulties with the model. The first is the lack of distinction between the two types of fit: often research has confused or interchanged these concepts, making the theoretical distinction redundant. Secondly, the form of relationship between (mis)fit and strain has been poorly defined. In an attempt to clarify the model, Edwards and Van Harrison (1993) identified five possible forms of this relationship, including a monotonic linear relationship, asymptotic curves, and quadratic forms.

In comparison with tests of the P-E Fit Model as depicted above, other researchers have adopted the model in quite a loose sense, and use the term P-E Fit to refer to small elements of the model. Several individual differences are of relevance in determining both individual capabilities and values, and hence “fit”. Thus, research into the role of individual differences in the stress process generally may be thought of as examining P-E Fit. Traits that have received attention in the stress literature include Type A Behaviour Pattern (e.g. Friedman and Rosenman, 1959; Greenglass and Burke, 1991; Rhodewalt, Sansone, Hill, Chemers and Wysocki, 1991), Hardiness (e.g. Kobasa, 1979; Kobasa, Maddi and Kahn, 1982), Locus of Control (e.g. Hurrell and Murphy, 1991; O’Brien, 1984), and Negative Affectivity (e.g. Parkes, 1990; Schaubroeck and Ganster, 1991).

Similarly, in Stratified Systems Theory, Jaques (1976, 1989) has suggested that a mismatch between an individual's ability ("work capacity") and that utilised in their job ("level of work" or "time span of discretion") will create stress and conflict. Jaques and his co-workers cite anecdotal evidence of curvilinear relationships between demands and strain. Stamp (1989) further suggested that there are two forms of imbalance or misfit: "misuse" occurs when challenges are in excess of capabilities (resulting in symptoms such as high anxiety), and "disuse" arises when capabilities are in excess of demands (leading to boredom and frustration). O'Brien (1982) reported a similar differential finding for over- and underutilisation of skills. In addition, in terms of environmental supplies, Jaques suggests that financial reward must also be matched to work capacity and level of work. Financial reward has similarly been incorporated into a theory of stress and control, by Siegrist and Matschinger (1989), called the Effort-Reward Model.

1.3.5 Karasek's Demand-Control Model

Karasek's Demand-Control Model of work stress (Karasek, 1979; Karasek and Theorell, 1990) proposes that symptoms of strain only arise when job demands exceed job decision latitude or personal control. Conversely, regardless of the absolute level of work demands, if these are matched by control opportunities, symptoms of strain should not result.

Dichotomising level of perceived demand and degree of control, Karasek has proposed a two-dimensional model, illustrated in Figures 1.3 and 1.4, in which jobs are categorised as high strain, low strain, active or passive. When the levels of demand and control are matched, average strain outcomes are predicted, and jobs are seen to increase only in activity (from passive to active) with increasing demands. However, as demands

exceed control, jobs are described as increasing in "psychosocial strain" (evidenced by higher rates of psychological and physical illness). Although describing this as an *interaction* effect between work demands and control, Karasek often places more emphasis on the mitigating effects of control (i.e. a statistical direct effect) than on this interaction (e.g. Karasek, 1989).

Whereas Karasek and his colleagues tend to use a quite narrow definition of work demands to mean workload, other researchers investigating the demand-control model have opted for a much wider definition of demand, encompassing all work pressures or potential stressors. For example role conflict, role ambiguity and interpersonal conflict were included as work "demands" by Spector (1987) and McLaney and Hurrell (1988); similarly job insecurity and hazard exposure were used by Landsbergis (1988) as operational definitions of work demands. Furthermore, Evans Shapiro and Lewis (1993) have extended the definition of "control". In addition to environmental control affordances (autonomy, discretion or decision latitude, as in Karasek's definition), they include individual differences in control cognitions, behavioural competencies, and control motivation. Thus, an extension of the Karasek model might include all such facets of demand and control. Finally, other researchers have extended the Demand-Control Model to incorporate additional factors, such as social support and locus of control (Johnson and Hall, 1988; Parkes, 1991a; Parkes, Mendham and von Rabenau, 1994). These extensions of the Karasek model are discussed further in Chapter 3, together with detailed evaluation of the evidence for and against this model.

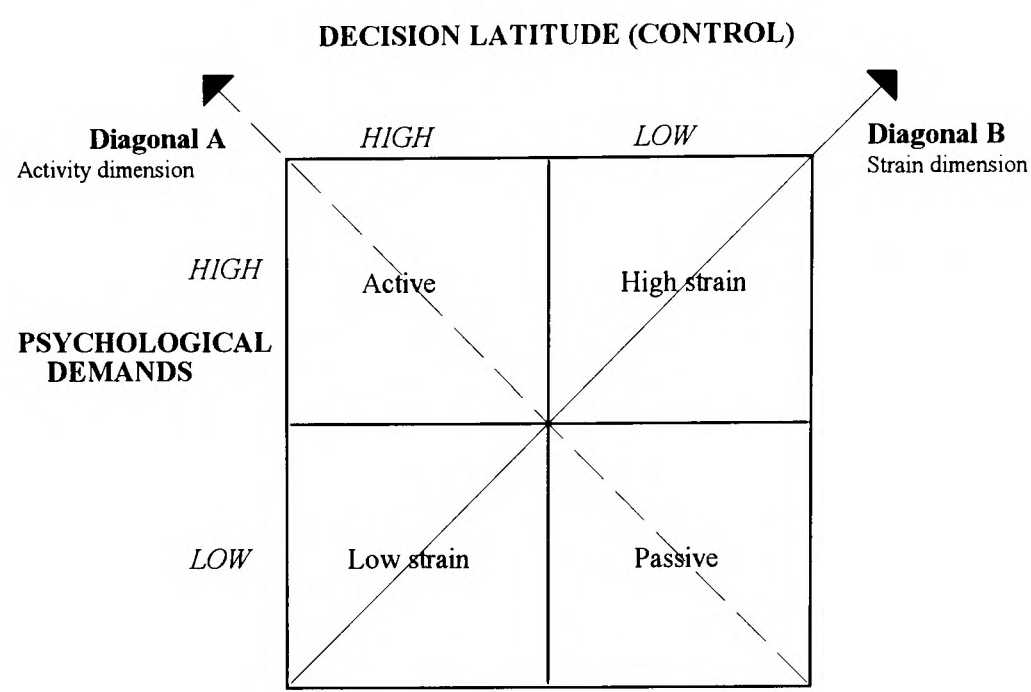


Figure 1.3 Karasek's Demand-Control Model

According to the level of demand and control required in a job, it is categorised as high or low strain, active or passive. When the levels of demand and control are matched, jobs increase only in activity (Diagonal A), but when demands exceed control, jobs are described as increasing in strain (Diagonal B). Source: Karasek (1979).

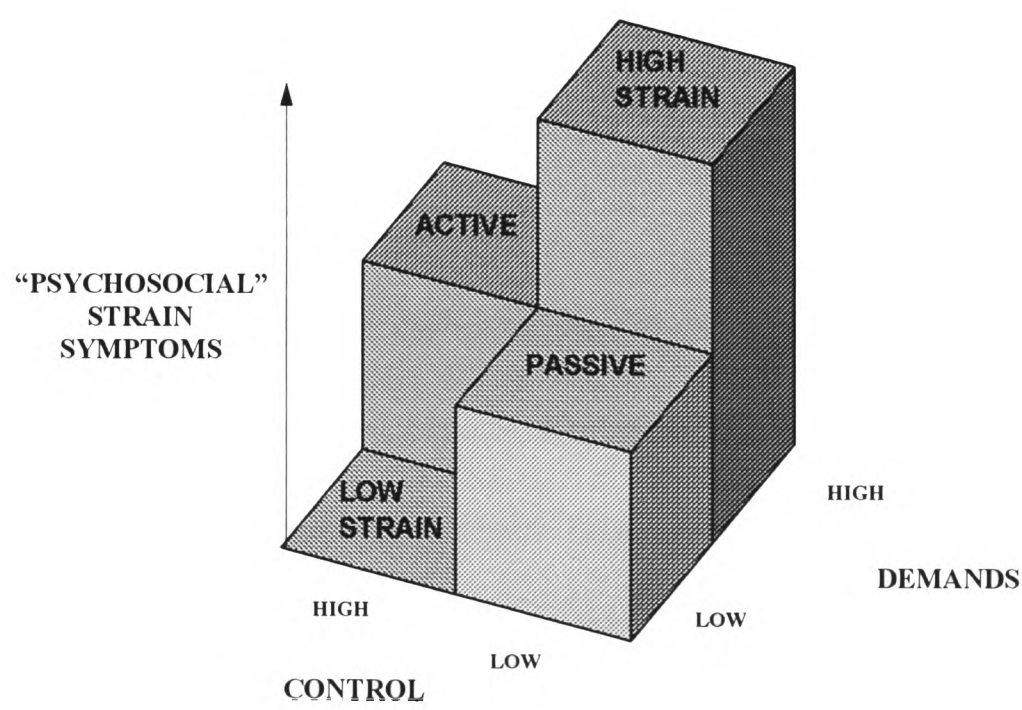


Figure 1.4 Karasek's Demand-Control Model, showing predicted symptom levels

Across the strain dimension, risk of psychological and physical illness is proposed to increase. In contrast to increasing activity (from passive to active), no differences in terms of stress or strain are predicted. (Karasek does however predict increased learning and motivation across the activity dimension). Source: Karasek and Theorell (1990).

1.4 Summary: Comparison of models

Several similarities among the “psychological” models presented here are apparent. In particular, the Michigan and P-E Fit Models maintain the central importance of individual perceptions in the stress process: if the environment is not perceived to be threatening or challenging *by the individual*, then it is not “stressful” by definition. Furthermore, the importance of individual perceptions in these models closely resembles the process of appraisal as described by Lazarus. In the P-E Fit Model, the relationship between subjective and objective characteristics can be seen to correspond to Lazarus’ concepts of primary (evaluation of the environment) and secondary (evaluation of the self) appraisal.

Similarly, Karasek’s high work demands combined with low control over tasks, has been likened to demands-ability misfit of the P-E Fit Model (Edwards and Cooper, 1990). Moreover, Lazarus suggests that the aim of stress research should be to “generate knowledge about the *kinds of persons* who are more or less vulnerable to divergent sources of stress” (Lazarus, 1991, p 7, italics added). This type of knowledge is precisely what is generated by researchers investigating individual differences within the general framework of Person-Environment Fit.

Despite such broad similarity, structural models in general and the P-E Fit Model in particular, have been greatly criticised by Lazarus. Lazarus (1991) submits that these models are static, emphasising stable person-environment relationships, whereas his transactional approach is concerned with on-going processes. More specifically, he argues that the transactional model examines the reciprocal causation between appraisal, coping and affective reactions that occur over time, whereas structural approaches look at cross-sectional relations between stressors, outcomes and conditioning variables. Contrary to this criticism however, proponents of the P-E Fit Model see the stress process as a dynamic

system (French et al., 1982). Furthermore, although the direction of arrows in Figure 1.2 implies causation, French and his colleagues recognise that the model as drawn is too simplistic, and that causal relations may be reciprocal. That such complex relationships have not been tested in the P-E Fit framework is due more to the nature of the available data, than to any theoretical argument. Similarly, recent refinements of the Michigan Model (Israel et al., 1991, 1992) incorporate feedback loops in an attempt to capture more fully the stress process, even if research guided by this model has not explicitly tested the full process.

A further criticism of structural approaches is that coping is assumed to be a property of the person, and tends to be inferred from trait measures, rather than measured per se. In contrast, the transactional model has a more contextual view of coping, assessing this as “a response to the psychological and environmental demands of *specific stressful encounters*” (Folkman et al., 1986, p 992, italics added). Although Lazarus and his colleagues acknowledge that an interindividual approach can be useful, they advocate intraindividual research methods to examine the stress process during the encounter.

Although many stress researchers recognise that Lazarus’ transaction theory probably maps the process of a stressful encounter more clearly than structural models, it is not a model that can readily be tested with current research methods (Parkes, 1986; Perrewe, 1991). Hence there is a continuing need for studies based on the less complex, structural models. It is such a pragmatic approach that is adopted in this thesis. It is granted that in terms of describing the stress process, the transactional approach is superior to structural models, however the structural models are more readily tested, and the normative data gained is potentially more useful in an applied context for the purposes of job redesign. In particular, the Michigan paradigm is the most encompassing of the structural models. In Chapters 2 and 3, the conceptual framework of the Michigan Model is discussed in detail.

2. The Michigan Model Elaborated

2.1 Introduction

House (1981) noted a convergence in the conceptualisation of the nature of stress, and proposed a general paradigm of stress research. Based upon previous descriptions of the stress process (French and Kahn, 1962; Katz and Kahn, 1966; Lazarus, 1966; McGrath, 1970), this model may be thought of as a “meta-model”. The Michigan Model, as described by James House and his colleagues in the Michigan Institute of Social Research, suggests broad guidelines for a systematic approach to examining the aetiology of occupational stress-related problems and illness (House, 1981; Israel et al., 1991; Israel et al., 1992).

This approach incorporates a multiplicity of interrelationships between individual and environmental characteristics, including direct, mediated and moderating influences. It is a flexible framework in which subsections of the overall paradigm describe different theoretical models. All variables relevant to the work stress process, be they individual differences, or environmental conditions can be placed into this framework. Where they are placed (e.g. as stressor versus modifying variable) depends to some extent upon the theory being examined, and one factor may simultaneously operate through several mechanisms. In Chapters 2 and 3, aspects of the Michigan model are examined through a discussion of the impact of different variables, each of which is placed into this conceptual framework.

The emphasis of the present chapter is on that part of the stress process represented across the lower part of Figure 1.1, and reproduced as Figure 2.1. This part of the model indicates that some aspects of the psychosocial environment (“potential stressors”) are perceived as stressful, and leading to short-term responses and enduring health outcomes. This process can be conceptualised as a filter: at each step in the process the individual’s

response may act either to enter the next phase of the process, or to alter circumstances such that they are no longer stressful. The arrow leading from stressors to perceived stress can be thought of as the process of appraisal, whereas arrows feeding back from short-term responses represent forms of coping. Finally, enduring health outcomes can feedback into the system, for example by casting long term illness as a stressor and/or as influencing perceptions of the environment. Each stage of this process may be modified by individual and situational characteristics, however the role of these modifying variables is reserved for discussion in Chapter 3.

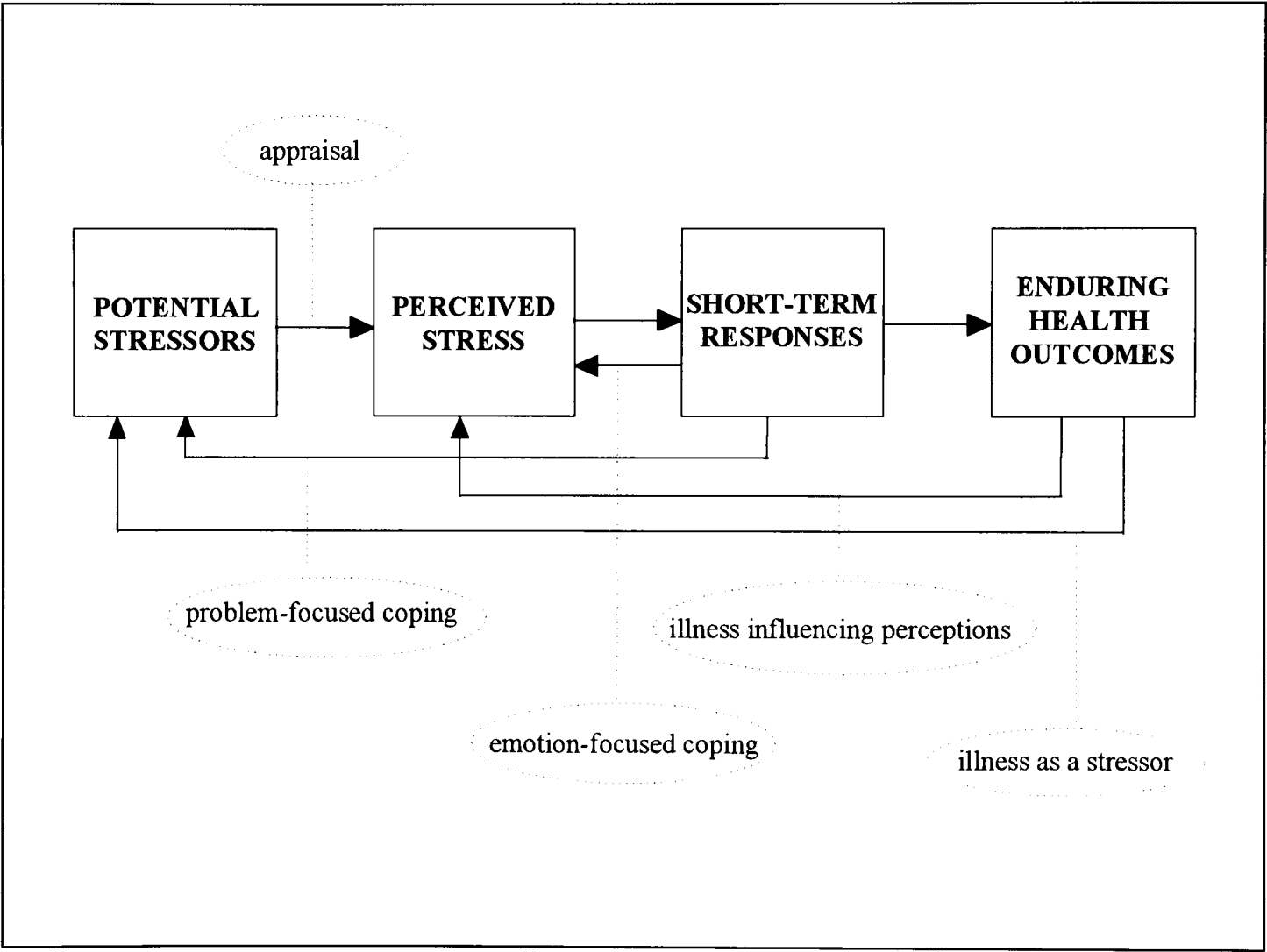


Figure 2.1 Reduced Michigan Model.

Modifying variables and associated pathways omitted; feedback processes labelled in dotted “balloons”.

2.2 Potential stressors

Israel et al. (1992) define work stressors as psychosocial-environmental conditions conducive to stress, and in doing so encompass attributes as diverse as noise, shiftwork, role conflict, and unemployment as potential stressors. However the focus of the present study is limited to the psychosocial rather than physical aspects of work.

Although the life stress research has at least historically, tended to focus on acute, intense sources of stress (e.g. bereavement, natural disasters), there has been a more recent shift toward an understanding that chronic and repetitive stressors may ultimately be more damaging (Fleming et al., 1984). For example, Schaubroeck and Ganster (1993) suggest that over time, exposure to stressors may become increasingly toxic to individuals as their capacities for adaptation are diminished. Thus, in common with much of the current work stress literature, an examination of chronic stressors is a major theme of the present research. In addition, the more acute stressor of occupational change is examined in a longitudinal study, with particular reference to how the transition period has an impact upon dimensions of work that have been established as stress-provoking.

Numerous potential sources of chronic psychosocial stress have been identified in the work stress research literature. The amount and type of workload, the degree of autonomy or discretion at work, and the supportiveness of colleagues, have been described as central features of the work environment in relation to the stress process (Johnson and Hall, 1988; Karasek and Theorell, 1990; Payne and Fletcher, 1983; Parkes et al., 1994). Role conflict and ambiguity are also work conditions with a long history of investigation (Kahn, 1976). Each of these characteristics is described in the sections that follow, together with a review of literature in which they have been linked to strain outcomes.

2.2.1 Level and type of workload

Rooted in the “engineering approach” to work stress, high workload is often thought of as synonymous with high stress (Cox and Fergusson, 1991; McGrath, 1970). Although defined in various ways, from objective measures of work pace (e.g. Broadbent, 1981) to perceptual measures involving subjective appraisal of job demands (e.g. Kahn, 1976), there is considerable evidence of an association between high workload and negative outcomes.

For example, Landsbergis (1988) reported an association of high self-reported job demands with job dissatisfaction, depression, sleeping problems, and physical symptoms among a sample of health-care workers. Similarly, national surveys have been analysed by Karasek and his colleagues to reveal associations between high demands and raised blood pressure, increased risk of coronary heart disease, and poor mental health (e.g. Karasek, 1979; Karasek, Baker, Marxer, Ahlbom and Theorell, 1981; Pieper, LaCroix and Karasek, 1989). In some national surveys, questions about workload were included, but in other instances, job characteristics were imputed by occupation on the basis of expert ratings. From a review and empirical analysis, Broadbent (1995) concluded that the most robust association of high demands is with tension and anxiety.

However, some recent work suggests that quantitative workload is less important than other features of work. For example, Terry, Neilsen and Perchard (1993) found that when the other relevant variables (particularly social support) are statistically controlled, the association of quantitative workload with psychological well-being and job satisfaction was not significant. Similarly, from an extensive review of the stress literature, Ganster and Schaubroeck (1991) concluded that, in contrast to popular conceptions of stress, high workload does not appear to be a significant stressor. Moreover, epidemiological studies examining the precursors and correlates of myocardial infarction report that excessive work

demands tend *only* to be associated with excess risk of poor health under certain adverse conditions, specifically if occurring in combination with low decision latitude (e.g. Alfredsson, Karasek and Theorell, 1982; Alfredsson, Spetz and Theorell, 1985; Theorell, Hamsten, de Faire, Orth-Gomer and Perski, 1987). This type of finding has led to the formulation of the Demand-Control Model of work stress (Karasek, 1979; Karasek and Theorell, 1990), which is discussed in further detail in Chapter 3.

In comparison with most reported relationships between workload and health, Albright, Winkleby, Ragland, Fisher, and Syme (1992) reported that *lower* objective job demands were associated with *higher* prevalence of hypertension in bus drivers. However this relationship was reduced to an insignificant level with the statistical control for a range of sociodemographic factors, leading to the conclusion that previous epidemiological findings were confounded both by a reliance on self-report measures and by social class. It may not be high demand or low control that influences coronary health, but the low socioeconomic status (SES) associated with these jobs. The authors further suggest that SES and occupational characteristics may be so highly correlated that it is difficult to separate their independent effects.

Many researchers have explored in detail some specific aspects of workload. For example, in a study of machine operators, Martin and Wall (1989) conceived double machine operation as involving high *attentional* demand; in combination with high levels of cost responsibility, attentional demand was associated with poorer levels of mental health. The degree to which workload varies, particularly when changes in work demands are unpredictable and uncontrollable, may also be seen as a potential stressor (Sutton and Kahn, 1986). For example, Aronsson (1991) reported that some office workers were forced to work at high pace early in the day to guard against possible breakdown of computerised machinery later on.

A distinction may be made between qualitative and quantitative aspects of workload (Perrewe and Ganster, 1989). Quantitative overload refers to insufficient time to do the required task, whereas qualitative overload refers to insufficient skills, knowledge or ability to do the task; qualitative underload refers to work for which the worker is overskilled. For example Seppala (1989) suggested that work should be "demanding enough". O'Brien (1986, p 87) has qualified this assertion, borrowing from the Person-Environment Fit paradigm, by suggesting that "[s]train is an imbalance or lack of fit between job demands and the capabilities of employees". Stratified systems theory (Jaques, 1989; Stamp, 1989) has also addressed the issue of optimum demands, as discussed in Section 1.3.4.

O'Brien (1982) presented empirical evidence that supports this hypothesis. He found that both overutilisation and underutilisation (defined in terms of level of education required for a job) were associated with low satisfaction, but that overutilisation leads to anxiety, whereas underutilisation is associated with boredom and depression. An association of underutilisation with job dissatisfaction, boredom or depression has been reported by other researchers (e.g. Caplan, Cobb, French, Van Harrison and Pinneau, 1975; Ganster, Fusilier and Mayes, 1986; Jones-Johnson and Johnson, 1991).

Similarly, lack of work variety has been examined as a job stressor: monotonous work has been associated with accelerated onset of myocardial infarction (Theorell et al., 1987), depression (Broadbent, 1985), and report of minor physical ailments (Schaubroeck, Ganster and Fox, 1992). However, the evidence is not conclusive, as tests for curvilinearity have been rare. One exception is reported by Parkes (1986), who found a curvilinear association of work demands with coping, such that moderate levels of demand were associated with more adaptive coping (although this was only true of individuals low in neuroticism). Furthermore, some studies have failed to find evidence that low demand or underutilisation has negative consequences. For example, although Terry et al. (1993)

found that underutilisation was associated with lower levels of job satisfaction, there was no relationship with a general index of psychological well-being. Similarly, although Schaubroeck et al. (1992) found that lack of variability was associated with report of symptoms and dissatisfaction, they did not replicate the association with depression.

2.2.2 Personal control

The construct of personal control has been heavily implicated in the stress process. A lack of control may be seen either as a stressor, or alternatively control may be viewed as a modifying variable, buffering against negative impact of other sources of stress. Only the role of (low) control as stressor is discussed here, with the buffering mechanism described and discussed in Chapter 3.

Not only is the mechanism through which control influences outcomes open to debate, but also a precise and consensual definition of control has also proven somewhat elusive. Until the 1980s studies mostly relied on a common-sense understanding of the word control, or an operational definition, rather than any formal scientific definition (Thompson, 1981). Noting this problem, Syme (1989) suggests that the development of a control typology is preferential to the narrowing of definitions, as research evidence can be arranged to support many control definitions. Several typologies have been put forward: however, although these typologies share common elements, there is still no consensual categorisation of control (e.g. Evans et al., 1993; Karasek, 1979; Steptoe, 1989; Warr, 1987). The major distinctions made are between personal and environmental control dimensions, and between objective and subjective aspects of control. The focus of this

section is on environmental provisions of control, regardless of whether control is actually exercised.

In 1959 White postulated that motivation for control is an innate drive. Since then evidence has accumulated that demonstrates the association between low levels of control and adverse outcomes, or conversely, high levels of control and positive outcomes. In a review of control literature, Evans et al. (1993, p 255) summarised the dominant psychological paradigm regarding control as follows: “ (1) having instrumental control over the environment is positive; and (2) the more control you have (or believe you have), the better.”

Low levels of personal control have been found to result in a variety of negative consequences. In particular, the association between control and job satisfaction is a robust finding, whether control is conceptualised as autonomy, participation, responsibility, decision latitude, or supervisory status (see Ganster, 1989 and Parkes, 1989 for reviews of the control literature). In addition, control has been associated with strain indices including anxiety, depression and poor physical health. However, associations between control and physical or emotional health are generally weaker and less consistent than the relationship with satisfaction (Kasl, 1989; Sauter, 1989). Occupational research has further revealed associations of control with organisationally relevant outcomes, including job performance (Algera, 1983; Spector, Dwyer and Jex, 1988), and work absence (Remondet and Hansson, 1991).

In contrast to this dominant paradigm, several researchers have questioned the necessary benefit of high levels of control, citing evidence that high control is sometimes associated with negative outcomes (Bazerman, 1982; Evans et al., 1993; Folkman, 1984; Rodin, Rennert and Solomon, 1980; Thompson, 1981). One explanation for such anomalous findings is that the relationship between control and strain outcomes might be

curvilinear rather than linear, such that there is an optimum level that is not necessarily the maximum level of control (e.g. Rotter, 1966; Warr, 1987). For example, Warr's (1987) Vitamin Model proposes that mental health will be enhanced by increases in personal control, *up to a point*, beyond which additional increments are no longer helpful, and may be detrimental.

Evans et al. (1993) have taken the idea of non-linear relationships one step further, positing interactions between individual and situational dimensions of control to account for differential findings. When environmental control provisions (situational dimension) are congruent with individual control dimensions (e.g. abilities or beliefs), control provisions will be functional. However, when environmental and individual control dimensions are incongruent, dysfunction results. Incongruity occurs in two ways: the usual case that has been studied is that control opportunities are low relative to individual control dimensions; however control opportunities may sometimes be too high. Evans et al. outline the research evidence in which additional control was detrimental, and demonstrate that in each case this was because high control opportunities were incongruent with low individual beliefs about control or ability to control. The Evans multidimensional model of control is discussed in Chapter 3, as the interaction between aspects of control essentially casts individual control dimensions as modifying variables that act upon environmental control provisions (the stressor).

A further difficulty with the control concept is that control has been found to be confounded by demographic differences. In particular, women tend to be over-represented in jobs with low control opportunities (Hall, 1991; Karasek and Theorell, 1990; Kauppinen-Toropainen, Kandolin and Mutanen, 1983). Although it may be argued that gender segregation is evidence of discrimination in the labour market, it may also be that the

observed relationships between control and health is confounded by gender, as women consistently report higher rates of symptoms than men (Goldberg, 1972).

Similarly, social epidemiological research has consistently shown that there are health differences according to socio-economic status (SES) (Lee and Schnider, 1958; Marmot, 1994; Stansfeld and Marmot, 1992; Syme, 1989). Therefore it is possible to argue that, as SES and control tend to be highly correlated, this may result in a confounding of the relationships with health. However, Marmot, Rose, Shipley and Hamilton (1978) demonstrated that the relationship between job grade and coronary heart disease remains after statistical control for class-related risk factors (e.g. diet, smoking behaviour, blood pressure). They therefore concluded that established risk factors only partially explain the observed correlation with job grade. This reinforces the hypothesis that job characteristics such as control also account for observed patterns of disease (Karasek and Theorell, 1990).

2.2.3 Social support

Social support is a central variable in the Michigan Model of the stress process. In this framework the role of social support is as a modifying variable, which may either have direct effects on perceived stress and short-term responses, or act to moderate relationships between potential stressors and strains. The role of social support as a moderator is discussed in Chapter 3, however the balance of evidence regarding social support indicates that lack of support has direct, additive effects on strain outcomes (e.g. Boumans and Landeweerd, 1992; Kaufman and Beehr, 1986; Melamed, Kushnir and Meir, 1991). In a recent review, Kahn and Byosiére (1992) found that 20 out of 22 studies reviewed revealed main effects of support on well-being. It is these direct effects that are discussed here.

Emotional and behavioural support, be it from a spouse, friends, colleagues, or supervisors has been found to have positive effects on strain outcomes in a large number of studies (e.g. Ganster et al., 1986; House, 1981). Within the work stress literature, however, it is support from colleagues, particularly supervisors, that is most important (Ganster et al., 1986). In particular, a supportive work environment has been associated with high job satisfaction (e.g. Boumans and Landeweerd, 1992; Kaufmann and Beehr, 1986; Ganster et al., 1986, Parkes et al., 1994) and good physical and mental health (e.g. Dignam and West, 1988; Ganster et al., 1986; Loscocco and Spitze, 1990; Parkes, 1990).

The association of social support with independently measured outcomes has not been as consistent as that with self-reported measures of strain. Physiological measures (e.g. pulse rate and blood pressure) have been associated with work support (Kaufmann and Beehr, 1986) when included in a conglomerate strain indicator together with self-report affect scales. A similar finding was reported by Jemmott and Magloire (1988), who found superior immune functioning in students who reported higher levels of social support. Lack of social support has also been associated with a higher incidence of heart disease (Cohen, 1988; Orth-Gomer, and Uden, 1990) and identified as a risk factor for mortality generally (Berkman and Syme, 1979; House, Robbins and Metzner, 1982). However the association of support with organisationally relevant outcomes such as work absences and performance has not been consistently demonstrated (Boumans and Landeweerd, 1992; Kaufmann and Beehr, 1986; Tharenou, 1993).

2.2.4 *Role conflict and ambiguity*

In Role Stress Theory, role conflict and ambiguity are seen as critical features of the work environment that determine strain responses. Role conflict and ambiguity have been associated with negative outcomes at the individual, interpersonal and organisational level (Jackson and Schuler, 1985; Van Sell et al., 1981). In a review article, Van Sell et al. reported that role conflict and ambiguity have been causally linked to lower productivity, dissatisfaction, employee turnover, tension and psychological withdrawal, although findings have been somewhat inconsistent, because of the diversity and incomparability of settings.

More recent research has further demonstrated consistent links between role conflict and ambiguity and a variety of strain outcomes, including job dissatisfaction (e.g. Beehr and Drexler, 1986; Edwards and van Harrison, 1993; Steffy, Jones and Noe, 1990) poor psychological health (Edwards and van Harrison, 1993; Greenhaus Bedeian and Mossholder, 1987; Jackson, Turner and Brief, 1987), and report of physical symptoms (Steffy, Jones and Noe, 1990).

In contrast to the common implication that conflict and ambiguity are necessarily negative features of the work environment, some more complex relationships between role stress and strain have been suggested. For example, Miles (1975) proposed that there may be a minimum level of conflict and ambiguity necessary for maximum performance, such that very low levels of ambiguity are experienced as lack of freedom and flexibility, which stifle innovation. Similarly, Schuler (1977) reported differential effects of ambiguity and conflict according to hierarchical level: it may be that for different types of work, a greater or lesser degree of ambiguity is appropriate.

Jackson and Schuler's (1985) meta-analysis also revealed consistent associations of role conflict and ambiguity with a range of work characteristics. Therefore it is

recommended that role conflict and ambiguity be examined in multivariate contexts. More specifically, some researchers have found that the negative impact of role conflict and ambiguity is buffered by provision of high control opportunities (e.g. Parasuraman and Alutto, 1981; Van Sell et al., 1981; Tetrick and LaRocco, 1987). Similarly Jackson and Schuler (1985) identified several individual and work characteristics which might interact with role conflict and ambiguity in determining strain responses.

In addition, more recent theoretical formulations propose a process model in which conflict and ambiguity mediate the influence of other work characteristics, particularly social support and autonomy, on psychological outcomes (Dompierre et al., 1993; Schaubroeck et al., 1989). The Dompierre et al. model further incorporates potential mediation of the influence of individual characteristics (e.g. locus of control, Type A behaviour). Findings consistent with role conflict and ambiguity as mediators have been reported by several researchers (e.g. Lee and Ashforth, 1993; Schaubroeck and Jennings, 1991; Tetrick, 1992). These more complex causal mechanisms are discussed further in Chapter 3.

2.2.5 Time urgency

Schriber and Gutek (1987) suggest that time is a basic dimension of organisations, and different organisations and their subunits have different norms regarding time. The degree to which an individual shares these norms can affect both employee performance and satisfaction. Jaques (1989) has developed a theory of organisational structure that is based upon the matching of individuals to work roles in terms of time management competencies and requirements. Time urgency as a stressor is of particular relevance to the Type A

literature, which is discussed in Chapter 3 (Landy, Rastergary, Thayer and Colvin, 1991; Conte, Landy and Mathieu, 1995).

Schriber and Gutek examined several aspects of time orientation, all with reference to perceived norms of the company, rather than the requirements of an individual job. Time dimensions that could be related to stress research were selected for examination in the current context. Working to a rigid schedules and meeting tight deadlines are time dimensions that have sometimes been examined as a part of the “control” dimension and in this way have been related to strain. Similarly, work pace is an aspect of some types of work that has also been previously shown to relate to negative outcomes, usually considered as a part of work “demands”. For example, Broadbent (1985) showed that work pace was related to anxiety in assembly-line workers.

Two other aspects of time are also considered here: the importance of quality versus speed of work, and the degree to which a company plans for the future. The requirement to produce high quality work, particularly when individuals are operating under tight time constraints, necessitates decisions about quality versus quantity trade-offs, and is a potential source of conflict. The ability to plan for the future is central to Jaques’ theory of organisation (Jaques, 1969, 1989), with each individual seen as capable of planning to a particular time horizon, and each job requiring planning to a certain time horizon. Jaques’ work indicates that when time horizons are not matched, negative outcomes at both individual and organisational levels can be expected.

2.2.6 *Change*

Major life changes have been associated with increased risk of illness, reduced work performance, and psychological distress (e.g. Fisher, 1989; Smith and Amick 1989; Theorell, 1992a). Several mechanisms linking change to negative outcomes have been proposed. Pearlin, Menaghan, Lieberman and Mullan (1981) state that an assumption of life stress research is that the human organism is "fundamentally intolerant" of change; that change creates a state of disequilibrium, and the consequent struggle to restore equilibrium makes the organism vulnerable. In contrast, Stamp (1989) suggests that rather than change causing an individual to be vulnerable to stressors, high levels of perceived stress make people resistant to change. In either case it appears that strain responses and the transition period are expected to coincide. Also from research on life stress, Fisher (1989) proposed that change creates a temporary loss of control often coupled with increased demand, both of which may act as stressors. Therefore it may be that reduced control and increased demand mediate that relationship between the change and strain outcomes.

Workplace changes are widely proposed to result in strain at an individual level (Burke, 1988; Levi, 1994). For example, Lindorff (1995) reported that the organisational instability associated with mergers and acquisitions, was a major influence on psychological distress in a sample of Australian managers. Furthermore, Roberts and Glick (1981) propose that the act of having one's job changed is likely to have an impact over and above that experienced in a job that was impoverished from the start. However systematic research into the stress associated with the transition period is relatively rare in the literature.

An investigation of an internal organisational change was undertaken by Karasek (1990), revealing that the transition period is stress-provoking, even when the new state achieved is superior in terms of both control and demand. Karasek reported uniformly high symptom levels

for Swedish white-collar workers during company-initiated change. Symptoms reported included coronary heart disease, gastro-intestinal problems, respiratory problems, musculo-skeletal aches, dizziness, headaches, depression, exhaustion, job dissatisfaction, pill consumption, absenteeism and smoking. In line with Fisher's (1989) suggestion that control might modify this process, those individuals who experienced greater personal control in their new work situation, demonstrated significantly lower strain; the effect was strongest for job satisfaction. However, this finding was more clear-cut for males than females: for women aged 20-39 the additional control obtained in the new work situation was insufficient to offset the "change stress".

In contrast, Kirjonen and Hanninen (1989), reported that metal industry employees who had made *voluntary* moves in employment (either promotion, or change of employer) showed lower levels of strain symptoms and dissatisfaction than a comparison group who had remained in the same position for at least 5 years. The researchers explained this finding in terms of voluntary moves achieving improved person-environment fit.

Based on such findings, Karasek (Karasek, 1990; Karasek and Theorell, 1990) suggests that greater worker participation during the transition phase is a first step towards increasing job control, and hence reducing strain. Karasek suggests that when opportunities for control over the change process are provided, strain is reduced, but warns that if permanent improvements in control do not follow, well-being will decline even further than if no opportunities for control had been present during the change period. Thus Karasek proposes that any workplace changes must be made in consultation with those who experience the change. The need for communication to overcome resistance to change, and general advantages of participation specifically during the change process have also been recommended elsewhere (Greenberger and Strasser, 1976; Israel et al., 1991; Kotter and Schlesinger, 1979).

Callan (1993) recently outlined a range of individual and organisational strategies for effective coping with change, based on research with managers and professionals during

organisational restructuring (e.g. Callan, Schweitzer and Terry, 1994). He suggests that individuals with an internal locus of control, available social supports, and who engage in emotion-focused and problem-focused coping, will deal more effectively with change. Furthermore, it is recommended that organisations can help employees cope with change by improving communication, leadership, job enrichment, and by the provision of stress management programmes.

The importance of consultation and communication is a theme also taken up by Zuboff (1982, 1988). In a discussion of the introduction of new computer technology, Zuboff suggests that changes can be introduced either in a manner that enhances personal control (especially given the greater flexibility permitted with recent software advances) or technology can be used by managers to exert more control over the work process. Zuboff implies that the latter has been more often the case. In contrast Rafaeli and Sutton (1986) reported that the sensitive introduction of word-processors to typists increased their perceptions of personal control and satisfaction. The implication is that negative outcomes sometimes associated with the introduction of technology are caused by mismanagement of the change process, rather than the technology itself.

A problem with change research is that findings tend to be based on a single survey in which employees retrospectively report their experiences of the change period. As discussed in Chapter 4, this methodology does not allow the separation of competing causal hypotheses: the conclusions drawn about “transition stress” may be due to other unexamined factors. Better methodology is reported by Ashford (1988) who surveyed telephone company employees before and after organisational restructuring, revealing that responses to change were moderated by feelings of control (internal locus of control) and an ability to tolerate ambiguity. Begley and Czajka (1993) used similar methodology with hospital employees, concluding that perceived stress resulted in strain (a conglomerate measure of job dissatisfaction, intention to quit and

irritation) only for employees with low organisational commitment. However, these studies would have been improved by an objective measure of change, for example by incorporating a comparison group who did not experience change, rather than relying on subjective ratings of “perceived stress”. Nonetheless, discussions of technological and organisational changes at work suggest that these are potential stressors in the Michigan Model. Strain outcomes may be moderated by individual differences or environmental factors.

2.3 Objective stressors and perceived stress

The Michigan Model makes a clear distinction between objective psychosocial-environmental conditions conducive to stress (stressors), and perceptions of these conditions (perceived stress). Before a strain response is made to potentially stressful work conditions, these conditions must be perceived as stressful. That is, perceptions mediate the relationship between objective conditions and individual responses. This step requires *appraisal* of the situation by the individual. Typically appraisal involves the evaluation that environmental demands outweigh an individual's capability to meet those demands, and that meeting the demands is important to the individual. An appraisal of "perceived stress" is therefore sensitive to both environmental and individual considerations.

This appraisal process is central to Lazarus' transactional model of stress; (e.g. Lazarus and Folkman, 1984) however the distinction between objective and perceived aspects of the work environment is one that is frequently made by other theorists in the work stress literature (e.g. Averill, 1973; Parkes, 1989). Although given a place in the Michigan paradigm, the appraisal process has been little examined in this context, as the common research method rarely includes measurement of both objective and subjective aspects of psychosocial-environmental conditions. There are however some notable exceptions.

In a study of work conditions among employees of several large US insurance companies, Pierce and Newstrom (1983) examined the influence of objective measures of work-schedule flexibility and perceived autonomy, on work attitudes and well-being. Perceptions of autonomy were found to act as an intervening variable, mediating the relationship between work characteristics and outcomes. The relationship between objective workload and perceptions of workload were similarly examined by Kirmeyer and

Dougherty (1988) in a sample of police radio dispatchers. They reported relationships of each workload measure with strain (anxiety-tension) that were consistent with a mediation effect of the objective environment through individual perceptions.

Subjective and objective measures of workload were also used in research involving a sample of UK driving examiners by Parkes (Parkes, 1991b; Parkes, Anastasiades, Broadbent, Johnstone, Rendall, Matthews and Smith, 1986). Parkes reported significant, favourable effects of reduced objective workload on heart-rate, cognitive performance, short-term absence, work perceptions and self-report of health status. Furthermore it was demonstrated that perceptions of work demands mediated the relationship between objective workload (number of exams per day) and mental health (anxiety response).

In examining the impact of a participative decision making programme (PDM), Israel et al. (1991) found that the positive effects of PDM were mediated almost entirely through satisfaction with participation. Melamed, Ben-Avi, Luz and Green (1995) used independent job analysts to provide “objective” measures of work characteristics in addition to incumbents’ report of “subjective” conditions. Using hierarchical regression analysis they found that objective work conditions influenced strain outcomes both directly and through mediated pathways via subjective ratings.

However, most stress research has used self-report of work conditions as a proxy for objective measures of psychosocial conditions. Although there is evidence for the validity of self-reports of job conditions (e.g. Frese, 1985; Kirmeyer and Dougherty, 1988; Spector, et al., 1988), the distinction between objective and subjective is often blurred. Individual biases in perception are inevitably confounded in this measurement method, and the frequent interpretation of self-report measures as if they were objective ignores the possibility of subjective bias (Brief, Burke, George, Robinson and Webster, 1988). However, the use of self-report measures is justified by many theorists and researchers (e.g.

Averill, 1973; Maddi, Bartone and Pucetti, 1987; Peterson and Stunkard, 1989) because, although perceptions are not identical with reality, they are reality-based, and it is the situation as appraised that is most relevant in terms of the influence on individual outcomes.

In the present study, the theoretical distinction between objective and perceived aspects of the psychosocial environment is made. Although practical constraints have limited the availability of objective data, the focus on questionnaire measures has been combined with a consideration of the difficulties of confounding subjective and objective constructs. A more detailed discussion of the valid use of self-report measures is included in Chapter 4.

2.4 Responses to stress

2.4.1 *A multiplicity of stress responses and strain indicators*

Strain is not a unidimensional construct. Many different outcomes occur in response to perceived stress, as indicated in the literature reviewed in Section 2.2. Some theorists have divided these into categories of physiological, psychological and behavioural strain (e.g. Cox, 1978; House, 1981; Israel et al., 1991). In the Michigan Model strain measures are further divided into short-term and enduring outcomes. The focus of the current investigation is on relatively short-term responses (i.e. at the level of weeks, rather than minutes or months), and in particular on psychological and behavioural outcomes, due to the time scale and size of the study. However there is considerable evidence linking these short-term responses to each other and to more enduring and serious outcomes.

Different strain indicators, such as physiological arousal, job satisfaction, psychological well-being, and physical symptomatology have been found to be differently influenced by variations in environmental conditions (Borysenko and Borysenko, 1982; Broadbent, 1995; Evans et al., 1993; Locke, 1982; O'Leary, 1990; Steptoe, 1989; Theorell, 1992b; Warr, 1990). For example, level of control is more closely associated with job satisfaction than with physical or behavioural measures of strain (Broadbent, 1995; Ganster, 1989; Jackson, 1989). Furthermore, the influence of individual differences on stressor-strain relations may also vary according to the outcome of interest (Schaubroeck and Ganster, 1991; Schaubroeck et al., 1992): these roles are discussed in Chapter 3. Accordingly, different pathways of the Michigan model might be more or less important, depending on the outcome of interest.

Following the typology of strain responses adopted by Israel et al. (1991), strain responses are discussed here under three headings: physiological responses, psychological responses and behavioural outcomes. Physiological responses include virtually instantaneous immunological and cardiovascular responses that have established links with enduring health outcomes. Psychological responses may be further sub-divided into indicators of mental health, cognitive functioning and affective outcomes. Finally, behavioural outcomes include a range of health-related behaviours, such as smoking and alcohol consumption, and also a set of more organisationally relevant outcomes, including job performance and work attendance.

2.4.2 Physiological responses

Several physiological responses have been examined, particularly in the medical model of stress research. Neuroendocrine processes and cardiovascular functions, because of their associations with immunology and heart disease, respectively, are of particular interest in biophysiological approaches to stress research. However, the intrusive nature of this type of research tends to have resulted in relatively small sample sizes, with animal as well as human subjects. Consequently, the generalisability of this type of research is sometimes limited.

There are two endocrine “stress” systems (Frankenhauser, 1983; Henry, 1982; O’Leary, 1990): the sympathetic adrenal-medulla system (SAM) and the hypothalamic-pituitary-adrenocortical (HPAC) system. The SAM system is engaged during acute states of excitement or arousal, and is accompanied by release of catecholamines (especially epinephrine and norepinephrine), and the HPAC system is thought to become activated

when threats are appraised as overwhelming. The HPAC is associated with the release of cortisol, and often accompanies distressing life events (Theorell, 1992a). In practice, both systems are often activated. Opioids (e.g. beta-endorphin) are also released in response to stress, producing analgesia in both humans and animals: this accompanies pain-induced psychological stress or periods of physical duress, but may also occur at other times.

Reviews of the literature regarding neuroendocrine processes in the stress response indicate that endocrine secretion and the associated immunological effects mediate the effects of emotional processes on the development of disease (Henry, 1982; O'Leary, 1990). In particular endocrine secretion can reduce the functional capacity of the body's immune system, resulting in vulnerability to disease (Borysenko and Borysenko, 1982; O'Leary, 1990).

An association of acute stressors with suppressed immunological functioning has been widely reported. For example, Glaser, Kiecolt-Glaser, and colleagues conducted a series of studies revealing suppressed immune functioning in students during university examinations (Glaser, Kiecolt-Glaser, Speicher and Holliday, 1985; Glaser, Kiecolt-Glaser, Stout et al., 1985; Glaser, Rice, Sheridan et al. 1987). In the occupational domain, Frankenhauser, Lundberg, Fredrikson et al. (1989) showed that managers' systolic and diastolic blood pressure, heart rate, and epinephrine excretion were all elevated during a working day.

The effects of chronic psychosocial stress on human immunological functioning has been less thoroughly examined. One exception is Baum, Scheiffer, Lake, Fleming and Colins (1985), who followed the progress of residents of Three Mile Island after a nuclear power accident in 1979, and found reduced immunological functioning. In reviewing this literature, Locke (1982) and O'Leary (1990) concluded that there is no evidence that the

immune system adapts to stressors over time, and prolonged stress may result in prolonged immunosuppression.

More recently Schaubroeck and Ganster (1993) presented experimental findings in support of this hypothesis. They reported that people who experienced chronic high work demands showed a lower capacity for responsivity to challenge in a laboratory setting. The responsivity measures included heart rate, blood pressure and skin temperature. This finding was interpreted as meaning that workers who experience high demands are toughened against these demands. However lowered responsivity implies a diminished (physiological) coping response, which may reduce efficacy of coping both at work and in other circumstances and may “eventually lead to diminished cardiovascular health.”

Marmot et al. (1978) suggested that psychosocial work influences on neuroendocrine systems might provide an explanation of cardiovascular disease (CVD) incidence over and above known cardiovascular risk factors. However, most research with physiological outcomes operationalises stress in an experimental setting, or has used stressful life events as an independent variable. Research linking physiological outcomes to psychosocial work stressors is relatively rare: Marianne Frankenhauser’s “biopsychosocial approach” is one exception.

In a detailed study of managers, Frankenhauser et al. (1989) not only showed that a range of physiological indicators were elevated during the working day, but also showed that female managers’ blood pressure and norepinephrine remained relatively elevated at night, indicating a greater difficulty in unwinding after work. As these neuroendocrine and cardiovascular functions serve as early warning signs for later cardiovascular disease, this finding suggests that female managers may be at an elevated risk of heart disease. Similarly, in a study of Dutch driving examiners, Meijman, Mulder, van Dormolen and

Cremer (1992) reported associations of objective workload with neuroendocrine reactions and blood pressure.

Furthermore, there exists evidence that undemanding as well as demanding tasks are associated with physiological stress outcomes. For example, Gardner (1986) found that a non-stimulating task caused higher autonomic arousal (tonic skin resistance, phasic skin response and pulse rate) and lower reported satisfaction than a task involving moderate stimulation. This finding supports the hypothesis that monotonous, as well as hectic work may be experienced as (physiologically) stressful. Finally, it has been reported that relationships between stressors and physiological outcomes can be modified by individual and situational characteristics (e.g. O'Leary, 1990; Frankenhauser et al., 1989; Jemmott and Locke, 1984). Modifying influences are discussed in Chapter 3.

2.4.3 Psychological responses

Three categories of psychological response are discussed here: mental health effects, cognitive functioning effects, and job satisfaction.

2.4.3.1 Mental health. A range of measures of psychological well-being have been used in the investigation of the stress process. Two common measures of general mental health are the General Health Questionnaire (Goldberg, 1972) and the Middlesex Hospital Questionnaire (also known as the Questionnaire Crown-Crisp Experiential Index; Crown and Crisp, 1966), both of which were designed to be used as screening instruments in community samples and have been validated against clinical psychiatric interviews.

Measures of specific facets of mental health such as anxiety, depression, and social dysfunction have also been frequently reported, although these tend to be quite highly correlated (e.g. Birtchnell, Evans and Kennard, 1988; Goldberg and Hillier, 1979). Report of minor physical symptoms, such as headaches, stomach complaints, and sleeping difficulties are sometimes also included as measures of mental health, labelled as “psychosomatic” or “neurotic” symptoms (e.g. McCrae, 1990; Watson and Pennebaker, 1989). However, some physical symptom scales, although quite similar in content to the psychosomatic scale, have also been shown to be precursors of more serious physical illness (Appels, 1989).

Impairment of general mental health has been associated with several work characteristics, some of which were outlined earlier in this chapter. For example, poor mental health has been associated high work demands, low control and low social support (e.g. Landsbergis, Schnall, Deitz, Friedman and Pickering, 1992) and with high role conflict and ambiguity (e.g. Edwards and Van Harrison, 1993; Terry et al., 1993). More specific scales suggest that different aspects of mental health are susceptible to the influence of different aspects of the psychosocial work environment. For example, Broadbent (1985) demonstrated specific associations between high work pace and anxiety, and low social support with depression, in samples of blue-collar workers.

Psychological “burnout”, although widely studied in the stress literature, has been dealt with somewhat separately from other mental health indicators. Maslach and Jackson (1981) described three components of the burnout phenomenon: emotional exhaustion, depersonalisation, and (low) personal accomplishment. They apply this set of symptoms uniquely to the human service industry. Furthermore, Jackson, Schwab and Schuler (1986) demonstrated that burnout is related to job conditions on the one hand and more enduring behavioural outcomes such as job-search and voluntary employee turnover, on the other.

Other researchers have argued that the three components of burnout are an artefact of limiting research to the human services and therefore the particular personality profiles and stressors prevalent in these professions (Garden, 1989; Evans and Fischer 1993). These researchers suggest that it is the exhaustion factor that is general for all employees. In accordance with this assertion, Lee and Ashforth (1993) used latent variable modelling to show that emotional exhaustion has a central mediating role between job characteristics such as social support and control, and longer-term outcomes such as job and life satisfaction and turnover intentions.

Most researchers addressing burnout, conceive these symptoms as indicative of mental health: Garcia-Izquierdo, Llor-Eseban and Saez-Navarro (1994), for example, showed that each of the subscales of the Maslach Burnout Inventory was significantly correlated with the General Health Questionnaire. However emotional exhaustion has also been related to the onset of actual illness. For example, Tessler and Mechanic (1978) reported high correlation between self-report of physical health status and an independent evaluation of health by a physician. Furthermore, Melamed, Kushnir, Shirom (1992) found that burnout with associated tension was not only related to report of somatic complaints, but also a range of physiological factors that are linked to CVD. Similarly, the work of Appels (Appels, 1990; Appels and Mulder, 1989) reveals that emotional exhaustion (or “vital exhaustion” as he names his measure) is related to prospective development of angina and myocardial infarction.

2.4.3.2 Cognitive functioning. Impairment of cognitive performance is another psychological outcome that has been related to potential stressors. Cognitive performance tests are superior to self-report scales in that they are more objective, and can allow meaningful generalisation to actual work performance. Furthermore, cognitive tests lend

themselves to use in more rigorous experimental designs, thus allowing more causal interpretation than simple questionnaire measures. Several cognitive tests have been developed in laboratory settings and can be successfully applied in field settings.

For example, search-and-memory tasks allow both speed and accuracy of performance to be measured for several levels of task difficulty: performance on this type of test has been linked with objective levels of workload in driving examiners by both Parkes et al. (1986) and Meijman et al. (1992). In both pieces of research, the cognitive test was repeated following different objective work conditions. Use of this objective criterion allowed a convincing argument for the reduction in workload to be made to employers. Other objective work characteristics that have been linked with cognitive functioning include shift pattern (Smith and Miles 1987), sleep deprivation (Babkoff, Thorne, Sing, Genser, Taube and Hege, 1985), noise (Smith and Miles, 1987), cold (Enander, 1987) and physical exertion (Englund, Ryman, Naitoh and Hodgdon, 1985).

2.4.3.3 Job Satisfaction. Job satisfaction and life satisfaction are affective outcomes that are frequently examined in the stress literature. Because the focus of the current research is work stress, only job satisfaction is discussed here. Job satisfaction has been closely associated with many job characteristics, particularly control (e.g. Jackson, 1989; Spector, 1986) and social support (e.g. Ganster et al., 1986), but also work demands (e.g. Karasek, 1979), role conflict and ambiguity (e.g. Beehr and Drexler, 1986), and perceived work monotony (Melamed et al., 1995).

However job satisfaction has recently been criticised as an outcome of the stress process, as it is not substantially related to other, more general measures of well-being such as the mental health indicators described above (Brief and George, 1991). There exists a

growing research literature indicating that satisfaction and mental health are influenced by different factors, and therefore should be considered separately (e.g. Brief et al., 1988; Moyle, in press; Parkes et al., 1994; Terry et al., 1993). Similarly, although there is a strong intuitive appeal to assume that job satisfaction and organisationally relevant outcomes like job performance are related, a meta-analysis of the available research literature reveals that this correlation is relatively low (Iaffaldano and Muchinsky, 1985).

2.4.4 Behavioural outcomes

Two types of behavioural outcome are considered here; health-related behaviours and organisationally-relevant behaviours.

2.4.4.1 Health-related behaviours. Poor eating habits, loss of sleep, and increased alcohol and nicotine intake are all behaviours that may be observed during stressful episodes. Smoking in particular has been associated with stressful work characteristics (Cherek, 1985; Johansson, Johnson and Hall, 1991; Karasek and Theorell, 1990), as has reduced physical activity (Johansson et al., 1991). Furthermore these health-related behaviours are known to produce direct effects on the immune system (e.g. Kiecolt-Glaser and Glaser, 1988). In addition, some of these behaviours, particularly if persistent, may lead to the development of specific enduring outcomes, such as eating disorder, alcoholism, lung cancer and cardiovascular disease. For example, smoking, elevated BP and excessive weight are established CVD risk factors (Marmot et al., 1978).

Furthermore some health-related behaviours are related to physiological and psychological responses. Steffy et al. (1990) present evidence that both health habits

(alcohol, caffeine, and tobacco consumption) and lifestyle factors (nutrition, sleep, relaxation) produce strong main effects on job tension, dissatisfaction, and psychosomatic symptom report, although strength of these relationships varied in different samples. Similarly, O'Leary (1990) noted that there is evidence that physical activity may improve immunity.

2.4.4.2 Organisationally relevant behaviours. Of perhaps greater importance to work stress research are behavioural outcomes that have direct organisational consequences. These include decreased performance and productivity at work, absence from work, job searching and intention to leave, as well as actual employee turnover. Although performance decrements are widely believed to occur under stressful conditions (e.g. Karasek and Theorell, 1990), the empirical evidence for this is less substantial than for other strain responses (Ganster and Schaubroeck, 1991).

One exception is Spector et al. (1988), who reported that supervisor ratings of job performance were correlated with perceived demands and level of control. Positive effects on job performance with increased job control have often been reported (Buchanan, 1989; Hackman and Oldham, 1975; Pierce and Newstrom, 1983; Ralston, Anthony and Gustavson, 1983; Spector, 1986).

Furthermore, Jones and Boye (1992) present evidence that high level of stressors are associated with counterproductive behaviour at work, including violence, alcohol misuse and theft. However, job performance is also strongly influenced by individual differences in work preferences (Parkes, Styles and Broadbent, 1990), achievement striving (Bluen, Barling and Burns, 1990; Lee, Ashford and Jamieson, 1993; Spence Helmrich and Pred, 1987), self-efficacy (Bandura, 1989), conscientiousness, and extraversion (Barrick and Mount, 1993). Moreover, Motowidlo Packard and Manning (1986) found that the

influence of work stressors on job performance is mediated by mental health (particularly depression). Wright, Bonnett and Sweeney (1993) also found that mental health predicted subsequent work performance.

Many factors contribute to the decision of whether or not to attend work. Classically, a distinction is made between absence as a result of ill health (long-term absence) and voluntary (short-term) absence: both types of absence may be susceptible to the influence of work stress (Hammer and Landau, 1981), although other factors also come into play. Absence has been shown to be related to several health risk factors, such as smoking, exercise habits, alcohol consumption and deviation from ideal weight (Kerr and Vos, 1993; Leigh, 1991; North, Syme, Feeney, Head, Shipley, Marmot, 1993; Parkes, 1987). Personal constraints, such as family commitments (Leigh, 1991; North et al., 1993) and the time taken to travel to work (Taylor and Pocock, 1972), have also been found to influence levels of absenteeism.

Furthermore, North et al. (1993) reported a strong inverse relationship between attendance behaviour and job grade in British civil servants: a small but significant proportion of this grade difference was accounted for by differences in work characteristics; specifically control, variety of skill use, work pace, support at work, and job satisfaction. An association of low absenteeism with high levels of control has also been reported by several other researchers (e.g. Karasek, 1990; Karasek and Theorell, 1990; Pierce and Newstrom, 1983; Remondet and Hansson, 1991; Marmot, 1994). Similarly, Melamed et al. (1995) reported that absence was associated with subjective and objective measures of work monotony in blue-collar women. The relationship between absence and job dissatisfaction has also been reported by Steers and Rhodes (1978), although they argue against satisfaction as the *major* determinant of attendance. Considered in this light, absence may be seen as a potential response to perceived stress. However, in contrast Leigh (1991)

found that job satisfaction did not predict absence, and Spector (Spector et al., 1988; Spector and Jex, 1991) failed to find significant correlations between absence and a range of job characteristics measured by self-report and independent data sources.

Similarly, there are theoretical arguments which suggest that there should be a relationship between perceived stress and turnover, as leaving a job is a way of avoiding work-related stress, and hence a coping strategy (Edwards, 1988). However, demonstrating such a link has proven difficult. Although associations between work characteristics and turnover or turnover intention have sometimes been reported (e.g. Brief and Aldag, 1976; Jackson, 1983; McKee, Markham and Scott, 1992; Mobley, Griffith, Hand, and Meglino, 1979), in a review of the turnover literature, Mobley (1982, p 182) concluded that the “empirical linkages between stress and turnover have been inadequately researched”. Consistent with this conclusion, Spector and Jex (1991) found that while intention to leave correlated with several self-reported job characteristics, it was not correlated with independent ratings of job characteristics.

2.5 Enduring health outcomes

Several debilitating and life-threatening illnesses have been examined within the stress literature. CVD is probably the most thoroughly investigated of these “stress-related” illnesses. CVD has been associated with several of the physiological, psychological and behavioural stress responses discussed in the previous section. In addition, direct associations with some psychosocial work characteristics have been shown. Individual differences in personality have also been linked with the development of heart, and other diseases, as discussed Chapter 3.

As noted earlier, several behavioural stress responses have health-damaging effects. For example, in a sample of Rotterdam civil servants Appels (1989) found that smoking and high cholesterol were the strongest predictors of myocardial infarction (MCI). The next best predictor was the mental health indicator “vital exhaustion”, which was predicted MCI at about the same level as blood pressure. Several studies in recent years have demonstrated a link between emotional distress or fatigue and the development of cardiovascular illness, after controlling for health and lifestyle risk factors (Appels, 1990; Appels and Mulder, 1989; Melamed et al., 1992).

Marmot and colleagues (Marmot, 1982; Marmot et al., 1978) have shown that cardiovascular risk is generally higher at lower levels of the bureaucratic hierarchy in the British Civil Service. One interpretation of this finding is that lower job grades are associated with more stressors, particularly restricted autonomy, and this provides an explanation of CVD incidence over and above previously accepted risk factors. A relationship between CVD risk and low job control and/or hectic and demanding work has been shown in several large scale epidemiological studies in Sweden (Alfredsson et al., 1982; Alfredsson et al., 1985; Karasek et al., 1981; Karasek, 1990; Theorell et al., 1987;

Theorell, 1991b) and the USA (Pieper et al., 1989; Reed, LaCroix, Karasek, Miller and MacLean, 1989). There is also some evidence of increased coronary risk under conditions of low social support (Johnson, Hall and Theorell, 1989; Karasek and Theorell, 1990).

The psychological health indicators used to measure short-term responses to stress focus on common low-level psychiatric symptoms. Both the General Health Questionnaire and the Middlesex Hospital Questionnaire were designed to be used as screening instruments for identifying potential psychiatric cases in a general population (Crown and Crisp, 1966; Goldberg, 1972), and have therefore been validated against clinical psychiatric interviews. The relationship of these self-report indicators to psychological disorder demonstrates a potential mediation of work stress with more enduring psychological outcomes, such as chronic depression and anxiety.

2.6 Feedback loops

The basic stress process discussed in this chapter, is a mediated chain whereby psychosocial work conditions may be appraised as stressful; perceived stress then results in some short-term response which may then lead to more enduring outcomes. In addition to this forward-feeding chain, the Michigan Model allows for feedback loops within the stress process. These pathways are briefly described here, although they do not form a major focus of the present study.

In particular, responses to stressful conditions may result in modification of the actual psychosocial conditions, or alternatively may act to alter perceptions of these conditions. House (1981) refers to the former as “coping”, and the latter as “psychological defense”. However other theorists prefer to conceptualise both types of responses as forms of coping, making a distinction between problem-focused and emotion-focused forms of coping (e.g. Folkman et al., 1986), although sometimes more detailed categorisations of coping are used (e.g. Carver, Scheir and Weintraub, 1989; Latack, 1986; Latack and Havlovic, 1992). These two coping pathways are labelled in Figure 2.1.

The Michigan paradigm has been criticised for not adequately addressing the issue of coping (Lazarus, 1991). Although coping has usually been researched within different theoretical models, particularly Lazarus’ Transactional Model, coping is also placed within the Michigan Model. The Michigan Model can be used to describe both the coping process (via feedback loops described above) and coping style (as an individual modifying variable). In practice however, coping as a response is not often examined within this framework.

The effectiveness of coping may be gauged by the degree to which coping results in a reduction of short- and long-term strain responses. Several researchers have reported that problem-focused coping has a positive effect on psychological well-being in response to

work stress, or that emotion-focused coping is associated with negative outcomes (Ashford, 1988; Israel, House, Schurman, Heaney and Mero, 1989; Knox, Svensson, Theorell, and Waller, 1988; Parasuraman and Cleek, 1984). More specific coping strategies have also been examined, for example Long and Flood (1993) reported that exercise as a coping response improves self-esteem.

Enduring outcomes also have a role in feeding back into the stress process presented in the Michigan Model, although again these roles have not tended to be the focus of investigation in work stress research. It is clear that the physical and mental health status of any individual may itself act as a stressor, or may influence the way in which psychosocial conditions are perceived. For example, within the life stress literature, long-term illness is commonly included in scales of life stressors, (e.g. Holmes, and Rahe, 1967; Dohrenwend and Dohrenwend, 1981; Lin and Ensel, 1989) and is seen as feeding into the beginning of the stress process, rather than as an end point.

2.7 Summary

Several features of the psychosocial work environment are identified as potential stressors. The literature reviewed indicates that there is an association between objective work conditions and perceptions of these conditions. Furthermore, relationships between work conditions and short-term responses have been described for physiological, psychological and behavioural strain responses. In addition, there exists substantial evidence from the medical literature linking these short-term responses with more enduring health outcomes, particularly CVD and mental illness. Moreover, some research, particularly that by Robert Karasek and his colleagues, demonstrates more directly the association between psychosocial work stressors and disease outcomes. Finally, feedback loops within the Michigan Model were explained to represent the coping process, and to allow for the influence of existing strain symptoms on coping and adaptation to current or future encounters with the psychosocial environment.

3. Potential Modifiers of the Stress Process

3.1 Pathways through which modifying variables may operate

3.1.1 *Different modifying roles*

In the Michigan Model, individual and situational characteristics can influence short-term and long-term outcomes through several pathways: direct effects, mediated effects and moderator effects are all postulated for those characteristics labelled as “modifying variables” (Israel et al., 1992). Social support is the main variable that has been examined in this framework (House, 1981); however several factors, both individual and situational, may be cast as potential modifying variables. The other situational characteristic that has been considered in this role is personal control (Israel et al., 1991), and almost any individual difference could be considered a candidate for modifying stressor-strain relations (Payne, 1988). Examples of individual modifying variables include Type A behaviour (Keinan and Melamed, 1987; Landy et al., 1991), locus of control (Cohen and Edwards, 1989; Krause and Stryker, 1984), coping style (Carver et al., 1989; Latack and Havlovic, 1992), hardiness (Kobasa, 1979), and negative affectivity (Parkes, 1990; Moyle, in press), as well as demographic differences such as age, sex and socio-economic status (Israel et al., 1991).

Returning to the Michigan Model (reproduced here as Figure 3.1), horizontal arrows printed in grey are those relationships discussed in Chapter 2, the vertical arrows indicate the potential roles of modifying variables and include both direct (solid arrows) and moderated (broken arrows) effects. A direct effect is a presumed causal relationship between variables, and is consistent with a statistical main effect or significant correlation. A broken arrow intersecting a solid arrow indicates an interaction between the modifying variable(s) and the

variable(s) in the box at the beginning of the solid arrow in predicting the box at the head of the solid arrow. This interaction is termed a moderation effect (Chaplin, 1991; Baron and Kenny, 1986), and may take several forms.

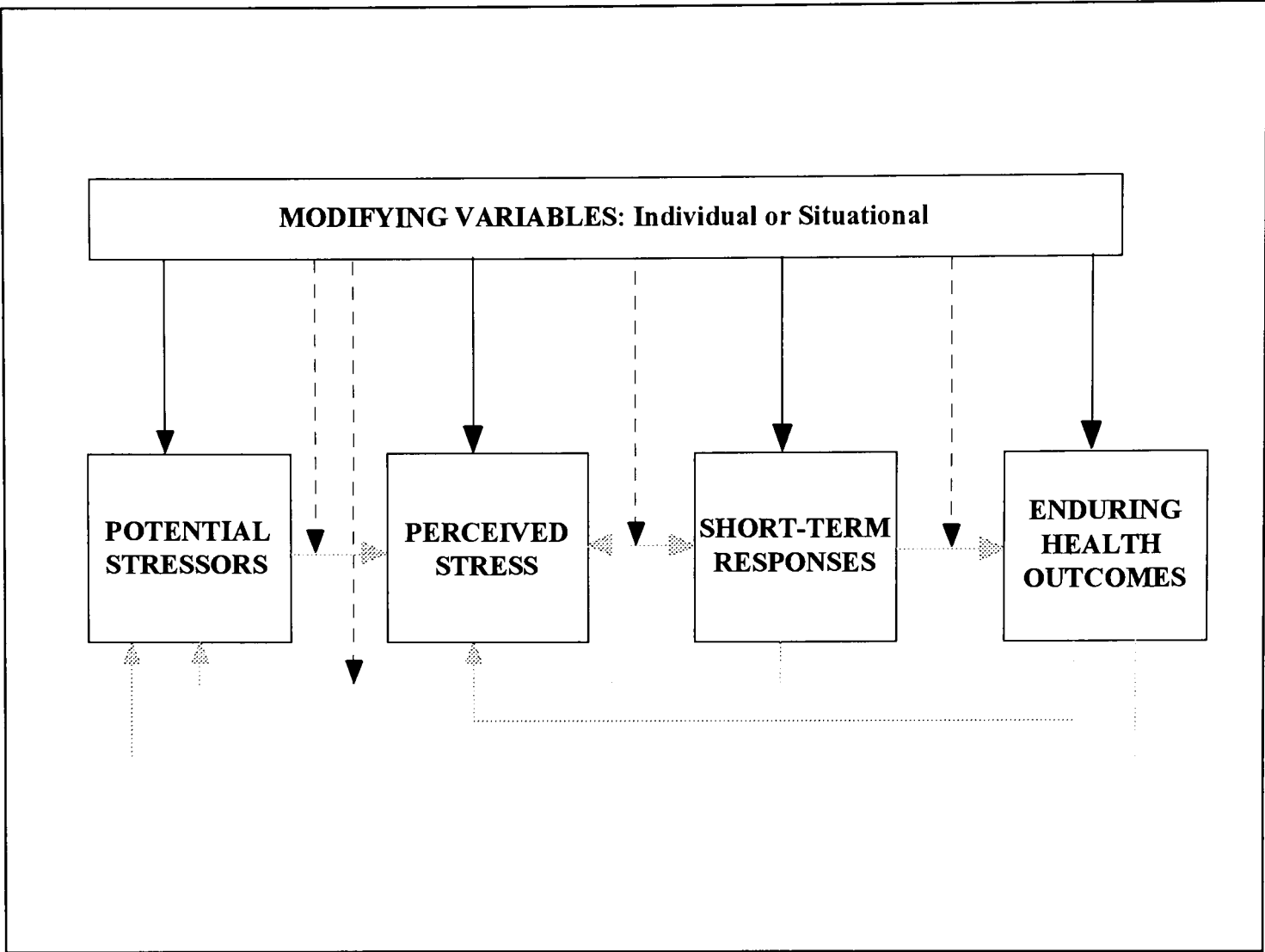


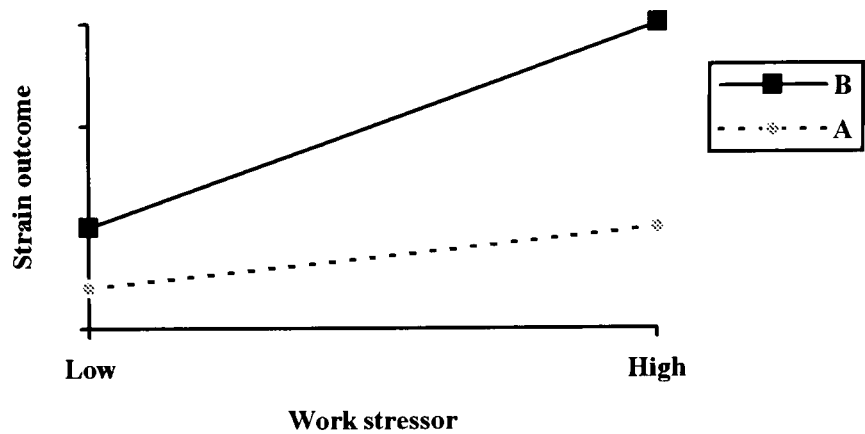
Figure 3.1 The Michigan Model, emphasising the roles of modifying variables.

Horizontal pathways discussed in chapter 2 are shown in grey; vertical black arrows indicate the potential role of modifying variables, including both direct (solid arrows) and moderated (broken arrows) effects.

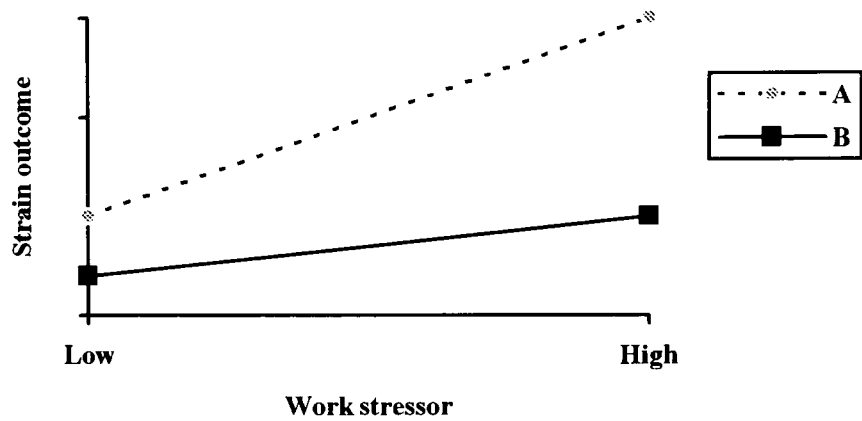
The moderation effect most commonly described within the Michigan framework is a “buffering effect”. Kahn et al. (1964) described the buffering role of social support in the work stress paradigm as an interaction in which high levels of social support weaken or eliminate the relationship between job stressors and employee reactions. Cohen and Edwards

(1989, p 238) suggest that buffering effects will occur when there is “reasonable match between the needs elicited by stressful events and available resources.” Another form of moderation is the reverse buffering or vulnerability effect, where a modifying variable acts to exacerbate or amplify the effect of a stressor on outcome measures. Parkes (1990) described this form of moderation for neuroticism. The third form of moderation effect occurs when the moderator variable is an individual characteristic, and is the congruence or person-environment fit model of moderation. This form requires a cross-over effect such that the environmental characteristic is perceived either as a stressor or as a resource, depending on the individual’s disposition. All three forms of moderation are depicted in Figure 3.2.

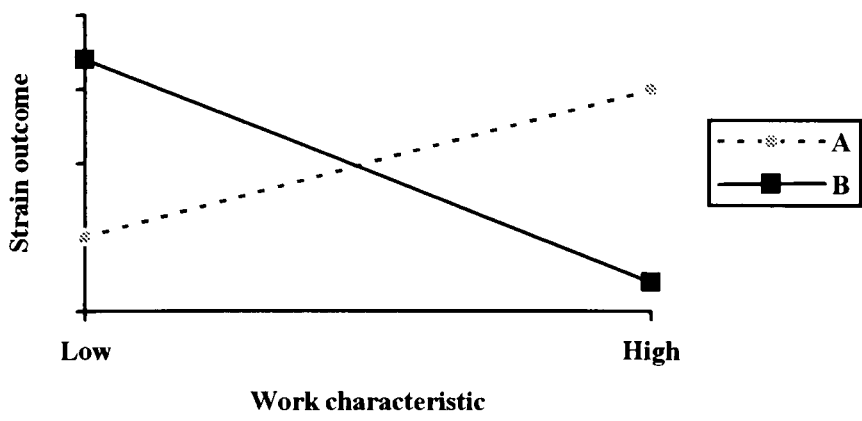
A mediation effect occurs when the modifying variable influences another variable, through an indirect pathway, via a third intermediate variable: these effects explain how or why relationships between stressors and outcomes are transmitted. For example, in Section 2.3 the mediation of the influence of objective work characteristics on mental health through work perceptions were discussed. Similarly, individual differences in personality may influence the type of job one is employed in, and the characteristics of that job in turn effect strain responses. Thus the observed associations between personality and strain may be mediated by objective and/or perceived job characteristics. For example Moyle (in press) observed that the association between neuroticism and job satisfaction was mediated by differences in perceptions of control. A schematic representation of this mediation effect is presented in Figure 3.3. Statistical tests for mediation have been outlined by Baron and Kenny (1986) and involves a series of correlation and partial correlation analyses, described in Section 4.3.1.



a) **The buffer model:** moderator variable (A) acts as to ameliorate influence of stressor.



b) **The vulnerability model:** moderator variable (A) acts as to exacerbate influence of stressor.



c) **The P-E fit model:** each level of the moderator variable is congruent (i.e. produces positive outcomes) at different levels of the work environment.

Figure 3.2 Schematic representation of different forms of moderation.

A and B represent high and low levels of some moderator variable. In model a) the buffer model, A is a positive characteristic (e.g. social support, control, internal locus of control), in model b) the vulnerability model, A is a negative characteristic (e.g. neuroticism) and in model c) neither A nor B is positive: positive outcomes are associated with a congruence or “fit” between the person and environment characteristics (adapted from Parkes, 1995).

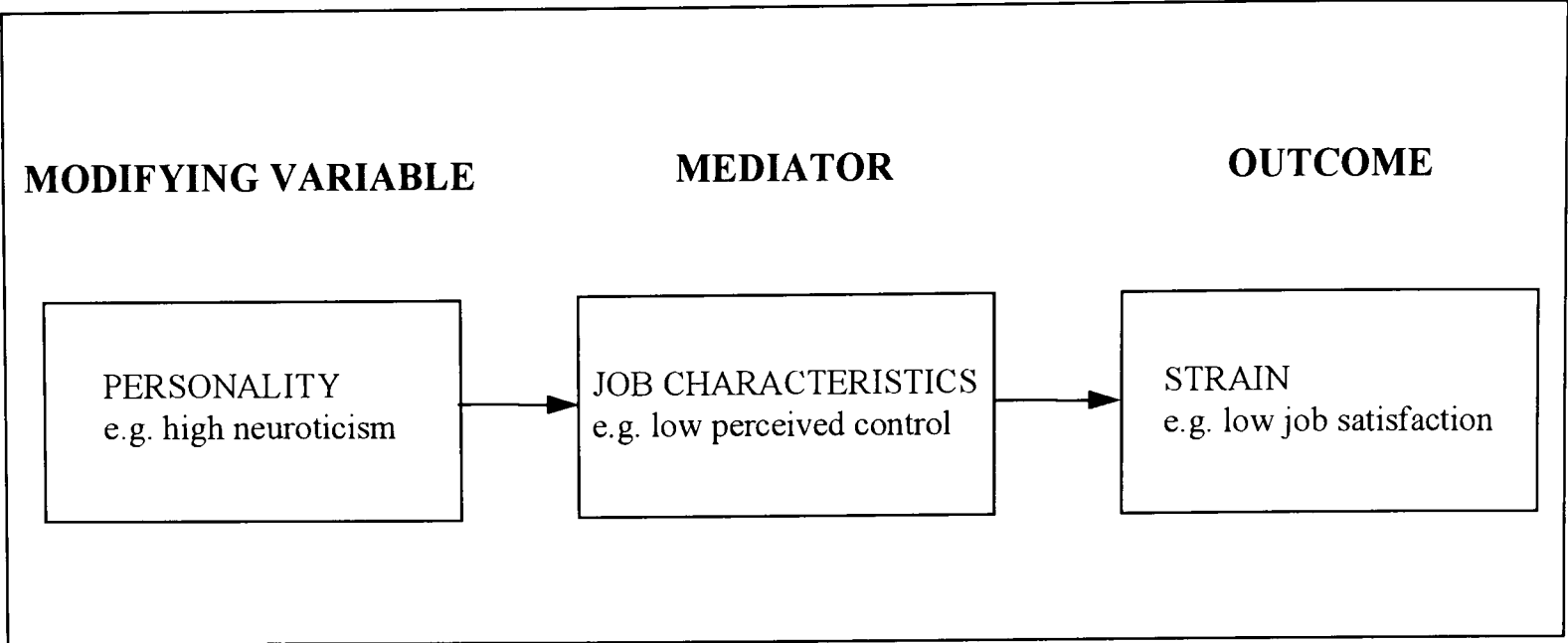


Figure 3.3 Schematic representation of an indirect, mediation effect: the influence of personality on strain is mediated by perceptions of job characteristics.

Although subsumed under a single element in the Michigan Model, the relationships *among* potential modifying variables, and the joint influence of several modifying variables have recently come under consideration (Chaplin, 1991; Evans, Johansson and Carrere, 1994; Smith, Smoll, Ptacek, 1990). For example Johnson and Hall (1988) examined the joint influence of perceptions of control and social support on the relationship between work demands and CVD prevalence. Furthermore, Parkes (1990) examined the joint influence of locus of control and perceptions of control in the development of psychological strain in response to work demands.

3.1.2 Links between Michigan Model, P-E Fit and Demand-Control Models

When considering the role of individual modifying variables, the Michigan Model may be seen to parallel the P-E Fit Model of stress. LaRocco, House, and French (1980) made explicit this comparison, stating that when demands are perceived to exceed individual

capabilities, this incongruence is essentially a lack of person-environment fit. Individual differences may influence what types of (objective) stressors an individual experiences, how these are perceived, and what type of response might be selected: all three pathways act to determine the congruency of P-E Fit.

Similarly, Karasek's (1979) Demand-Control Model may be placed into the Michigan framework by casting work demand as a stressor and control as a modifying variable. The interaction between demand and control is represented as a broken arrow influencing the stressor-strain relationship, i.e. a moderator effect. Karasek and Theorell (1990) acknowledge that the Michigan Model has greatly influenced the development of the Demand-Control Model and particularly, the more recent extensions of this model to incorporate social support.

In the Sections 3.2 to 3.4 specific situational and individual modifying variables are discussed, including evidence that demonstrates how these variables modify the stress process described in Chapter 2.

3.2 Situational modifiers

3.2.1 Job control

3.2.1.1 Control as a moderator of stressor-strain relations. Not only may low levels of control induce strain, but high levels of control may also moderate or buffer the effects of other potential stressors. The main advocate of control as a buffer is Robert Karasek (Karasek, 1979), although theoretical formulations of this idea have also been proposed by others (e.g. Sutton and Kahn, 1987). These theories rest upon the assumption that control facilitates adaptation to stressful work demands, by allowing the individual to regulate demands to an optimal level (Aronsson, 1991; Karasek and Theorell, 1990; Sauter and Hurrell, 1989).

Figure 3.4 illustrates how Karasek's Demand-Control Model addresses a subset of the relationships incorporated in the full Michigan Model. The Karasek model is much more specific than the Michigan Model or Sutton and Kahn's model - work demands is the psychosocial stressor of interest, and control is the modifying variable. In particular, Karasek emphasises the role of control as a potential buffer between demands and either short-term or enduring outcomes (dashed arrows). However direct effects of demand and control on measures of strain are also considered (represented by solid arrows). In omitting the influence of individual differences, Karasek does not claim to address all issues relevant to the stress process, but sees this model as encapsulating the "core" process.

Based within the framework of the Michigan Model, Sutton and Kahn (1987) present a similar but more general model of the role of control in the stress process, the Stress Antidote Model. Sutton and Kahn's theory incorporates understanding and prediction as well as control, all of which are seen as "antidotes" to work stress. These "antidotes"

attenuate the effects of organisational stressors on individual strain, and might therefore be included in the “modifying variables” box. Like the Michigan Model and Karasek’s paradigm, Sutton and Kahn incorporate both main and moderating effects. Sutton and Kahn also include in their concept of control many related constructs such as participation in decision making, autonomy, authority, power, and alienation.

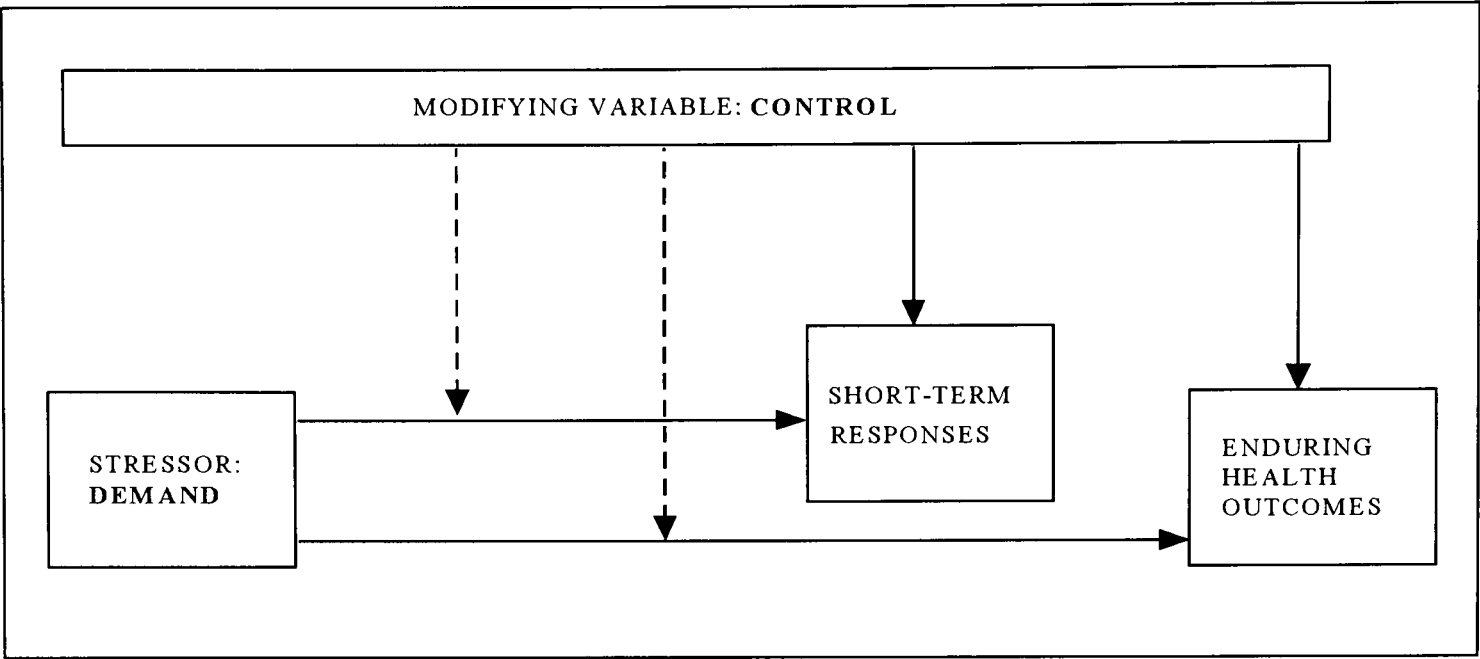


Figure 3.4 Karasek’s Demand-Control Model as a sub-model of the Michigan Model.

There is substantial evidence for a direct association between control and/or work demands, and short-term responses and enduring health outcomes. Some of this evidence was reviewed in the previous chapter. Karasek and his colleagues have reported that high demand and/or low discretion jobs are associated with outcomes as varied as depression, exhaustion, pill consumption, days of sickness, myocardial infarction, and increased blood pressure and heart rate (Alfredson et al., 1982; Alfredsson et al., 1985; Karasek, 1979; 1989; 1990; Karasek, et al., 1981; Karasek, Russell and Theorell, 1982; Karasek and Theorell, 1990; Theorell et al., 1987). Such diverse findings have led Karasek to generalise his theory

to a wide range of outcomes, all indicative of so-called “psychosocial strain” (Karasek and Theorell, 1990).

The combination of demand and control, however, has not always been found to be “interactive”. Since Karasek’s (1979) original suggestion of a demand-control interaction predicting a range of physical and mental health indicators, demand-control interactions have also been reported for prediction of CVD (e.g. Karasek et al., 1981; Karasek et al., 1982) and physiological indicators (Fox, Dwyer and Ganster, 1993). Furthermore, Theorell (1989) reported that the ratio of demands to decision latitude was associated with blood pressure at work, sleep disturbance, and gastrointestinal symptoms. Aronsson (1989) reported that the relationship between demand and a range of ill health indicators was modified by control resources; and Dwyer and Ganster (1991) report that the demand-control interaction predicted job satisfaction, sickness absence and tardiness.

However, although Bromet, Dew, Parkinson and Schulberg (1988) found the predicted interaction effect in relation to alcohol problems, for report of physical symptomatology the interaction was in the *opposite* direction to that predicted by Karasek. Similarly, Hesketh and Shouksmith (1986) reported a significant interaction for prediction of overall job satisfaction, but not for a range of other affective and mental health measures; and in a laboratory manipulation, Perrewe and Ganster (1989), found the interaction for anxiety but not for job satisfaction or physiological arousal. In contrast, in a sample of healthcare workers, Tetrick and La Rocco (1987) found that control moderated the relationship between role conflict and ambiguity to explain job satisfaction, but not mental health.

Others have reported only main effects for demand and control without any statistical interaction (e.g. Chay, 1993; Hurrell and McLaney, 1989; Kushnir and Melamed, 1991; Landsbergis, 1988; McLaney and Hurrell, 1988; Payne and Fletcher, 1983; Warr, 1990). That is, the additive combination of demand and control predict strain outcomes. Although

not testing for an interaction effect, Kaupinnen-Toropainen et al. (1983), also raised doubts about Karasek's model, specifically regarding the equivalence in terms of strain of "active" and "passive jobs". They found that significantly higher job satisfaction was reported by the incumbents of active jobs than passive jobs. Even some of Karasek's own research suggests that psychosocial strain is mostly predicted by additive effects (Karasek, 1990; Karasek, Gardell and Lindell, 1987).

3.2.1.2 Explaining discrepant findings in the Demand-Control model. Six possible explanations for the discrepancies in findings regarding demand-control interaction are outlined below. Many of these are methodological issues, which are discussed further in Chapter 4.

Specificity of strain outcomes. The assumption that all stress outcomes covary as "psychosocial strain" may not be valid: depending on which type of outcome is considered, there may be very different predictors. The most compelling evidence for interactions between demand and control have been reported for cardiovascular outcomes (Karasek and Theorell, 1990), whereas for affective and mental health outcomes, the evidence is weaker and often contradictory (Ganster, 1989; Kasl, 1989; Parkes, 1989).

Potential for dispositional response bias to act as a confound in self-report data. When demand, control and outcomes are all measured by self-report, there is a potential for personality factors to influence the perception and report of all three factors, thus giving rise to spurious correlations between variables (Brief et al., 1988). In addition to confounding the interpretation of main effects, such correlated error may act to attenuate any interactions in the data (Chaplin, 1991).

Sampling differences. Evidence for interaction between demand and control largely derives from national survey data, often restricted to men and including a disproportionate

number of blue-collar workers. Several researchers (e.g. Ganster, 1989; Kristensen, 1995; McLaney and Hurrell, 1988) have questioned the validity of generalising conclusions from such surveys to application at the company or industry level.

Varied definition of demand and control. Karasek has used a very wide definition of “job decision latitude” to operationalise control, such that skill level, skill utilisation, decision authority, control beliefs, and discretion have been confounded. Similarly, “demand” has been variously defined in different studies. The importance of clear definition is noted by Theorell (1989), who reported that different aspects of control can have discrete effects on a range of physiological outcomes. McLaney and Hurrell (1988) suggested that non-supportive studies have used more narrow definitions than those used by Karasek. In contrast, Wall, Jackson, Mullarkey and Parker (in press) suggest that non-supportive studies have used definitions that are too broad and subjective.

Testing for an “interaction” between demand and control. Parkes (1994) notes that in biomedical research the term interaction is sometimes used in a very general sense to refer to any form of interplay between two or more factors that are jointly related to an outcome measure. In contrast, the psychological literature has defined interaction more specifically to mean a multiplicative combination of two or more variables, or the interaction term in analysis of variance (Baron and Kenny 1986; Edwards and Cooper, 1990). Thus Karasek’s (1979) “special interaction term”, which was calculated by determining the absolute difference between his measures of demand and control and adding a constant, is not equivalent to an interaction effect as defined by psychological researchers. Subsequent attempts to find evidence for an interaction using multiplicative terms have usually been unsuccessful (e.g. Hurrell and McLaney, 1989; Kushnir and Melamed, 1991; Landsbergis 1988, Schaubroeck and Ganster, 1991; Spector, 1987), and it is therefore confusing that the

“special interaction term” is cited as supportive of a buffering interaction effect, even though the reported analysis of variance interaction term did not reach statistical significance.

Moderation of the demand-control interaction by a third factor. More recently evidence has been reported that a higher order interaction with a third independent variable, determines whether demand and control combine additively or interactively. Johnson and Hall (1988) reported a three-way moderation effect, such that high demand, low control and low support was predictive of CVD in Swedish factory workers. Similarly Parkes (1991a) reported that locus of control beliefs moderated the demands by discretion interaction for affective distress. However this interaction was not replicated for absence frequency or social dysfunction as outcomes.

In summary, Sauter and Hurrell (1989, p xv) are typical of many reviewers of the control literature (see also Ganster and Fusilier, 1989; Kristensen, 1995), concluding that, “there seems to be little evidence that the control-demands effect is interactive as originally proposed (i.e. that strain is specific to a combination of high demands and low control).” Even proponents of the Demand-Control Model have recently acknowledged the lack of empirical evidence for the interactive combination of demand and control. For example, Karasek (1989, p 143) stated that, “While I admit that a multiplicative interaction would strengthen the plausibility of the demand-control mechanism (a pre-potentiating effect for low control), the practical implications for job redesign...are largely unchanged if two separate linear effects for control and demand are observed...However, for the demand-control model, the existence of a multiplication interaction term is *not* the primary issue.” Similarly, Theorell (1992 b), notes that the combined effects of demand and control outweigh either effect considered individually, rather than emphasising the importance of a statistical interaction. Nonetheless, the intuitive appeal of the theory, and its potential applications are

such that organisational researchers continue to advocate research into this model (Schaubroeck, and Ganster, 1991).

3.2.1.3 Indirect (mediated) influences of control. An alternative pathway through which control might act as a modifying variable is that perceptions of control may influence perceptions of psychosocial stressors, and hence strain, in an indirect, mediated relationship. Individuals with high levels of control may use this control to alter their actual work situation. Alternatively, being in a position of high control may alter perceptions and attitudes about other work stressors, without necessarily changing the objective situation. Although considered at a theoretical level, empirical evidence for such indirect, mediated effects of control are less commonly reported than the proposed buffering effects. Studies reporting mediated influences of control have shown that the mediator is role conflict and/or role ambiguity.

In particular, Schuler (Lee and Schuler, 1982; Schuler, 1980; Schuler and Kim, 1978) proposed that the positive effects of participative decision-making (PDM) programmes, in terms of job satisfaction, are largely caused by the positive influence in reducing role conflict and ambiguity. Consistent with this model, Schaubroeck and Jennings (1991) reported that the effect of PDM on job satisfaction in a group of maintenance employees, was partially mediated through role ambiguity, perceived obstacles and reward expectancy. Looking at psychological health as an outcome, Jackson (1983) also reported that the positive influence of a PDM programme was mediated through perceptions of reduced role conflict, in a hospital environment.

Using measures of perceived control rather than quasi-experimental manipulations of the work environment, Schaubroeck et al. (1989) used structural analysis to show that role ambiguity mediated the influence of perceived participation on job tension and satisfaction.

Similarly, Lusch and Jaworski (1991) reported that control had an indirect effect on manager performance, mediated by role conflict and ambiguity. Furthermore, in a group of managers Lee and Ashforth (1993) reported that the influence of control on exhaustion was mediated through role conflict and ambiguity: Dompierre et al. (1993) reported a similar finding for service-industry employees.

3.2.1.4 Control as a mediator. Another mediation effect in which control has been implicated is one in which control mediates (is itself modified by) an individual trait variable, negative affectivity (NA). There is a growing body of evidence that negative affectivity is related to job satisfaction *through* perceptions of control, such that individuals high in NA report lower levels of control, and it is these low levels of control that result in reduced satisfaction (Levin and Stokes, 1989; Moyle, in press; Terry et al., 1993), as depicted in Figure 3.3.

3.2.2 Social support

3.2.2.1 Social support as a moderator. As discussed in Chapter 2, there is considerable evidence that social support has strain-reducing effects. In addition to these positive, direct effects, it has been suggested that support buffers the impact of other stressors (e.g. Cohen, 1988; House, 1981; LaRoccco et al., 1980; Wells, 1982). The importance of the pathway through which social support influences outcomes lies in the implications for practical applications. If support acts as a buffer, then it is of benefit only to those experiencing noxious environmental conditions (House, 1981). In contrast, a main effect model implies that everyone will benefit from improvements in support (LaRocco et al., 1980). Until the

precise role of social support is defined, potential benefits cannot be fully utilised (Ganster et al., 1986; LaRocco et al., 1980).

There exists considerable empirical support for the buffering hypothesis. For example, the health effects of daily life stressors have been found to be buffered by emotional social support (De Longis, Folkman and Lazarus, 1988; Lin and Ensel, 1989). In a work context, Greller, Parsons and Mitchell (1992) found that support from supervisors acted as a buffer against a range of stressors experienced in police work in predicting physical and psychological symptoms. Similar findings have also been reported by Etzion (1984) among (male) managers and human service professionals, Russell, Altmeier and van Velzen (1987) among school teachers, and Kirmeyer and Dougherty (1988) for police radio dispatchers.

However, other researchers have either failed to find buffering effects of social support (e.g. Ensel and Lin, 1991; LaRocco and Jones, 1978; Melamed et al., 1990; Schaubroeck et al., 1992), or have found moderating effects that are inconsistent with the buffering theory, such that the presence of social support was found to exacerbate the effects of other stressors (Beehr, 1976; Beehr and Drexler, 1986; Ganster et al., 1986; Kaufmann and Beehr, 1986; Kobasa and Pucetti, 1983). It should, however, be noted that these studies did report positive main effects for social support. The general conclusion drawn from these findings is either that support acts negatively in combination with some stressors, or that where moderation effects are found they may well result from chance, and are of no theoretical or practical importance. The more parsimonious model is one of additive main effects, in which job stressors operate independently of level of social support (Beehr and Drexler, 1986; Ganster et al., 1986; Ganster and Victor, 1988).

One reason for confusion in the research findings may be differences in definition of social support, meaning that comparisons between studies have not always compared like with like (House, Umberson and Landis, 1988; LaRocco et al., 1980). Essentially, two

types of social support measure have been utilised: the degree of social integration, and perceptions of available support. Cohen and Wills (1985) suggested that a buffering model is supported only when perceived availability of support is measured. Furthermore, it has been suggested that for support to be buffering, the source of support must be relevant. For example, in buffering work stressors, work-relevant sources of support (colleagues and particularly supervisors) will be most important, as those closer to the problem can have greater impact on the situation (Cohen and Wills, 1985; Ganster and Victor, 1988; House, 1981; House and Wells, 1978; Kirmeyer and Dougherty, 1988; Wells, 1982). Moreover Etzion (1984) found that only work stressors (and not life stressors) were buffered by social support.

Different findings also tend to be reported depending upon the outcome measure of interest. From a review of the research evidence LaRocco et al. (1980) concluded that social support buffers mental health outcomes (e.g. anxiety, depression, irritation, and somatic symptoms), but not affective outcomes (e.g. job dissatisfaction, boredom, dissatisfaction with workload). Boumans and Landeweerd (1992) have developed this specificity idea further, suggesting that buffering by social support is highly selective, regarding the outcome variable *as well as* the source of stress and support. After performing tests of a large number of stressor-buffer combinations, they found evidence that social support may moderate several specific stressor-strain relationships. However, in light of the number of tests performed, they were cautious in the conclusions made about buffering role. Similarly Terry et al. (1993) found a buffering effect for social support in only one of eight stressor-strain relationships.

3.2.2.2 Indirect (mediated) influences of social support. Social support may also modify stressor-strain relations through indirect, mediated pathways. There exists evidence that

social support has direct effects on potential stressors, and through this mechanism comes to be related to strain indices (see Ganster and Victor, 1988, for an overview of this literature). For example, in a longitudinal survey, Krause (1987) found that increases in social support are associated with increased feelings of control, which were then related to strain. Similarly, social support has been found to influence perceptions of role conflict and ambiguity, which mediates the association of social support with mental health outcomes (Dompierre et al., 1993; Lee and Ashforth, 1993; Schaubroeck et al., 1989; Tetrick, 1992). Furthermore, Fondacaro and Moos (1987) found that the type of support received influenced coping responses in different situations: they concluded that specific aspects of support and coping jointly mediate the link between stressors and outcomes.

3.2.2.3 Social support as a mediator. Social support can also be influenced by other modifying variables. Dunkel-Schetter, Folkman, Lazarus (1987) reported that personal predispositions were related to the type of support received at times of stress: in particular, habitual ways of coping was strongly associated with all types of support. Similarly, Marcelissen, Winnubst, Buunk and de Wolff (1988) reported different levels of social support at different hierarchical grades, with highest and lowest grades perceiving the lowest levels of support. In reviewing the literature pertaining to the relationship between social support and health, Ganster and Victor (1988) cited evidence that this relationship may be modified by age, gender, and locus of control, although complex buffering effects tended not to have been adequately statistically tested. More specifically, Chay (1993) found that social support was predicted jointly by (internal) locus of control, extraversion and achievement motivation, and that perceived social support acted to buffer the relationship between low control and poor well-being. However, as this research was cross-sectional, interpretations regarding causal mechanisms were more speculative than conclusive.

3.2.3 *The joint influence of situational modifiers*

Recently, there has been an increasing awareness that it is important to understand the joint influence of modifying variables (Chaplin, 1991; Evans et al., 1994). Johnson and Hall (Johnson and Hall, 1988; Johnson et al., 1989) have incorporated social support into Karasek's Demand-Control Model, thus examining the joint modifying influence of social support and control on the relationship between demand and strain outcomes (in particular the prevalence of CVD). Johnson (1989 p 67) suggests that neither control nor support alone is sufficient to moderate the impact of job demands, "When support is present, control is an effective modifier. But when support is absent, control no longer functions to reduce the impact of job demands. We also observe that social support is not an effective moderator when control is low."

Building on the work of Johnson, Karasek, (Karasek, 1989; Karasek and Theorell, 1990) has recently included social support as an extension to the original Demand-Control Model. Karasek and Theorell report that high "iso-strain" is characterised by working conditions of high demand, low control and low social support, and has been associated with CVD, mental fatigue, gastro-intestinal diseases and lower back pain in a random sample of the Swedish working population.

Three-way interaction effects of demand-control-social support that are consistent with this theory have been reported for job dissatisfaction (Landsbergis et al., 1992), and for somatic symptom report (Parkes et al., 1994). However, both research groups reported additive, rather than interactive effects of social support, when looking at alternative outcomes. Similarly, Melamed et al. (1991) reported only additive effects of demand, control and social support in the prediction of job satisfaction and burnout. Similar analyses

have also been conducted that involve the relationships between individual and situational modifiers, and stressor-strain relations: these are discussed in Section 3.4.7.

3.2.4 *Overall evidence for situational modifiers*

Although there is evidence consistent with the buffering effects of control and social support, in both cases, the balance of evidence rests with the simpler additive models. Recent analyses of the control and social support literature suggests that buffering may only occur in specific situations, such that the influence of the modifying variables depends upon the stressor-strain relationship being examined, or alternatively upon the presence of other potential modifiers. However, even when significant, such three-way interactions account for only a relatively small proportion of variance in strain outcomes.

Indirect, mediated pathways, although specified in the Michigan Model and discussed theoretically, have been empirically examined less often than buffering effects. However, the available evidence suggests that both social support and control might mediate or be mediated by other situational or individual characteristics. These pathways of mediation may lead to a better understanding of the processes underlying additive relationships between stressors and strain outcomes.

3.3 Sociodemographic differences as modifiers

The stressors to which an individual is exposed are determined by a wide range of factors, including his or her sociodemographic background. For example, the age, gender and family background of a person may be critical influences on the type of job in which they become employed. Furthermore, these variables have been related to many strain outcomes, perhaps predisposing certain individuals to different types of response. Consequently background variables are important considerations in any model of the stress process. Although in most research these variables are treated as nuisance variables, there is also some evidence that they operate through more complex causal mechanisms. By casting sociodemographic variables as modifying variables in the Michigan Model, their influence upon any stage of the process can be incorporated.

Four variables in particular are often included in studies of the stress process, namely age, gender, marital status and socio-economic status (e.g. Parkes, 1990; Russell et al., 1987).

3.3.1 Age

An individual's age, and hence experience, influences both exposure and response to stressors and perceived stress (Folkman et al., 1986; White and Spector, 1987). For example Russell et al. (1987) found that younger teachers reported a greater number of job-related stressors and greater emotional exhaustion than their older colleagues. Similarly, Remondet and Hansson (1991) reported that older workers exhibited fewer concerns about low control, perceived job stress, job involvement and job satisfaction. Furthermore, within several

research samples, age has been associated with better physical health (Loscocco and Spitze, 1990), mental health (Parkes, 1991a), and higher job satisfaction (Parkes, 1993a).

The lower levels of strain reported by older workers has been explained as an improved ability to cope by those with more experience. Consequently, age can be treated as a potential moderator and not just a nuisance variable in studies of the stress process (Murphy, Hurrell and Quick, 1992). Indeed, McCrae, Bartone and Costa (1976) found that the relationship between anxiety and report of physical health was moderated by age. However, Folkman and Lazarus (1980) found no differences in coping style with age.

3.3.2 *Gender*

The fact that much research is conducted with single-sex samples (e.g. Karasek, 1979; McCrae et al., 1976; Melamed et al., 1991) implies an understanding that sex is involved in the stress process, although its precise role has been examined less often. Most often, gender is included as a covariate to control for potential confounding, as there is substantial evidence that women report higher levels of physical and psychological symptoms than men (e.g. Parkes, 1990; Russell et al., 1987; Thoits, 1987). Karasek and Theorell (1990) suggest that a possible reason for this is that women are disproportionately employed in “high strain” (high demand, low control) jobs. However, there is evidence that even women working in more autonomous, traditionally male occupations, tend to have higher catecholamine levels and may take longer to unwind (in terms of cardiovascular and neuroendocrine activity) after work (Frankenhauser et al., 1989). Furthermore, men working in the more traditionally female domain of school teaching have been found to have high levels of strain (Russell et al., 1987).

Several researchers have demonstrated that women tend to be exposed to different stressors than men (e.g. Hall, 1991; Karasek and Theorell, 1990; Kauppinen-Toropainen, et al., 1983; MacLennan, 1992). In addition, Adelman (1987) reported that the relationships between occupational characteristics (control, complexity and income) and two outcomes (happiness and self-confidence) were different for men and women (a moderator effect of gender). In contrast, Loscocco and Spitze (1990) found no important gender differences in the effects of working conditions on well-being. However Loscocco and Spitze (1990) found that the relationship between education level and strain was moderated by gender. Similarly, Etzion (1984) found that the efficacy of different sources of social support in protecting against burnout, was gender specific (i.e. moderated by gender): whereas the stressor-burnout relationship was buffered by support from friends and family for women, for men it was work sources of support that acted as a buffer. Fondacaro and Moos (1987) have also reported different influences of social support in men and women. In contrast, Ganster et al. (1986) failed to find evidence of three-way interactions involving gender, social support and work stressors.

That men and women might differ in their coping responses to perceived stress has been more specifically examined. In a community sample, Folkman and Lazarus (1980) found that men used more problem-focused coping than women in work contexts, although there were no gender differences in the use of emotion-focused coping strategies. In contrast, Parasuraman and Cleek (1984) reported that female managers used more adaptive behavioural coping strategies at work than males. Parkes (1990) similarly found that among trainee teachers, men reported more use of suppression (an emotion-focused form of coping) than women. Discrepancies in this area may result from nature of the coping measures used, sampling differences, and the consequent exposure to relevant stressors (Parkes, 1990).

3.3.3 *Marital status*

Marital status is a demographic variable that has not been widely studied in the context of work stress. The social support literature identifies the spouse as source of support available only to those in stable relationships (House, 1981), however this source of support has been shown to be less relevant in terms of work stressors. Nonetheless, several pieces of research have shown that married people tend to have fewer symptoms of strain, particularly in terms of mental health (e.g. Thoits, 1987). For example, in the study of burnout, Russell et al. (1987) found that married teachers reported greater feelings of personal accomplishment. Similarly, Parkes (1990) found that married teachers experienced better mental health, after controlling for the effects of work characteristics and other individual differences.

3.3.4 *Socio-economic status*

Common measures of socio-economic status (SES) or class include income, education, and occupational grade. People of lower SES are often found to experience poorer physical and mental health (Sauter et al., 1990; Syme, 1986). More specifically, Marmot et al. (1978) demonstrated a clear inverse relationship between grade of employment and coronary mortality in British Civil Servants. This finding reflected the observed pattern in national statistics, and remained significant after controlling for known risk factors including body mass index, blood pressure, cholesterol level, smoking, and exercise patterns.

The same social gradient has also been observed for differences in sickness absence (North et al., 1993), physical symptom report (Loscocco and Spitze, 1990), and mental health (Loscocco and Spitze, 1990; Mirowsky and Ross, 1990; Stansfeld and Marmot,

1992). In reviewing this literature, Syme (1986) suggested that, above a certain “basic needs” threshold, social class may be a more powerful determinant of health than material conditions. However, in contrast to this general pattern, among oilworkers Parkes (1992) found that supervisors were more anxious than their subordinates.

Marmot (1982, 1994) and Karasek (Karasek and Theorell, 1990) suggest the need to look toward psychosocial factors to explain patterns of illness across different classes. That is, it is suggested that the relationship between class and strain outcomes is mediated by psychosocial factors. Systematic differences in exposure and response to job stressors with employment grade or class have been widely reported (e.g. Kahn et al., 1964; Parasuraman and Alutto, 1981; Turnage and Spielberger, 1991; Zaleznik, Kets der Vries and Howard, 1977). More specifically, in an investigation of social class gradients in physical and mental health, Lundberg (1991) analysed a Swedish national survey and concluded that working conditions, including high demands, low decision latitude, and poor social support, are the primary source of class inequality in physical and mental illness. Similarly, North et al. (1993) observed that differences in pace, control, variety and support across Civil Service grades, contributed to prediction of sickness absence over and above health and lifestyle factors.

As discussed briefly in Section 2.2.2, control opportunities tend to be higher in jobs of high SES. This trend has been suggested as a possible explanation for the observed class gradients in strain outcomes (Hall, 1991; Karasek and Theorell, 1990; Marmot, 1982; Mirowsky and Ross, 1990; Syme, 1989). It is further proposed that if differences in control underlie class gradients, then this trend may be amenable to change (Syme, 1989; Karasek and Theorell, 1990). However, Mirowsky and Ross (1990) argue that the centrality of control arises *because* a sense of control reflects the reality of social and economic status,

implying that it is not conducive to change. Marmot (1994) also noted the potential confounding of job grade with control opportunities.

Job grade itself has also been examined as a moderator of stressor-strain relations. For example Karasek and Theorell (1990), noted that at higher levels of the bureaucratic hierarchy, control may be seen as responsibility, and therefore is likely to be a stressor rather than a positive work characteristic. In this formulation, SES is a modifying variable, acting on the relationship between control and strain outcomes. Job grade differences in the role of social support have also been reported. In particular, Marcelissen et al. (1988) found that the health effects of role conflict, ambiguity and overload were reduced with high support only in the lower occupational group. Turner and Noh (1983) also reported a differential influence of social support according to class in affecting the response to life stressors. However Beehr and Drexler (1986) reported only direct effects of hierarchical grade on stressor and strain measures, and no significant interaction. Similarly, Ganster et al. (1986) tested three-way interaction between social support, stressors and class, but concluded that stressor-strain relations were not significantly different in blue- and white-collar groups.

There is also a potential for confounding SES with both job characteristics (which vary by occupation) and personal characteristics (which may help determine occupational choice and attainment). Furthermore, measures of occupational grade tend to confound SES with demographic factors such as age and gender, because of the segregation of the labour market (Hall, 1981; Karasek and Theorell, 1990). This potential confound is particularly important because social class gradients observed for men are not always equivalent for women (Loscocco and Spitze, 1990; Stansfeld and Marmot, 1992). Hence in examining social class as an independent variable in the stress process it is advisable to consider it jointly with other individual and situational characteristics.

3.4 Personality factors as a modifying variables

The Michigan Model involves an evaluation or appraisal of individual capabilities as well as environmental demands (House, 1981). The process of appraisal has strong implications for the role of individual differences: both actual capabilities, and the appraisals of these are influenced by an individual's personality. Furthermore, personality can influence which response to perceived stress is selected (Carver et al., 1989; Hurrell and Murphy, 1991), and even whether short-term responses will develop into enduring outcomes (Eysenck, 1991). The strength of these associations is such that aspects of personality are sometimes referred to as "coping style" (Parkes, 1994).

A currently popular theory of the structure of personality is the "Big Five" factor theory (Digman, 1990; Goldberg, 1990). According to this model, the basic dimensions of personality are Extraversion, Agreeableness, Conscientiousness, Neuroticism, and Openness. In principle, any aspect of personality might influence the stress process. Barrick and Mount (1993) present one study in which all five personality characteristics were examined. However the more common practice in this area of research is to examine just a few particular traits which have demonstrated empirical associations in the stress model. Two of these, extraversion and neuroticism, are incorporated in the Big Five as well as other competing models of personality (e.g. Cattell, Eber and Tatsuoka, 1970; Eysenck and Eysenck, 1975; Meyers, 1980). However, other influential traits have been developed from more focused research into the stress process. In particular Locus of Control and Type A behaviour are selected for discussion here, as these are the traits for which there is most evidence of modification of the stress process (Cohen and Edwards, 1989; Evans et al. 1993; Parkes, 1994).

In the following sections the evidence that different aspects of personality act as modifiers of the stress process is reviewed. First the individual dimensions of control from Evans et al. (1993) framework of the control construct are discussed. This is followed by a discussion of the roles of neuroticism and extraversion in the stress process. Finally, more complex relationships involving the combination of personality with situational modifying variables are discussed.

3.4.1 Individual dimensions of control

In the control literature a distinction is often made between individual and situational aspects of control (e.g. Folkman, 1984; Parkes, 1989). Evans et al. (1993) have expanded on this idea by dividing the individual aspects into “behavioural competencies”, “control cognitions” and “control motivation”, thus providing a useful framework in which to examine the relationships between individual and situational dimensions of control. The central thesis of the Evans et al. model is essentially one of P-E Fit: low levels of (environmental) control are experienced as stressful when combined with high individual control dimensions (competencies, cognitions or motivation); conversely high levels of control will be experienced negatively if combined with low individual control dimensions. Both types of stressful combination are labelled “dysfunctional mismatches”, and may be conceptualised as moderation of stressor-strain relations. The three individual dimensions of control are outlined below; their roles as potential modifying variables are discussed separately in Sections 3.4.2 to 3.4.4.

*Behavioural competencies*¹ refers to people's ability to exert control over their environment. Some people are less able than others to take advantage of the control opportunities afforded to them by the environment; also in any particular environment, specific competencies will be of greater or lesser relative importance.

Control cognitions refers to individual differences in beliefs about control, usually operationalised as locus of control or self-efficacy.

Control motivation refers to individual differences in need or desire for control. Although there are scales which have been developed specifically to measure control motivation, a commonly examined personality characteristic which taps into this dimension is Type A behaviour.

3.4.2 Competency to exert control

The research literature on competency with respect to personal control and stress is relatively sparse, and there is little agreement as to how ability to exert control can be measured independently of actual exertion of control, or environmental affordances. O'Brien (1982) used level of education to tap into this construct, while others (Parkes, 1990; Epstein and Meier, 1989; Boyatzis, 1982) have examined coping styles: higher levels of education, and certain adaptive coping styles are considered to be associated with a greater ability to utilise control opportunities. In contrast, Jaques (1976, 1989) and Gonzales and Zimbardo (1985) have developed cognitive constructs which may have application to the stress and control literature. Jaques' construct of "work capacity" is a measure of cognitive power, being the degree to which an individual is able to plan into (exert control over) the future.

¹ Although it is not clear that "competency" is strictly an aspect of personality (rather than intelligence for example), it will be discussed here, as operational definitions are often consistent with this interpretation.

This concept bears some similarity to Zimbardo's cognitive style construct of "time perspective". Both theorists suggest that the greater an individual's future orientation, the more successful they will be (at least in Western industrialised society): however their methodology for measuring future orientation varies considerably.

Mismatches between competencies and control provisions are seen to be detrimental in the Evans et al. model. Building on Seligman's theory of learned helplessness (Seligman, 1975), the provision of control when this is not congruent with ability to use that control may lead to feelings of incompetence, and cause the individual to give up, rather than persist in pursuing an unobtainable goal. In support of this theory, Bazerman (1982) showed that when an individual believes that s/he does not have the ability to exert control, the provision of control opportunities was detrimental, resulting in poorer performance. In contrast, Tharenou and Harker (1984) found that sense of competence in a group of electrical apprentices did *not* moderate stressor-strain relationships.

3.4.3 *Control cognitions: Locus of control and self-efficacy*

Locus of control (LOC) refers to the extent to which an individual believes that there is a connection between their efforts, and outcomes (Rotter, 1966). Those who believe that outcomes are influenced by their actions are said to have an *internal* locus of control while those who believe that actions are independent of outcomes have an *external* locus of control: that is, they believe that outcomes are determined by external forces rather than themselves. For example, an "internal" might believe that if you do your job well that you will be promoted, whereas an "external" might believe that promotions are awarded at the whim of superiors.

Self-efficacy (Bandura, 1977, 1989) is a similar construct, but rather than referring to generalised beliefs about control, self-efficacy recognises that people hold specific beliefs about their ability to control particular situations. There is some debate as to whether more general or more specific measures are the most appropriate for use in this type of research (Cohen and Edwards, 1989; Hurrell and Murphy, 1991). Context-specific measures are suggested to have greater relevancy and therefore predictive power than traditional generalised LOC scales (Paulhus, 1983; Orpen, 1991; Rotter, 1975; Spector, 1988).

Several studies have found that internality is generally more adaptive than externality. For example in a recent review Hurrell and Murphy (1991 p136) stated that “one of the most consistent and widespread findings in the locus of control literature is the association between belief in external control and self-report of ill-health”. Earlier reviews of the LOC literature also reported an association of internal LOC with high job satisfaction, low anxiety, high motivation, high occupational attainment, and superior performance (O’Brien, 1984; Spector, 1982). However, most studies are correlational and so is not possible to determine the direction of causality, nor eliminate the possibility of confounding factors. Using a methodology which allows a more causal interpretation, in a longitudinal study of naval men who volunteered for Antarctic duty over winter (N=2724), Palinkas, Stern and Holbrook (1986) found that internals were at reduced risk of long-term disease (reported in Hurrell and Murphy, 1991). A causal mechanism to explain this pattern of findings may be found in the work of Parkes (1984) who revealed that the patterns of coping reported by internals were more adaptive in relation to their situational appraisals.

Others (e.g. O'Brien 1986, Wong and Sproule, 1984) suggest a curvilinear relationship between locus of control and outcomes, such that a moderate, realistic appraisal of control is necessary for positive outcomes. In a national longitudinal survey of middle-aged American men, Krause and Stryker (1984) examined the relationship between stressful

job and economic events and psycho-physiological well-being. They found that moderately internal LOC was associated with more effective coping than for either extreme internal extreme external or moderately external control beliefs.

In his review, Spector (1982) concluded that LOC is a moderator of the relationship between incentives and motivation, such that internals are more motivated by rewards, and therefore tend to show greater effort and superior performance than externals under strong performance-reward contingencies. It may also be that an internal LOC is only beneficial under certain work conditions (Hurrell and Murphy, 1991): interaction effects between LOC and job characteristics, particularly, opportunities for control have been widely recognised (Cohen and Edwards, 1989; Evans et al., 1993; Hurrell and Murphy 1991; Moos, 1987; Spector, 1982). However inconsistencies in research findings suggest that the interaction depends on the measures of LOC employed and the outcome of interest (Cohen and Edwards, 1989; Cox and Ferguson, 1991).

For example, Marino and White (1985) reported that LOC moderated the relationship between low control (job specificity) and perceived job stress, such that internals experienced greater stress under low control than did externals. Similarly, Fusilier, Ganster and Mayes (1987) found that role conflict was more strongly related to report of somatic symptoms in externals than internals. In a more complex interaction effect, Parkes (1991a) reported that LOC moderated the relationship between job strain (high demand, low control) and mental health. Contrary to expectations however, MacKenzie and Goodstein (1986) found that prisoners with external control beliefs showed no better adaptation than internals to a restrictive prison environment. Likewise Tharenou and Harker (1984) were unable to support a moderation hypothesis, reporting that self-efficacy did not moderate stressor-strain relationships in a group of electrical apprentices.

With respect to mediated effects of LOC, it might be expected that control beliefs would colour perceptions of job stressors. However, in a literature review Hurrell and Murphy (1991, p138) concluded that there is “little empirical evidence to suggest that internals are more likely to perceive greater control over other work processes”: Spector (1982) reached a similar conclusion. A reverse causation hypothesis, whereby life experiences, including those in the work context, act to influence control beliefs has received some support (Andrisani and Nestel, 1976; Anderson, 1977; O’Brien, 1984). In these studies it was shown that the experience of successful control acted to enhance internal control expectancies, and conversely experience of failure led to a shift toward externality. More specifically, Krause (1987) reported that increases in social support increased internal LOC beliefs, but only up to a certain threshold, beyond which additional support decreased feelings of control: a curvilinear mediated effect.

3.4.4 Control motivation and Type A Behaviour Pattern

The Type A behaviour-personality complex was developed over the last 30 years from research to identify risk factors for coronary heart disease. During this time evidence has accumulated which links Type A behaviour patterns to an increased risk of coronary disease (see Rosenmann, 1991 for a review). Minor health complaints have also been associated with Type A behaviour. For example, Keinan and Melamed (1987) report an association of Type A behaviour with burnout symptoms. Characteristic Type A behaviours include competitiveness, hostility, ambition, achievement-striving, impatience and time urgency (Rhodewalt et al., 1991). People who do not display these characteristics are often called Type Bs.

However there is some debate about the structure of the Type A behaviour pattern (Edwards, Baglioni and Cooper, 1990; Ivancevich and Matteson, 1988), and which Type A dimensions are responsible for the observed health risks. In particular, recent factor analytical studies (e.g. Spence et al., 1987) support a two factor model of impatience-irritability (including trait anger, hostility and time urgency) versus achievement striving (incorporating ambition and competitiveness). Although achievement striving is linked with good performance (Bluen et al., 1990), measures of the impatience-irritability dimension are associated with physiological reactivity (Ganster, Schaubroeck, Sime and Mayes, 1991), physical complaints (Spence et al., 1987), depression (Bluen et al., 1990) job dissatisfaction (Bluen et al., 1990) and anxiety (Lee et al, 1993).

Following a Person-Environment Fit theory of stress, it has been suggested that Type A personality characteristics will be particularly detrimental in some work environments. Frankenhauser Lundberg and Forsman (1979) reported that while Type Bs were physiologically aroused during strenuous mental work, Type As were more aroused during periods of inactivity. Ivancevich and Matteson (1984) propose that the optimal work environment for a Type A individual is one which is controllable, fast-paced and challenging, and that negative consequences arise when Type A individuals are placed in environments which differ from this optimum. Conversely an environment in which the work is routine, moderately paced and moderately challenging, would be optimal for Type B individuals. Other researchers have concentrated on matching time urgency aspects of the individual and the work environment. Landy and his colleagues (Landy et al., 1991; Conte et al, 1995) suggest that mismatch of the person and environment on time urgency may have negative consequences for job satisfaction, commitment and performance.

The high need for control by Type As has also been taken up by other theorists. Type A persons have been shown to use control as their major strategy for coping with

stressful work situations (Greenglass and Burke, 1991). It is therefore thought that Type As will suffer more adverse effects than Type Bs in a work environment where opportunities for successful control are restricted (Chesney, Sevelius, Black, Ward, Swan and Rosenmann, 1981; Glass, 1972; Kushnir and Melamed, 1991; Rhodewalt, et al., 1991). For example, Lee, Ashford and Bobko (1990) examined the interaction between Type A characteristics and control: Type As in conditions of high control performed better and had higher satisfaction than those in low control conditions. In his review, Syme (1989) suggested that people exhibiting Type A behaviour may have higher rates of coronary disease because of their continued but unsuccessful efforts to control events in their lives.

Other researchers have separated the motivation for control from the rest of the Type A Behaviour Pattern. Greenberger and Strasser (1986) proposed a model of the stress process based on perceived and desired levels of control. Where these control dimensions are mismatched, an individual is motivated to restore equilibrium: if these attempts are congruent with organisational goals, then productivity is enhanced. However, if equilibrium cannot be reached, learned helplessness will result (Seligman, 1975). Therefore a failure to recognise an individual's need for control can lead to dysfunctional behaviour. Similarly, Burger and Cooper (1979) developed an individual difference measure for general level of motivation to control event in one's life. People high on this construct demonstrated greater "illusion of control" in a laboratory setting reacted poorly to uncontrollable events, with greater learned helplessness. On the other hand, Parkes et al. (1990) found that individuals who have a preference for *low* control, showed poorer performance and increased arousal on a self-paced letter-sorting task, relative to machine pacing.

3.4.5 *Neuroticism or Negative Affectivity*

Negative affectivity (NA), of which neuroticism is one recommended measure (Watson and Clark, 1984), is the extent to which an individual tends to be worried, anxious, pessimistic or moody. The most common reference to NA in the stress literature is as the cause of a response bias in self-report scales, which may result in spurious correlations between measures (e.g. Brief et al., 1988; Watson and Clark, 1984).

Several researchers have shown that individuals scoring high on a measure of neuroticism, also report high levels of somatic and psychological symptoms (e.g. Goldberg, 1972; Keinan and Melamed, 1987). This finding can either be interpreted as evidence of a general response style contaminating self-report measures of well-being, or as evidence of a direct effect of the trait NA on health outcomes. Furthermore, it has been suggested that NA may moderate the impact of work demands, such that it acts as a vulnerability factor for strain outcomes (Parkes, 1990), or may operate through mediated pathways (Levin and Stokes, 1989; Spector, 1994; Terry et al., 1993;). These two roles of NA are demonstrated and discussed in Appendix I (Moyle, in press).

3.4.6 *Extraversion and Positive Affectivity*

Positive affectivity (PA) is extent to which an individual perceives the world in a positive fashion. It is postulated to be independent of NA, rather than the opposite end of a bipolar NA-PA dimension (Watson, Pennebaker and Folger, 1987; Watson and Pennebaker 1989), and is sometimes operationalised as extraversion. Although the role of PA in the stress process has not been widely explored, recent advances in the NA literature have resulted in

calls for PA to be incorporated into research designs. In particular, it has been suggested that PA may act to colour, and therefore confound, self-reports of stressors and strain, particularly when these are worded positively (Burke, Brief and George, 1993; Schaubroeck and Ganster, 1991). However, a recent empirical investigation failed to demonstrate these effects (Moyle, in press).

Extraversion, the extent to which an individual describes themselves as sociable, outgoing, active, and impulsive, has also been implicated in the stress process in its own right. In particular, Eysenck (1991) asserts that Type A behaviour is essentially the combination of high neuroticism with high extraversion. In support of this hypothesis, he reported the results of large scale longitudinal studies in Eastern Europe in which this personality combination was associated with a higher incidence of coronary heart disease.

Furthermore, an interaction between extraversion and perceived autonomy was reported by Barrick and Mount (1993) in an investigation of the effects of the Big Five personality dimensions. They found that, among a group of managers, supervisor ratings of job performance was positively correlated with autonomy for extraverts, but not for introverts. A further role for extraversion in the stress process might lie in a relationship between sociability and social support. If more extraverted individuals have a larger and/or stronger social networks, then it may be that this support assists them in coping with any stressors which they encounter. Consistent with this hypothesis, Chay (1993) reported that extraversion was a predictor of perceived social support.

3.4.7 *More complex relationships with individual modifiers*

Recent reviews of the influence of moderator variables note the need to extend analyses to include multiple moderator effects (e.g. Chaplin, 1991; Cottingdon and House, 1987; Evans et al., 1994). These relationships are not well captured within the Michigan Model (or other general models of the stress process), as all potential moderator variables are included in a single box within the path diagram. Furthermore, although complex moderation effects may be of theoretical significance, effect sizes are generally relatively small, and therefore most reliably detected only in large samples (Cohen and Cohen, 1983). Consequently many of the data sets developed to investigate models of stress are not appropriate for this type of analysis (Chaplin, 1991). A few studies however have reported significant three-way interactions involving personality variables.

Arsenault and Dolan (1983) looked at three-way interaction involving two personality variables (Type A and LOC) and a set of job stressors (role conflict and ambiguity, skill underutilisation) in influencing job performance and absenteeism. Under high levels of stressors, Type Bs generally showed poorer performance than Type As. In addition, Type A externals showed lower performance than Type A internals in response to stressors. Furthermore, Type A internals and Type B externals showed the greatest absence response to stressors, interpreted by the authors as active and passive avoidance respectively. A 3-way interaction of extraversion, neuroticism and job stressors was described by Schaubroeck and Ganster (1991): neurotic introverts experienced the greatest level of symptoms in response to job stressors.

Joint moderation effects have also been reported which involve the interaction of an individual modifying variable, a situational modifying variable and a stressor in predicting some strain outcome. For example in a sample of MBA students, Cummins (1989) reported

an interaction between LOC, social support and work hassles: support acted as a buffer in predicting job satisfaction for internals only. Similarly, Parkes (1991a) reported that locus of control beliefs moderated Karasek's demand-discretion interaction for affective distress: for externals, demand and discretion combined interactively, whereas for internals the effects of demand and discretion were additive. Using sub-groups analysis, Smith et al. (1990) also demonstrated a 3-way interaction, revealing the joint influence of patterns of coping and levels of social support on the relationship between stressful life events and subsequent athletic injury in adolescents.

Type A behaviour has also been examined in more complex interactions. Kushnir and Melamed (1991) incorporated Type A behaviour pattern into the Demand-Control Model. In a large sample of Israeli factory workers they found that high strain jobs (high demand low control) were associated with anxiety, irritability and somatic complaints for Type As only. Similarly Orth-Gomer and Unden (1990) reported that lack of social support combined interactively with Type A such that social isolation was a predictor of mortality in the Type A group only. Three-way interactions of social support and work stressors with sex and social class, were examined by Ganster et al. (1986): however in this case there was no evidence for significant higher order interaction.

Evans et al. (1994) introduce further complex modifying effects with the concepts of mediated moderation and moderated mediation. Mediated moderation attempts to model the underlying pathway through which an interaction occurs, such that in an observed interaction effect the influence of the moderator variable may be mediated through some other characteristic. In contrast, moderated mediation occurs when mediating pathways differ according to the level of some moderator variable. These mechanisms have not yet received empirical attention.

3.5 Summary and conclusions

A criticism of the Michigan Model, with its multistage associations and reciprocal causation, is that it is too complex to examine in its entirety, particularly given the data sets typically available for analysis (Karasek and Theorell, 1990). Even analysis of smaller sets of pathways within the model, particularly those involving moderation, may be invalid without sample sizes numbering several hundred (Chaplin, 1991). Nonetheless researchers endeavour to clarify aspects of the model.

In this chapter, evidence for the role of situational and individual characteristics as modifiers of the stress process has been reviewed. Moderation effects have become more accessible for analysis over the last two decades, and so the theoretical recognition that simple linear effects are inadequate to represent the true process can now be reflected in research practice (Hurrell and Murphy, 1991). However, several reviewers of this literature have concluded that evidence for moderation remains somewhat equivocal, and that although moderation effects may be theoretically important, additive effects account for most of the explainable variance in outcomes (e.g. Chaplin, 1991; Cohen and Edwards, 1989; Evans et al., 1994; Parkes, 1994; Tetrick, 1992). Mediation mechanisms, which explain how or why relationships between stressors and outcomes occur, require more sophisticated research design and analysis. These indirect pathways have received less empirical attention and tend to be less well understood (Evans et al., 1994).

4. Methodological Issues in Occupational Stress Research

4.1 Introduction

The aim of occupational stress research is to establish cause of strain. Unfortunately the methodologies adopted in the majority of research conducted in this area result in findings which are open to several competing causal interpretations (Kasl, 1987; Kessler, 1987; Spector et al., 1988). Furthermore, inconsistencies in research findings, apparent from the review in the previous two chapters, are often attributed to poor research design. This is a long-standing criticism of stress research, and although examples of more rigorous research approaches are increasing in the literature, methodological problems still abound. Essentially these criticisms may be divided into three broad areas of concern: issues of measurement, issues of research design and issues of statistical analysis. These issues are discussed in Sections 4.1 to 4.3.

4.2 Measurement issues

The most common criticism of occupational stress research is the dependence on self-report measures. Criticisms of self-report methods are outlined in Section 4.2.1, with alternative measurement methods described in Section 4.2.2. Section 4.2.3 concludes that there are strong theoretical arguments as to why some types of variables (perceptions, personality, and affective reactions) are best measured by self-report, and furthermore that questionnaire measures are an efficient and practical form of data collection. Thus the psychometric properties of questionnaire measures need to be examined carefully; these are discussed in Section 4.2.4. The final issue presented here is that of specificity of outcome measures. In Section 4.2.5 it is argued that, although they tend to be correlated, different indicators of strain are not equivalent. An awareness of the independence of strain measures needs to be reflected in research models, such that it is recognised that a model which predicts one type of outcome may not predict other outcomes equally well.

4.2.1 Criticisms of self-report measures

The use of questionnaires, in which information pertaining to both independent and dependent variables is collected by self-report is very common in occupational research. By the end of the 1980s this methodology was being widely criticised (e.g. Ganster and Schaubroeck, 1991; Kessler, 1987; Roberts and Glick, 1981; Schmitt, 1989). For example, Kessler (1987, p123) wrote that with self-reports “we are never sure what we are measuring, because influences other than the actual stress situation can play a part in shaping perceptions.” Furthermore, Spector (1992) estimated that only 10-20% of variance in self-

report measures represents the objective environment or trait. Thus in 1989 Neil Schmitt, then editor of the *Journal of Applied Psychology*, recommended that, although appropriate in the exploratory stages of research, exclusive use of self-report data was unlikely to contribute to a greater understanding of the stress process (Schmitt, 1989). Since this time alternative measurement methods have become more frequently incorporated into research designs, however self-report questionnaires remain widely used. Criticisms of self-report are discussed below.

Spector (1994) noted that use of self-reports for both independent and dependent variables can lead to dismissal of research findings as due to common method variance rather than any true association between the proposed constructs: this criticism holds for any research design involving only one form of measurement. In addition to monomethod bias, it has been suggested that reliance on self-reports is specifically contaminated by dispositional response biases: an individual's personality may colour their response to all questionnaire items, resulting in inflated or spurious correlations some among questionnaire measures. In particular, occupational stress research may be susceptible to confounding due to negative affectivity and/or social desirability influencing questionnaire responses (Schmitt, 1994; Spector, 1994).

Brief et al. (1988) published an influential article in which it was argued and empirically demonstrated that the trait negative affectivity (NA) can lead to spurious correlations between proposed stressor and strain variables. Thus they called into question the findings of all stress research based on self-report data, and recommended that NA should be both measured and statistically controlled in self-report research. Furthermore, wherever possible alternative measures of the constructs of interest should be obtained. Subsequent research has revealed that although negative affectivity may inflate correlations between stressors and strains, the partialled correlations (controlling for NA) remain

statistically significant (e.g. Chen and Spector, 1991; Moyle, in press; Parkes, 1990). The degree to which NA inflates self-reported stressor-strain correlations however remains an issue of debate (Brett, Brief, George and Webster, 1993, Burke et al., 1993; Schaubroeck et al., 1992).

Ganster, Hennessey and Luthans (1983) presented evidence that social desirability may not only act to produce spurious relationships in organisational research, but may alternatively act to suppress real effects or to moderate relationships. However, from an empirical analysis they concluded that confounding due to social desirability is not a serious threat to the validity of the bulk of organisational research. Similarly, Moorman and Podaskoff (1992) conducted both a meta-analysis and their own empirical research to investigate potential confounding effects of social desirability. The meta-analysis revealed that, although social desirability did not have global effects on all the work factors investigated, it was significantly correlated with several key variables. However examination of partial correlations (controlling for social desirability) revealed very little difference between these and first order correlations. Moorman and Podaskoff therefore also concluded that there was little support for the biasing effects of social desirability.

Discussions of the effects of both negative affectivity and social desirability suggest that the way in which questionnaire items are worded strongly influences the degree of potential confounding. It is therefore recommended that items intended to measure objective stressors should avoid asking participants to make subjective judgements about stressor impact, but rather to make more objective statement about the presence or absence of a particular feature (e.g. Kasl, 1987; Moorman and Podaskoff, 1992; Schaubroeck et al., 1992).

4.2.2 *Alternatives to self-report*

Although prudent item-wording and statistical control for relevant traits partially addresses the problems of self-report measures, the use of alternative measures of each construct is also recommended. Common alternative measures of the work environment are independent ratings by people other than the job incumbent (e.g. by co-workers, supervisors or trained observers). Epidemiological researchers have used ratings at an occupational level to measure work characteristics uncontaminated by individual perceptions; for example Karasek and Theorell (1990) reported use of the Dictionary of Occupational Titles to obtain such information. Another way of achieving more objective measures is by using a naturally occurring experiment, or quasi-experimental design (Ganster and Schaubroeck, 1991), in which subjects are placed in objectively different work environments. Example of such designs are given in Section 4.4.4.

In terms of outcome measures, company records can provide independent measures which have the additional advantage of being organisationally relevant: these might include measures of sickness absence, turnover, accident rates, health claims and performance ratings (Ganster and Schaubroeck, 1991; Murphy et al., 1992; Reynolds and Shapiro, 1991). Experimental cognitive performance measures have been shown to have the advantage of being less susceptible to potential manipulation by subjects, and can be used in both laboratory settings and field experiments (Englund et al., 1985; Parkes, 1994; Parkes, et al., 1990).

Several multitrait-multimethod investigations have examined relationships between self-report and other sources of data. For example, Frese (1985) compared self-report with observer ratings and a median rating by co-workers; Gupta and Beehr (1982) assessed the correspondence between self-reports, observer reports and company records; and Spector et

al. (1988) compared self-reports with ratings by supervisors. In each case moderate convergent validity between different data sources measuring the same construct was found: self-reports were indeed substantially influenced by objective conditions. Moreover, Spector et al. estimated that only 0.04% of variance in self-report measures could be attributed to dispositional response bias. However, the level of agreement between measures varies somewhat for different constructs. Specifically, Gupta and Beehr reported poor agreement about exposure levels to physical hazards, and Frese and Zapf (1988) noted that there is better agreement about positive work characteristics than about stressors.

Use of independent or objective measures avoids confounding of dispositional response and facilitates cause-effect interpretations (Kasl, 1987). Furthermore an understanding of objective work characteristics may be useful for making recommendations for intervention (Frese and Zapf, 1988; Ganster and Schaubroek, 1991). However, independent measures may not only be difficult, expensive or time consuming to obtain (Caplan, 1987; Gupta and Beehr, 1982), but also many of these measures are not necessarily superior to self-reports: they simply involve different sorts of error variance. In particular these measures may ignore fine-grained differences at an individual level in the way that a job is carried out (Frese and Zapf, 1988; Schaubroek and Ganster, 1991), and may not capture the subjective nature of the stress experience (Kasl, 1987). Thus, although correlations between self-report measures may be inflated, correlations between objective measures are considered to underestimate true associations (Frese and Zapf, 1988; Murphy, et al., 1992).

Howard (1994) compared evidence of construct validity for several types of measures, concluding (p 400), "In almost all cases, the construct validity coefficients of self-reports were superior to the validity coefficients of other measurement approaches." Spector (1994) also notes the deficiencies of alternative data sources. However Schmitt (1994) argues that the fact that other methodologies also have associated problems is not a defense

of self-reports. One potential resolution to this dilemma is to use a combination of self-report and independent measures of the constructs of interest wherever possible (Frese and Zapf, 1988; Gupta and Beehr, 1982; Sauter et al., 1990; Spector et al., 1988).

4.2.3 *Conclusions regarding self-report scales*

The criticism of self-report measures rests largely on the assumption that they are adequate indicators of the objective work environment (e.g. Frese and Zapf, 1988; Spector and Jex, 1991; Spector, 1994). In contrast, some of the more subjective aspects of the stress process are probably best measured through self-report, particularly beliefs, attitudes and perceptions (Gupta and Beehr, 1982; Schmitt, 1994; Spector, 1994). For example, in noting the poor correspondence between supervisor and subordinate ratings of coping, Latack (1986) concluded that it is necessary to measure coping with self-report. Appraisal of perceived stress is another aspect of the model which cannot be appreciated without recourse to individual perceptions (Frese and Zapf, 1988; Folkman and Lazarus, 1984; Folkman, 1984).

Moreover, although in principle information such as absence records and performance ratings might be available from personnel files, these are not always maintained in a form suitable for research analysis and access to such files may breach company confidentiality policies. Kasl (1987) cautioned researchers that the drive to seek independent data may result in the use of trivial or irrelevant measures, and/or may result in neglect of other methodological problems inherent with these measures.

A related criticism of self-reports is that they are often used in conjunction with weak research designs (particularly the cross-sectional survey). Used in this way self-reports are

considered inadequate to contribute further to our understanding of work stress (Schmitt, 1994). However, given the convergent validity with independent measures and the cost of alternatives, self-reports, judiciously constructed and employed within an adequate research design, are an efficient and potentially informative measurement option (Ganster et al., 1983; Gupta and Beehr, 1982; Howard, 1994). A more detailed discussion of what might constitute good research design is undertaken in Section 4.3

4.2.4 Psychometric issues for questionnaire scales and other measures

In choosing research variables, several important factors must be taken into consideration. These include the availability, reliability, validity and utility of possible measures. From the preceding discussion, it is clear that the ideal situation is one in which multiple, independent measures are available for each construct of interest. However multiple measures can result in multiplying research costs, and sufficient resources to fund ideal research designs are not always available (Kasl, 1987): questionnaire scales remain a cost-effective method of data collection. The following discussion is mostly concerned with the psychometric properties of questionnaire scales, however these points apply equally to self-report and those measures used by independent raters.

The required psychometric properties of questionnaire scales are frequently discussed in the methodology literature (see Nunally, 1978 for a general discussion, or Cox and Ferguson, 1994 for a summary of these points as they relate to the stress literature). It is recommended that multiple items are used to cover the content domain of any construct under consideration: the use of multiple items can act to reduce bias in the error of the scale as a whole. Care should be taken in scale construction to ensure that items are selected on a

theoretical basis, and they should be worded in as objective manner as possible to minimise contamination by for example, social desirability (Kasl, 1987; Moorman and Podaskoff, 1992), negative affectivity (Maddi et al., 1987; Schaubroek et al., 1992) or other constructs of interest in the research. Conceptual overlap, or poor discriminant validity of independent and dependent variables has been a particular concern in the stress literature (e.g. Kasl, 1987; Schroeder and Costa, 1984).

When using multiple item scales it is necessary to determine the internal structure of each scale, particularly internal reliability. Low internal reliability or consistency of scales may result in a failure to detect true associations between variables due to increased error variance, relative to variance in the “true score” of the theoretical construct. Adequate internal consistency among scale items is conventionally accepted to be Cronbach’s $\alpha > 0.70$ (Nunnally, 1978). Further confirmation that different items are tapping the same construct can be obtained through principle components analysis to ensure that each scale measures a single factor. In reviewing the coping literature, O’Driscoll and Cooper (1994) noted that internal consistencies for the same coping scale varied in a range from 0.35 to 0.85 between samples. This reinforces the need to reassess internal consistency of a scale each time it is used. External, or test-retest reliability refers to the correlation of a scale with itself over time. Scales which measure constructs such as personality are expected to be highly stable over time, whereas those measuring more transient constructs, such as work environment characteristics should be less highly correlated over time.

Scale validity must also be established. In a psychometric sense there are three types of validity: convergent validity, discriminant validity and face validity. Convergent validity is the requirement that a questionnaire scale should be strongly associated with other measures of the same theoretical construct, for example an alternative questionnaire scale or an independent assessment. Discriminant validity requires that the scale in question measures

something distinct from scales of other theoretical constructs. Discriminant validity is particularly important when several constructs are measured using the same method, but may be correlated due to method bias (Campbell and Fiske, 1959). Finally, face validity is concerned with the need for questions to appear appropriate to subjects. Parkes (1994) for example, notes that some questionnaires measuring mental health are quite acceptable in a clinical or laboratory setting, but may be considered intrusive and unacceptable in field settings of occupational research. A related practical consideration is to ensure that the wording of questions is appropriate for the target population in terms of vocabulary and complexity.

Many forms of statistical analysis (e.g. multiple regression, analysis of variance) assume that variables are measured on continuous scales with multivariate normal distributions. To allow a suitably wide distribution of scores on any scale, Cox and Ferguson (1994) recommend that questionnaire items be measured on at least Likert-type scales. The normality of any distribution is less easy to ensure. Some measures may, by their nature be highly skewed or truncated. For example, sickness absence tends to occur frequently at low levels, but rarely at high levels (i.e. a positive skew). It may therefore be necessary to perform some mathematical transformation (e.g. log transform or square root) of absence measures before using them some forms of analysis (Cohen and Cohen, 1983). Alternatively, substitute measures and/or statistical analysis may need to be considered (e.g. Probit or Tobit analysis).

Similarly, researchers need to be aware of the population from which they have sampled: a working population will not necessarily be representative of the general population, and single occupation samples do not allow wide generalisation. Furthermore, limited sampling may result in relatively homogeneous questionnaire scores, which may have insufficient variance to reveal patterns occurring at a wider level. Restriction of variance has

been cited as a potential reason for conflicting findings between epidemiological and psychological researchers of the Karasek demand-control model (e.g. Ganster, 1989; McLaney and Hurrell, 1988).

Determining the psychometric properties of a questionnaire scale can be a time-consuming and expensive process. It is therefore strongly recommended that existing measures with known psychometric properties should be used (Cox and Ferguson, 1994): compendia of such measures are readily available (e.g. Cook, Hepworth, Wall and Warr, 1981). Standardised quantitative methods also have the advantage of allowing comparison with other research groups, organisations or individuals (Murphy et al., 1992; Schriber and Gutek, 1987; Sauter et al., 1990). Standardised measures may however need to be supplemented with more qualitative approaches due for example to the job-specific nature of some potential stressors (Sauter et al., 1990). Finally it must be noted that psychometrically adequate measures do not necessarily ensure meaningful results: research design also needs detailed consideration. Experimental design are discussed in Section 4.3.

4.2.5 Specificity of strain indicators

Returning to the schematic Michigan Model, each “box” represents a large number of related variables. There exist many potential stressors, modifying variables and strain measures. Although researchers commonly examine the simultaneous effects of several environmental and individual characteristics, there has been a tendency to treat distinct strain indicators as though they all tap into a single strain dimension; for example Karasek’s concept of “psychosocial strain” (Karasek and Theorell, 1990). However, from the literature review presented, it is clear that individual and situational characteristics operate differently to

influence specific strain outcomes. For example, opportunities for control tend to be more closely associated with job satisfaction than with physical or behavioural measures of strain (e.g. Ganster, 1989). Similarly, Broadbent (1985, 1995) reported specific associations between work demands and anxiety, and between social isolation and depression.

Differential influence of stressors on specific outcomes have been widely reported in recent years (e.g. Chay, 1993; Lee et al., 1990; Moyle, in press; Tharenou, 1993). Even within a class of strain indicators, such as secretion of stress-related hormones, there is wide variation in response to different stressors, and each specific physiological change predisposes the individual to different disease outcomes (Borysenko and Borysenko, 1982; O'Leary, 1990; Locke, 1982). Therefore attempting to simultaneously predict a range of outcomes with a single stress process model can lead to gross over-simplification (O'Leary, 1990).

However a wide range of behavioural, affective and physical outcomes are equally valid measures of strain within the Michigan Model, and moreover all of these outcomes are of considerable interest to organisational researchers. Rather than limiting investigations of "stress" to a particular outcome, a multivariate approach is recommended (e.g. Evans et al., 1993). One reason why multivariate outcomes have not been more widely reported is that the most common methods of statistical analysis, such as multiple regression, allow the examination of only one outcome at a time. More sophisticated statistical techniques are now available which allow the simultaneous analysis of several outcomes. These are discussed in Section 4.4.

4.3 Research design

In 1987, Kessler wrote, “The most fundamental question asked by stress researchers is whether stress causes ill health. Yet, despite an enormous amount of research over several decades, we still have only limited information about this fundamental question.” (Kessler, 1987, p113).

In the period prior to Kessler’s comments, the most common form of research design in the stress literature was the cross-sectional survey. It remains very common today. Although an effective way of collecting information, this method is open to competing causal interpretations and has been widely criticised (e.g. Schmitt, 1994; Spector et al., 1988). The criticism is aimed, in part at the self-report nature of the measures used (as discussed above), but also at the single time period of data collection. Spector (1994) therefore recommends that researchers using cross-sectional surveys should limit their conclusions to those substantiated by the data. Suggestions for alternative methodologies which do allow more causal interpretation are discussed below.

4.3.1 Longitudinal experimental design for causal inference

The general view of writers on statistics and methodology is that causal inference is most firmly based upon results of experiments when subjects are randomly allocated to treatment or control group, as used for example in medical drug trials (e.g. D.R. Cox, 1992). Unfortunately for stress researchers, except in laboratory studies with their questionable external validity and generalisability, random exposure of subjects to stressors is often not ethically or practically possible (Kasl, 1987; Kessler, 1987). Therefore observational field

studies and quasi-experimental designs may offer the best compromise of methodological rigor and external validity.

Cox (1992) suggests that causality can be inferred from an observed statistical association that cannot be explained away by confounding variables. However control for potential confounding variables is limited to those which are known and measured (Kessler, 1987). Careful experimental design can eliminate some potential confounding variables. In particular, longitudinal data are helpful in establishing a clear asymmetry between cause and effect, as the independent variable is assessed before the dependent variable is measured. It is also possible to establish a “presumed temporal order” through theoretical arguments, for example assuming that trait is constant, and a state transient (Cox, 1992; Nie, Hull, Jenkins, Steinbrenner and Bent, 1975). All approaches require some external information and not just statistics to assess direction of causality, and hence there is a need for strong theoretical underpinning of any research design (Kasl, 1987; Parkes, 1994).

Intervention or quasi-experimental studies are frequently recommended in the stress literature (e.g. Ganster and Schaubroeck, 1991; Kessler, 1987; Murphy et al., 1992; Parkes, 1994; Sauter et al., 1990; Spector, 1994). Both research designs are closer to the “ideal” randomised experiment than a simple observational study, and causal interpretations are more justified. An intervention study is one in which a proposed causal variable is manipulated. Longitudinal data allow analysis of within-subjects effects and the presence of a control or non-treatment group may allow the separation of effects due to the passage of time (or uncontrolled events occurring during the study) relative to those of the treatment. However in field studies the allocation to control or treatment group may not be random, and therefore might be subject to systematic selection biases. This design therefore requires the assumption that group allocation is independent of the base-line response (Cox, 1992). A

cross-over design in which both groups receive the treatment, but at different times, can help control for potential selection effects (Parkes, 1995).

The quasi-experimental design (Cook and Campbell, 1979), or natural experiment is similar to the intervention study. It is a longitudinal study in which response to change is measured by collecting data both prior to, and following the transition. However, in the quasi-experiment allocation to treatment or control group is typically determined by processes which are unknown, and therefore may not be random. A brief discussion of selection biases is included in Section 4.2.2.

Longitudinal data, even if not within an intervention or quasi-experimental design, are still superior for testing causal hypotheses than cross-sectional data, because the data allow the assessment of changes in independent variables in relation to changes in dependent variables (Broadbent, 1995; Frese and Zapf, 1988; Kasl, 1987; Spector, 1994). Furthermore longitudinal research may permit the testing of reverse and reciprocal causation between presumed independent and dependent variables (Hall and Spector, 1991; Spector et al., 1988; Tharenou, 1993).

It has been argued that some aspects of the stress process cannot be modelled with anything but longitudinal data. For example, an examination of the effects of chronic exposure to stressors in working populations, including the role of adaptation over time, is only possible with longitudinal data (van Dormolen, Hertog, van Dijk, Kompier and Fortuin, 1990; Murphy et al., 1992). The use of cross-sectional research design to explore the mediational and transactional processes has also been criticised (Ganster and Victor, 1988; Lazarus, 1991). Finally, to examine workplace change as a stressor requires longitudinal data to allow intraindividual comparison over the transition period. The use of a comparison or control group, as in an experimental or quasi-experimental design, further strengthens conclusions which can be drawn about responses to change.

The advantages of a longitudinal research for making causal inference are substantial. However, several researchers have noted that simply making research longitudinal is not a panacea for all the ills of the much criticised cross-sectional survey. Ganster and Schaubroeck (1991) and Schmitt (1994) for example note that potential confounding effects of dispositional responses biases or other unmeasured variables can act over a longitudinal design, particularly if the setting is relatively stable. Similarly, Spector (1994, p387) notes that “even longitudinal designs and multiple methods cannot control for all possible factors that can produce the observed result.” Grounding in firm theory and testing of competing causal hypotheses are still necessary.

Furthermore, the longitudinal time scale of stress processes remain relatively unexplored with different longitudinal patterns of response being predicted by different theories of stress, (Frese and Zapf, 1988; Kessler, 1987). Therefore the precise length of time which should be covered in a longitudinal study is not always clear. For example Griffin (1991) conducted a follow-up study of responses to a job redesign for bank tellers, which revealed distinctly different results for job satisfaction and performance after 6, 24 and 48 months. Job satisfaction showed initial improvement, but then returned to baseline levels, while performance only showed significant improvement after 24 months which was sustained at 48 months. Frese and Zapf (1988) also note that longitudinal data collection may lead to underestimation of results.

4.3.2 *Self-selection bias*

A major difficulty in occupational field research is that participation is usually voluntary, giving rise to potential selection biases. Kessler (1987) suggested that selection bias may result in the most “stressed” people never being included in research samples. Alternatively, it may be argued that the most willing volunteers are likely to be employees who feel the greatest pressure or have a grievance with their employer. Furthermore, selection into any occupational group is far from random: not only do individual differences influence a person’s choice of job, but also employers select personnel on a range of criteria that may or may not be measurable by the researcher. For example Type A individuals may choose more time urgent work environments (Landy et al., 1991).

Kessler (1987) suggests that our understanding of the personality determinants of job selection is still so primitive that it is unlikely that all relevant variables can be measured and controlled in any investigation. It has therefore been suggested that occupational stress research would benefit from increased use of representative sampling procedures and replication, for example use of multiple work sites or industries in the investigation of a particular occupation or job dimension. This might reveal the degree to which findings have general application. (Murphy et al., 1992; Sauter et al., 1990)

Problems of selection bias are compounded when dealing with comparisons between work groups, as in a quasi-experimental design. Unless the researcher has been able to randomly allocate individuals to treatment or non-treatment groups, it must be assumed that selection biases (self-selection or by the employer) could have operated, and that differences in response to any treatment could have occurred due to pre-existing differences between the two groups. For example in the case of stressor exposure, it may be that individuals who are thought to be more stress-resistant are selected (or volunteer) for jobs in which they are

exposed to higher levels of stressors. For example Parkes (1992) reported that oilworkers working in an off-shore environment may be subject to regular compulsory medicals, and therefore might be expected to be of higher than average health. The important issue is whether allocation to treatment or non-treatment groups was independent of any variation in baseline responses, fortunately an assumption which can often be tested (Cox,1992).

4.4 Techniques of statistical analysis

The appropriate form of statistical analysis depends upon characteristics of the data and the proposed relationships between variables under examination. The majority of stress research has examined simple linear relationships between individual differences, environmental characteristics and outcomes. However the Michigan Model also specifies more complex, indirect relationships between variables, specifically mediated effects and moderation of relationships by third variables: an additional indirect effect which is considered is a suppression effect. Appropriate analyses for testing these indirect, modifying effects are discussed in Sections 4.4.1. Furthermore, curvilinear relationships between variables have also been proposed in the stress literature: tests for curvilinear associations are discussed in Section 4.4.2.

The vast majority of variables used in stress research reflect not only the true underlying construct but also a degree of measurement error. Thus, the score obtained on each measure is influenced not only by the theoretical construct of interest, but potentially also by several other sources which contribute to “noise” or error. Latent variable modelling is a technique which controls for the error of measures used, allowing the researcher to estimate relationships between the underlying (“latent”) constructs unattenuated for these measurement errors. This is done through the use of multiple indicators of each construct of interest, and is therefore an efficient way of utilising several sources of data: this method is discussed in Section 4.4.3. Additionally latent variable modelling allows the simultaneous modelling for several outcomes: this and other forms of analysis for multivariate outcomes are discussed in Section 4.4.4. Finally alternative forms of analysis of change in longitudinal data are described in Section 4.4.5.

4.4.1 *Testing indirect, modifying effects*

The theoretical and practical distinction between moderator and mediator effects has now been clearly described in several places (Baron and Kenny, 1986, Cleary and Kessler, 1982; Cox and Ferguson, 1991; Finney, Mitchell, Cronkite and Moos, 1984). Baron and Kenny's widely cited paper probably gives the clearest explanation for non-statisticians. Unfortunately these terms continue to be used carelessly in some instances: the controversy over the demand-control "interaction" effect in Karasek's model of work stress is one example. Moderation and mediation both involve the joint action of two independent variables in predicting some outcome. However, whereas mediator effects reveal the mechanisms or pathways through which the outcome is influenced, moderator effects are concerned with prediction of the outcome: these theoretical differences were described in Section 3.1.1.

4.4.1.1 Testing for mediation. Baron and Kenny's prescription for testing a mediation effect requires a three- step procedure. a) The two independent variables must be correlated; b) both independent variables must significantly predict the outcome measure; and c) when the outcome is simultaneously regressed onto the two independent variables, only one significantly predicts the outcome. This variable is said to be the "mediator", as it causally intervenes (or mediates) between the other two variables.

4.4.1.2 Testing for a moderator effect. Several tests have been recommended for the moderator effect. The simplest of these is a significant interaction in an analysis of variance design. A second test is subgroups analysis, involving the separate estimation of stressor-strain relations at different levels of the moderator variable: this is the method preferred by

Arnold (1982; 1984). However subgrouping has been criticised in favour of the equally flexible and more powerful moderated hierarchical regression analysis (Cleary and Kessler, 1982; Cohen and Cohen, 1983; Cohen and Edwards, 1989; Finney, et al., 1984; Stone and Hollenbeck, 1984, 1989). In general, subgrouping of continuous variables (e.g. dichotomisation or trichotomisation) is strongly cautioned against as it results in a substantial loss of power and consequent increased Type II error. For example, Cohen (1990) notes when a continuous variable is “mutilated” by subgrouping, its squared correlation with other variables is typically reduced by about 36%. Cohen and Edwards (1989) further suggest that the use of sub-grouping analyses can in results which are uninterpretable.

Testing for a moderator effect with multiple regression requires a two-step procedure in which both independent variables are entered in the first step, followed by the entry of their cross-product in a second hierarchical step (Cohen and Cohen, 1983; Baron and Kenny, 1986). If the addition of the product term accounts for a significant incremental variance in the outcome, then a moderator is said to be present. Finney et al. (1984) further recommend that all continuous measures should be standardised before analysis to facilitate the interpretation of interaction effects (at the average level of all other variables).

Whereas in mediation, both independent variables must be correlated, for moderation this is unnecessary. Some have suggested that the proposed moderator and predictor variables should be uncorrelated, but this is not a requirement (Frese and Zapf, 1988; Kenny, pers. comm. summer 1994). Furthermore any collinearity between independent variables is accounted for in the multiple regression procedure when moderator and predictor variables are standardised prior to computing the cross-product term (Dunlap and Kemmery, 1987).

Smith et al. (1990) have furthered the investigation of moderator effects by extending analyses to include joint moderators. In particular they distinguish between conjunctive and disjunctive moderator patterns. Both are concerned with three-way interaction involving two

moderators and a predictor variable (or stressor): a conjunctive moderator occurs when both moderators are required to produce the maximum moderator effect; in disjunctive moderation either one moderator or the other is all that is necessary, and the contribution of both together will not be significantly greater than either alone.

Another point pertinent to the testing of moderation effects is that the lack of theoretical sophistication in this area is such that researchers often perform multiple significance tests in any single study, thus escalating Type I error rate (Cohen, 1990; Cohen and Edwards, 1989). On the other hand, Cohen and Edwards (1989) note that a buffering hypothesis allows a 1-tail significance test and therefore $p < 0.10$ (2-tail) is conventionally acceptable, and any effects in the “reverse buffering” direction would therefore result in a failure to reject the null hypothesis. Ideally specific moderator effects should be tested within the context of a well-articulated theory (Chaplin, 1991; Cleary and Kessler, 1982). Similarly Parkes (1994) recommends that for exploratory tests of moderation effects, alpha levels could be adjusted to avoid Type I error. An alternative and more conservative approach, also suggested by Parkes, is to examine sets of multiple interactions and evaluate the interaction set as a whole, rather than each specific interaction term.

It has been suggested that a buffering hypothesis might be best tested with longitudinal data sets as, like direct effects, concurrent interaction effects are amenable to several causal interpretations (Cleary and Kessler, 1982; Cohen and Edwards, 1989; Evans, et al., 1994). Cohen and Edwards (1989) outline these as (1) a stress buffering effect by the proposed resource, (2) the strain outcome causing a change in stressor and resource levels or (3) a confounding factor causing changes in levels of stressor, resource and strain. Lin and Ensel (Lin and Ensel, 1989; Ensel and Lin, 1991) used three waves of data and lagged interaction terms to examine the buffering effects of social support and self-esteem on life stressors in predicting physical and psychological health, thus distinguishing between

alternative patterns of causation. Frese and Zapf (1988) have also suggested that moderators can affect the time course of the development of dysfunction, and therefore require examination over time.

In the literature reviewed in the previous chapters, it has been noted that evidence for moderator effects, for example of control or social support, has been somewhat equivocal. This is often attributed to analytical differences in testing for moderation effects (e.g. subgrouping versus multiple regression techniques), but there are several additional reasons why true moderation effects may not be detected. In particular, the size of moderation effects are generally quite small and therefore require powerful tests to be detected reliably. For example Chaplin (1991) reviewed moderator effect sizes in personality research and suggested that they can be expected to correspond to a correlations of about 0.10. Therefore for an interaction term to reach acceptable levels of statistical significance, research must use reliable measures and large samples (Cohen and Edwards, 1989).

Chaplin (1991) suggests that samples of several hundred are necessary, but Cronbach (1987) reported work with simulated data has shown that even with large bodies of data, moderator effects of potential interest are likely to be called insignificant. Regarding measurement reliability Schmitt (1994) noted that the presence of inflated correlations between independent and dependent variables (as when all are collected by self-report) may reduce the power to detect moderation and mediation effects. Furthermore Russell and Bobko (1992) express a concern that use of simple Likert scales provide too coarse a measure to detect moderation effects and recommend the use of continuous scales, although summed multiple-item Likert scales provide more fine-grained measurement. Chaplin's rather pessimistic conclusion was "Although failures to find significant moderator effects, or worse, effects in the opposite direction, are technically theoretical disconfirmations, they can always be attributed to a lack of statistical power, improper measurement strategies, and/or

chance. Alternatively, the few instances of success may be chance events” (Chaplin, 1991, p.171) The only solution is a recourse to well-grounded theory.

4.4.1.3 Testing for suppression Cohen and Cohen (1983) describe the term “suppression” as indicating that the relationship between an independent and a dependent variable is hidden, or “suppressed” due to a third, correlated variable (the “suppressor variable”). In zero-order correlations, the suppressor (X2) is significantly associated with an independent variable (predictor, X1), but not with the criterion (dependent, Y). In this way the suppressor may add irrelevant variance to the predictor, reducing its relationship with the criterion. Therefore when the suppressor is included in a simultaneous regression equation unwanted variance in X1 is removed, and the relationship between X1 and Y is enhanced.

Thus to test for a suppression effect two analyses are required. First the proposed independent and dependent variables have only a weak zero-order correlation: the suppressor and independent variables are also correlated. In the second analysis, the suppressor variable is included in a multiple regression with the independent variable: at this point the relationship between the independent and dependent variable (as reflected in the β coefficient) is strengthened: the sign of the association may even be reversed. This set of relationships is schematically presented in Figure 4.1. Cohen and Cohen suggest that modest suppression effects are common in complex models including highly related independent variables.

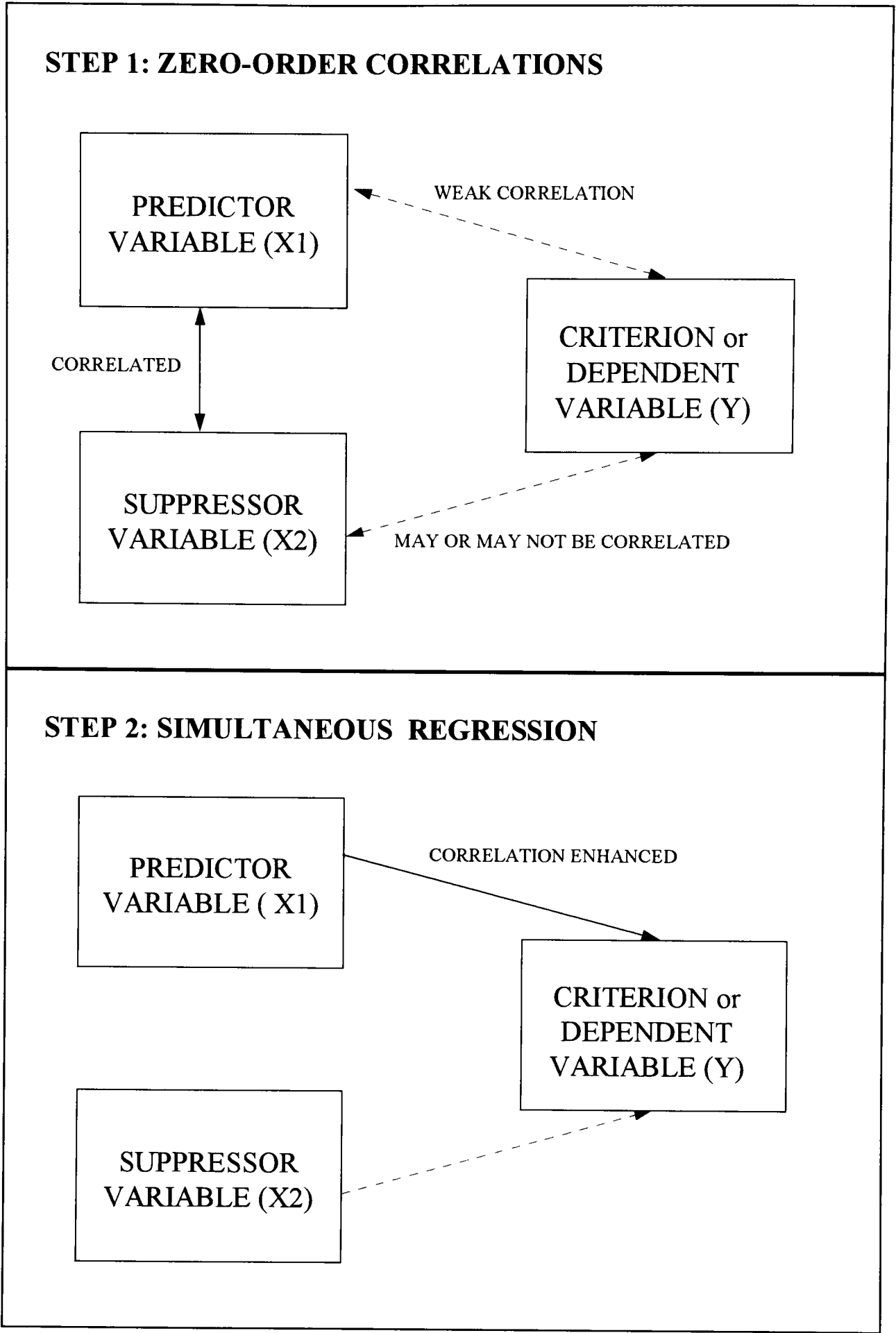


Figure 4.1 Schematic representation of two-stage test for a suppression effect.

4.4.2 *Curvilinear relationships*

Some relationships within the stress process have been proposed to be curvilinear rather than linear. Selye's (1956) original formulation of the general adaptation syndrome was defined along curvilinear lines such that an optimal level of arousal was required, and negative effects only occurred once this was exceeded. Similarly, some researchers have proposed that the relationship between LOC and outcomes is not linear (i.e. internals are not necessarily better off) but curved, such that there is an optimal level of internality: these people are sometime named "realists" (Krause and Stryker, 1984; O'Brien, 1986; Wong and Sproule, 1984).

Several approaches for testing for curvilinear associations have been used. The easiest to interpret is a subgrouping of the independent variable, such that associations with strain are calculated at low, moderate and high levels. For example Krause and Stryker (1984) used a four-fold classification of LOC to examine non-linear effects on well-being. However, as noted in testing for moderation effects, any such division of a continuous variable results in a loss of statistical power. Furthermore the division tends to be quite arbitrary, depending upon the distribution of that variable in any given study, rather than upon any principled theory. In the case of LOC for example, it has been suggested that there may be more internals than externals in any Western sample (particularly American college students), and dividing such a skewed distribution is likely to lead to misleading results (Hurrell and Murphy, 1991).

More powerful and theoretically stronger approaches can be achieved through non-linear modelling techniques. The most flexible of these can be performed within linear regression models, involving the entry of a non-linear terms as independent variables (Nie et al., 1975). For simple curvilinear relationships, this is usually the quadratic term for the independent variable (e.g. LOC x LOC), entered after the simple linear term (LOC). This

form of analysis was reported for the investigation of the relationship between organisational expectations and perceived stressors (Wells, 1982), and between neuroticism and work demands (Parkes, 1986).

In principle cubic, quartic or higher order terms can be used in the same way to examine more complex effects, however stress theories seldom specify the nature of curvilinear relations to this level of precision. Similarly, logarithmic terms are sometimes used to examine asymptotic relations. A drawback with this type of technique is that the form of the curve is very tightly specified, and that entry of the quadratic term only tests whether the relationship follows a parabola, and not any non-linear curve.

4.4.3 Dealing with measurement error: modelling with latent variables

Many common techniques of statistical analysis assume that variables are measured without error. In most cases this assumption is not valid, and thus difficulties of interpretation arise when it is not clear if an observed association occurs between the true constructs of interest or merely between their associated errors: this is one argument underlying criticisms of the use of self-report data. On the other hand, if measurement errors are uncorrelated, as occurs when independent data sources are used measurement error will tend to cause an underestimation of the true association.

Latent variable modelling, also known as covariance structure modelling, causal modelling or structural equation modelling (SEM), is a technique which combines “the logic of confirmatory factor analysis, multiple regression, and path analysis within a single data analytic framework.” (Breckler, 1990, p260). It can be very useful for making sense of complex interrelationships among constructs. There are two commonly used software

packages offering this form of analysis, LISREL (Joreskog and Sorbom, 1988) and EQS (Bentler, 1989).

It is recommended that SEM proceeds by a two-step approach (Anderson and Gerbing, 1988; Dunn, Everitt and Pickles, 1993). The first step is the measurement model or confirmatory factor analysis (CFA) in which latent variables are constructed from two or more manifest or observed variables. This technique separates the variance of each manifest variable into a loading onto the specified latent variable and an error term. The second step involves estimation of hypothesised associations between the latent variables or factors, in a structural model. As latent variables are conceived as error free, these associations are corrected for attenuation due to unreliability or measurement error.

Assessment of the goodness of fit of both measurement and structural model may be achieved with the use of several fit indices. Chi-square (χ^2), which tests the difference between hypothesised (specified) covariances and those observed, is the most commonly cited index. However it is thought to underestimate fit, particularly in large samples: chi-square may be significant even when differences between hypothesised and observed relationships are trivial (Bentler and Bonnet, 1980; Breckler, 1990). The alternative fit indices (e.g. Bentler-Bonnet Normed Index, NFI, Bentler-Bonner Non-normed Fit Index, NNFI, Comparative Fit Index, CFI) compare the hypothesised model with a null or independence model, in which no covariation between variables is assumed. They each vary in a range between 0 and 1, but have some bias in estimation of fit (Bentler, 1992). Of the alternative fit indices, the CFI which accounts for sample size, is the most stable and therefore widely accepted; it has a recommended cut-off for model acceptance of 0.90 (Bentler, 1990; Bentler, 1992; Byrne, 1994). Another suggested test is $\chi/df < 3$ indicates acceptable fit (Feist, Bodner, Jacobs, Miles and Tan, 1995), although this criterion is not commonly cited. In practice a range of indices should be considered (Dunn et al., 1992).

A further advantage of the use of SEM is that it offers a basis for systematic hypothesis testing (Breckler, 1990). In particular nested models can be constructed in which different hypothesised relationships are specified, and these can be compared through differences in fit indices (usually chi-square), relative to the loss of degrees of freedom (Anderson and Gerbing, 1988; Dunn et al., 1993). This is the most powerful use of SEM (Breckler, 1990).

Recommendations for appropriate sample size to be used with this type of analysis vary considerably. Bentler (1992) reported that the various fit indices do not work well with sample sizes below 50, suggesting that any greater sized sample is sufficient. In contrast Breckler (1990) suggests that $N > 100$ is required for estimation procedures that require assumptions about populations distributions (e.g. multivariate normality), and therefore this sets the minimum sample size. More conservatively, Anderson and Gerbing (1988), from a series of Monte Carlo studies, reported that a sample size of 150 is typically be needed to obtain parameter estimates that have standard errors small enough to be a practical use. However for more complex models even larger samples are recommended. Tanaka (1987) describes a method for assessment of appropriate sample size using Monte Carlo simulations, whereas Bentler (1989) recommended as a simple guideline, a ratio of at least 5:1 (but preferably 10:1) of sample size to number of parameters to be estimated.

Several criticisms have recently been made with reference to SEM. While the potential power of the technique is acknowledged, there is concern that the limitations discussed in the technical literature are not well understood by practitioners (Breckler, 1990). In particular, use of SEM with cross-sectional non-experimental data is no more causal than other forms of analysis, contrary to the commonly used name of “causal analysis” (Breckler, 1990; Cox, 1992; Spector, 1994). As with other statistical techniques, research design is important in inferring causation. Breckler further suggests that alternative causal

interpretations of findings are rarely considered by users of this technique, and claims for causal relations are often unjustified.

A second point is that the use of maximum likelihood estimation assumes multivariate normality of data, although robust estimation techniques are available within the standard statistical packages. Third, Breckler is critical of the use of exploratory and confirmatory analyses with the same data set, and recommends validation of models developed with SEM on independent samples. Schmitt (1994, p844) adds that there is a tendency to use these high-powered techniques when “simpler, more familiar data-analytic techniques would result in better communication of the findings”. Finally, although SEM is well-suited to testing of both direct and complex mediation effects, moderation effects are more difficult to estimate within this framework (Busmeyer and Jones, 1983; Kenny and Judd, 1984).

4.4.4 Analysing multiple outcomes

As discussed in Section 4.1.3, one difficulty with general models of the stress process is the tendency to examine various responses to stress as if they are all representative of some general strain construct, when the research evidence suggests that different models are required to adequately explain distinct outcomes. Kasl (1987, p311) further notes that each class of strain indicator has its own large set of determinants, such that the “unique additional contribution of stress is difficult to pin down.” However repetition of analyses for several dependent variables may result in an inflation of Type I error. Analyses that account for multiple outcomes are clearly required: several options are available.

Both multiple regression and SEM techniques can be used to develop complex path models which may include several dependent variables. The main differences between

multiple regression and SEM are that in multiple regression measurement error is not accounted for; also there is no goodness of fit index estimated for the overall model, but only a multiple R^2 for each dependent variable. However, one advantage of constructing path models using multiple regression is that including moderator effects is relatively straightforward (Nie et al. 1975).

A study reported by Motowidlo et al. (1986) is a good example of the development of path models with regression. The study was designed to test a theoretical model of stress in which subjective stress generates anxiety, hostility and depression, and these influence different components of job performance. Path coefficients were calculated using multiple regression, predicting simultaneous effects on each dependent variable. Jackson (1983) applied similar principles to test a causal model of the effects of participative decision making in a longitudinal design. More recently, and using SEM, Schaubroeck et al. (1992) modelled the simultaneous effects of negative affectivity, role conflict, role ambiguity, social support and workload variability on depression, physical symptoms and job satisfaction.

A further option for the simultaneous analysis of strain outcomes is multivariate multiple regression, which can be conducted for example through the MANOVA procedure in SPSS (see Tabachnick and Fidell, 1989 and Norusis, 1988, for detailed discussions of this procedure). Multivariate regression is an extension of univariate regression procedures, allowing the simultaneous analysis of several independent and dependent variables. Testing for interaction effects can proceed in a similar manner as described in Section 4.4.1, with the hierarchical addition of a cross-product term between two or more independent variables. Both multivariate and univariate tests of significance are produced for each independent variable. Wall et al. (in press) used this procedure to test the Karasek demand-control model simultaneously for job satisfaction, depression and anxiety.

4.4.5 *Analysing change*

As discussed above, a frequent recommendation by reviewers of the stress literature is for longitudinal and particularly intervention studies (e.g. Reynolds and Shapiro, 1991; Murphy et al., 1992). In addition to establishing a temporal relationship between cause and effect, longitudinal research contributes to an understanding of causal processes by allowing the assessment of change in independent variables in relation to changes in dependent variables. The use of difference scores to represent changes in independent and dependent variables has been strongly criticised in favour of regression-based approaches (Cronbach and Furby, 1970). In particular, recent reviews recommended structural equation modelling (SEM) for use with longitudinal data to help establish causal relations (Breckler, 1990; Murphy et al., 1992; Sauter et al., 1990). In addition conventional regression techniques and analysis of variance designs can also yield important findings with longitudinal data. Some examples of good practice are discussed below.

4.4.5.1 Use of structural equation modelling with longitudinal data. Within psychology, the most common use of SEM with longitudinal data is in the developmental area. The journal *Child Development* devoted a special issue to structural models (February, 1987, volume 58, issue 1), as SEM is ideally suited to growth models of data over several points in time, as specified in developmental theories. These models are often specified as two-level polynomials such that future development is predicted from terms representing an initial level of development and a growth trajectory (Dunn et al., 1993; Goldstein, 1986; Hoeksma and Koomen, 1992). Such models have not yet been applied within the stress literature, although the same principles may apply: strain may be predicted by pre-existing levels of strain plus a

trajectory calculated from changes in the individual's situation (e.g. life experiences or work characteristics).

In the stress literature longitudinal data have been analysed using SEM to investigate potential reciprocal relationships between proposed stressors and strains over time. For example Aneshensel and Frerichs (1982) examined the mutual effects of life stressors, depression and social support in a 4-wave study over a one year period. The occurrence of stressful events between surveys was found to increase levels of depression, whereas social support was found to reduce current depression and have indirect effects on subsequent depression. Similarly Tharenou (1993) used two waves of data to simultaneously examine relationships between work absence, job satisfaction, job performance and supervisor support. All factors were correlated cross-sectionally, and in addition there was a strong positive association over time of each construct with itself. Of greater theoretical interest, future absence was predicted by prior supervisor support, while prior absence predicted both job satisfaction and performance. Tharenou concluded that absence should not just be considered as an outcome in stress research, but also as an influence.

4.4.5.2 Use of multiple regression techniques. One use of regression techniques, where an outcome variable is measured on at least two occasions, is to control or residualise analyses for initial level of the outcome (Cronbach and Furby, 1970). This allows for the fact that the most powerful predictor of outcomes such as health status is previous health status and thus can identify predictors of change in health status. Furthermore, controlling for initial levels of the outcome controls for the fact that level of strain is often related to level of chronic exposure to stressors (Ganster and Schaubroek, 1991). An example of such residualised analyses may be found in Chay (1990) looking at psychological health in small business

entrepreneurs and employees in a two-wave study. Psychological well-being, residualised for prior status, was predicted over time by individual differences and social support.

A growth model perspective using multiple regression was implemented by Barnett, Marshall and Singer (1992). Barnett et al. used longitudinal data from a three-wave study of employed women to calculate individual rates of change in job role quality and psychological distress. The *change* in role quality together with several variables measured at time 1 (e.g. initial level of distress, socio-economic status, non-work role) were successfully used to predict *changes* in psychological distress, including moderation effects of non-work roles. In particular, for single women and women without children, improvements in job role quality was related to decreasing levels of psychological distress.

Also using regression techniques on longitudinal data, Lin and Ensel (Ensel and Lin, 1991; Lin and Ensel, 1989) tested the buffering effects of social support and self-esteem in a three-wave survey. To examine causal links, each variable (stressor, buffer, strain) was measured at all three times, and relationships were specified temporally. In the main analyses, the dependent variables (physical and psychological health) were taken from Time 3 measurement and multiplicative interactions were computed between all independent variables at Time 2 as well as between each independent variable at Time 1 with potential buffer variables at Time 2. Prior health, stressors, buffers and interaction terms were hierarchically entered into the analysis. Lagged interaction terms (T1xT2) are more consistent with a buffering hypothesis and were found to account for greater incremental variance than the contemporaneous interaction terms. Furthermore the strongest effects were the buffering effects and not the direct, additive ones, therefore it was concluded that support for the buffering hypothesis had been demonstrated.

4.4.5.3 Naturally occurring experiments and intervention studies. The use of intervention studies and naturally occurring experiments allows analysis of within subjects changes over time and in response to objectively different conditions. Comparison of groups or individuals in different objective conditions is an important addition to self-report data traditionally analysed in stress research. These factors together mean that such studies can provide evidence of causal relationships. Appropriate forms of statistical analysis used in such designs include analysis of variance and t-tests (for between groups differences), repeated measures analysis of variance (for analysis of trends over time), and regression and path analysis (for testing of causal relationships in proposed models).

Objective differences between work environments have been examined using repeated measures designs with systematic manipulation of workload (Parkes, 1995), and rotation of employees through naturally occurring work situations (Martin and Wall, 1989; Parkes, 1982). Also using a repeated measures design, Frankenhauser et al. (1989) compared cardiovascular and neuroendocrine activity at work and at home, showing that female white-collar employees have a slower return to baseline in the evening than males.

The redesign of work to involve greater participation in decision-making creates an opportunity for examining employee responses to a changed work environment. Such changes have been associated with higher perceptions of control, decline in role conflict and ambiguity, increased job satisfaction and psychological health, lower absence, reduced turnover intention, and improved performance (Jackson, 1983; Wall and Clegg, 1981; Wall, Kemp, Jackson and Clegg, 1986). The studies by Jackson and Wall et al., included control groups who did not receive the work design treatment, thus strengthening causal conclusions regarding improvements in outcomes.

4.5 Overview of measurement issues and research design in present research

To enable generalisation of findings, for example to make recommendations for stress-reducing interventions, occupational stress research is best conducted in an applied field setting. This research setting brings with it several practical constraints which may limit research design options. Although occupational stress researchers may be aware of the limitations of self-report, the need for psychometrically adequate scales, the preference for multiple data sources and sophisticated experimental designs, it is not always possible to employ these ideal strategies (Kasl, 1987). In most cases, a compromise is required (Parkes, 1994), and the resultant study may be somewhat different from this ideal (e.g. Wall and Clegg, 1981). In the design of the research presented here, these methodological issues were carefully considered.

The present work deliberately focused on a narrow sector of the working population; it does not attempt to draw conclusions about the stress process in the general population, but is intended to have application for a specific work domain. Furthermore, all analyses are based upon empirical findings which have been reported in the literature, and placed within the conceptual framework of the Michigan Model; one aim being to assess whether stress processes observed in different occupational samples have application in the particular work settings investigated.

Although the main source of data were derived from self-report questionnaires, several additional design features were incorporated to address the criticisms of survey work. In particular, theoretical constructs were measured using established scales with proven validity and reliability: psychometric properties of all scales were further examined with the data from the different respondent samples included in the research. Furthermore, negative

affectivity and social desirability measures were incorporated into the questionnaires to allow statistical control of the response biases associated with these traits.

In addition, in the main study, information was sought from company records to provide an independent assessment of some work characteristics and outcomes. This information not only supplemented the self-report data, but also allowed the representativeness of voluntary respondents to be assessed relative to a randomly drawn sample within the company.

Furthermore, the research design of the two main studies was longitudinal, and in one case, quasi-experimental. This methodology allows an examination of patterns of response to work changes over time, and also the testing of the direction of causal relationships among constructs. The research was further strengthened by the incorporation of comparison groups which, based within a single large company, were selected to be comparable in terms of several key work characteristics. Although allocation to comparison groups was not random, differences in baseline responses were tested to investigate the possibility of systematic selection biases.

Finally, the statistical analyses presented have taken advantage of a range of techniques. Multivariate techniques, best suited to the complex models under examination, are supplemented with univariate analyses to ensure clarity in the explanation of findings. In particular multiple regression techniques are used to test simultaneously the direct and indirect influences of independent and modifying variables. Multivariate multiple regression is an extension of this style of analysis, allowing the examination of multiple outcomes as well as multiple predictor variables. Furthermore, latent variable modelling is employed to allow control for error in the measures, to examine more than one outcome measure, and to develop models with longitudinal data.

In summary, the chosen applied research setting was intended to maximise external validity of the findings. However, the constraints of a field setting resulted in a research method which differs from an “ideal” controlled experiment, and thus compromises the causal nature of conclusions which can be drawn. Nonetheless, where practical, the most serious criticisms have been overcome, and conclusions drawn are limited to those which can be substantiated from the data.

5. Cross-sectional Pilot Study

5.1 Introduction

5.1.1 Overview of stress research with managerial and professional samples

Occupational stress research is conducted in many work settings, as reflected in the literature review of the previous chapters. Much stress research involves analysis of data from occupationally diverse samples, including representative national surveys (e.g. Karasek 1979; Folkman and Lazarus, 1980; Ganster et al., 1991). Other research concentrates on specific occupations which are assumed to be “high stress”, such as offshore oil workers (e.g. Sutherland and Cooper, 1986; Parkes, 1992), police (e.g. Greller et al., 1992; Kirmeyer and Dougherty, 1988), medical professions (e.g. Boumans and Landeweerd, 1992; Kaufmann and Beehr, 1986; Parkes and von Rabenau, 1993), and blue-collar industrial workers (e.g. Wells, 1982; Johnson and Hall, 1988). Furthermore, some researchers utilise student samples and simulations of work situations (e.g. Bazerman, 1982; Conte et al., 1995; Staw and Barsade, 1993).

The use of contrasting samples may explain some of the discrepancies in research findings: it may be that general models of work stress, developed with population data, or specific occupations, may not apply to all types of work. Specific stressors are more prevalent in some work domains, and different types of work may attract certain personality types. Furthermore, the stress process may not operate in the same manner within different work domains. For example, in a 5-year prospective study, Kirjonen and Hanninen (1986) reported that improvements work content and physical conditions, resulted in reduced symptoms for blue-collar but not white-collar workers.

The present research involves white collar and particularly managerial work. Burke (1988) presented a review of research in which sources of stress for managers and professionals were identified. Some of this literature was discussed in previous chapters, under headings relating to stressors, moderators and outcomes: a brief overview of recent relevant research is presented here.

Several work characteristics have been associated with negative outcomes for professionals and managers. For example Karasek's demand-control model has been tested in these domains. In particular, in samples of both Finnish and US managers, Hurrell and Lindstrom (1992) found additive, but not interactive effects of job demands and control on self-reported health. Similarly, Chapman, Mandryk, Frommer and Edye (1990) reported only equivocal support for the interactive combination of demand and control in a 5-year longitudinal study predicting blood pressure change in a sample of Australian Government employees. However Carayon (1993) failed to find support for either additive or interactive effects of demand and control on strain in a sample of "office workers", (clerical, professional and managerial): low control was associated with symptoms of tension, anxiety and depression, while high demand was associated with physical symptoms.

The role of social support has also been examined within white collar samples, such that low support has been associated with poor physical and psychological health in US public utility workers (Jones-Johnson and Johnson, 1991), and human service managers and professionals (Etzion, 1984; Lee and Ashforth, 1993). Furthermore, Chay (1993) found that support buffered negative effects of low control on mental well-being in a sample of entrepreneurs and their employees. Turnage and Spielberger (1991) conducted a factor analysis of work perceptions in clerical, managerial, and professional groups, and found that work stressors could be divided into "pressures" and "lack of support". Work stressors were found to be differentially related to age, gender, tenure and occupational level. In particular,

managers reported higher levels of work pressures than other groups, but attributed lower stress intensity to these pressures than to low support.

Role conflict and ambiguity are cited as major psychosocial stressors for managers and professionals. In his review of this literature Burke (1988) reported that these variables are consistently related to job dissatisfaction and poor psychological and physical health. In addition, Lee and Ashforth (1993) recently demonstrated that role conflict and ambiguity mediated the influence of social support on emotional exhaustion in a sample of human service professionals and managers.

The influence of individual differences have also been examined with white collar samples. Some researchers have sought to determine whether certain personality types are more suited to coping with the pressures of professional and managerial work. In particular, Kobasa (1979) found that executives who were resistant to illness despite experiencing stressful life events, possessed a set of traits, labelled "hardiness". One of these traits is an internal locus of control. More specifically, internality has been associated with adaptive coping and positive outcomes during periods of change in several studies. For example, Anderson (1977) reported that, following a major flood, entrepreneurs with an internal LOC engaged in more active coping. Similarly, Callan, et al. (1994) found that internal LOC predicted better psychological adjustment among lawyers involved in a period of organisational change. Terry, Tonge and Callan (in press) have further shown that the influence of internality on psychological health is mediated by use of more adaptive coping strategies, in a sample of public sector middle managers.

Type A behaviour is another individual difference which has received particular attention within white collar work domains, as successful managers have been found to be high in these characteristics (Kirkcaldy and Cooper, 1992). In particular, the achievement striving component of Type A is associated with positive outcomes of performance, career

progression and job satisfaction, while the impatience-irritability dimension predicts negative psychological and health outcomes (e.g. Bluen et al., 1990).

A few studies have investigated the relative influence of individual differences and work characteristics on strain outcomes in professional and managerial samples. In particular, Brief et al.'s seminal article on negative affectivity (Brief et al., 1988) was based upon research with managerial and professional employees of an insurance company. Negative affectivity (NA) was correlated with self-reports of both job stress (negative work perceptions) and strain outcomes. Furthermore, after statistical control for NA, the partial correlations of job stress with job dissatisfaction, life dissatisfaction, depression and negative affect at work remained statistically significant. Similarly, using hierarchical regression with data from a sample of managerial and professional women, Burke and McKeen (1995) found that work perceptions and work-related affect predicted emotional exhaustion and life satisfaction after control for individual demographic and organisational characteristics. Finally, Chay (1993) reported one of the few studies in which extraversion has been incorporated into a stress paradigm: he found that more extraverted entrepreneurs perceived higher levels of social support, which, as described above, buffered the effects of low control.

5.1.2 *The present study*

The present study was conducted with participants from a range of white collar work environments. One aim of this cross-sectional study was to pilot the selected questionnaire scales for use in the main study. Most scales were drawn from the published literature, while other questionnaire scales had not been previously validated. This study allowed scales to be

checked for validity and reliability in white collar, UK sample, and to be refined where necessary. An additional goal was to examine some simple cross-sectional relationships between job characteristics, individual differences and well-being within a white collar work domain.

Questionnaires measured both individual differences and work characteristics. More specifically, individual differences included demographic and personality measures, while work characteristics were categorised as work pressures and work resources. Finally, given the evidence for the multidimensionality of strain, several indices of strain were included: these were job satisfaction, general health, physical health, social dysfunction, anxiety and depression.

Although demographic variables have not often been the focus of stress research with managerial and professional samples, measures of age, gender, marital status and education level were included to allow statistical control for these background factors. From the research reviewed in Section 3.3, it might be expected that older, male, married and better educated employees will experience lower levels of strain, but that these relationships may be confounded with the influence of work characteristics.

The personality factors included in the study were locus of control, Type A, neuroticism and extraversion. In accordance with the research discussed above, an internal locus of control is expected to be associated with lower levels of strain. Likewise, a correlation of poor health with Type A behaviour and neuroticism is anticipated. Finally, extraversion may be associated with positive outcomes, perhaps mediated by perceptions of social support.

The work characteristics included in the questionnaire were also selected on the basis of the research evidence presented above. High levels of work pressure are expected to have negative effects on health and well-being. The work pressures measured were

perceived demands, number of hours worked, time urgency and role conflict and ambiguity. The positive work characteristics, or work resources, included in the study were perceptions of control and work-related social support.

Only direct, and not interaction effects of these characteristics were tested here, due to the weak research evidence of significant interaction within managerial and professional samples, and in consideration of the relatively small sample size. Furthermore, all variables in this cross-sectional study were measured by self-report. This potential limitation was addressed by using a measure of NA (neuroticism) to statistically control for subjective response bias, as recommended by Brief et al. (1988). It is expected that statistical control for NA will attenuate the association between proposed stressors and strain, but that (partialled) associations will remain statistically significant. Finally, to assess the relative contribution of work characteristics in explaining outcomes once individual differences are taken into account, hierarchical multiple regression was utilised. As reported by Burke and McKeen (1995), it is expected that work characteristics will explain a significant incremental proportion of the variance, after control for individual differences.

5.2 Participants and procedure

5.2.1 Subjects

The 143 participants included in pilot study were drawn from three general occupational groups: 21 from small businesses in an Oxford business park, 36 from an Oxford branch of a national bank, and 86 from two Cambridge-based business consultancies (N = 50 and N = 36). Although all participants in the study were involved in white-collar work, they were employed in a wide range of occupations, (from company chief executive, to clerk), and work settings (from single person office, to a large high street bank); this heterogeneity was intended to ensure suitable variance on the work measures of interest.

Respondents ages ranged from 17 years to 59 years, (mean 32.8; standard deviation = 8.2 years); 39% of the sample were female; and 74.1% were married or living with a partner. The sample reported higher levels of education than the general population, as illustrated in Figure 5.1: the predominance of a university education is particularly noteworthy.

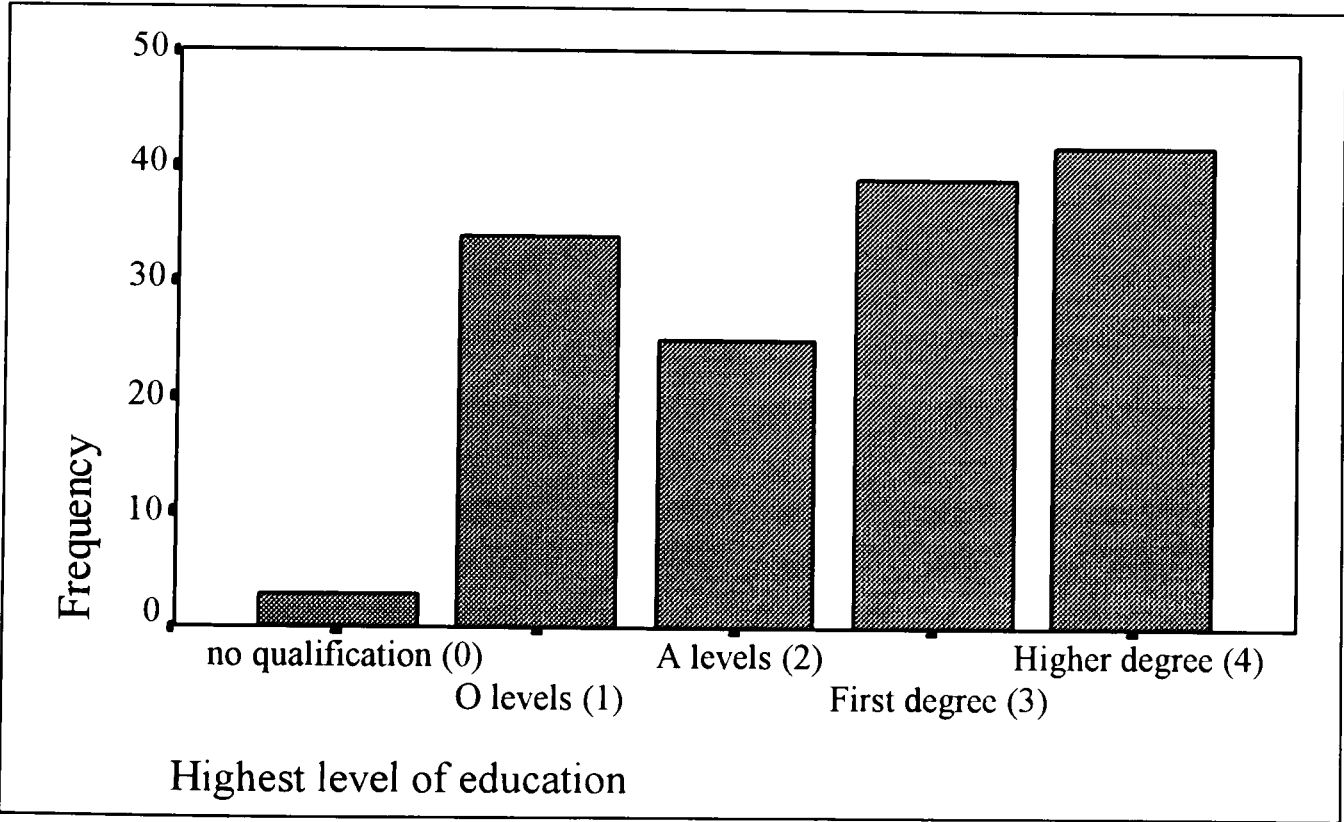


Figure 5.1 Distribution of sample according to educational attainment

5.2.2 *Survey methods*

Chief executives or branch managers of companies were contacted in the first instance, and permission was sought to send questionnaires to all company members. Participation was voluntary and no employee was approached independently of their company manager. In this manner, 30 questionnaires were sent out in the business park, 80 to the bank, and 150 to the business consultancies, resulting in response rates of 70%, 45% and 57%, respectively. The lower response rate in the bank may be explained by the fact that questionnaires were not personally distributed, but merely accompanied by a covering letter which would have generated less interest and commitment to the study by potential respondents.

5.3 Scale development

5.3.1 *Choice of scales*

Wherever possible established scales drawn from the published research literature were chosen to assess the constructs of interest. Published scales have established internal consistency, test-retest reliability and construct validity, thus reducing the need for preliminary psychometric work. Thus, the psychometric analyses presented here are confirmatory rather than exploratory. Furthermore, for some scales it is possible to make comparisons with normative data from previous research samples. In the sections which follow, each scale is briefly described and the psychometric properties discussed. Except where otherwise stated, items were presented with Likert-type response formats. Unpublished scales are reproduced in Appendix II.

5.3.2 *Sauter's perceived demand and control scales*

Perceived work demands and control were measured using a self-report scale adapted from Sauter (1989). The combined scale comprises 34 items taken from the Work Environment Scales (Insel and Moos, 1974) and the Michigan Institute for Social Research scales (Caplan, et al., 1975), and provide a wide coverage of these aspects of the work environment. In a study of health complaints in office workers, Sauter (1989) used these scales to show an interaction of demand and discretion in accord with Karasek's Demand-Control Model.

In the present study demand and control items were intermingled. Several high level managers were unable to answer some of the control items as they did not apply to their

particular work situation, resulting in missing data on this scale¹. The proposed demand (20 item) and control (14 item) scales were each found to have good internal consistency at $\alpha = 0.84$ (N=142), and $\alpha = 0.78$ (N=133) respectively. This compares with Sauter's reported alpha coefficients of 0.84 and 0.87 for his demand and control scales.

Further validity of scale structure was found in a principle components factor analysis² of all items from the two scales. Examination of a scree-plot of eigenvalues (as recommended by Cattell, 1966), confirmed a two-factor structure, splitting items into the predicted demand and control scales, accounting for 17.8% and 11.9% of the variance respectively. The only items not loading onto the predicted scales were two control items, items 9 (*How often are you given a chance to do the things you do best?*) and 25 (*Few people have any important responsibility at work*) which loaded moderately onto both factors. However, as internal consistencies were found to be quite high including these less clearly loading item, they were retained.

5.3.3 Time urgency scale

To measure time-related aspects of job demands, 22 items from Schriber and Gutek's (1987) Time Dimensions scales were also included in the questionnaire. The general concept of time was selected in light of the suggestion that the time urgency component of Type A may be of particular importance to P-E Fit (Edwards et al., 1990; Landy et al., 1991): Landy et al. specifically suggested use of the Schriber and Gutek scale to test such an hypothesis. Schriber and Gutek's complete scales were not utilised because of their length (56 items);

¹ In all analyses reported in this thesis missing cases were deleted listwise. Relevant sample sizes are reported with each analysis result.

² All principal components analyses incorporated Varimax rotation.

subscales were chosen on the basis of their relatively high internal consistency, and for their conceptual similarity to other constructs measured in the questionnaire. Thus items were drawn from the subscales relating to schedules and deadlines, punctuality, future orientation and quality versus speed, work pace, and autonomy of time use. Subjects were instructed to answer the questions with respect to their place of work rather than their own specific job (in contrast to the demand and control scales).

The full Time Urgency scale had good internal consistency ($\alpha = 0.83$, $N=143$). However, as this scale was composed of items drawn from five "temporal dimensions" proposed by Schriber and Gutek, a factor analysis was performed to see whether this factor structure would be reproduced. The screeplot of eigenvalues suggested a three-factor solution, corresponding to "time control", "speed of work", and "quality of work". However the separation into subscales was not clear-cut, with several items loading on more than one factor, and so a single scale was retained for use in subsequent analyses.

5.3.4 *Role Conflict and Role Ambiguity*

For the consultancy samples ($N=86$) additional measures of role conflict and ambiguity were adapted from Rizzo et al. (1970). These scales have good reported reliability and validity (Schuler, Aldag and Brief, 1977; Van Sell et al., 1981). However Tracy and Johnson (1981) have recently criticised the psychometric characteristics of the scales, suggesting that positive (comfort) and negative (stress) wording of items has been confounded with ambiguity and conflict, respectively. Alterations to the wording of several items were made to address this issue. Eight conflict (4 positive, 4 negative) and six ambiguity (3 positive, 3 negative) items were thus formed.

The role conflict and ambiguity scales were each found to have only moderate internal consistencies, with Cronbach's alphas of 0.66 and 0.71 respectively, considerably lower than the Kuder-Richardson internal consistency reported for the scales by Rizzo et al. (role conflict: 0.82; role ambiguity: 0.78 to 0.81).

Furthermore, a principle components analysis of the two scales was inconsistent with the theoretical two-factor structure: the scatter-plot of eigenvalues suggested that a single factor accounted for most of the explained variance. In addition, Tracy and Johnson's (1981) argument concerning positively and negatively worded items received mild support: when two factors were extracted, the second factor was composed entirely of negatively worded items (although a mixture of both conflict and ambiguity questions).

The factor analytical evidence, combined with the high correlation between conflict and ambiguity scales ($r = 0.64$, $N=84$, $p < 0.001$), indicates that these two scales can be combined into a single "role clarity" scale, with an internal consistency of $\alpha = 0.80$. The more neutral term "role clarity" was chosen, in preference to "role stress", which is often used in the literature when these two scales are combined, since it avoids the implication that high scores on these scales are necessarily experienced as stressful. However, as some researchers have suggested unique roles for role conflict and role ambiguity, (e.g. Jackson and Schuler, 1985; Schaubroeck et al. 1989) for purposes of comparison with previous research, separation into two scales may also be justified. A high score on the role conflict and ambiguity scales indicate high levels of perceived role stress; however, where the scales are combined, reverse scoring is used to be consistent with the positive naming of the scale as role clarity.

5.3.5 *Social Support*

House's (1981) social support scale comprises 13 items concerning the extent to which different people are helpful, reliable and competent with respect to difficulties encountered at work. As the research literature indicates that work sources of support are most relevant to work stressors, only those items referring to support from senior colleagues and peers were analysed. The senior colleague support scale contains six items, with an internal consistency of $\alpha = 0.89$; the three-item peer support scale had an internal consistency of $\alpha = 0.80$ ($N=143$). Furthermore, principal components analysis was consistent with the proposed two factor structure, with the senior colleague support accounting for 47% of the variance and peer support accounting for 20.0%.

5.3.6 *Locus of Control*

Spector's (1988) 16-item work locus of control scale (WLCS) was selected to measure locus of control beliefs. This situation-specific scale was selected in preference to a more general locus of control scale (e.g. Rotter's 1966 scale) in light of the evidence that control beliefs may vary depending upon the situational context. A high score on the work locus of control scale is indicative of an *external* locus of control.

The scale was found to have reasonable internal consistency ($\alpha = 0.77$, $N=143$), which is comparable with the reliabilities reported by the author: Spector (1988) reported alphas ranging from 0.75 to 0.85 for six independent samples given the WLCS. The scree-plot of eigenvalues from principle components analysis was consistent with either a one or two-factor solution. However the two factor solution simply separated positively and

negatively worded items, rather than making a distinction between theoretically-based subscales, and so a single factor solution is considered most appropriate.

5.3.7 *Type A Behaviour Pattern (TABP)*

A 30-item Type A behaviour scale was developed with particular emphasis on the time urgency aspect of this trait, as recommended by Landy et al. (1991). It is of particular interest to compare individual measures of time urgency with the time dimensions of the work environment (Schriber and Gutek, 1987). Also Type A behaviour may be used to infer a desire for control, which may influence whether or not control will be perceived and exercised (e.g. Evans et al. 1991). Items were drawn from items listed by Landy et al. (1991), themselves selected from recognised Type A scales. Several items from the scales were dropped as a consideration to scale length and redundancy: the resulting 30-item scale is displayed in Appendix II.

Overall, the Type A scale showed good internal consistency ($\alpha = 0.80$, $N=143$). However, as subscales of Type A have been reported, both by Landy et al., and by other researchers (e.g. Bluen et al., 1990; Spence et al., 1987), a principle components analysis was carried out. Nine factors with eigenvalues greater than 1 were extracted, but an examination of the scree-plot suggests that a two-factor solution is a better summary (see Figure 5.2). These two factors correspond to the Achievement Strivings and Impatience-Irritability factors reported by Spence et al. (1987), and each was found to have adequate internal consistency ($\alpha= 0.81$ for the 19 items of the Achievement Strivings Scale; $\alpha = 0.72$ for the 11 items of the Impatience-Irritability Scale). However the two scales were moderately

correlated ($r = 0.17$, $p < 0.05$), and so the full Type A scale was used in the exploratory analyses reported here.

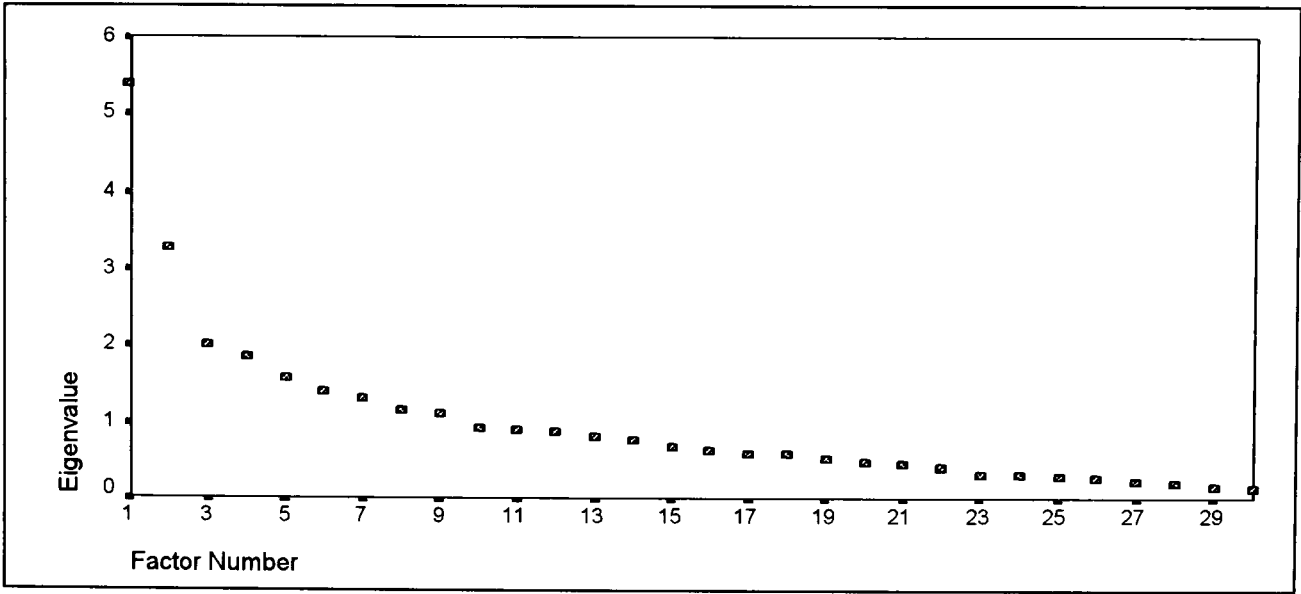


Figure 5.2 Screeplot of eigenvalues from factor analysis of 30 item Type A scale (N=143)

5.3.8 *Extraversion and Neuroticism*

To measure these aspects of personality, the 12-item (YES-NO) extraversion and neuroticism scales were taken from the well-established Revised Eysenck Personality Questionnaire (EPQ-R, Eysenck, Eysenck and Barrett., 1985). The two EPQ-R scales were found to have high internal consistency: for the extraversion scale $\alpha = 0.85$, and for the neuroticism scale $\alpha = 0.84$. This is the same as the internal consistency reported in the EPQ-R Manual.

Factor analysis provided further evidence of this two factor structure, producing two factors with eigenvalues of 4.8 and 4.3, representing the extraversion and neuroticism scales respectively, and accounting for 20.0% and 18.1% of the common variance. The two scales were not significantly correlated ($r = -0.06$; ns; $N = 143$).

5.3.9 *General Health Questionnaire*

Thirty-five questions were chosen to assess different aspects of physical and psychological well-being, all drawn from published scales. Specifically, the 12-item scale from the General Health Questionnaire (GHQ-12, Goldberg, 1978) was used to measure general well-being. This scale has been shown to have good reliability and validity for occupational samples (Banks, Clegg, Jackson, Kemp, Stafford, and Wall, 1980), and has been validated against clinical ratings of mental health (Banks, 1983). The scale asks respondents to indicate the extent to which they have experienced a list of somatic and affective symptoms over the past six weeks, relative to their "usual" level of health.

In addition to this general scale, seven-item subscales from the full-length GHQ (Goldberg, 1972) were included. These subscales measure anxiety (including questions about nervousness, irritability and insomnia), somatic complaints (physical symptoms such as headaches and tiredness) and social dysfunction (low morale, difficulty making decisions, and impaired performance in work and social roles) and have been validated against clinical ratings (Goldberg and Hillier, 1979).

The depression subscale of the GHQ was not included due to the severity of many of the items, for example relating to suicide; such items are thought to be inappropriate for research in occupational settings. Instead, the depression items from the Middlesex Hospital Questionnaire (Crown and Crisp, 1966) were adapted to fit into the General Health Questionnaire format: these were questions concerning mood, interpersonal relationships and sleeping patterns. All responses were scored on a Likert scale (0-1-2-3) and summed such that a high score is indicative of poor health (high distress or symptom level). Internal consistencies for all scales are shown in Table 5.1: all were above conventionally acceptable levels.

Subscale	No. items	Internal consistency (α)
General well-being (GHQ-12)	12	0.90
Anxiety	7	0.85
Somatic (physical) symptoms	7	0.80
Social dysfunction	7	0.81
Depression	7	0.72

Table 5.1 Internal consistencies for general health questionnaire subscales.

5.3.10 Job satisfaction

A 10 item job satisfaction scale was adapted from Parkes (1993b). Respondents were asked to rate features of their job on a 4-point scale from “very dissatisfied” (1) to “very satisfied” (4). These features included physical working conditions, working hours and shift arrangements, future work prospects, consultation about changes, co-workers, and the way skills are utilised. The scale was found to have a high internal consistency ($\alpha= 0.82$, $N=142$), with item 10 (How satisfied are you with: *Your job as a whole, taking everything into consideration?*) having the highest item-total correlation ($r = 0.75$). The single factor structure of the scale was confirmed in a principle components analysis, where the primary factor had an eigenvalue of 4.2 and accounted for 41.6% of the variance.

5.4 Descriptive statistics and norms

5.4.1 Means and standard deviations

Means and standard deviations for all questionnaire scales are shown in Table 5.2. As the majority of questionnaire scales have arbitrary units of measurement, in later analyses, scores are “standardised” to have a mean of 0 and standard deviation of 1.

SCALE	No. items	Scale mean	Standard deviation	Valid N
TRAITS				
1. Extraversion	12	7.55	3.35	143
2. Neuroticism	12	4.64	3.40	143
3. Type A Behaviour	30	97.87	12.87	143
4. Work Locus of Control	16	40.09	7.89	143
JOB CHARACTERISTICS				
5. Workload	20	75.20	9.16	142
6. Time Urgency	22	71.67	11.13	143
7. Hours worked per week	1	43.6 hours	8.0 hours	124
8. Control	14	43.95	8.45	133
9. Role conflict	8	18.4	7.55	84
10. Role ambiguity	6	12.28	6.35	86
11. Social support: peers	3	6.27	2.00	142
12. Social support:senior colleagues	6	10.39	4.20	140
STRAIN INDICES				
13. Job satisfaction	10	27.29	5.28	142
14. GHQ-12	12	11.20	5.63	141
15. Somatic symptoms	7	5.75	3.66	142
16. Anxiety	7	5.63	3.98	141
17. Social dysfunction	7	6.99	2.86	141
18. Depression	7	11.92	2.65	141

Table 5.2 Table of means and standard deviations.

5.4.2 *Scale norms*

Many of the questionnaire scales were chosen to enable comparison of scores with normative data from the published literature. In particular, descriptive statistics for other samples are available for the Eysenck extraversion and neuroticism scales, the two locus of control scales, colleague social support scale and the GHQ scales, as these scales were not altered for inclusion in the present survey.

Table 5.3 lists the means and standard deviations obtained in previous research using these scales. It should be noted however that the samples reported by other researchers are not necessarily similar to the current sample. Nonetheless, comparing the mean scores observed in the current sample with those from the published literature, it is seen that the personality scale scores generally fell within the range of scores reported for other samples. The present sample scored slightly lower on the neuroticism scale than Eysenck's reported norms, but not significantly so ($t = 0.70$, ns, relative to an adult male sample). Social support from peers was also observed to be lower than that reported for student teachers ($t = 24.63$, $p < 0.001$), and health-care workers, although the difference from the health-carers was not statistically significant ($t = 0.87$, ns). Finally, symptom levels on all the GHQ scales were slightly higher than reported by other samples. For example there was a higher average score on the GHQ-12 than that reported for driving examiners ($t = 2.21$, $p < 0.05$).

Scale	Source of comparison	Sample description	N	Mean	SD
Extraversion	Eysenck et al. (1985)	adult males	408	6.36	3.80
		adult females	494	7.60	3.27
Neuroticism	Eysenck et al. (1985)	adult males	408	4.95	3.44
		adult females	494	5.90	3.14
Work LOC	Spector (1988)	municipal managers	496	36.9	9.6
		university students	151	41.7	9.6
	Orpen (1991)	-57% also employed manufacturing employees	52	39.91	10.21
Social support: peers	Parkes et al. (1994)	health-care workers	145	6.47	2.02
		student teachers	180	11.73	2.39
GHQ-12	Banks et al. (1980)	employees of an engineering firm (male)	552	8.8	4.04
	Parkes (1992)	oil-workers (onshore, male)	88	7.64	2.94
	Parkes (1991a)	driving examiners (male)	590	10.22	4.43
GHQ-Somatic symptoms	Parkes (1987)	student nurses (female)	185	4.77	3.32
	Parkes (1992)	oilworkers (onshore, male)	88	3.05	2.46
	Parkes et al (1994)	Health-care workers	145	2.79	2.11
GHQ-Anxiety	Parkes (1991a)	Trainee teachers	147	1.99	1.08
	Parkes (1992)	oilworkers (onshore, male)	88	2.43	2.18
GHQ-Social Dysfunction	Parkes (1987)	student nurses (female)	185	5.81	2.29
	Parkes (1991a)	Trainee teachers	147	2.38	0.62
	Parkes (1992)	oilworkers (onshore, male)	88	6.61	1.43

Table 5.3 Means and standard deviations of questionnaire scales from the published research literature.

5.4.3 *Correlations between scales*

The Pearson correlations between all questionnaire scales are shown in Table 5.4.

5.4.3.1 *Correlations with the trait measures* The four trait measures were not highly correlated, indicating good discriminant validity between the measures. One exception is Type A and extraversion which were moderately (positively) correlated. This correlation is consistent with Eysenck's contention that extraversion is a major component of Type A behaviour (Eysenck, 1991). However, Eysenck also contends that neuroticism is a component of Type A: this assertion was not supported.

Several correlations between the trait measures and job characteristics are statistically significant. Although generally modest in size, this pattern of correlations confirms that job characteristics and personality are not independent. Different types of people may select or create different work environments for themselves. Alternatively, it may be that personality differences act to colour perceptions of job attributes.

High correlations between trait and strain measures suggests a potential confounding of independent and dependent variables. In particular, neuroticism was found to correlate significantly with all strain indices. Such a high level of association confirms that neuroticism should be statistically controlled in subsequent analyses, as suggested by Brief et al. (1988).

5.4.3.2 *Correlations with job characteristics* Several significant correlations among the job characteristics measures were found, indicating that these attributes are not independent. However, no correlation approached the internal consistency of either scale, indicating that the scales generally discriminate between the different constructs measured. One particularly high correlation was between role conflict and role ambiguity, indicating a threat to

discriminant validity, thus reinforcing that it may be more appropriate to combine these scales into a single role clarity scale. Relatively high associations between control and time urgency, and between role conflict and support from senior colleagues, also suggest that caution should be exercised in interpreting univariate analyses of variables.

Examining correlations between work characteristics and outcomes, the most striking feature is the significant correlation of a small number of job characteristics with nearly all outcome measures. Specifically, control, support from senior colleagues, role conflict and role ambiguity were each significantly correlated with most strain measures: these work characteristics appear to be related to *general* levels of strain. In contrast, the work demand scale was *specifically* associated with anxiety, while peer support was only associated with job satisfaction and not the health indicators.

5.4.3.3 Correlations among strain indices Indices of mental health and job satisfaction are usually significantly correlated (e.g. Schaubroeck et al., 1989; Lee and Ashforth, 1993): this was also the case in the present study. However, very high correlations, approaching the internal consistencies of scales, indicates poor discriminant validity among measures. This was true of the general health questionnaire measures, with all subscales showing strong correlations with the general measure (GHQ-12). In contrast, job satisfaction was not as highly correlated with the health scales, and measures a separate, although related aspect of well-being. The GHQ subscales may be useful for investigating specific responses, however in general the GHQ-12 appears to be an adequate summary of the facets of mental health.

MEASURE	TRAITS				WORK CHARACTERISTICS								STRAIN				
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
TRAITS																	
1. Extraversion																	
2. Neuroticism	-.03																
3. Type A Behaviour	.24	.03															
4. Work LOC	-.15	.15	-.05														
WORK CHARACTERISTICS																	
5. Demands	.15	.01	.30	-.19													
6. Time Urgency	.10	.20	-.02	-.07	.22												
7. Hours worked per week	.16	-.23	.39	-.11	.35	-.25											
8. Control	.08	-.27	.17	-.26	.17	-.57	.34										
9. Role conflict (N=83)	-.09	.11	.35	.24	.28	-.24	.22	-.05									
10. Role ambiguity (N=83)	-.16	.06	.24	.23	.16	-.21	-.06	-.11	.65								
11. Social support: Peers	.29	-.11	-.09	-.24	.10	-.06	.04	.29	-.12	-.20							
12. Social support: Seniors	.17	-.20	-.21	-.33	-.22	.19	-.21	.16	-.58	-.41	.39						
STRAIN INDICES																	
13. Job satisfaction	.23	-.20	-.05	-.45	.14	.13	.02	.39	-.46	-.50	.30	.59					
14. GHQ-12	-.03	.55	.17	.24	.12	.10	-.12	-.26	.38	.33	-.07	-.34	-.47				
15. Somatic symptoms	-.02	.40	.10	.23	.05	.06	-.12	-.24	.27	.37	-.11	-.29	-.35	.67			
16. Anxiety	.08	.57	.22	.14	.24	.17	-.07	-.25	.36	.33	-.11	-.34	-.38	.84	.71		
17. Social Dysfunction	-.03	.32	.11	.13	-.03	.04	-.12	-.21	.18	.06	-.01	-.21	-.36	.79	.48	.49	
18. Depression	-.06	.35	.04	.16	.16	.07	-.09	-.18	.28	.25	-.05	-.32	-.33	.68	.68	.63	.52

Table 5.4 Pearson correlations between questionnaire measures. Unless otherwise stated, the coefficients shown were calculated from the total number of subjects with complete data, (N=129). All coefficients with $p < 0.05$; are shown in bold.

5.5 Relative contribution of job characteristics and individual differences in accounting for variation in strain indices.

In this section, simple models of the relationships between personality, work characteristics and strain are presented. More sophisticated models of the stress process have also been examined with this cross-sectional data set and are presented elsewhere (e.g. Moyle, 1994; Moyle, in press). Two outcomes will be examined here, job satisfaction and anxiety, since these measures are commonly used strain outcomes and represent separate aspects of individual well-being.³

Multiple linear regression is used to examine the influence of several potential explanatory variables simultaneously. When groups of independent variables are entered into a regression analysis in one step, the influence of each variable on the outcomes measure is calculated, controlling for all other variables in the model. When additional variables are added to the model in an hierarchical analysis, the contribution of the variables entered later in the analysis is calculated as an increment over and above the variance already explained by the earlier variables (expressed as ΔR^2). The order of entry of the different explanatory variables is determined on theoretical grounds.

5.5.1 Predicting job satisfaction from individual and work characteristics

Four sets of potential explanatory variables were examined in separate multiple regression analyses to explain variation in job satisfaction. Individual differences were divided into two groups: demographic variables and personality factors. The demographic variables included were age (in years), sex (0 = male; 1 = female), marital status (0 = living as married; 1 =

³ Anxiety was selected as a measure of mental health in preference to the GHQ-12, as it is not so highly correlated with job satisfaction, and so represents a more distinct aspect of well-being.

single), and education level (0 - 4, as in Figure 5.1). The personality traits included were locus of control, Type A behaviour, neuroticism, and extraversion. Similarly, work characteristics were divided into measures of work pressure (number of hours worked per week, work demands and time urgency) and work resources (control, support from peers and support from senior colleagues). Role clarity measures were not included in these analyses, as these measures were not available for the whole sample.

Squared multiple regression coefficients (R^2), and hence the amount of variance in job satisfaction which is accounted for by these explanatory measures, were calculated for each set of variables. Regression coefficients for each variable are given in Table 5.5, and the relative strengths of each group of explanatory variables is shown in Figure 5.3. From Figure 5.3 it is clear that personality variables and work resources are more important predictors of job satisfaction than the demographic variables of level or work pressure. Age was the only demographic variable which showed any significant association with job satisfaction: consistent with previous research (e.g. Remondet and Hansson, 1991), older employees were more satisfied. Although neuroticism was significantly correlated with job satisfaction in zero-order correlations (Table 5.4), this association was not significant once other aspects of personality were accounted for: extraversion and an internal locus of control were the traits found to be associated with job satisfaction. Similarly, of the work resources measures, support from senior colleagues and control, were significantly associated with job satisfaction, while support from peers was not significant once these other factors were included in the multiple regression model.

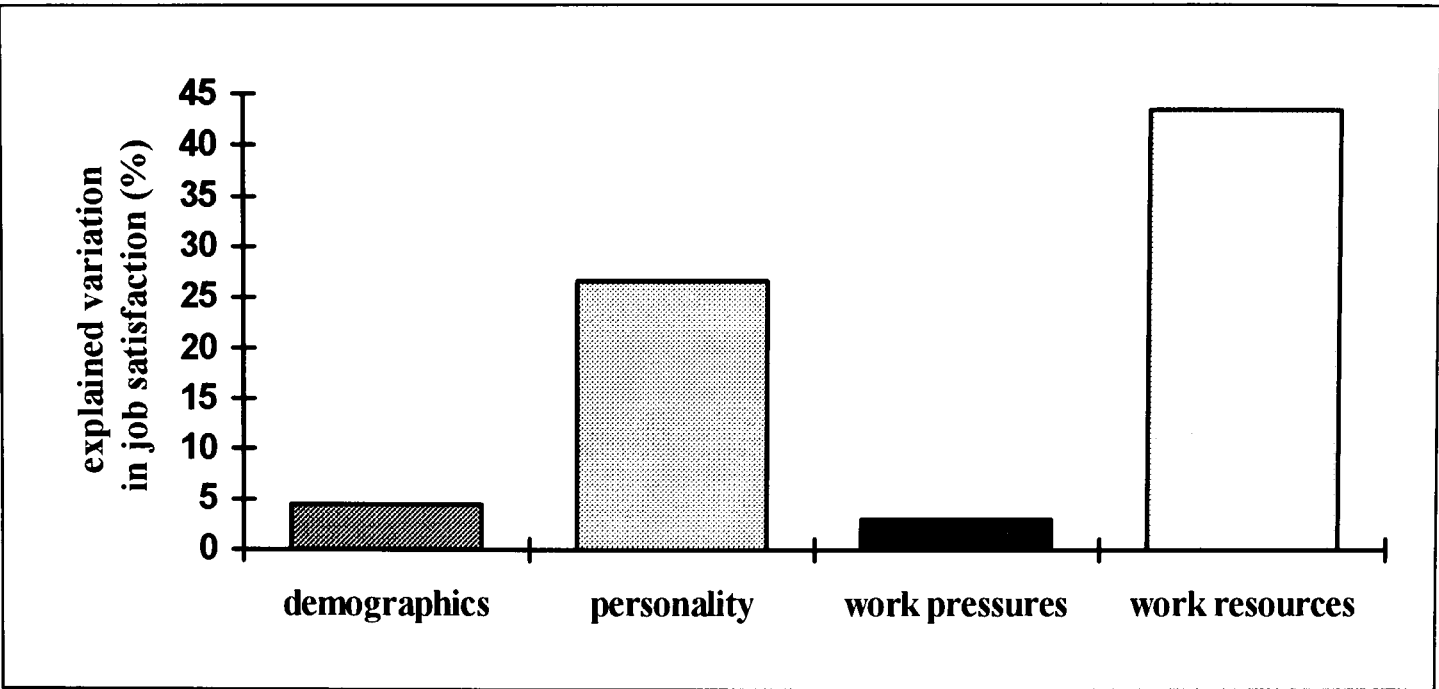


Figure 5.3 Relative contribution of individual and work characteristics in explaining variance in job satisfaction.

INDIVIDUAL DIFFERENCES
Demographic variables

Variable	Beta	Significance level
Age	.176	p < 0.05
Gender	-.051	ns
Marital status	.133	ns
Education level	-.102	ns
R ² model (df = 4,137)	.045	ns

JOB CHARACTERISTICS
Work pressures

Variable	Beta	Significance level
Work hours	.001	ns
Demands	.117	ns
Time urgency	.105	ns
R ² model (df = 3,119)	.029	ns

Personality measures

Variable	Beta	Significance level
Work LOC	-.402	p< 0.01
Type A Behaviour	-.074	ns
Neuroticism	-.131	ns
Extraversion	.204	p< 0.01
R ² model (df = 4,137)	.266	p< 0.01

Work resources

Variable	Beta	Significance level
Control	.303	p < 0.01
Peer Support	.008	ns
Senior Support	.540	p<0.001
R ² model (df = 4,136)	.434	p< 0.01

Table 5.5 Multiple regression analysis predicting job satisfaction from individual differences and job characteristics

5.5.2 *Predicting anxiety from individual and work characteristics*

Multiple regression analyses, using the same sets of potential explanatory variables were also performed with anxiety as the outcome measure. The results of these analyses are presented in Figure 5.4 and Table 5.6. Again, personality variables and work resources were found to explain more of the variance in outcome than either demographic factors or work pressures, although in this case, the variance accounted for by work pressures was statistically significant. Control and support from senior colleagues were again found to be the work resources which contributed significantly to variance in the outcome measure. In contrast, the personality factors contributing significantly to the explanation of (high) symptom report were neuroticism and Type A behaviour. The work pressure measure significantly predicting anxiety was perceived demands: reported number of hours worked and level of time urgency were not significant.

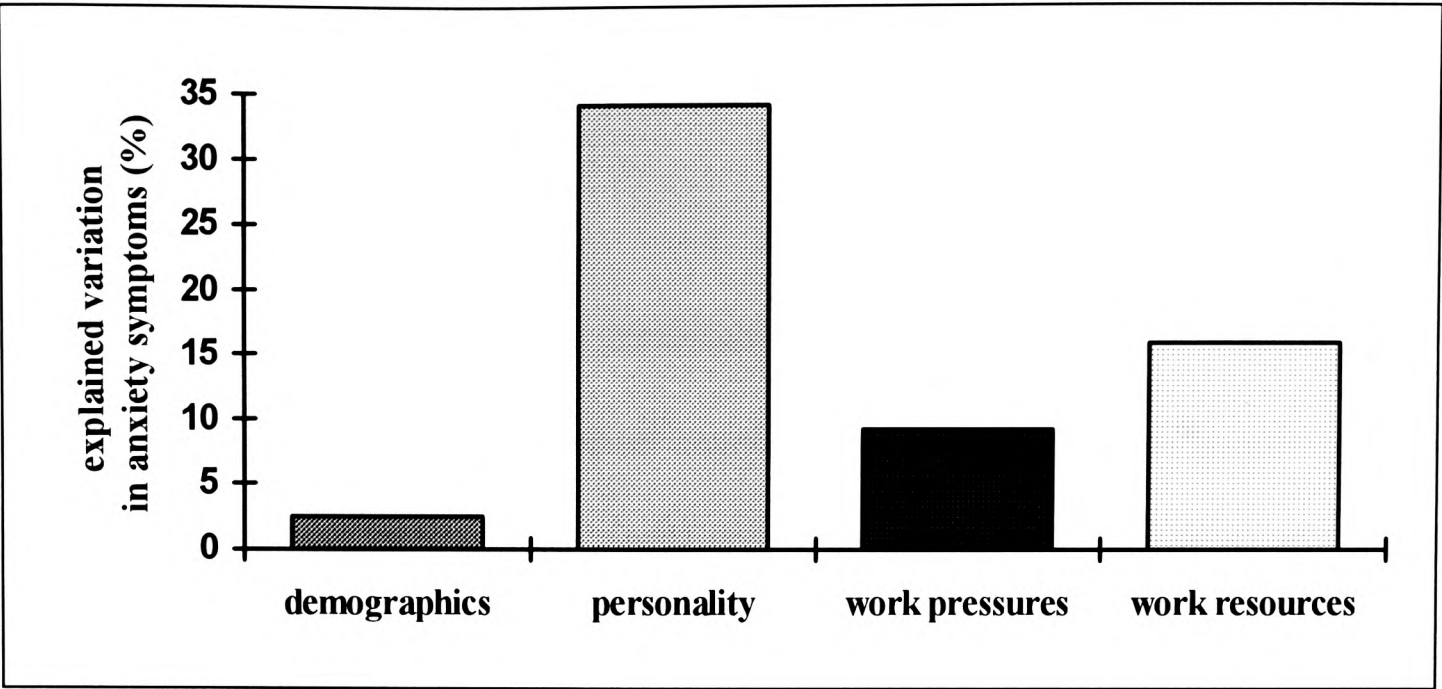


Figure 5.4 Relative contribution of individual and work characteristics in explaining variance in symptoms of anxiety

INDIVIDUAL DIFFERENCES
Demographic variables

Variable	Beta	Significance level
Age	.088	ns
Gender	.079	ns
Marital status	.108	ns
Education level	-.041	ns
R ² model (df = 4,136)	.025	ns

JOB CHARACTERISTICS
Work pressures

Variable	Beta	Significance level
Work hours	-.073	ns
Demands	.123	p<0.01
Time urgency	.026	ns
R ² model (df = 3,118)	.092	p<0.01

Personality measures

Variable	Beta	Significance level
Work LOC	.061	ns
Type A Behaviour	.153	p< 0.05
Neuroticism	.550	p< 0.01
Extraversion	.079	ns
R ² model (df = 4,136)	.342	p< 0.01

Work resources

Variable	Beta	Significance level
Control	-.221	p < 0.05
Peer Support	.081	ns
Senior Support	-.331	p< 0.01
R ² model (df = 3,126)	.159	p<0.01

Table 5.6 Multiple regression analysis predicting anxiety symptoms from individual differences and job characteristics

5.5.3 Examining joint influences of individual and work characteristics: hierarchical regression analysis

Hierarchical regression analyses were performed by entering blocks of variables into each analysis in a set order. The first group of variables were the demographic factors, as these are characteristics which an individual brings with them to work, or any situation. Similarly, personality is assumed to be relatively stable and independent of the work environment: this group of variables were entered second. In the final hierarchical step the work characteristics were entered as a single block, as there is no theoretical reason to discriminate between work pressures and resources.

This form of analysis allows the contribution of groups of variables entered later in the analysis to be calculated as an increment over and above the variance accounted for by the preceding variables. In addition, the overall variance accounted for by all variables together, can be derived from the final simultaneous model. The hierarchical models for the prediction of job satisfaction and anxiety are presented in Table 5.7, and relative contribution made by each variable block is displayed in Figure 5.5.

57.6% of the variance in job satisfaction was accounted for by the proposed explanatory variables. After accounting for stable differences in personality, work characteristics were found to explain a further 27% of variance in satisfaction. In contrast, for the prediction of anxiety, personality appears to be the main influence. The work characteristics as block, accounted for only an additional 9.6% of variance in anxiety once individual differences were included in the model: a total of 44.8% of the variance in anxiety symptom levels were accounted for in this way.

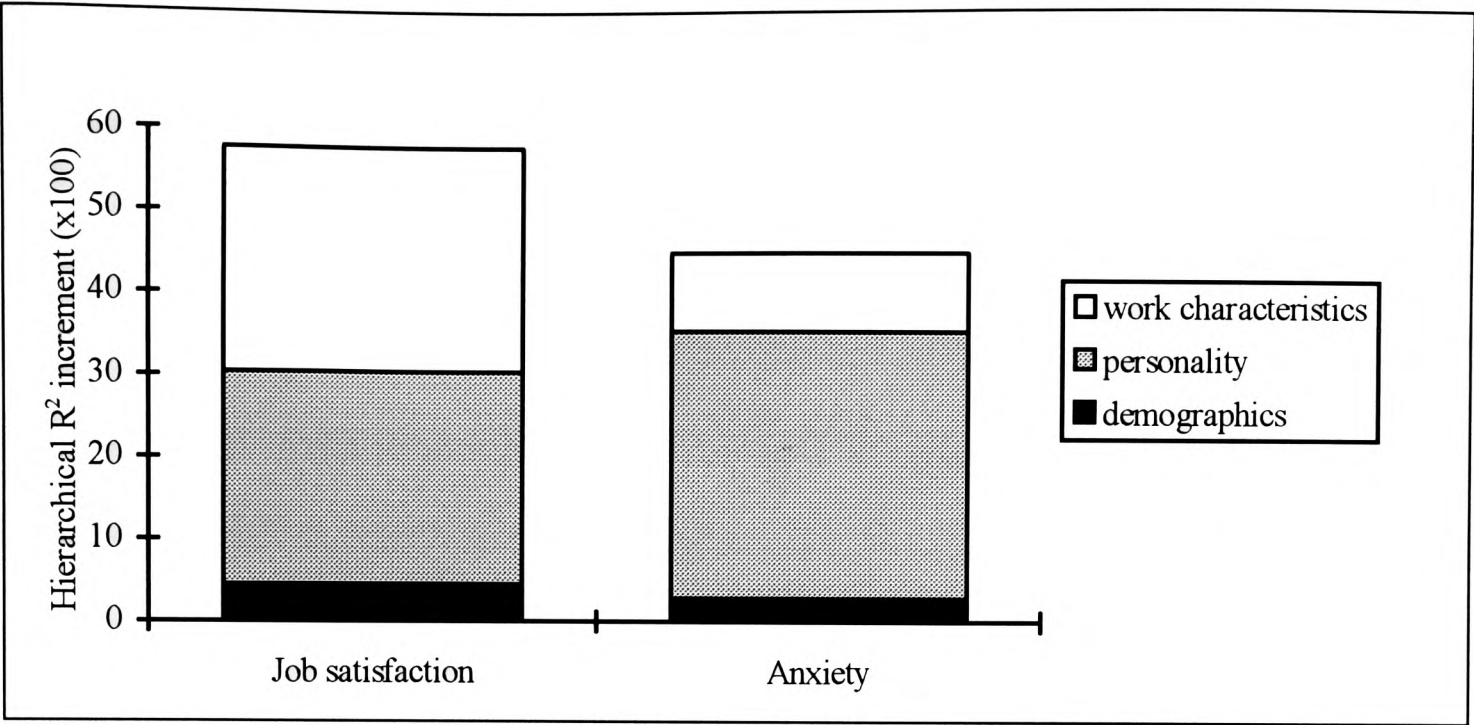


Figure 5.5 Stacked bar charts indicating percentage of variance in anxiety and satisfaction explained by the full regression models. The R^2 increment (ΔR^2) for each set of variables is taken from Table 5.7.

Source	Job satisfaction		Anxiety	
	ΔR^2	Final step β	ΔR^2	Final step β
Age		.029		.014
Gender		-.001		-.081
Marital status		.139*		.034
Education	.045	-.083	.028	-.040
Locus of Control		-.191**		.046
Type A Behaviour		-.019		.110
Extraversion		.060		.104
Neuroticism	.257**	-.039	.324**	.458**
Hours worked per week		-.025		-.110
Perceived demands		.062		.234*
Time urgency		.242*		-.061
Perceived control		.469**		-.172
Peer support		-.028		.033
Support from senior colleagues	.274**	.392**	.096**	-.194~
Overall R^2	.577**	df (14,106)	.448**	df (14,105)

~ $p < 0.10$ * $p < 0.05$ ** $p < 0.01$

Table 5.7 Hierarchical regression analyses predicting job satisfaction and anxiety from demographic variables, personality measures and work characteristics.

In the final simultaneous model for job satisfaction, high levels of satisfaction were associated with marital status (unmarried), internal locus of control, low time urgency, high perceived control and high support from senior colleagues. For anxiety, the individual variables making a significant contribution were high neuroticism, high perceived demand and low support from senior colleagues (marginally significant). Support from senior colleagues was therefore the only factor which was influential in explaining variance in both outcomes in the simultaneous analyses.

5.5.4 *Residualised analyses*

As the job satisfaction and anxiety measures are moderately correlated ($r = -0.38$, $p < 0.05$), there is a degree of overlap between the two outcomes, which might be referred to as non-specific symptomatology. While it can be useful to examine the influence of individual and work characteristics on this shared variance, it can also be instructive to examine that variance which is unique to each measure. This may be achieved by residualising each outcome for the other by entering the other outcome into an hierarchical analysis as a preliminary step (Broadbent 1985).

The results of residualised analyses were very similar to those already presented. Job satisfaction (residualised for anxiety) was predicted by marital status (unmarried), locus of control, time urgency, perceived control and support from senior colleagues. Anxiety (residualised for job satisfaction) was predicted only by neuroticism and perceived demand: support from senior colleagues appears to predict only that part of the variance in anxiety which is shared with job satisfaction.

5.5.5 *Differences between company groups*

As the respondent sample was drawn from several contrasting work environments, follow-up analyses were conducted in which variance in strain outcomes attributable to company differences were controlled. This was achieved through the creation of three dummy variables to represent four company groups: 1. small businesses; 2. bank; 3. consultancy group A; 4. consultancy group B. The small business group was used as the reference category. These dummy variables were entered as a preliminary block, prior to the hierarchical analyses presented in Table 5.7.

In the prediction of job satisfaction, this “company” block did not contribute significantly ($R^2 = .046$, ns). Furthermore, controlling for the variance attributable to company differences did not substantially alter the findings presented above. In contrast, the company block made a significant contribution to the explanation of variance in symptoms of anxiety ($R^2 = .173$, $p < 0.001$), such that the bank and consultancy samples experienced significantly lower levels of symptoms than the small business operators. However, despite this significant main effect, the model presented in Table 5.7 was only slightly changed. Specifically, after control for the variance due to company differences, the regression coefficient associated with perceived control was increased, and reached a statistically significant level ($\beta = -.275$, $p < 0.05$), and support from senior colleagues was reduced to below a statistically significant level. The overall model to predict anxiety, including control for company differences explained 54.5% of the variance ($df = 17, 102$).

5.6 Summary and Conclusions

Analysis of the data obtained in this cross-sectional survey enabled an examination of the psychometric properties of the questionnaire scales. Several scales had not been substantially altered, and these were generally found to exhibit similar psychometric properties to those reported in previous research. Where scales were modified, it was important to examine reliability and validity, and these were also generally acceptable.

An exception was the role conflict and ambiguity scales. Alterations made to these scales validated concerns expressed by Tracy and Johnson (1991) that the separation of items in factors analysis reflects positive and negative item-wording, rather than distinct theoretical constructs. A similar result was achieved in the factor analysis of the Work LOC scale, such that a two-factor solution merely discriminated between positively and negatively-worded items. Parkes (1988) has previously reported a distinction between positively and negatively worded items with the Paulhus spheres of control scales. These findings confirm the need for caution when deriving subscales from “balanced” questionnaire scales using principle components analysis.

Analyses exploring the relationships among individual differences, job characteristics and strain indicators further demonstrated the utility of the selected scales. Substantial proportions of variance in both job satisfaction and anxiety were accounted for using simple additive regression models of individual differences and work characteristics. Furthermore, hierarchical regression analyses revealed that, work characteristics, as a block, explained significant incremental variance in both job satisfaction and anxiety, after control for individual differences, including negative affectivity. This is consistent with the literature outlined at the beginning of this chapter (e.g. Brief et al., 1988; Turnage and Spielberger, 1991).

However, not *all* work characteristics and personality variables associated with strain outcomes in previous research significantly predicted satisfaction and/or anxiety in the present study. Specifically, neither hours worked per week, nor peer support added any unique explanation of the variance in when considered with other work characteristics. Likewise, neither extraversion, nor Type A behaviour was associated with the strain measures after the inclusion of work perceptions in the multiple regressions⁴. Consistent with previous research (e.g. Terry et al., 1993), neuroticism was more strongly associated with psychological distress than with job satisfaction. The finding that LOC predicted job satisfaction is also consistent with the research findings presented in Section 5.1, however the lack of association with anxiety was contrary to expectations. It should be noted that the strongest evidence for the association of internal LOC with good psychological health derives from research in which managers and professionals were experiencing some acute stressor, which was not the case in the present study.

Also consistent with past research (e.g. Broadbent, 1995; Ganster, 1989; Warr, 1990), work demands were more closely associated with symptoms of anxiety than with job (dis)satisfaction, while the opposite was true for perceptions of control. Additive effects of demand and control were not found for either the prediction of job satisfaction or anxiety, thus offering only equivocal support for the Karasek model of job strain, even in its simplest (additive) form. Finally support from senior colleagues was found to be a more important predictor of strain outcomes, being associated with both job satisfaction and (low) symptoms of anxiety. Again this is a finding consistent with the research literature discussed previously (e.g. Chay, 1993; Turnage and Spielberger, 1991).

⁴ Peer support, extraversion and Type A were all significantly associated with job satisfaction in simple correlations presented in Table 5.4. The reduction of these associations in multiple regression models indicates that the simple correlations are confounded or mediated by work characteristics. Indirect relationships are discussed further in Chapter 7.

One finding inconsistent with past research was the positive association of time urgency with job satisfaction. That is, individuals who perceived their work environment to require fast working to a high quality, also reported high job satisfaction; a finding contradicting the general association of more demanding work with negative outcomes. The reason for this anomaly may lie in the nature of the research sample: during an economic recession, professionals and managers particularly the self-employed, may prefer to be “busy” at work, rather than risk redundancy or bankruptcy.

From this summary it is clear that the different aspects of well-being are associated with specific combinations of individual and work characteristics. This finding has important implications for any programme of intervention which might be designed to alleviate problems of poor well-being: the programme likely to increase job satisfaction *and* reduce anxiety is one based on improving perceptions of support from senior colleagues.

Limitations of the pilot study

There are several limitations to the conclusions which may be drawn from the present study. In particular, the sample was drawn from a non-representative selection of companies, making it difficult to determine to what population the findings might generalise. In addition, the relatively small sample size limited the types of analyses which could be undertaken: in particular, the sample was too small to allow the testing of interaction effects, or to use structural equation modelling of the stress process. Furthermore, this was a cross-sectional survey, a research design which has been deservedly criticised (see Chapter 4). Although the reliance on self-report measures was improved by the statistical control for NA (neuroticism) in the hierarchical analyses, the addition of objective measures to supplement self-reports would strengthen causal arguments. Similarly, a longitudinal design would allow causal mechanisms to be more closely examined.

In the following chapters a more extensive research study is described, in which several of these limitations are addressed. Specifically, the sample was drawn from a single large company, and thus all respondents were not only involved in the same industry, but also worked within the same “company culture”. Furthermore, some independent information about the work environment was available to supplement questionnaire data. In particular, the literature reviewed in Section 3.3.4 indicated that job level may have an important role in the stress process, and in the main study it was possible to investigate the role of this factor. Finally, in the main study the sample size is sufficient to use the more sophisticated statistical analyses, and it was possible to extend the research longitudinally.

6. Retail Manager Study

Two research projects were undertaken in co-operation with a major retailing company. The general research aim was to examine the influence of individual and job characteristics on a range of strain indicators in retail employees. More specifically a longitudinal panel survey of head office and supermarket managers was conducted between May 1993 and July 1994, the “retail manager study”. In addition, responses to the specific stressor of a new supermarket opening were examined in the “relocation study”, discussed in Chapter 9.

6.1 Introduction

6.1.1 Stress research in retailing

Few academic studies of the stress process have been conducted within a retail environment. Retailing research (e.g. *Journal of Retailing*) has tended more often to focus on related issues of productivity, performance, organisational climate, and management style, than on the stress process as defined in this thesis. A few exceptions, of relevance to the present study, are briefly described.

Lusch and colleagues (Lusch and Jaworski, 1991; Lusch and Serpkenci, 1990) surveyed retail branch managers about different sources of control at work, role conflict and ambiguity, and job satisfaction. These self-report measures were also related to independent ratings of manager performance, and store productivity. Using latent variable modelling, they found that “self-control” (motivation for control) and “social-control” (presence of social norms to perform) had indirect influences on manager performance: the relationship

between these aspects of control and performance was mediated by role conflict and ambiguity. Furthermore, ratings of managerial performance were found to influence objective measures of store productivity. However, although conflict and ambiguity were also found to influence manager job satisfaction, satisfaction did not have any implication for store productivity.

Jimmieson and Terry (1993), also reported the mediation of control perceptions by role conflict and ambiguity, in predicting “employee adjustment” (depression, anxiety, job satisfaction, and depersonalisation) for a non-management sample of retail employees. Direct and moderating effects of control were also tested in this study, but it was concluded that the strongest evidence was for mediation. Furthermore, an internal locus of control predicted psychological health, as was reported in several studies reviewed in Chapter 5. Also consistent with previous research (e.g. Broadbent, 1985; Ganster, 1989; Warr, 1990), Jimmieson and Terry found that work overload was associated with poor psychological health, but not with job dissatisfaction. They concluded (p. 195) that “having a demanding job does not necessarily mean that it will be unsatisfying”.

This point, that specific outcomes are predicted by different causal factors, was a theme of Broadbent’s (1995) chapter. A longitudinal survey was conducted in a single large supermarket, with new recruits (non-managerial) over their first 6 months in the job. Using multiple regression to statistically control for pre-existing symptom levels and other background factors, demand was found to predict anxiety, and discretion predicted job satisfaction. Furthermore, the association between demand and anxiety was only significant for employees working more than 20 hours per week. That is, greater exposure to the stressor (work demands) resulted in greater strain (anxiety). Broadbent concluded that high work demands *cause* anxiety. Lack of support from supervisors was also correlated with

satisfaction and anxiety, although this factor was not significant in the multiple regression model.

These findings are generally consistent with research reported with other occupational samples. However, each of the studies described has significant limitations for application to the present sample of retail employees. In particular, each of the studies described addressed only a proportion of the variables implicated in the stress process and discussed in Chapters 1-3: personality factors examined were limited to locus of control and motivation for control. Furthermore, the studies by Jimmieson and Terry, and by Broadbent, included only non-management employees, and the work of Lusch only involved branch managers, and not the range of management positions involved in the present research.

Both the Broadbent and the Jimmieson and Terry studies were longitudinal, allowing the temporal separation of proposed predictors and outcomes, and therefore some control for response consistency effects. Moreover, independent measures were obtained in Lusch's and Broadbent's work in addition to self-report data. However, none of the studies included a control for negative affectivity, and therefore the associated self-report biases. The Broadbent study also suffered from a relatively small sample size, and thus conclusions drawn from more complex analyses are only tentative.

The present study builds upon this research. A wide range of both individual differences, work characteristics and strain outcomes are measured. Although the emphasis of the study is on questionnaire data, this is supplemented by some independent information. Furthermore, a longitudinal research design, combined with statistical control for negative affectivity reduces response consistency effects and hence the possibility of spurious correlations. Finally, the sample size is sufficient to allow the use of some complex statistical models, including confirmatory analyses to test the generality of past findings.

6.1.2 *Introduction to the company*

In the preliminary discussions in which this research project was designed, it was revealed that manager well-being was a particular concern to the company. The reasons for this concern were two-fold: firstly, company investment in management training is considerable and secondly, managers are key in their influence throughout the company hierarchy. Moreover, from a practical side, the company's experience indicated that managers were more likely than weekly paid employees to participate in voluntary research of the nature proposed.

With the exception of specific professions (e.g. accountants, surveyors, legal personnel), managers entering the company, currently do so through the retailing division. There are essentially three points of entry for a management trainee: internal application (by a non-management employee), A-level entry (by school-leavers), and graduate entry (by university degree-holders). This results in a broad range of educational backgrounds, although there is a tendency for graduate management trainees to transfer to head office roles during their career. Basic management training in the retail division training occurs over 1 year for graduates or 18 months for non-graduates. This is supplemented throughout a manager's career by additional training initiatives.

Retailing is a constantly changing business. Retailers are affected by both seasonal fluctuations, such as the Christmas rush, and longer term influences, like the introduction of new technologies. In the design phase of this research, it was not known exactly what changes would take place over the time scale of the survey. A major consideration was that six months prior to the survey a new Chief Executive Officer was appointed. This change in leadership created an air of expectation within the company that major changes would

“trickle-down” over the ensuing months and years, although the precise nature of any changes was unknown.

In addition, the general economic climate in 1993 was one of recession, resulting in aggressive marketing in the retail sector. Fortuitously for the research project, a major marketing campaign coincided with the second wave of the survey. Then, early in 1994 and just prior to the final survey wave, it was announced that the company would undergo major restructuring over the next 6 to 8 months. The aim of restructuring was to rationalise all supermarket operations and central services, and eliminate overlaps and duplication. It was estimated that nearly 1000 jobs would be removed, mainly in personnel and training functions. However, redundancies were minimised through early retirement offers and internal and external redeployment: furthermore overall employment in the company continued to increase through a programme of branch openings. Nonetheless, the impact of this “business process re-engineering” was felt greatly throughout both head office and retail functions, and was the dominant change occurring during the survey period.

Thus, in addition to the anticipated seasonal variations, at the time of the second questionnaire there was some expectation of imminent change, particularly within the head office, where people were aware of the existence of special review projects. By May 1994 and the final questionnaire, restructuring was in full swing, affecting managers throughout the company.

6.2 Recruitment of subjects and procedure

6.2.1 *Subject recruitment and survey outline*

Potential research participants were recruited from a range of hierarchical grades in both head office and retail functions within the company. The survey was designed as a three wave longitudinal study, over a one year period. As it was expected that there would be a substantial drop-out rate of participants over the survey period, an initial sample of 250 employees was targeted, to allow for a suitably large sample over the whole survey period. This was divided evenly between the two selected work environments (head office and retail divisions). A stratified sampling technique was utilised to ensure sufficient sample size at each hierarchical level of management: 50 junior, 50 middle and 25 senior managers from each work environment.

Random sampling, within each management level was undertaken by the company from the payroll database. Each potential research participant first received a letter of introduction to the research from a Company Director, explaining that they had been randomly selected to participate in an independent survey. Participants were informed that questionnaires would be sent out from Oxford University, and that all responses would be confidential; they were also informed that questionnaires could be completed in company time. One week following this introductory letter, participants were sent a questionnaire pack through the company's internal mail system. The pack included an introductory letter from the researcher explaining the aims of the survey, the questionnaire booklet, and a pre-paid address label to enable completed questionnaires to be returned directly to the Department of Experimental Psychology, Oxford.

One month after the questionnaire was sent, a reminder letter was sent to non-responders, requesting that questionnaires be completed and returned as promptly as possible. The response rate from this initial sample was 82%. Two months after the initial questionnaires were distributed, a supplementary sample of 77 employees was chosen, again randomly, to make up participant numbers to the target of 250. The same procedure was followed with this supplementary sample.

Six months following the initial questionnaires, the second questionnaire was distributed (the supplementary sample's questionnaires were sent a month later than this, i.e. 5 months after their first questionnaire). Again, a reminder was sent to all non-responders after one month. The final questionnaire was sent to all participants one year after the beginning of the survey. Questionnaires 2 and 3 were only sent to those employees who had responded to a previous questionnaire. To maintain confidentiality, questionnaires were matched using a coded research number rather than participants' names.

This methodology resulted in an approximately six month lag between survey waves for each participant (slightly less for the supplementary sample), with the second questionnaire arriving during the retail group's peak shopping period, pre-Christmas, and just after the introduction of a major marketing campaign. In the two months prior to the third questionnaire, company management restructuring was announced. Thus these data allow an analysis of employee perceptions of and responses to both a cyclical and more revolutionary workplace change.

6.2.2 *Description of the employee population and the randomly selected sample*

The participant company employed over 90,500 people during 93-94, of which over 14,000 were employed in full-time salaried positions. It was from this group of full-time employees that the manager sample (N=327) was drawn. The “head office” sample was drawn from a total population of 1899 managers. Middle and junior level managers for the “retail” sample were drawn from one of the six geographical regions (Central and Western region), then employing 1786 full time salaried managers. However, as senior managers make up only a small percentage of management in each geographical area, in order to obtain the requisite senior retail management sample, the 29 District Managers, from around Britain, were also invited to participate. Thus the management sub-population which was sampled comprised head office managers, retail managers in the Central Western area, and District Managers company-wide (3714 employees).¹²

6.2.2.1 Management Level. The company’s management is divided into junior, middle and senior hierarchical levels in both the retail and head office groups, within which there are several job grades. For the purposes of statistical analyses two different grading systems are used, a three-level categorisation (“management level”), and a more detailed 7-level ordinal system (“job grade”). Table 6.1 shows the naturally occurring distribution of managers in different levels of management. The management structure is somewhat pyramidal, with junior managers comprising 70% of the management population, and senior managers forming only 3%.

¹ It should be noted that during the survey period, the regional boundaries were redrawn: combined with transfers this resulted in several respondents working in a region other than Central and Western by the end of the longitudinal study.

²Unless otherwise stated, all descriptive statistics for company population were provided by from the company database (1/9/94).

A total of 8.8% of the target management population were invited to participate in the research project. This sample of 327 managers was distributed across levels of management as shown in Table 6.2. i.e. in approximately the ratio 2:2:1 for junior, middle and senior levels. This sampling technique deliberately over-represents upper levels of management, relative to their proportion in the company. Thus, while only 5.3% of eligible junior managers were included in the survey, 43.1% of eligible senior managers were invited to participate. Over-representation of senior managers allows sufficient sample size at all levels of management to examine the stress process across and within management levels. Senior managers were of particular interest from the outset of the research due to concern about the distinct pressures of these high level jobs, including their isolation from similar grade peers.

Management Level	Junior	Middle	Senior	Total Sample
Head Office	1027	763	109	1899
Retail (C&W)	1559	221	3	1786
Total	2586	984	115	3685

Table 6.1 Distribution of management in Head Office and Central and Western Area, from the company database.

Management Level	Junior	Middle	Senior	Total Sample
Head Office	69	63	30	162
Retail	67	66	32	165
Total	136	129	62	327
Percentage of management level represented	5.3%	13.1%	43.1%	8.8%

Table 6.2 Distribution of management **sample** according to management level.

6.2.2.2 *Gender.* Although the company has a clearly stated equal opportunities policy through which women have been encouraged into non-traditional work roles, only around 40% of managers are female, and these are concentrated in the junior grades. The distribution of women by management grade and location for the survey sample is shown in Table 6.3. Particularly noteworthy is the complete absence of female senior managers within the retail group. Therefore, because the stratified sampling of the survey is “top-heavy” relative to the company’s management hierarchy, the survey sample also under-represents women, with only 19.6 % of the sample being female.

Management Level		Junior	Middle	Senior	Total Sample
Head Office	Total Count	69	63	30	162
	% women	36.2	23.8	6.7	25.9
Retail	Total Count	67	66	32	165
	% women	37.3	10.6	0	19.4
Total	Total Count	136	129	62	327
	% women	36.8	17.1	3.2	19.6

Table 6.3 Distribution of women in management, for the survey sample.

6.2.2.3 *Age.* The age distribution of the target managers group is shown in Figure 6.1. This distribution is skewed, with the majority of managers in their 20s and 30s, and relatively few older managers. The average age of managers in the random sample was 37.1 years (sd = 9.8 years) at the time of the first survey, ranging from a minimum of 21 years to a maximum of 67 years. The distribution of ages in the survey sample is illustrated in Figure 6.2. Comparing Figures 6.1 and 6.2, it is clear that a higher proportion of older managers were included in the selected sample than exist in the target population: this is due to the stratified sampling which over-represents managers in senior positions.

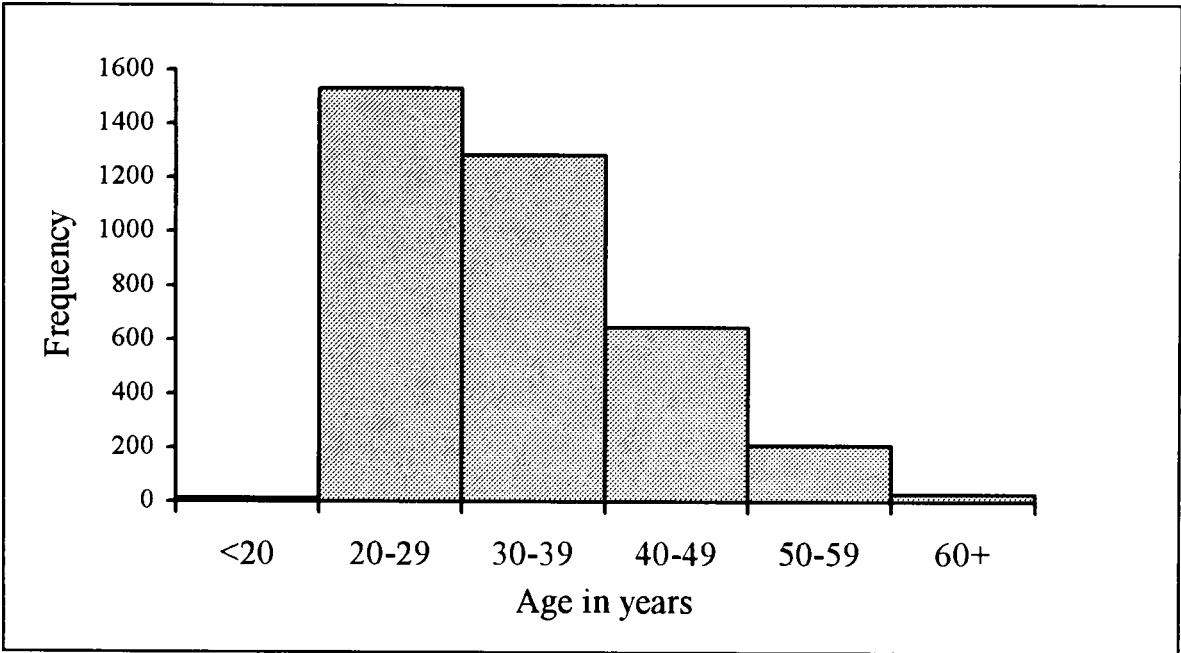


Figure 6.1 Age distribution of target manager group (N = 3714).

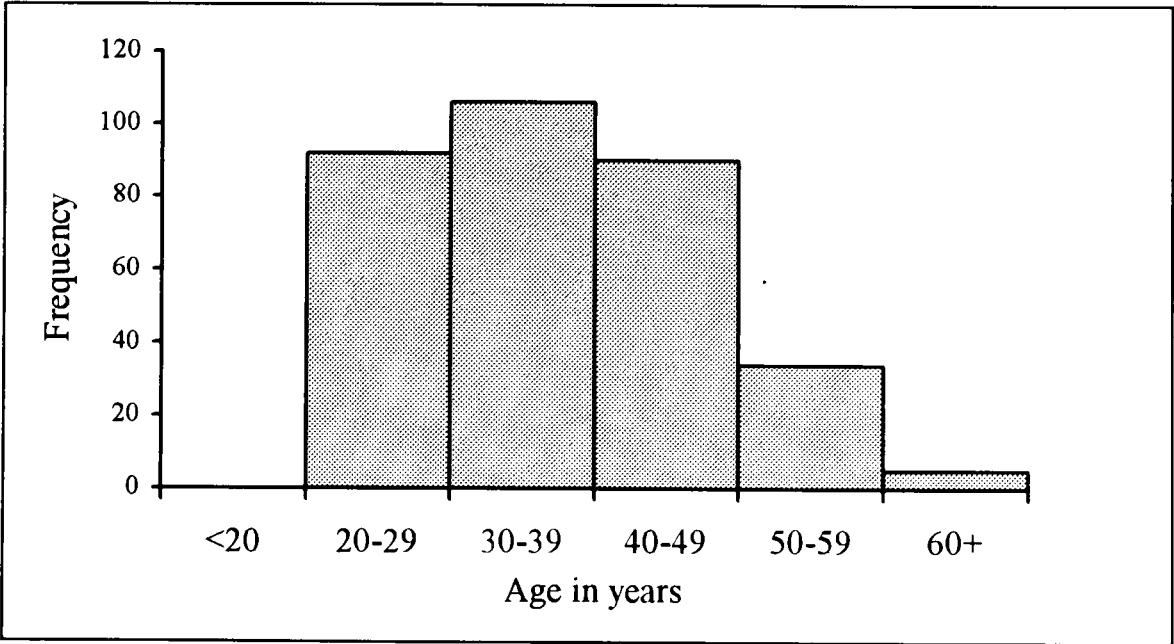


Figure 6.2 Age distribution of management sample (N=327)

6.2.2.4 *Company Tenure.* The tenure distribution of managers in the target population is shown in Figure 6.3. Again, due to the oversampling of senior management, the tenure distribution of the actual sample is biased toward those with longer tenure. The average company tenure for sample was 13.4 years (sd = 8.8).

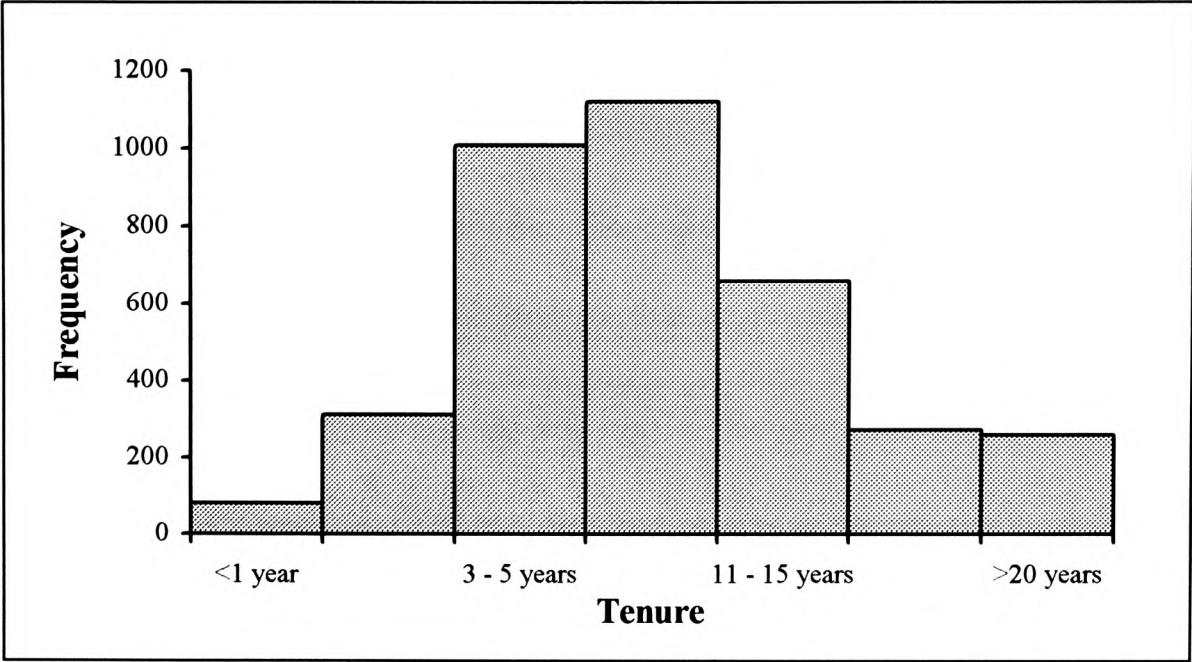


Figure 6.3 Distribution of target manager group according to tenure (N=3714).

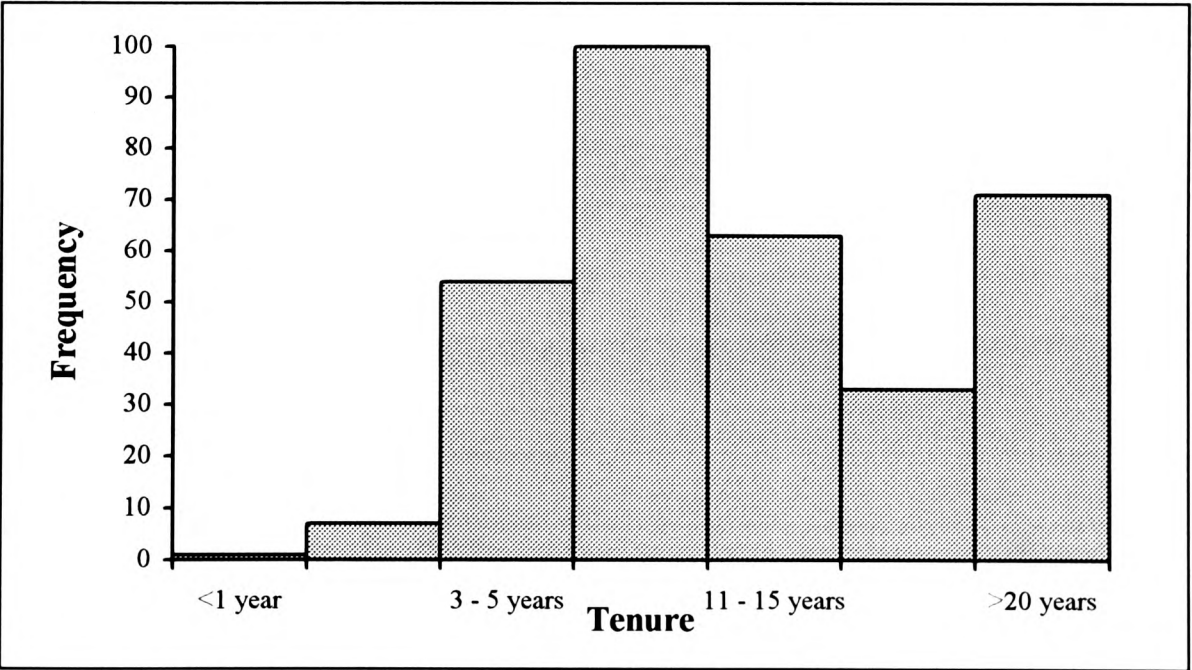


Figure 6.4 Distribution of manager sample according to tenure (N=327).

6.2.3 Response rates

Participation in the survey was voluntary. Thus, while a stratified random sample was selected to participate (N=327), only a proportion of these employees chose to complete the questionnaires. Sixty-six randomly selected employees did not respond to the first questionnaire, giving an 80% response rate at Time 1. 160 participants returned all three questionnaires (48.9% full response). Partial response (1 or more questionnaires returned) was achieved for a further 106 employees. This level of response is high relative to other mailed questionnaire surveys in this field (e.g. McLaney and Hurrell, 1988; Spector, 1987). Furthermore some non-responders can be accounted for due to employee turnover, which is approximately 8.5% for managers. More detailed response levels for each survey wave are outlined in the flowchart, Figure 6.5

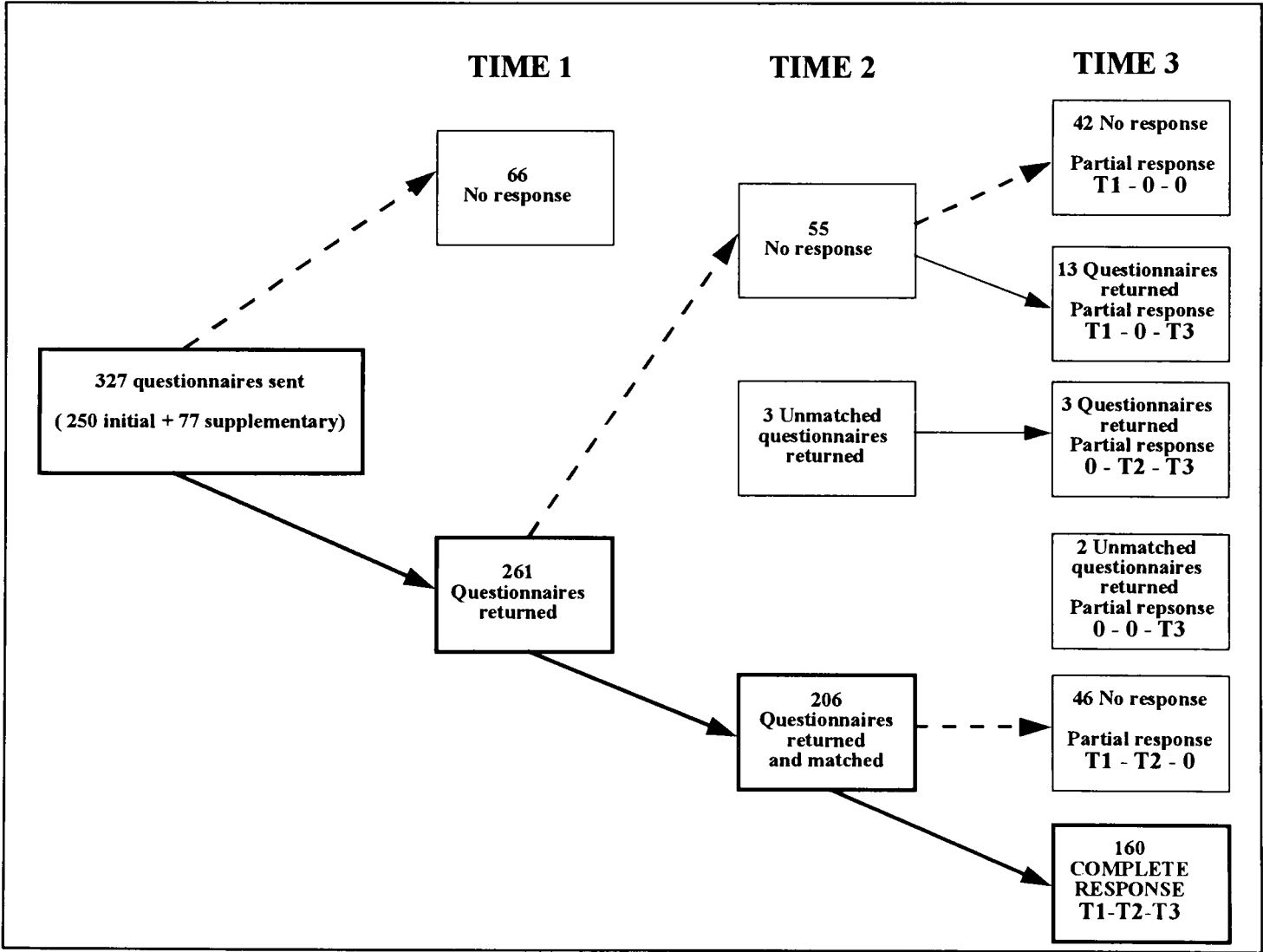


Figure 6.5 Flowchart of response rates for each survey.

6.2.4 *Description and representativeness of respondents*

Employees' level of participation in the survey varied from no response, to partial response, to full response. A total of 265 employees returned at least one questionnaire. It is important to establish whether those who participated in the survey were representative of the wider target population of managers, or whether the voluntary sample is systematically biased.

Several comparisons may be made. In Section 6.2.2 personal background information (job grade, gender, age, and length of company service) was presented for both the target population and the selected sample. In this section, employees with different levels of response in the survey (full responders, partial responders and non-responders) are compared on these factors. Additionally, comparisons are made between full and partial responders, in terms of job characteristics, individual differences and outcomes measured in the first questionnaire.

6.2.4.1 Personal background. The breakdown of the respondent group by managerial level was very close to that intended in the stratified sampling (and not in the ratio in which these grades occur in the company), that is a ratio of 1:2:2 for senior: middle: junior managers. Comparing employees with different response levels, it was found that senior management were more likely to respond, and to respond to all three questionnaires ($\chi^2 = 9.51$; $df = 4$, $p < 0.05$). A similar correlation of response rate with job grade was also reported by North et al. (1993) among British Civil Servants. This difference is illustrated in Figure 6.6. Thus although senior managers are over-represented in the survey, their high levels of response suggest that there is no difficulty with voluntary response bias within this group.

Management Grade	Head Office	Retail
Junior managers	56	48
Middle managers	49	58
Senior managers	27	27

Table 6.6 Breakdown of participants by location (Head Office or Retail) and management level.

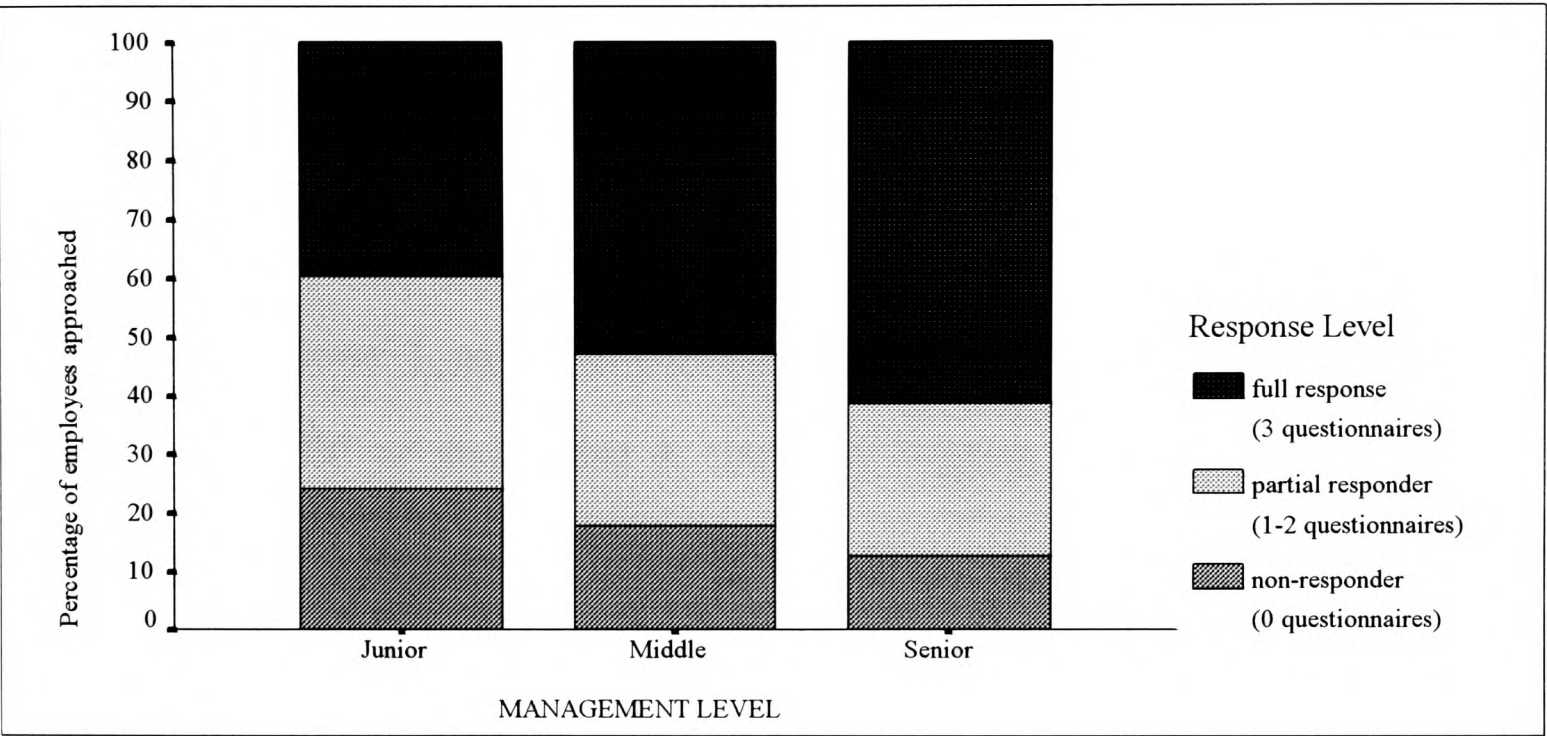


Figure 6.6 Difference in response according to management level.

The group of participant employees (full and partial response) were 22.2% female, with an average age of 37.10 years (sd = 9.6 years), and an average length of company service of 13.6 years (sd = 8.9 years). There were no significant differences in terms of age or gender between different levels of response. However in terms of tenure, full responders had a significantly longer service record than partial or non-responders (ANOVA $F=3.40$, $df = 2,324$, $p<0.05$). This difference might be confounded with the observed difference in response by more senior managers, and is graphed in Figure 6.7.

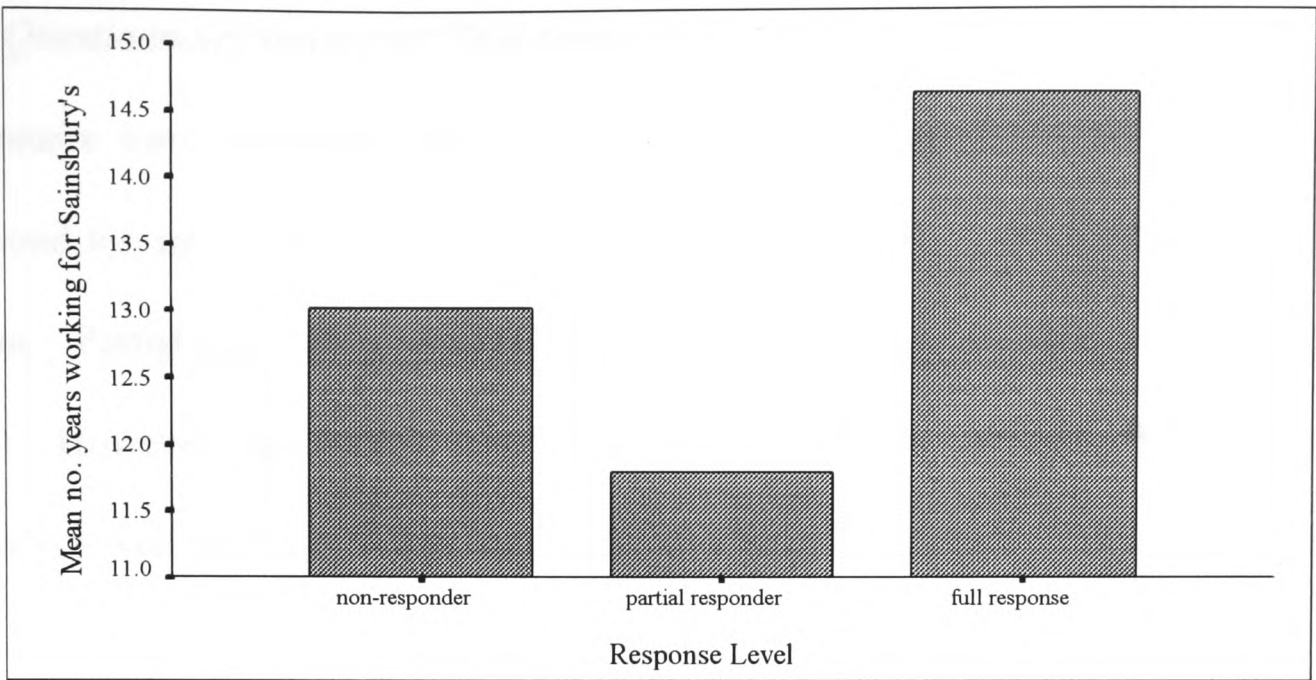


Figure 6.7 Differences in company service across response levels.

From responses in the first questionnaire, managers’ educational background was categorised as follows: 1. no formal qualifications; 2. GCSE/ O-levels or equivalent; 3. A-levels, HND, BTEC or similar; and 4. University Degrees. A difference in educational background between the Head Office and Retail managers is seen in Figure 6.8. Head Office managers were more likely to hold University degrees than their retail counterparts. This trend was also evident from company records, with 547 (29%) Head Office managers holding university degree, compared with 65 (4%) Central and Western managers. There was however, no significant difference in response rates according to educational background.

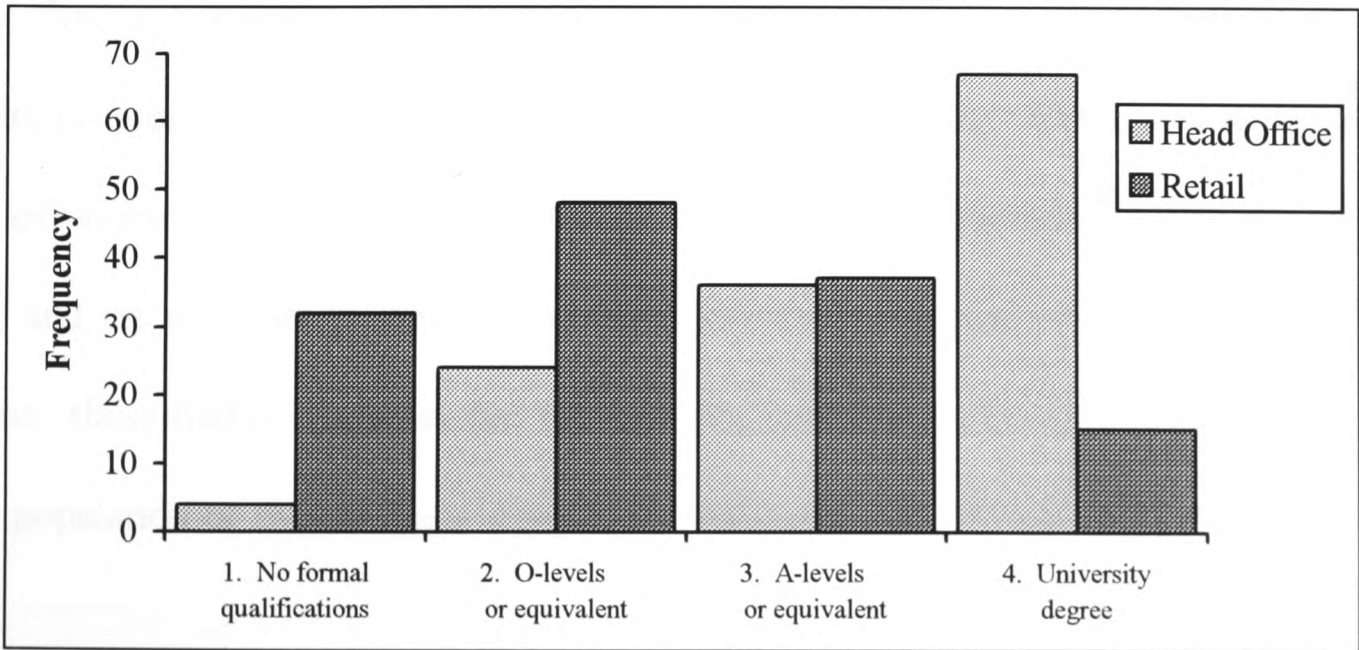


Figure 6.8 A breakdown of respondent sample according to educational background

6.2.4.2 Questionnaire measures. Differences between full and partial responders on the first questionnaire were examined using independent samples Student's t-tests. No differences were found for any of the work-related measures, including job satisfaction, nor for health measures. Partial responders were slightly more extraverted than full responders ($t = 2.1$; $p < 0.05$). However care should be taken in interpreting this finding; given the number of t-tests which were performed, one statistically significant is expected to occur due to chance.

6.2.4.3 Summary. Stratified sampling resulted in a participant group who were unrepresentative of the company's management population, in that senior levels of management are over-represented. Although this strategy allows an examination of the stress process within the different management grades, the over-representation of senior managers also results in an under-representation of women, young managers, and managers with short company service.

Furthermore, senior managers were more likely to reply to questionnaires than either middle or junior managers. In fact there was a 100% participation rate among the initial sample of head office senior managers for the first two surveys. Evidence of self-selection bias among the remainder of the sample is minimal. There were no significant differences in age or gender between responders and non-responders. Furthermore, comparing responses on the first questionnaire, partial and full responders did not vary systematically in their answers to questions regarding job characteristics or well-being. There was a tendency for more extraverted managers *not* to respond to all three questionnaires, but this was only slight, and on no other personality measure was there any significant difference. Taken together, these findings suggest that the research findings can be validly generalised to the wider population of the company's managers, although analyses should take account of job grade.

6.3 Questionnaire Design

6.3.1 *Description of scales and measures*

The majority of the questionnaire scales included in the survey were those described in Chapter 5. Where refinement of scales was required, modification was based on the pilot work. Furthermore additional questions concerning individual background and experience were phrased in an objective and factual manner.

In addition to the information obtained by questionnaire, some data was provided from company records. Information provided included gender, age, job grade and company tenure (all provided at the beginning of the survey period). Sickness absences records for the two financial years, 1992-1993, and 1993-1994 were also provided for a subset of the sample.

The survey measures are divided into three broad categories: individual differences, job characteristics, and strain indices. The questionnaire scales are briefly described below under these categories, and unpublished scales are presented in Appendix II.

6.3.1.1 *Individual Differences*

Extraversion, Neuroticism and Social Desirability were measured using the 12-item subscales of the Revised Eysenck Personality Questionnaire (Eysenck et al., 1985). The extraversion and neuroticism scales were described in Chapter 5. The social desirability subscale gives as an indication of the extent to which an individual has completed the questionnaire to present him or herself in an (unrealistically) positive light; it is composed of items for which the most socially acceptable answer is unlikely to be true. Sample items are “Have you ever cheated at a game?” and “Do you always practice what you preach?”: all

questions were answered in a yes-no response. Social desirability response is of particular concern in occupational settings, as discussed in Chapter 4.

Type A Behaviour was measured using a 30-item scale, with each item presented on a 5-point Likert response scale. The scale was adapted from that described in Chapter 5, with 3 redundant items concerning eating behaviour replaced with 3 questions from the Framingham Type A Behaviour Pattern scale which address job involvement (Haynes, Levine, Scotch, Feinleib and Kannel, 1978). The scale was designed to address both the “achievement orientation” and “impatience-irritability” dimensions of the Type A personality, however principle components analysis of the 30 items did not consistently reproduce this two factor structure, and so this scale is used as a single factor.

Locus of Control Locus of control was measured using Spector's (1988) 16-item work locus of control scale, as described in Chapter 5.

6.3.1.2 Job Characteristics

Demands. Perceived workload was measured using a 20 item self-report scale adapted from Sauter (1989).

Control. Perceived control was measured using 14 items from Sauter's (1989) scales.

Time Urgency. This 22-item scale, adapted from Schriber and Gutek (1987), refers to the general work culture rather than an individual job, and was described in Chapter 5.

Hours worked per week. This was a single-item self-report measure, completed in each questionnaire, with reference to the previous working week.

Role Conflict and Ambiguity. Role conflict and ambiguity were measured using a scale adapted from Rizzo et al. (1970), altered as described in Chapter 5. Although factor loadings for a 2-factor solution were consistent with the theoretical factors for all three survey waves of this sample, examination of the screeplots of eigenvalues suggests that a

single factor solution may be more parsimonious. The single “role clarity” factor accounted for over 30% of variance.

Social Support was measured using two scales adapted from House (1981): senior colleague support (6 items), and peer support (4 items).

6.3.1.3 Strain Indices

Job satisfaction was measured with the 10-item job satisfaction scale, adapted from Parkes (1993b).

Cognitive Failures The 12-item “cognitive failures” questionnaire was developed by Donald Broadbent, and measures the extent to which an individual has experienced minor lapses in memory and concentration *over the preceding six weeks*. Although initially intended to capture short-term changes in cognitive functioning, later work with this scale indicates that this dimension is quite stable and trait like (Broadbent, Cooper, Fitzgerald and Parkes, 1982).

General Health Questionnaire The physical and psychological health scales described in Chapter 5 were also included in each questionnaire. Thus there were separate subscales to measure general well-being, anxiety, depression, somatic symptoms and social dysfunction: items were drawn from the General Health Questionnaire (GHQ; Goldberg, 1972; 1978) and the Middlesex Hospital Questionnaire (MHQ, Crown and Crisp, 1966).

Work Absence Work absence data was provided from company records for both the 1992-1993 financial year and the survey year (1994-1994). Two measures were derived: the number of absence episodes (a frequency measure), and the total number of days absent (a time lost measure). The nature of company records of absence resulted in substantial missing data (valid N = 67).

6.3.2 *Reliability and validity of questionnaire measures*

Several indices of reliability are available for each questionnaire scale. As the survey was longitudinal, internal consistencies (Cronbach's α) were calculated at each wave in addition to test-retest reliabilities, for 6 and 12-month intervals. Although the job characteristics and strain indices were taken at all three waves, personality measures were only included at Time 1 and Time 3. All available measures of reliability are shown for each scale in Table 6.7

The conventionally acceptable level of internal consistency is $\alpha \geq 0.70$ (Nunally, 1978). The majority of scales showed internal consistencies well in excess of this level. However, for 4 scales (control, role conflict, social support from peers and depression) alpha fell slightly below this level in at least one survey wave. Item-total correlations did not suggest that the internal consistency of any of these scales could be significantly improved by item deletion without compromising the coverage of the theoretical domain. However, both the control scale and the depression scale had internal consistencies which were close to, and sometimes in excess of the 0.70 standard, and so are used without alteration. Returning to the factor analytical evidence presented for the role conflict and ambiguity scales in Chapter 5, combining these 2 scales to form a "role clarity" scale results in higher internal consistency in all three waves ($\alpha = .84, .83, .82$), and may therefore be considered a superior scale. Finally the support from peers scale not only has a relatively low internal consistency, but was also shown to be a less important predictor of strain than support from senior colleagues in the pilot study reported in Chapter 5. This scale is not used in subsequent analyses.

Test-retest correlations (Pearson's r) between scales gives an indication of the intraindividual stability of responses to the same questions over time. In the current survey there is a relatively long time period between waves, and so while significant correlation might be expected, some change, particularly in the job characteristics and strain scales

would also be predicted; personality scales however are expected to show high stability, even over the 12 month interval.

In general, the findings presented in Table 6.7 are in accord with these expectations. All scales were significantly correlated over time, indicating that previous behaviour (or attitude) is a good predictor of future behaviour. Job characteristics and strain measures showed similar or higher correlation over a six-month retest compared with the one-year retest, suggesting that changes in work conditions and well-being vary slightly over time: social dysfunction was the least stable of these measures. The personality scales showed considerable stability over a one year period ($r > 0.70$ for most measures) with the exception of locus of control. As indicated in Chapter 3, locus of control has been previously shown to be responsive to environmental pressures (e.g. Anderson, 1977). Job satisfaction and cognitive failures were highly stable over the 12 month period, at a level similar to that found for personality characteristics. Such stability has led some researchers to conclude that these constructs are more dispositionally oriented than situational (Broadbent et al. 1982; Staw Bell and Clausen, 1986). For analyses of the stress process job satisfaction will be retained as a strain measure, due to its wide use in the research literature; cognitive failures are not further analysed.

RELIABILITY COEFFICIENT		INTERNAL CONSISTENCY			TEST-RETEST RELIABILITY		
SCALE	Wave	T1	T2	T3	T1-T2	T2-T3	T1-T3
	N	259-263	207-210	176-179	202-209	160-166	170-176
PERSONALITY	Number of items						
1. Extraversion	12	.84	*	.85	*	*	.84
2. Neuroticism	12	.81	*	.81	*	*	.75
3. Social Desirability	12	.75	*	.77	*	*	.75
4. Type A	30	.78	*	.77	*	*	.73
5. Locus of Control	16	.75	*	.81	*	*	.60
WORK CHARACTERISTICS							
6. Demands	20	.85	.89	.90	.70	.70	.64
7. Time Urgency	22	.75	*	*	*	*	*
8. Hours worked per week	1	*	*	*	.72	.69	.66
9. Control	14	.68	.69	.71	.68	.69	.65
10. Role conflict	8	.74	.69	.71	.61	.69	.54
11. Role ambiguity	6	.81	.82	.81	.58	.68	.50
12. Social support: peers	3	.67	.63	.69	.48	.46	.47
13. Social support: senior colleagues	6	.86	.83	.86	.69	.61	.58
STRAIN INDICES							
14. Job satisfaction	10	.84	.82	.81	.76	.78	.75
15. Cognitive Failures	12	.82	.85	.85	.78	.81	.78
16. GHQ-12	12	.85	.88	.87	.42	.43	.35
17. Somatic symptoms	7	.78	.83	.82	.44	.39	.36
18. Anxiety	7	.83	.85	.83	.54	.52	.41
19. Social dysfunction	7	.70	.77	.73	.23	.19	.19
20. Depression	7	.67	.69	.76	.44	.45	.46

* shown where reliability coefficient could not be calculated

Table 6.7 Internal consistencies and test-retest reliabilities for all questionnaire scales.

Discriminant and convergent validity were examined by correlating all questionnaire scales at Time 1. Correlations were calculated only for those participants with complete data (N=244). The resulting correlation matrix is shown in Table 6.8 (presented as Tables 6.8.1 to 6.8.3). Discriminant validity is threatened if the correlation between theoretically distinct scales approaches the internal consistency of either scale. In comparison, significant correlation between theoretically related scales is evidence of convergent validity (Campbell and Fiske, 1959). A further threat to questionnaire validity lies in response bias: thus the relationships of stressor and strain measures with negative affectivity and social desirability requires examination.

In questionnaire construction, care was taken to select items to eliminate content overlap between job characteristics, personality and strain scales and maximise discriminant validity. In addition, the correlations between different scales were examined. Although there are significant correlations between many of the questionnaire scales, in general these correlations are not as high as the internal consistencies reported in Table 6.7. This indicates that the different scales are addressing distinct (although correlated) underlying constructs. For example, several scales (role conflict, role ambiguity, control, support from senior colleagues) are highly correlated with job satisfaction.

An exception is the pattern of correlations among the symptom scales of the General Health Questionnaire. Although, some convergence is expected for these similar measures, many correlations approach the reported internal consistencies for these scales, indicating poor discriminant validity: these theoretically distinct measures appear to be tapping a single underlying mental health dimension. Therefore the general 12-item GHQ measure is utilised to encompass all aspects of psychological well-being. Job satisfaction was not as highly correlated with these health measures, suggesting this is distinct aspect of well-being.

Convergent validity is also observed in the high correlations between other theoretically similar scales, for example the demands and time urgency scales were highly correlated ($r = .35, p < 0.01$). Role conflict and role ambiguity were also found to be highly correlated. However, consistent with the meta-analysis reported by Jackson and Schuler (1985), each variable showed somewhat unique relations with other variables. Thus, although in many instances these two scales may be combined into a single scale of “role clarity”, an argument for the use of separate scales can also be made.

Positive self-presentation, or socially desirable response is thought to be particularly problematic when questionnaires are completed in a work context, as despite assurances of confidentiality, respondents may believe that their responses will affect their employment situation (Moorman and Podaskoff, 1992). Furthermore, some types of questions might be more susceptible to contamination in this way, and hence to threaten validity. The social desirability scale was significantly correlated with role conflict and ambiguity, cognitive failures, GHQ-12 and depression. It is therefore possible that at least to some extent, these scales measure social desirability rather than the named construct. Social desirability should therefore be statistically controlled in analyses involving these variables. Similarly, the high correlations between the neuroticism scale and the general health questionnaire scales (except social dysfunction) is consistent with the need to control for neuroticism when examining the causes of high symptom report.

Table 6.8. Matrix of intercorrelations among survey variables (Pearson r). Due to space limitations the matrix has been divided into 3 separate tables for presentation. Correlations were calculated from measures included in the first questionnaire. Correlations were calculated for respondents with complete data (N=244). All correlations for which $p<0.05$ are shown in bold.

MEASURE	1	2	3	4	5	6	7	8
INDIVIDUAL DIFFERENCES								
1. Age								
2. Gender (F=1, M=0)	-.21							
3. Tenure	.65	-.34						
4. Extraversion	-.11	.07	-.09					
5. Neuroticism	-.19	.11	-.08	-.19				
6. Social Desirability	.27	-.07	.16	-.17	-.20			
7. Type A Behaviour	-.03	-.16	.14	.14	.09	-.07		
8. Locus of Control	-.03	.11	-.17	-.16	-.17	-.02	-.23	
WORK CHARACTERISTICS								
9. Job Grade (7 level scale)	.39	-.33	.52	-.06	-.19	.09	.39	-.30
10. Demands	.03	-.01	.19	.00	-.02	.13	.44	.02
11. Time Urgency	-.11	.03	.07	-.04	-.02	.05	.23	.11
12. Hours worked per week	.15	-.25	.35	.03	-.14	.01	.40	-.24
13. Control	.13	-.05	.04	.14	-.21	-.02	.10	-.35
14. Role conflict	-.12	.00	-.06	-.15	.17	-.21	.00	.44
15. Role ambiguity	-.17	.07	-.19	-.22	.19	-.12	-.21	.44
16. Social support: peers	.05	-.06	.15	.23	-.16	-.08	.02	-.25
17. Social support: senior colleagues	.12	.04	.10	.19	-.15	-.03	.04	-.36
STRAIN INDICES								
18. Job satisfaction	.34	-.09	.26	.11	-.28	.10	.17	-.43
19. Cognitive Failures	-.15	.31	-.13	.01	.36	-.37	-.01	.09
20. GHQ-12	-.10	.12	-.06	-.22	.50	-.15	-.02	.19
21. Somatic symptoms	-.14	.11	-.10	-.05	.42	-.11	.09	.12
22. Anxiety	-.09	.05	-.02	-.17	.57	-.11	.04	.15
23. Social Dysfunction	.09	.09	.02	-.07	.17	-.03	-.09	.10
24. Depression	-.10	.02	-.05	-.15	.53	-.13	.05	.15

Table 6.8.1 Correlations with individual differences.

MEASURE	9	10	11	12	13	14	15	16	17
WORK CHARACTERISTICS									
9. Job Grade (7 level scale)									
10. Demands	.19								
11. Time Urgency	-.05	.53							
12. Hours worked per week	.52	.26	.18						
13. Control	.30	-.19	-.42	.11					
14. Role conflict	.08	-.23	-.25	.05	.34				
15. Role ambiguity	.18	.03	-.02	.21	.31	.59			
16. Social support: peers	.29	.01	-.07	.20	.24	-.08	-.03		
17. Social support: senior colleagues	.18	-.13	-.24	.11	.49	-.47	-.41	.28	
STRAIN INDICES									
18. Job satisfaction	.41	.03	-.17	.25	.53	-.46	-.54	.20	.56
19. Cognitive Failures	-.25	-.02	-.06	-.24	-.09	.15	.15	-.05	.01
20. GHQ-12	-.16	.10	.04	-.16	-.22	.26	.22	-.06	-.23
21. Somatic symptoms	-.17	.14	.07	-.12	-.11	.14	.08	-.09	-.23
22. Anxiety	-.12	.19	.11	-.11	-.22	.18	.15	-.08	-.16
23. Social Dysfunction	-.05	-.01	-.03	-.08	-.04	.12	.02	-.01	-.13
24. Depression	-.13	.10	-.01	-.11	-.18	.22	.18	-.07	-.24

Table 6.8.2 Correlations with job characteristics.

MEASURE	18	19	20	21	22	23
18. Job satisfaction						
19. Cognitive Failures	-.16					
20. GHQ-12	-.31	.29				
21. Somatic symptoms	-.23	.23	.61			
22. Anxiety	-.21	.28	.77	.62		
23. Social Dysfunction	-.14	.10	.62	.33	.29	
24. Depression	-.32	.25	.75	.60	.73	.34

Table 6.8.3 Correlations among outcome variables

6.3.3 Descriptive statistics

Means and standard deviations for the survey scales are presented in Table 6.9. Use of published scales allows comparison of average scores to those obtained in previous research. In particular, Eysenck et al. (1985) reported means for large samples of adult males and females for the three short EPQ-R scales. Furthermore, the sample of white collar workers described in the study in Chapter 5 completed many of the same questionnaire scales.

As the present sample was nearly 80% male, the average scores for the EPQ-R scales were compared with the norms reported for adult males. Relative to Eysenck et al.'s norms, the managers were significantly more extraverted ($t = 2.20$, $p < 0.05$), but similar in terms of neuroticism ($t = 0.42$, ns). Furthermore, social desirability scores were slightly higher than those reported by Eysenck et al. ($t = 3.86$, $p < 0.05$). This finding is consistent with the suggestion that in occupational research subjects are more likely to present themselves in an unrealistically positive light than in other research samples (Moorman and Podaskoff, 1992).

Many of the questionnaire scales included in the present study were identical to those reported for the pilot study in Chapter 5. Independent samples t-tests were performed to assess the significance of any differences between these two samples. The results of these tests are presented in the final column of Table 6.9. Although the present sample differed from Eysenck's norms, as discussed above, there were no significant differences between this and the pilot study sample on any personality measure. In terms of work characteristics, the retail managers reported significantly longer working hours, more demanding and time urgent workload, and lower levels of control: however these characteristics were combined with lower role ambiguity. Finally, the present sample reported significantly higher job satisfaction and health (GHQ-12, somatic symptoms and depression) than the pilot study sample.

Measure	Mean	Standard deviation	t (relative to pilot study)
BACKGROUND FACTORS			
1. Age	37.13 years	9.82	N/A
2. Gender (F=1, M=0)	22% female		N/A
3. Tenure	13.5 years	8.87	N/A
4. Job Grade (7 point scale; range:6-12)	7.96	1.37	N/A
PERSONALITY			
5. Extraversion	7.22	3.40	+ 0.93
6. Neuroticism	4.82	3.22	+ 0.49
7. Social Desirability	4.65	2.79	N/A
8. Type A Behaviour	103.42	12.16	N/A
9. Locus of Control	41.83	8.37	0.86
WORK CHARACTERISTICS			
10. Demands	78.74	8.91	+ 4.31*
11. Time urgency	78.04	9.23	+ 6.12*
12. Hours worked per week	49.65 hours	6.89	+ 7.60*
12 Control	40.83	6.69	- 3.89*
13. Role conflict	17.25	5.85	- 0.51
14. Role ambiguity	9.44	4.85	- 6.98*
15. Social support: peers	5.76	1.79	- 2.10*
16. Social support: senior colleagues	10.78	3.72	- 0.96
STRAIN INDICES			
17. Job satisfaction	28.71	5.55	+ 2.48*
18. Cognitive failures	15.74	6.20	N/A
19. GHQ-12	10.37	4.55	- 2.25*
20. Somatic symptoms	4.97	3.17	- 2.21*
21. Anxiety	5.12	3.40	- 1.35
22. Social dysfunction	6.68	2.05	- 1.25
23. Depression	5.61	2.82	- 21.78*
24. Absence spells	2.78 spells	1.84	N/A
25. Absence days	10.57 days	15.20	N/A

Table 6.9. Means and standard deviations for all questionnaire scales and some background variables. Calculated for sample with complete data at Time 1 N= 261, except for absence data, N=67.

The final column gives the independent samples t statistic for comparison with the pilot study sample of Chapter 5 for those scales which were included in both studies. * p < 0.05

6.4 Summary

The retail managers study builds upon past stress research, and more specifically extends the research which has been conducted within a retail setting. This chapter outlined the methods used in this study, together with psychometric analysis of the questionnaire scales. Scales were generally found to display adequate internal consistency, convergent and discriminant validity, mostly very similar to that established in the pilot study described in Chapter 5. The longitudinal survey design also allowed an examination of temporal stability of scales (test-retest reliability), and these were again found to be appropriate to the theoretical constructs being measured. Finally the retail managers were compared with the pilot study sample on all scales common to both studies. Although the two samples were very similar in terms of personality characteristics, significant differences in perceived work characteristics and strain outcomes were revealed.

Chapter 7 presents the findings of more detailed analyses of the first retail manager survey: this includes an investigation of the relative contribution of individual differences and work perceptions in explaining variations in strain outcomes, and testing of moderation and mediation pathways specified in the Michigan Model. In Chapter 8, causal mechanisms of the stress process are investigated with the use of latent variable modelling and longitudinal data from the retail manager survey. Finally, the absence data obtained for a subset of the manager sample are analysed, together with the relocation sample in Chapter 10.

7. Cross-sectional Analysis of Manager Study

7.1 Introduction

The survey method of the retail managers study was outlined in the Chapter 6. As is common in longitudinal studies, response rates fell during the survey period, such that there was a significantly larger sample at Time 1 than subsequently. To take advantage of this larger data set, initial analyses were cross-sectional, concentrating on Time 1 data (N=261). Several aspects of the stress process are explored. In Section 7.2 six work environments are compared: individual differences, work characteristics, and strain are examined across head office and retail locations for junior, middle and senior levels of management.

Furthermore, this chapter involves the empirical testing of some of the stress models described in Chapter 1, as potential explanations of observed patterns of strain responses. In particular, the Michigan Model of the stress process describes direct, mediated and moderated influences of individual differences and work characteristics on strain outcomes. In addition, Karasek's Demand-Control Model and the Person-Environment Fit Model describe moderators of stressor-strain relations.

In Section 7.3 direct effects are examined using hierarchical multiple regression. Additive models, describing the joint influence of individual and situational characteristics on job satisfaction and psychological distress are presented. This technique also allows the relative contribution of individual differences and work factors to the explanation of variation in strain outcomes to be compared. In addition some indirect mediated influences and suppression effects are noted. Section 7.4 explores in detail several proposed moderation effects in the stress process, including demand-control interactions as well as more general buffering effects by situational and individual characteristics.

7.2 Differences between work environments

It is expected that the requirements of different jobs within a company would be reflected in differences both in job characteristics, and levels of strain. In particular, past research has demonstrated significant variation in both job characteristics and strain outcomes according to job grade (see Section 3.3.4). Furthermore, systematic differences in personality might be expected in different job types. In the present study it was possible to distinguish between two broad work locations (head office and retail divisions) and three management grades (junior, middle and senior), thus forming 6 distinct job categories. The mean scores on the questionnaire scales for each of these job categories are displayed in Table 7.1.

The aim of the analyses in this section is to investigate differences between the two locations and across the three management grades. Because the variables analysed are correlated, multivariate analysis of variance (MANOVA) was selected as the appropriate statistical technique. MANOVA is a procedure in which group differences for several correlated variables can be analysed simultaneously. This reduces the probability of Type I error, relative to conducting separate analyses for each variable. Three separate MANOVAs were performed: for personality traits, job characteristics, and strain indices.

Several multivariate statistics for each effect (location, grade, and *location x grade* interaction) are given in the SPSS MANOVA output. These are Pillai's Trace, Wilk's Lambda, Hotelling's Trace, and Roy's Largest Root. Each of the test statistics can be transformed to have a distribution that approximates the F distribution with associated degrees of freedom, from which a test of significance is determined. Of these statistics, Pillai's Trace is the most powerful and also the most robust (Norusis, 1985), and hence it is the significance of this statistic which is the criterion reported.

Location	Retail Group			Head Office Group		
Management Grade	Junior	Middle	Senior	Junior	Middle	Senior
Questionnaire scale						
PERSONALITY SCALES (N=259)						
WLOC	44.09	38.81	35.70	44.24	44.96	40.44
Type A	98.43	107.20	112.26	98.64	101.69	109.44
Neuroticism	5.28	4.28	3.96	5.63	5.14	3.60
Social desirability	4.92	4.33	5.44	4.31	4.74	4.64
Extraversion	7.20	8.07	7.02	7.55	6.35	6.80
WORK CHARACTERISTICS (N=249)						
Role conflict	18.74	16.22	15.58	16.46	19.39	17.00
Role ambiguity	7.85	5.05	4.92	9.29	9.84	7.88
Work hours	46.84	53.51	59.38	44.61	47.57	51.56
Demand	79.82	80.64	83.00	73.94	78.59	79.62
Time urgency	83.91	81.20	80.96	74.29	73.62	75.04
Control	37.32	40.87	43.21	39.05	43.07	42.96
Support from seniors	8.49	10.72	11.29	10.72	12.17	11.85
Support from peers	4.91	5.80	6.63	5.40	5.95	6.70
STRAIN INDICES						
Satisfaction	26.69	29.39	32.56	25.83	29.38	31.70
Anxiety	5.98	4.84	4.26	5.33	4.86	5.11
Depression	6.08	5.57	4.78	5.84	5.59	5.26
Social dysfunction	7.04	6.75	6.37	6.64	6.47	6.96
Somatic complaints	6.65	5.14	3.82	5.36	4.37	4.78

Table 7.1. Means for questionnaire scales by location and management grade.

If a statistically significant multivariate effect is found, univariate effects can be usefully examined to indicate which of the variables contribute to the overall observed differences. As in univariate analysis of variance, higher order (interaction) effects are examined before lower order (main) effects. Main effects are discussed when the interactions are non-significant, as these can be misleading to interpret in the presence of an interaction (Norusis, 1985).

7.2.1 *Personality characteristics*

The multivariate test of differences in personality characteristics is shown in Table 7.2: traits differ significantly across locations and management grades, but the multivariate interaction effect was not statistically significant. Examining the univariate findings, work locus of control (WLOC) differs across both management grade and location. Subgroup means for WLOC are graphed in Figure 7.1, showing that head office managers were more external in their control beliefs than retail managers, and that external control beliefs were higher among more junior managers. (The univariate interaction effect for WLOC was also statistically significant, such that the difference between head office and retail was greater for middle and senior managers relative to junior managers). Univariate main effects for management grade were also observed for Type A behaviour and neuroticism, such that more senior managers were found to be higher in Type A but lower in neuroticism¹. There were no differences according to job category for either extraversion or social desirability in univariate analyses.

¹ Group differences in Type A were not explained by differences between Achievement Striving and Impatience-Irritability: both factors were found to be higher in senior managers

Personality	Location	Management grade	Interaction
Multivariate Test	F = 3.27** (df = 5, 249)	F = 7.09*** df = (10, 500)	F = 1.63, ns (df = 10, 500)
Univariate Effects WLOC Type A Neuroticism Social desirability Extraversion	(df = 1, 253) F = 12.91***	(df = 2, 253) F = 10.42*** F = 21.27*** F = 4.86**	(df = 2, 253) F = 3.98*

Table 7.2 Differences in personality characteristics. N = 259.
Relevant test statistics are shown for significant univariate effects only.

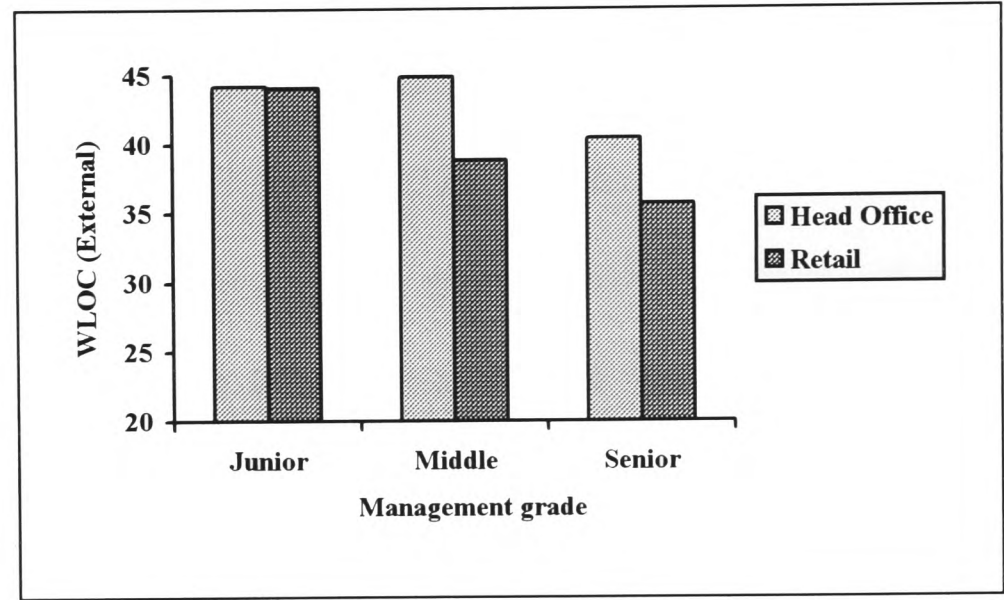


Figure 7.1 Group mean scores for work locus of control scale.

Thus, more senior managers were relatively ambitious and impatient, but emotionally stable, and holding internal control beliefs. These are characteristics which might be expected in successful managers, as there is evidence that they are adaptive in terms of job performance and/or coping with work pressures (e.g. Bluen et al., 1990; Jimmieson and Terry, 1993). However, it is not clear whether group differences reflect recruitment patterns into different types of jobs, or self-selection into different jobs by individuals. A further possible explanation is that the job conditions experienced in different roles act to reinforce certain beliefs and attitudes which are then reflected in responses to trait scales.

7.2.2 *Work characteristics*

Table 7.3 presents the findings from multivariate and univariate analyses of variance of work characteristics. Work characteristics were jointly predicted by management grade and location, including a significant interaction effect. Examining the univariate results, interactions between management grade and location were significant for role conflict, role ambiguity and hours worked per week.

Figure 7.2 illustrates the interaction effect for hours worked: retail managers, and those in more senior positions, reported longer working hours. The interaction effect is evident in that the head office-retail differential is greater for more senior managers. In contrast to data reported by Kahn et al. (1984), both role conflict and role ambiguity, were lower for more senior managers. In addition retail managers generally reported lower conflict and ambiguity than those in head office: group means for role ambiguity are graphed in Figure 7.3. The interaction is apparent in that for the retail group, the major difference is between junior managers versus middle and senior managers, but in head office, it is between senior managers versus middle and junior managers. Univariate main effects were in the following directions: retail managers reported higher job demands and greater time urgency than head office managers, and more senior managers reported higher demands but also higher control and greater social support than their juniors.

In summary, retail managers generally reported higher work pressures (demand, time urgency, hours worked), but also greater role clarity. Consistent with previous research (e.g. Karasek and Theorell, 1990; Lunberg, 1991), although senior managers reported longer working hours and higher demands, they also experienced relatively high levels of control, social support and role clarity. Significant interactions indicate that differences between head office and retail groups were not constant at all management levels.

Work characteristics	Location	Management grade	Interaction
Multivariate Test	F=18.56*** (df = 8, 236)	F=8.39*** (df = 16, 474)	F= 1.96* (df = 16, 474)
Univariate Tests	(df = 1,243)	(df=2, 243)	(df = 2, 243)
Role conflict			F = 5.85**
Role ambiguity	F = 26.45***	F = 4.12*	F = 3.51*
Work hours	F = 55.95***	F = 57.71***	F = 5.41**
Demand	F = 10.62**	F = 4.91**	
Time urgency	F = 47.56***		
Control		F = 13.03***	
Support: seniors		F = 6.66**	
Support: peers		F = 13.37***	

Table 7.3 Differences in job characteristics. N=249.
Relevant test statistics are shown for significant univariate effects only (p < 0.05).
* p <0.05; ** p <0.01; *** p < 0.001.

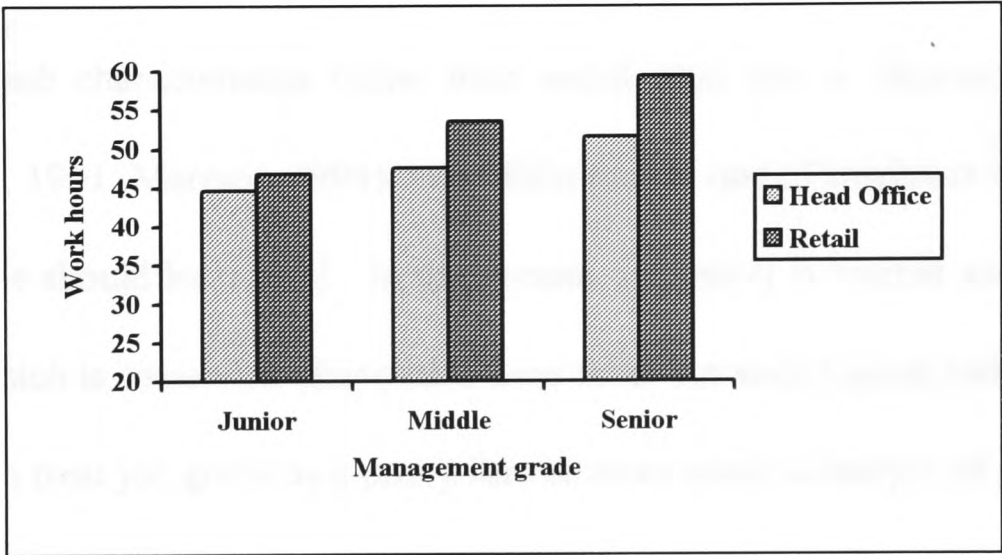


Figure 7.2 Group differences in reported number of hours worked per week.

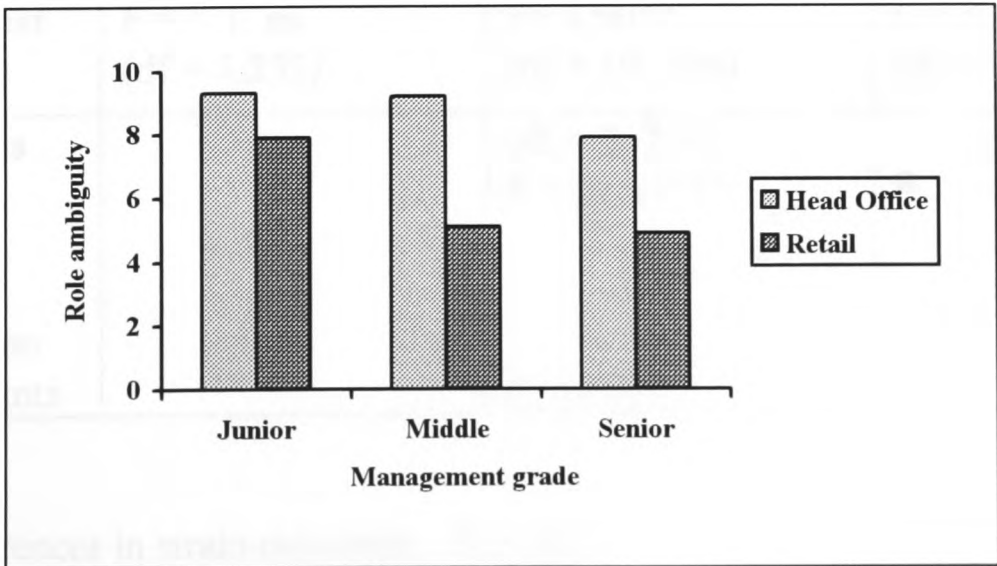


Figure 7.3 Group differences in reported role ambiguity.

7.2.3 Measures of strain

A summary of the multivariate and univariate analyses of variance for strain indices is presented in Table 7.4. (The 12 item GHQ was not included due to the very high degree of overlap, including shared items, with the depression and anxiety scales.) Multivariate differences in strain outcomes were found only for management grade and not location. In particular, univariate analyses revealed that more senior managers reported higher levels of satisfaction and lower levels of (physical) symptoms than more junior managers.

This finding is consistent with the literature outlined in Section 3.3.4. While some researchers refer to this pattern as a class differential, such that better health and well-being is enjoyed by higher socio-economic groups, others suggest that the differential occurs due to experienced job characteristics rather than social class per se (Karasek and Theorell, 1990; Lundberg, 1991; Marmot, 1994). The difference is one of emphasis in how a variable such as job grade should be treated. In the present analysis it is treated as an objective job characteristic which is somewhat changeable over time, but sociological and epidemiological researchers often treat job grade as a proxy for the more static construct of social class.

Strain indices	Location	Management grade	Interaction
Multivariate Test	F = < 1, ns (df = 5,252)	F= 4.90** (df = 10, 506)	F = < 1, ns (df = 10, 506)
Univariate Tests Satisfaction Anxiety Depression Social dysfunction Somatic complaints		(df = 2, 256) F = 24.67*** F = 2.96*	

Table 7.4 Differences in strain outcomes. N = 262.
Relevant test statistics are shown for significant univariate effects only (p<0.05).
* p <0.05; ** p <0.01; *** p < 0.001.

7.2.4 *Summary*

Job characteristics, personality and experienced strain were all shown to vary significantly across management grade in multivariate tests. Senior managers were more emotionally stable, but higher in Type A behaviour and internal control beliefs than more junior managers. Furthermore, although senior managers reported higher work pressures (longer working hours and more demanding work), this was combined with high levels of control, social support and role clarity. Finally, senior managers reported lower levels of strain, particularly in terms of job satisfaction and somatic symptoms. As all three classes of variable vary significantly with job grade, there is a potential for the confounding of job grade with other independent variables in analyses to predict strain. Therefore, in further analyses, management grade is statistically controlled.

In addition to variation across management grade, job characteristics and personality measures differed significantly between retail and head office locations. In general, retail managers reported higher work pressures, but also greater role clarity and more internal locus of control beliefs. However, as there were no significant differences in strain between the two locations, it is not necessary to control for location in analyses to predict strain.

7.3 Relative contribution of individual differences and work characteristics in explaining differences in strain

To examine the relative contribution of individual and work characteristics in influencing strain outcomes, hierarchical multiple regression analyses were conducted to predict two contrasting strain indices: job satisfaction and psychological distress. Multiple regression allows only one dependent variable to be examined in each analysis. The GHQ-12 was selected to represent health-related outcomes (“psychological distress”) rather than repeating analyses for anxiety, depression, social dysfunction and somatic symptoms. Additive models of the stress process are discussed in Section 7.3.1. In addition, hierarchical regression revealed several indirect pathways of influence. The indirect effects of mediation, suppression and confounding are discussed in Section 7.3.2, including a comparison of the result of the treatment of job grade as a class indicator versus its treatment as an objective work characteristic. Finally, Section 7.3.3 presents residualised analyses, in which the relative contribution of a block of independent variables is assessed as an increment, after statistical control for all other predictors in the additive model.

7.3.1 Hierarchical regression: main effects models

The order of entry of the independent variables into each hierarchical regression analysis is determined on theoretical grounds. In the first step, background demographic variables were entered as these are considered to be stable characteristics which an individual brings to the work situation. The sociodemographic variables included were: age, gender (coded 0 = male, 1 = female), marital status (coded 0 = single; 1 = cohabiting or married), education (4 point ordinal scale) and job grade (7 point ordinal scale). Note that in this

analysis job grade is treated as a proxy for social class and is therefore grouped with stable demographic variables rather than with the more changeable job characteristics.

In the second step of the analysis, the five traits (extraversion, neuroticism, social desirability, locus of control, and type A behaviour) were entered as a block. Thus the incremental contribution of personality is assessed after control for the influence of demographic variables. In the third and final step of the hierarchical analysis, work characteristics are entered, assessing the incremental contribution of work environment perceptions after control for all individual differences. The results of the hierarchical analyses to predict job satisfaction and psychological distress are summarised in Table 7.5, and illustrated in Figure 7.4.

Each set of independent variables made a statistically significant contribution to the explanation of variance of job satisfaction and psychological distress. However in Figure 7.4 the size of the contribution of each of these blocks is seen to differ substantially between the two outcomes. A much greater proportion of the variance in job satisfaction is explained than for psychological distress. Furthermore, job characteristics and demographic variables are more powerful predictors of job satisfaction than of psychological distress. The majority of the variance in psychological distress explained was due to stable differences in personality.

An examination of standardised regression coefficients (β s) for each variable reveals more detail. Within each block of predictors, different individual variables influence each of the strain outcomes. Thus, age and job grade are associated with job satisfaction, while education is associated with psychological distress. Locus of control and neuroticism are associated with job satisfaction, while extraversion and neuroticism are associated with psychological distress. Finally, psychological distress is related to perceived job demands, but job satisfaction is associated with control, support and (low) role ambiguity.

Independent Variables	Job satisfaction			Psychological distress (GHQ-12)		
	ΔR^2	β at entry step	Final step β	ΔR^2	β at entry step	Final step β
STEP 1 DEMOGRAPHIC VARIABLES						
Age		.192*	.163**		-.084	-.021
Gender		.086	.037		.081	.078
Marital status		.052	.005		.080	.121*
Education		-.063	-.014		-.087	-.101
Job grade	.219**	.353**	.135*	.047*	-.116	-.017
STEP 2 PERSONALITY						
Extraversion		.068	-.035		-.142*	-.117*
Neuroticism		-.137*	-.083		.445**	.425**
Social Desirability		-.001	-.018		-.095	-.103
Locus of Control		-.325**	-.074		.089	-.005
Type A Behaviour	.138**	.027	-.008	.271**	-.009	-.045
STEP 3 WORK PERCEPTIONS						
Hours worked per week			.018			-.075
Perceived demands			.090			.160*
Time urgency			-.016			-.089
Perceived control			.228**			-.037
Support: senior colleagues			.253**			-.068
Role conflict			-.077			.081
Role ambiguity	.230**		-.223**	.041*		.032
Overall R^2	.587**	df (17,227)		.359**	df (17,226)	

Table 7.5 Hierarchical regression analyses predicting job satisfaction and general well-being from demographic variables, personality measures and work characteristics.
~ p < 0.10 * p < 0.05 ** p < 0.01

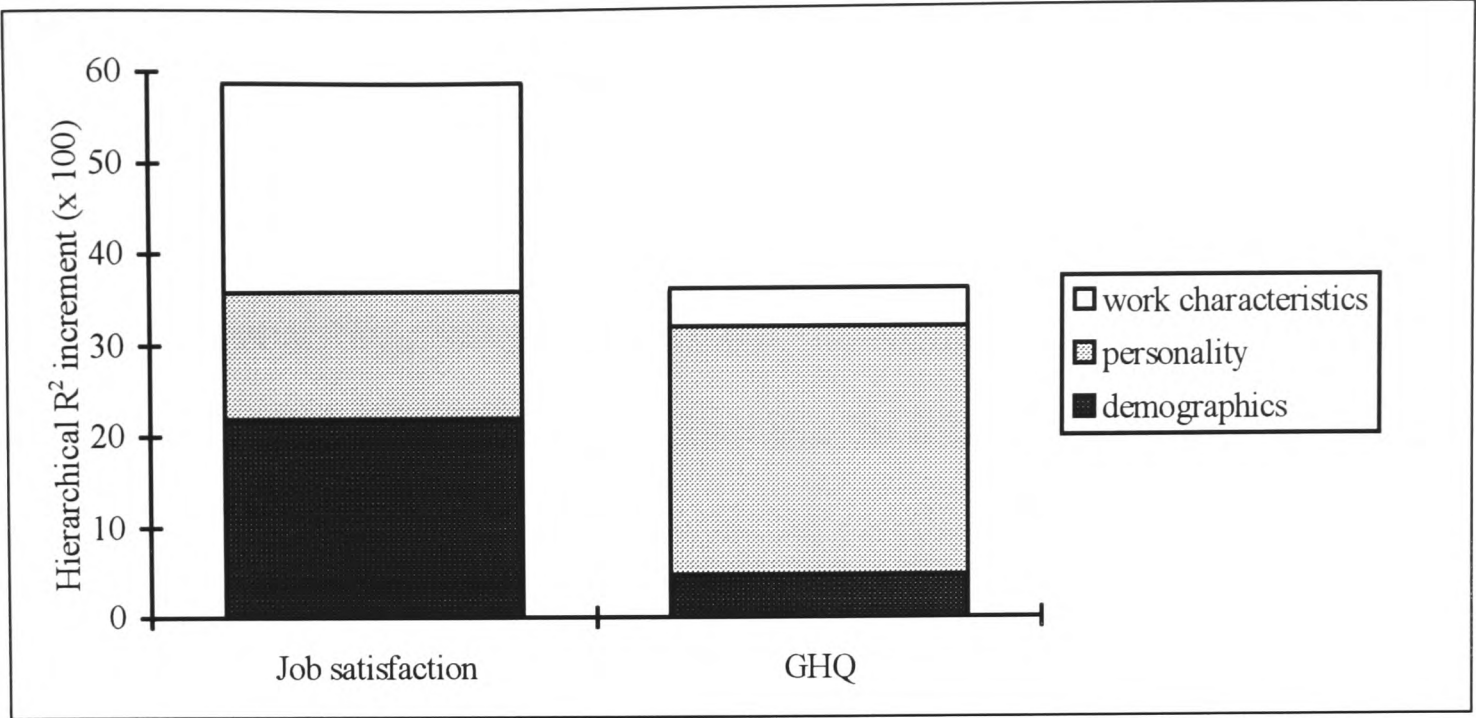


Figure 7.4 Stacked bar charts indicating the proportion of variance in strain measures explained by the full regression models. The R^2 increment (ΔR^2) for each set of variables is taken from Table 7.5.

7.3.2 Indirect effects: suppression, mediation and confounding

In Section 4.3.1, indirect effects which may be revealed in hierarchical multiple regression were discussed. These indirect effects occur as a consequence of correlations among independent variables (Cohen and Cohen, 1983), and they are revealed by substantial differences between the regression coefficient (β) obtained for a variable at its point of entry in a hierarchical model, and that in the final regression model. In particular, a suppression effect is revealed when an association between a proposed independent and dependent variable is significant only after statistical control for some other factor. In contrast, mediation occurs when the statistical control for other factors results in the reduction of a significant association between two variables to below statistical significance.

For example, in the analysis presented in Table 7.5, the initial (statistically insignificant) association of marital status with psychological distress was strengthened after

the inclusion of personality factors, such that married people reported higher symptom levels. Follow-up analyses revealed that neuroticism was the critical personality factor in the relationship. Married people tend to be less neurotic than unmarried people ($r = -.215$, $p < 0.01$): this correlation masks or “suppresses” the association between marital status and symptom levels. However, adding neuroticism into the hierarchical regression, removes the variance in symptom levels due to this trait, and reveals that, controlling for personality differences, married people report more symptoms than unmarried people. This suppression effect is schematically illustrated in Figure 7.5.

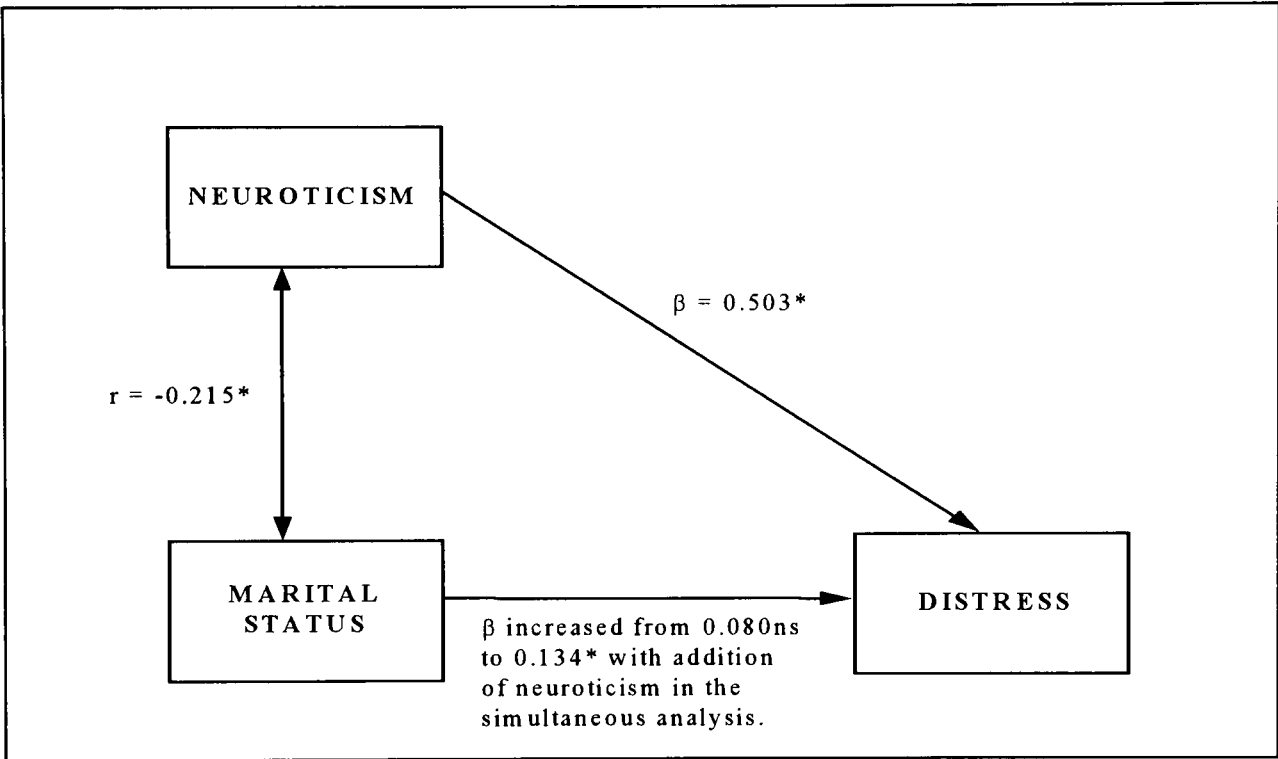


Figure 7.5 Path diagram illustrating the suppression of the influence of marital status on psychological distress by neuroticism. Path coefficients are shown for the simultaneous analysis which includes all demographic variables and neuroticism. * $p < 0.05$

In the analysis predicting job satisfaction presented in Table 7.5, (low) neuroticism and (internal) locus of control were significantly associated with job satisfaction when first entered into the regression. However, after work perceptions were included in the analysis, the statistical significance of these traits was reduced to below conventionally accepted levels. This mediation effect was particularly striking in the case of locus of control, and is

illustrated in Figure 7.6. Follow-up analyses revealed that the influence of locus of control on job satisfaction was jointly mediated by perceptions of control, role ambiguity, and support from senior colleagues². People with an internal locus of control reported lower role ambiguity, higher control and higher support from senior colleagues. It is these work perceptions which then influence job satisfaction. In Figure 7.6, it is assumed that locus of control causally precedes work perceptions. However from the present data it is not clear whether internals merely perceived their work environment differently, or if they select, are selected into, or create different work environments.

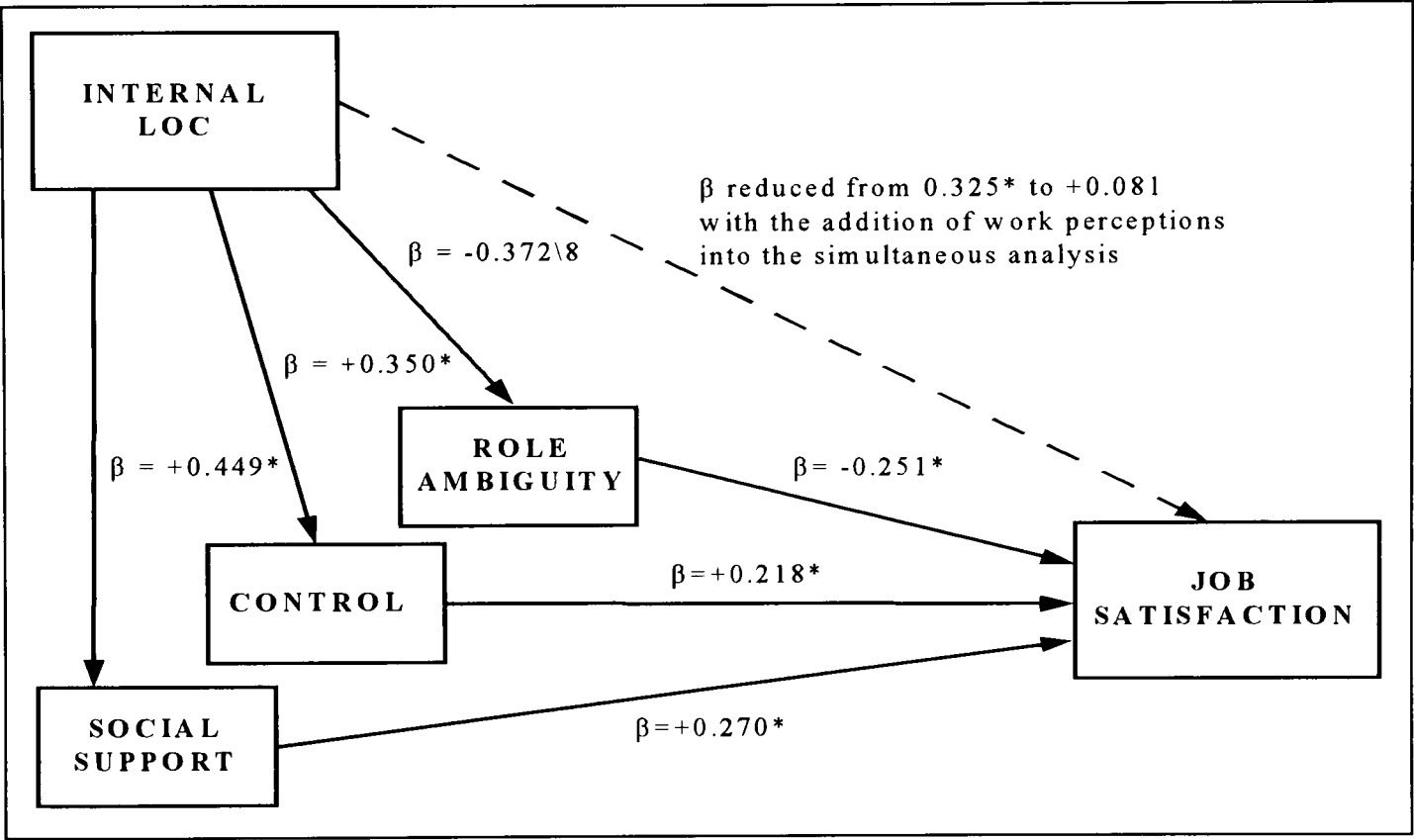


Figure 7.6 Path diagram illustrating the mediation of the influence of locus of control on job satisfaction through work perceptions. Path coefficients are shown for the simultaneous analysis which includes all demographic and personality variables. * p <0.05.

Similarly, in the prediction of job satisfaction, the regression coefficient associated with job grade was much smaller (although still statistically significant) in the full model

² Statistical control for each of these work perceptions individually was insufficient to substantially reduce the association between (internal) locus of control and satisfaction. For a description of the testing of simple mediation effects, see Appendix I.

than at the first step. In the previous section it was noted that job grade was treated as a proxy for social class, and consequently was entered into the hierarchical regression in the first step with other demographic factors. An alternative treatment of job grade is as an objective work characteristic. Another objective work characteristic would be for example “location” (head office versus retail). Defined in this way, it is logical to enter job grade and location into hierarchical regressions as a separate block, after individual differences (demographic and personality variables), and prior to work perceptions. This analysis was performed for job satisfaction only, as this was the outcome which was significantly associated with job grade.

Although statistically significant in both cases, the regression coefficient associated with job grade at the point of entry with the background variables (Table 7.5: $\beta = 0.353$, $p < 0.001$) is much larger than that obtained in the present analysis when job grade is entered later, as an objective work characteristic ($\beta = 0.197$, $p < 0.01$). The incremental change in R^2 for each block in this four-step hierarchical analysis is shown graphically in Figure 7.7: each step resulted in a statistically significant ($p < 0.01$) increase in R^2 . Location did not make a significant independent contribution to the variance of job satisfaction.

The reduction in influence of job grade before and after control for personality variables indicates a partial confounding effect. As job grade is highly correlated with several personality variables (neuroticism, Type A and locus of control), which are in turn correlated with job satisfaction (see correlation matrix Table 6.8), the apparently strong association between job grade and job satisfaction is partially attributable to differences in personality which coincide with job grade. In particular, follow-up analyses revealed that work locus of control was primarily responsible for this effect, although further reductions in the association of job grade with job satisfaction were observed with the statistical control for other traits and work characteristics. The partial confounding effect of locus of

control and job grade is illustrated in a path diagram in Figure 7.8. The causal direction of the relationship between locus of control and job grade is not clear from this cross-sectional data. It is plausible either that internals are more likely to be promoted, or that more senior work roles might lead to stronger beliefs about control.

Thus treating job grade as a proxy of social class led to the conclusion that job satisfaction is greatly influenced by stable background factors, and is therefore less amenable to change. In contrast, treating job grade as an objective work characteristic leads one to conclude that the role of background sociodemographic factors is relatively less important, comparing Figures 7.4 and 7.7. Furthermore comparison of the two models revealed a partial confounding effect with personality variables, such that part of the variance originally attributed to job grade as a social class indicator may be seen to be due to differences in personality with occur with job grade.

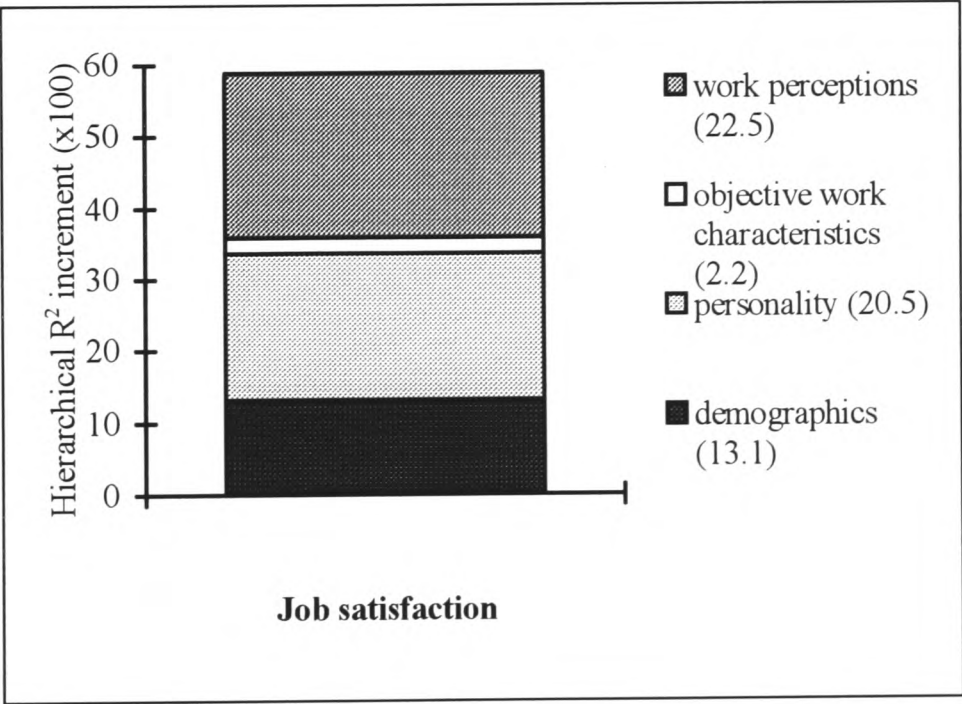


Figure 7.7 Stacked bar charts indicating percentage of variance in job satisfaction explained by the alternative regression model. In these 4-step hierarchical analyses objective work characteristics of job grade and location were entered into the analysis after personality and demographic variables, and before the more subjective work perceptions scales.

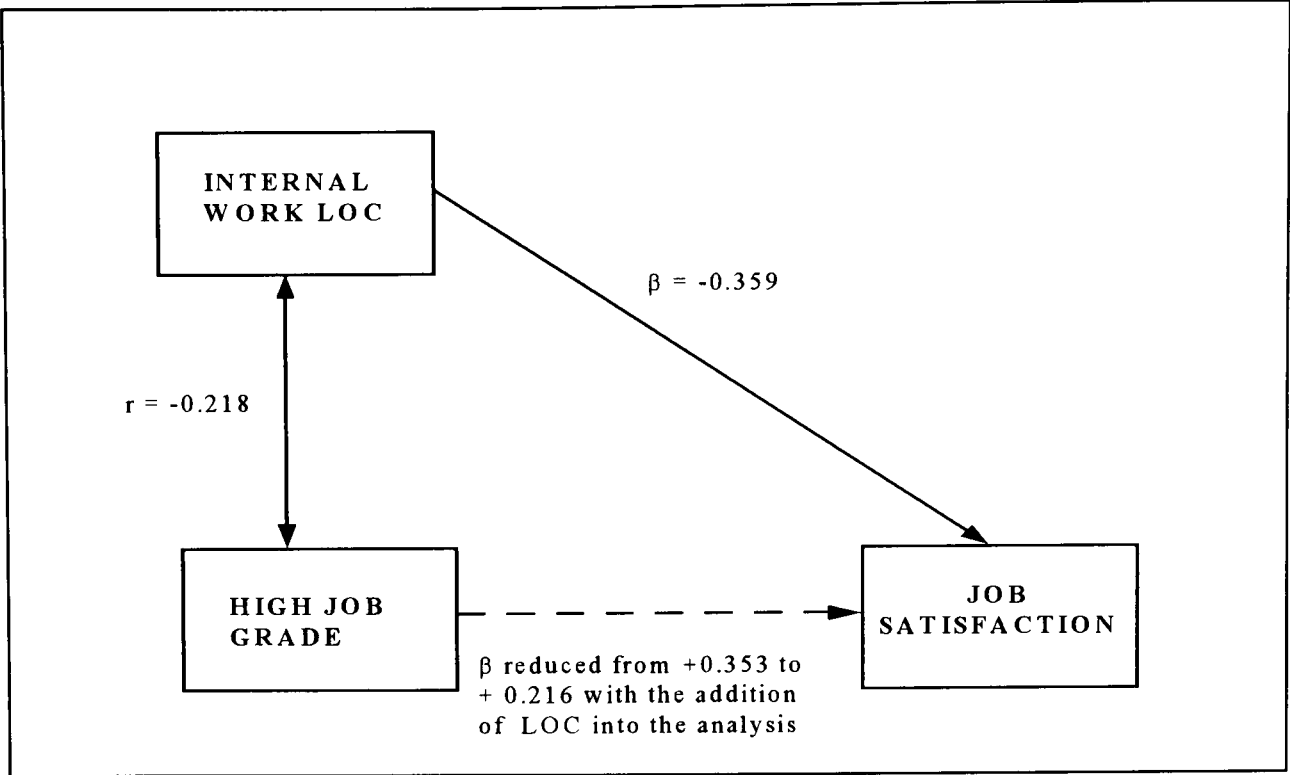


Figure 7.8 Path diagram illustrating the partial confounding of the influence of locus of control with job grade in influencing job satisfaction. Path coefficients are shown for the simultaneous analysis which includes all demographic variables in addition to LOC and job grade. * $p < 0.05$.

7.3.3 Residualised contributions of individual differences and job characteristics

In the previous section hierarchical analyses were performed on the basis of theoretical arguments about temporal stability of variables, with the least changeable variables entered earlier in the analysis. To examine the relative contribution of different sets of variables, an alternative approach is to perform residualised analyses such that the contribution of each block is determined after controlling for all other variables (i.e. each block entered as a final hierarchical step). Four sets of variables were examined in this way: sociodemographic variables (age, sex, marital status, education); personality (extraversion, neuroticism, social desirability, work locus of control, type A behaviour); objective work characteristics (job grade, job location) and self-reported work characteristics (hours worked, perceived demands, time urgency, perceived control, role clarity, support from seniors, and colleague support). The relative contribution of each of these variables sets after control for all other

variables, is shown in Figure 7.9 for job satisfaction and Figure 7.10 for psychological distress. The findings from the residualised analyses are consistent with the hierarchical analysis: psychological distress was principally explained by personality and job satisfaction was primarily influenced by work perceptions.

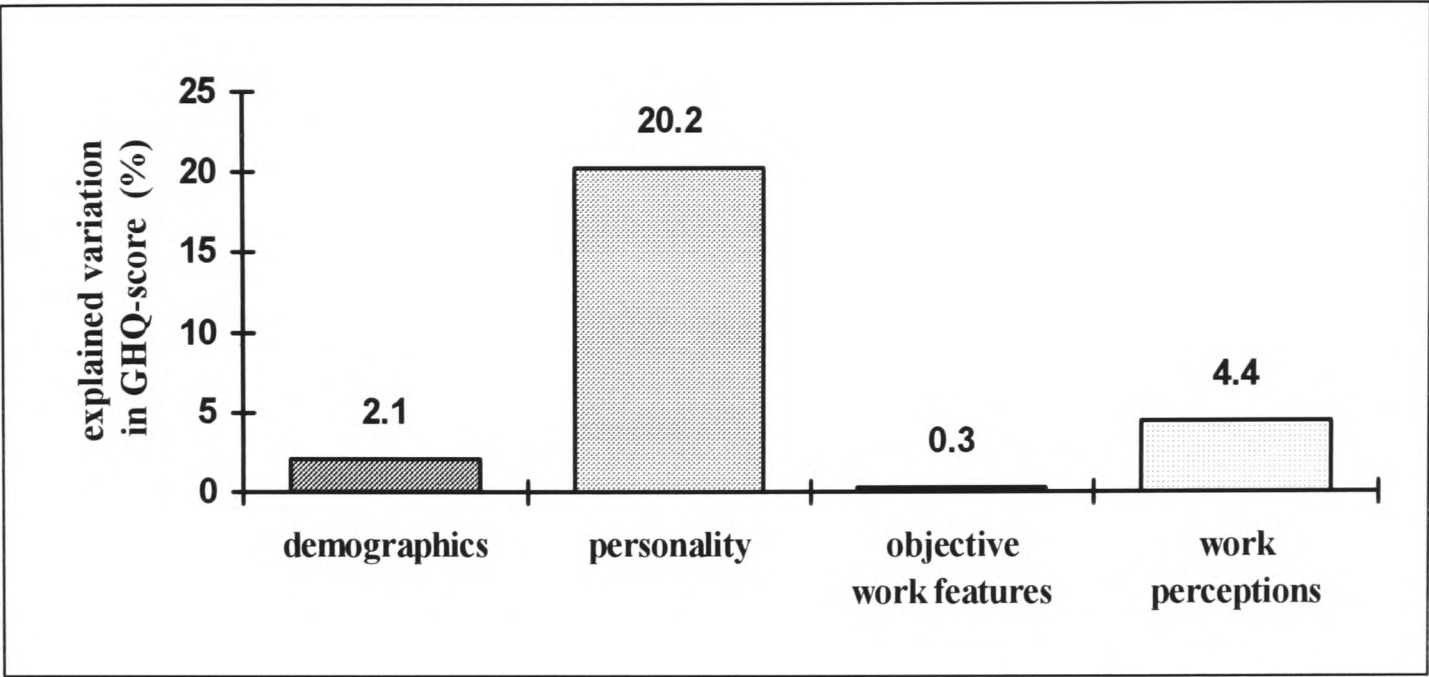


Figure 7.9 Relative power of demographic, personality and work perceptions variables in explaining variance in **psychological distress**, each shown *after control for all other variables* (calculated as $\Delta R^2 \times 100$). Note the contributions of demographic variables and objective work characteristics were not statistically significant at the 0.05 level.

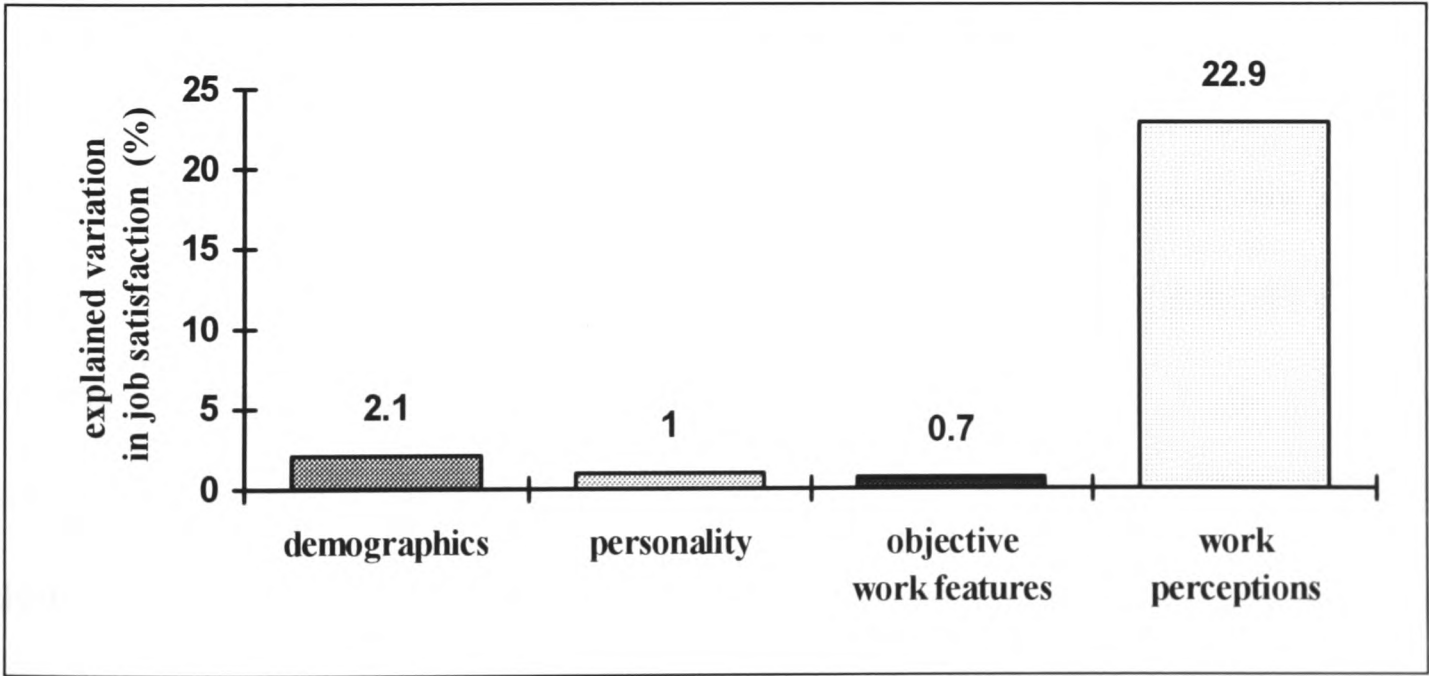


Figure 7.10 Relative power of demographic, personality and work perceptions variables in explaining variance in **job satisfaction**, each shown *after control for all other variables* (calculated as $\Delta R^2 \times 100$). Note the contribution of personality characteristics and objective work features were not statistically significant at the 0.05 level.

7.4 Moderation of the stress process

As discussed in Chapter 3, several individual and situational characteristics have been proposed as moderators of stressor-strain relationships. The form of this moderation is that the presence of positive characteristics may buffer against stressors, reducing the strength of the association between stressors and strains, or conversely that the presence of a negative characteristic may act as a vulnerability factor, increasing the strength of stressor-strain associations. The work characteristics which have been most thoroughly investigated as buffers are level of control and social support. Similarly, in terms of individual characteristics, an internal locus of control, low neuroticism and low Type A behaviour (Type B) are seen as traits which may protect the individual from the negative effects associated with exposure to stressors.

From the literature review presented in Chapter 3, it is apparent that evidence for moderation is equivocal. Several reasons have been suggested which might account for this inconsistency in the literature: these were outlined in Chapter 4, and are addressed in the tests applied here. In particular, the sample size ($N = 244$) should be adequate to detect an interaction if present. Furthermore, several stressors and strain outcomes are examined to allow for the suggestion that buffering may operate on specific stressor-strain relationships. Given the number of independent and dependent variables to be investigated, the probability of Type I error would be substantial if multiple tests of significance were conducted with the same data. To minimise this problem, multivariate techniques were employed so that each interaction effect was tested simultaneously for several stressor and outcome variables. This analysis was carried out using multivariate moderated regression analysis, an extension of the general linear regression model. This method is describe below.

7.4.1 *Multivariate tests of interaction effects*

As for standard moderated regression, interactions between continuous variables are tested with the use of cross-product of the (standardised) variables involved in the interaction (Baron and Kenny, 1986; Finney et al., 1984). Several work characteristics have been identified as potential stressors. In particular, high reported number of hours worked per week, high levels of perceived demand, high time urgency, low perceptions of control, low social support, and high role conflict and ambiguity, are all significantly correlated with one or more strain indices in the present study (refer Table 6.8). For most proposed moderation effects, theory does not specify that the potential moderator will buffer any particular stressor but just stressors generally³. Consequently, the interaction terms between the proposed buffer and each work stressor is tested as a single interaction block (as recommended by Parkes, 1994). Only if the interaction block as a whole contributes significantly to the explained variance of the dependent variables after entry of all main effects, are individual interaction terms examined.

Multivariate moderated regression allows not only for several potential stressors to be examined simultaneously, but also several strain outcomes. As noted in Chapter 6, these outcomes tend to be quite highly correlated. For present purposes the set of “strain” outcomes includes job satisfaction, anxiety, depression, social dysfunction, and somatic symptoms. Multivariate moderated regression is achieved by entering continuous variables (both main effects and interaction effects) into the MANOVA procedure in SPSS as covariates (Norusis, 1988; Tabachnick and Fidell, 1989). As for ordinary multiple regression, this procedure also allows the effects of background factors to be statistically controlled. Thus a full main effects model including demographic variables, personality

³ An exception is the demand-control interaction proposed by Karasek’s model of work stress

factors and job characteristics (as described in section 7.3.1) is entered as a base model, with interaction blocks tested as a subsequent hierarchical block. To evaluate multivariate effects of variables or sets of variables using MANOVA, the F statistic derived from Pillai's Trace is reported.

Thus the initial test of interaction sets through MANOVA, indicates whether the sets of independent variables, specifically the interaction block, considered jointly, significantly influence job strain as a whole. Where the multivariate test was found to be significant, this was examined in further detail with univariate moderated regression analyses for each dependent variable. The form of any interactions are then examined using the parameters from the univariate analysis of standardised variables, to graph the fitted model (described by Finney et al., 1984).

7.4.2 Karasek's demand-control interaction

The most clearly elaborated interaction model is Karasek's demand-control model of work stress. The general form of the interaction proposed by Karasek (illustrated in Figure 1.4) is that high demands are only associated with "strain" under conditions of low control. According to Chaplin (1991), this level of theoretical specification allows the use of a one-tail significance test, and any other form of interaction results in a failure to reject the null hypothesis, that the proposed interaction is *not* present.

The method used to test the Karasek model was a replication of that described by Wall et al. (in press), with the extension of the inclusion of five strain outcomes rather than three. Furthermore, the background factors included were more extensive than those reported by Wall et al.. The background factors are all the independent variables analysed

in the hierarchical regression reported in Table 7.5.⁴ The main effects of demand and control were tested hierarchically, following control for background factors, and the *demand x control* interaction was the final term to be entered into the analysis. Multivariate and univariate results are shown in Table 7.6; follow-up univariate regression results are summarised in Table 7.7.

EFFECTS TESTED	Background factors	Demand	Control	Demand x Control Interaction
MULTIVARIATE TEST	4.39** (df = 75, 1097)	3.17** (df = 5, 221)	5.00** (df = 5, 221)	2.92* (df = 5, 221)
UNIVARIATE TESTS (df = 1, 225)				
Anxiety	7.72**	11.67**	0.02	4.20*
Depression	7.16**	4.84*	0.02	5.23*
Social Dysfunction	1.94*	0.03	0.98	4.18*
Somatic symptoms	4.95**	5.52*	2.48	6.24*
Job Satisfaction	10.19**	2.91~	18.10**	3.01*

Table 7.6. F ratios from multivariate and univariate moderated regression: main and interaction effects of demand and control on anxiety, depression, social dysfunction, somatic symptoms report and job satisfaction, after controlling for other relevant background factors. N=244.

The results summarised in Table 7.6 show that the demand-control interaction term was significant in the multivariate test as well as for each univariate outcome. It should be noted however from Table 7.7 that the relative contribution of the interaction term to the explanation of variance in each outcome was very small, compared with the contribution of the main effects model.

⁴ Specifically, age, gender, marital status, education level, job grade, neuroticism, extraversion, social desirability, locus of control, Type A, social support from senior colleagues, number of hours worked, time urgency, role conflict and role ambiguity were included as background factors.

EFFECT TESTED	Main effects model	Demand x Control Interaction	Full Model
OUTCOME	ΔR^2	ΔR^2	Total R^2
Anxiety	0.392**	0.011*	0.404**
Depression	0.351**	0.014*	0.365**
Social Dysfunction	0.097~	0.012*	0.109~
Somatic symptoms	0.266**	0.022**	0.288**
Job Satisfaction	0.549**	0.009*	0.557**

Table 7.7 Relative contribution of main effects model and *demand x control* interaction in explaining variance in univariate outcomes.

Interactions were examined by plotting the regression equation when all variables not included in the interaction are set at their average (i.e. zero for standardised variables). All graphs are shown for values of “high control” = +1 standard deviation, and “low control” = -1 standard deviation. The form of the resultant interactions was not always consistent with Karasek’s formulation (or those reported by Wall et al.). For job satisfaction, control was found to have both main and interactive effects, such that people perceiving high levels of control not only reported higher levels of satisfaction than those with low levels of perceived control, but in addition satisfaction increased with increasing levels of job demand. The interaction effect is illustrated in Figure 7.11 and is consistent with Karasek’s model: high levels of demand, combined with high levels of control give a greater opportunity for challenge and mastery, which are predicted to result in high satisfaction (Karasek and Theorell, 1990).

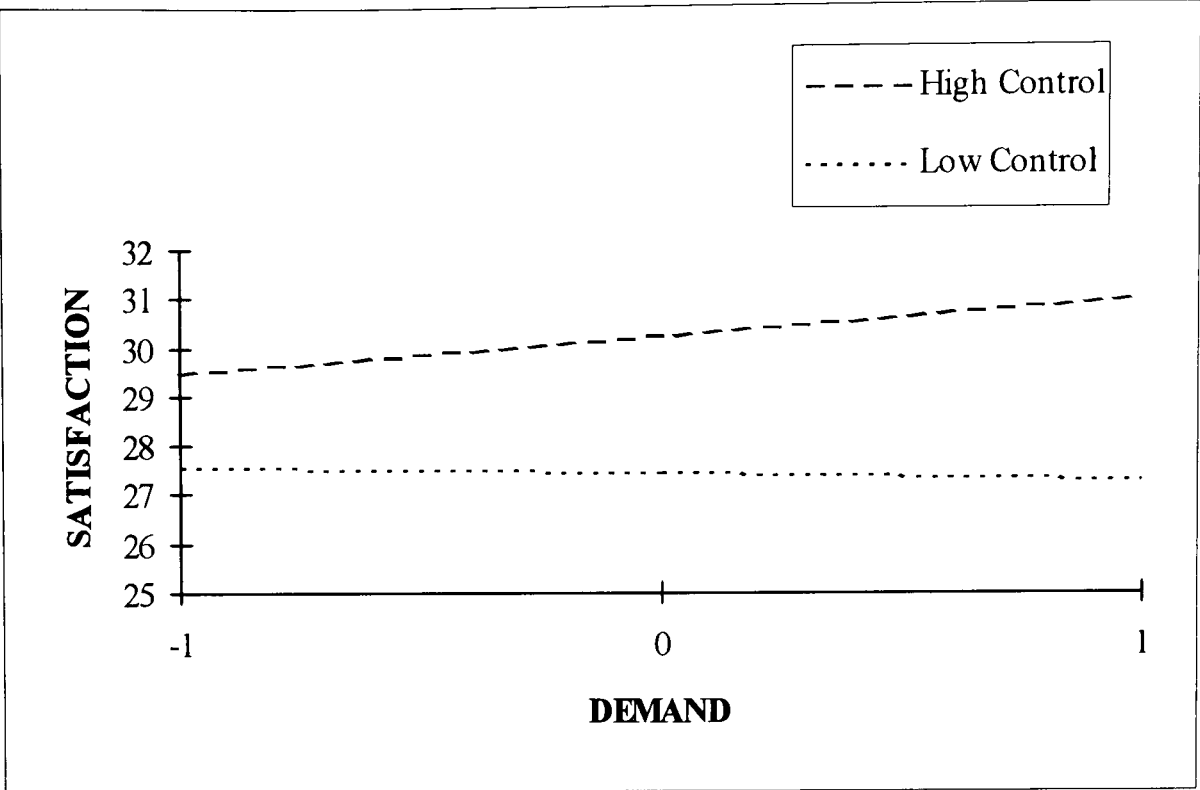


Figure 7.11 Interaction between demands and control in the prediction of job satisfaction (satisfaction = .310 demand + 1.387 control + .459 *demand x control* + 28.84).

However, the form of the interaction effect for health outcomes was quite contrary to that for satisfaction; high levels of control acted as a vulnerability factor, exacerbating the negative health effects of high demand. The effect is illustrated graphically for report of somatic symptoms in Figure 7.12, and was of similar form for the other health-related scales. Thus, according to Chaplin’s (1991) recommendation, the hypothesis that control acts as a stress buffer must be rejected for health-related outcomes.

Nonetheless, this form of interaction effect has been discussed by Karasek and Theorell (1990). They suggest that high levels of control may be perceived as additional responsibility and therefore be associated with negative outcomes by people in managerial positions, such as the present sample. Consistent with this argument, Parkes et al. (1994) also reported both high job satisfaction and high levels of somatic symptoms for healthcare workers and teachers in “active” (high demand, high control) jobs.

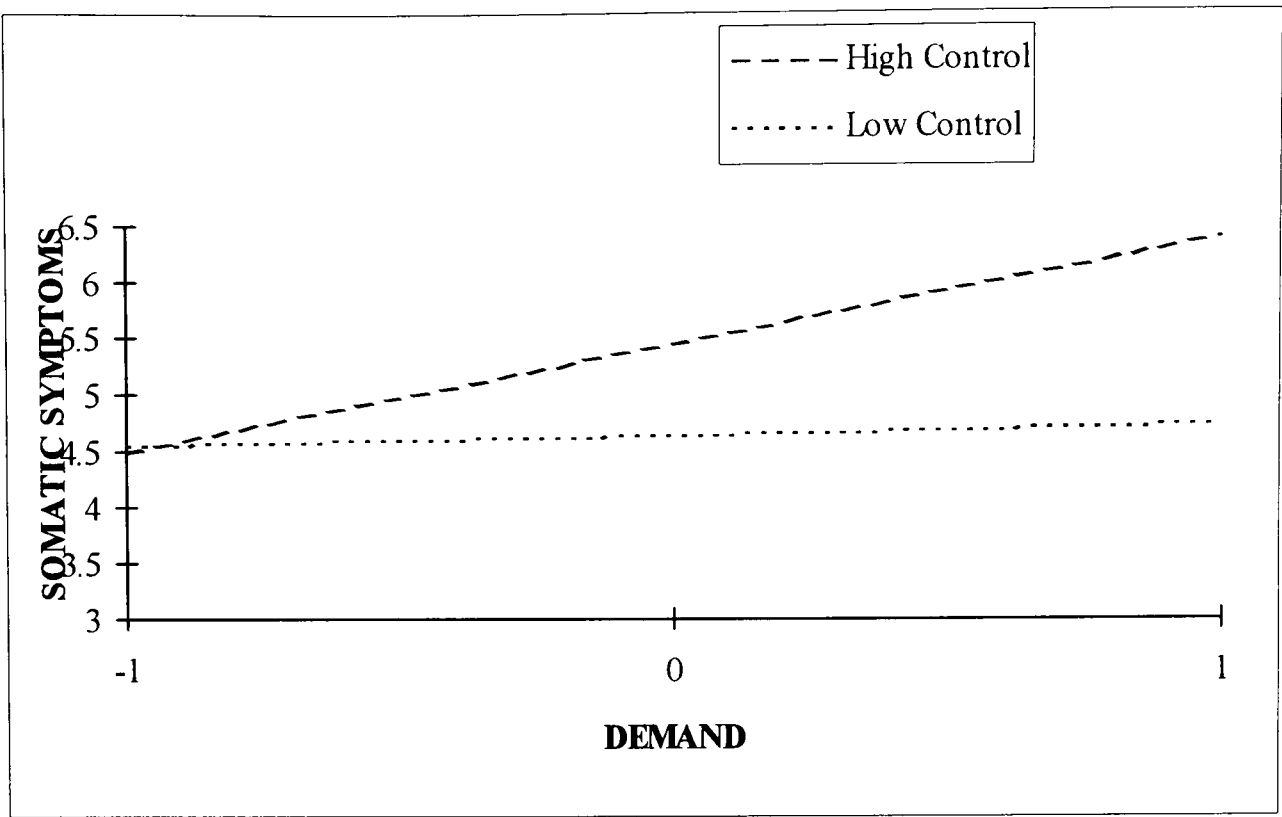


Figure 7.12 Interaction between demands and control in the prediction of symptom report. (Somatic symptoms = .522 demand + 0.396 control + 0.426 *demand x control* + 5.05)

A recently proposed extension of the demand-control model is that the two-way interaction is itself moderated by a third factor. Specifically significant three-way interactions have been reported with locus of control (Parkes, 1991), and work social support (Johnson and Hall, 1988; Parkes et al., 1994). Three-way interactions were tested simultaneously for the five strain outcomes using multivariate moderated regression: the relevant two-way and three-way interactions were entered following the full main effects model. In neither case did the three-way interaction reach conventionally acceptable statistical significance: *Demand x Control x Locus of control* $F(5, 218) < 1$, ns; *Demand x Control x Work Social Support* $F(5, 219) = 1.33$, ns.

7.4.3 General buffering effects by individual and situational characteristics

In addition to the demand-control interaction, general buffering effects by individual and situational characteristics have also been proposed. In terms of situational characteristics, control and work social support have been suggested as buffers for a wide range of work stressors, as discussed in Chapter 3. Consequently the interaction of each of these variables with the other work variables was tested simultaneously for the five strain outcomes in multivariate moderated regression analyses. In addition, the traits of locus of control, Type A behaviour and neuroticism have all previously been reported to moderate stressor-strain relations. The interaction of each of these traits with potential work stressors were also tested using multivariate moderated regression. As with tests of the Karasek model, the interaction block was tested after control for the full main effects model described in Table 7.5. Results of the multivariate tests are summarised in Table 7.8.

Of the potential buffers tested, the only interaction block significantly associated with joint strain outcomes was Type A behaviour (TABP). Examining the univariate effects from this analysis, both somatic symptoms and job satisfaction were predicted by the interaction of Type A with job characteristics. The relative contribution of the main effects model and the interaction block are shown for job satisfaction and somatic symptom report in Table 7.9, together with regression coefficients and associated significance levels for each interaction term.

EFFECT TESTED	F	Degrees of freedom	Statistical significance
BASE MODEL full main effects model	4.07	85, 1095	p<0.001
INTERACTION BLOCKS (tested separately)			
SITUATIONAL BUFFERS			
1. Control	1.27	30, 1100	ns
2. Support	1.22	30, 1100	ns
PERSONALITY BUFFERS			
3. Locus of control	1.03	35, 1095	ns
4. Type A	1.42	35, 1095	p < 0.05
5. Neuroticism	0.87	35, 1095	ns

Table 7.8 Multivariate moderated regression analyses testing potential buffering effects of control, social support, locus of control, type A behaviour and neuroticism. Each interaction block was tested separately, following the full main effects base model.

DEPENDENT VARIABLE	Job Satisfaction		Somatic Symptoms	
EFFECT TESTED	ΔR ²	B	ΔR ²	B
Main effects model	0.555**		0.256**	
TABP interaction block	0.048*		0.062**	
TABP x Control		.042		.306
TABP x Demand		.335		-.629*
TABP x Support		.387		-.090
TABP x Role conflict		-.947**		-.490
TABP x Role ambiguity		.511*		.353
TABP x Time urgency		.199		.201
TABP x Hours worked		.072		.541*
Total R ²	0.603		0.318	

Table 7.9 Relative proportion of variance accounted for by main effects and TABP interaction block, predicting job satisfaction and somatic symptoms. * p<0.05; ** p <0.01

For prediction of job satisfaction, the interaction terms which reached statistical significance were *TABP x demand* and *TABP x number of hours worked*. For somatic symptoms, the individual interaction terms which reached statistical significance were *TABP x role ambiguity* and *TABP x role conflict*. Two of these interaction effects are illustrated in Figures 7.13 and 7.14 for high (+1 standard deviation) and low (-1 standard deviation) values of TABP, labelled as Type A and Type B respectively. Again, graphed effects are shown with all other independent variables held at their average value.

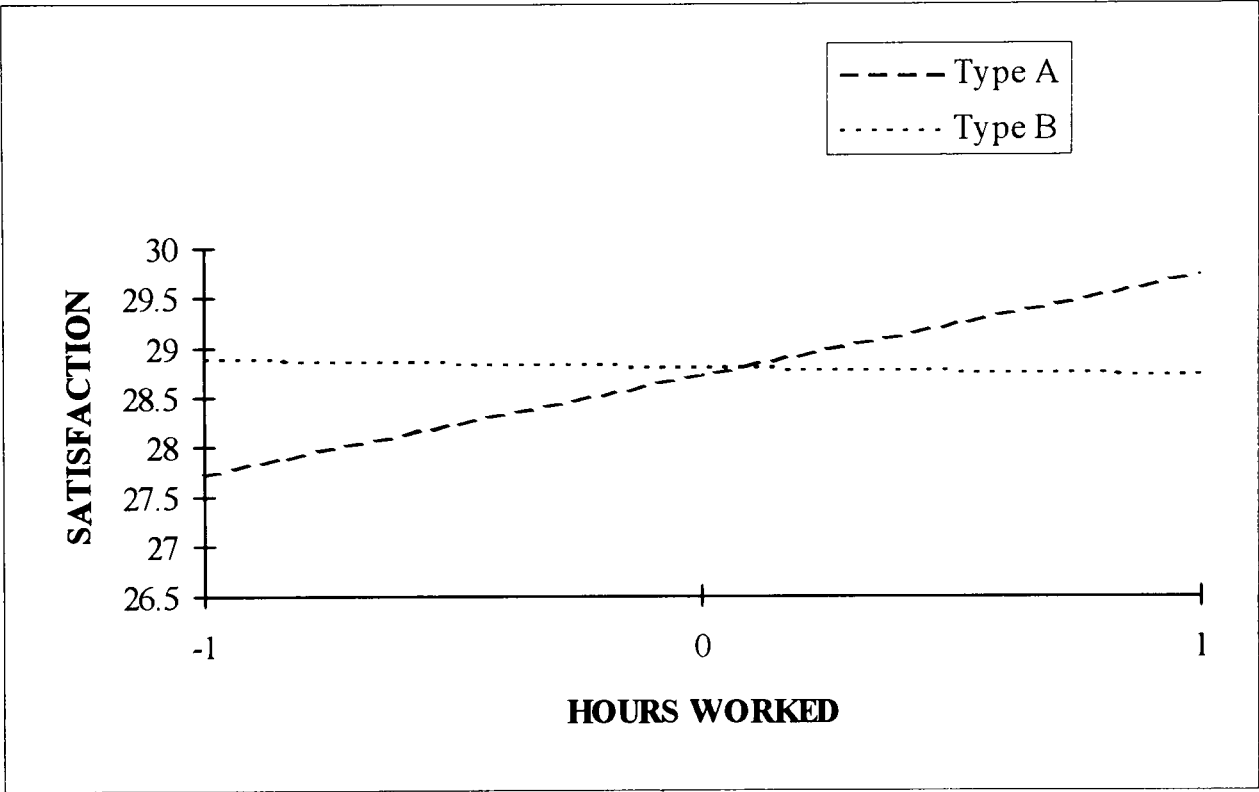


Figure 7.13 Interaction between hours worked and TABP in the prediction of job satisfaction. (Satisfaction = -.046 TABP -.034 hours .541 *TABP x hours* + 28.78)

In Figure 7.13 Type As show a favourable response to a higher number of hours worked per week, while the job satisfaction of Type Bs was not related to number of work hours. This is a finding consistent with the expectation that individuals high in Type A behaviour seek and enjoy challenging and demanding work situations. However, the

interaction with perceived job demands, illustrated in Figure 7.14, is in the opposite direction, such that it is Type Bs who show the association of satisfaction with high demands: this is contrary to expectations. Furthermore, there was no significant interaction of TABP with time urgency, as predicted by Landy et al. (1991). The interaction effects between role conflict and ambiguity and TABP in predicting somatic symptom report were also inconsistent: high role conflict was associated with more symptoms for Type Bs and fewer symptoms in Type As, while the reverse was true for role ambiguity.

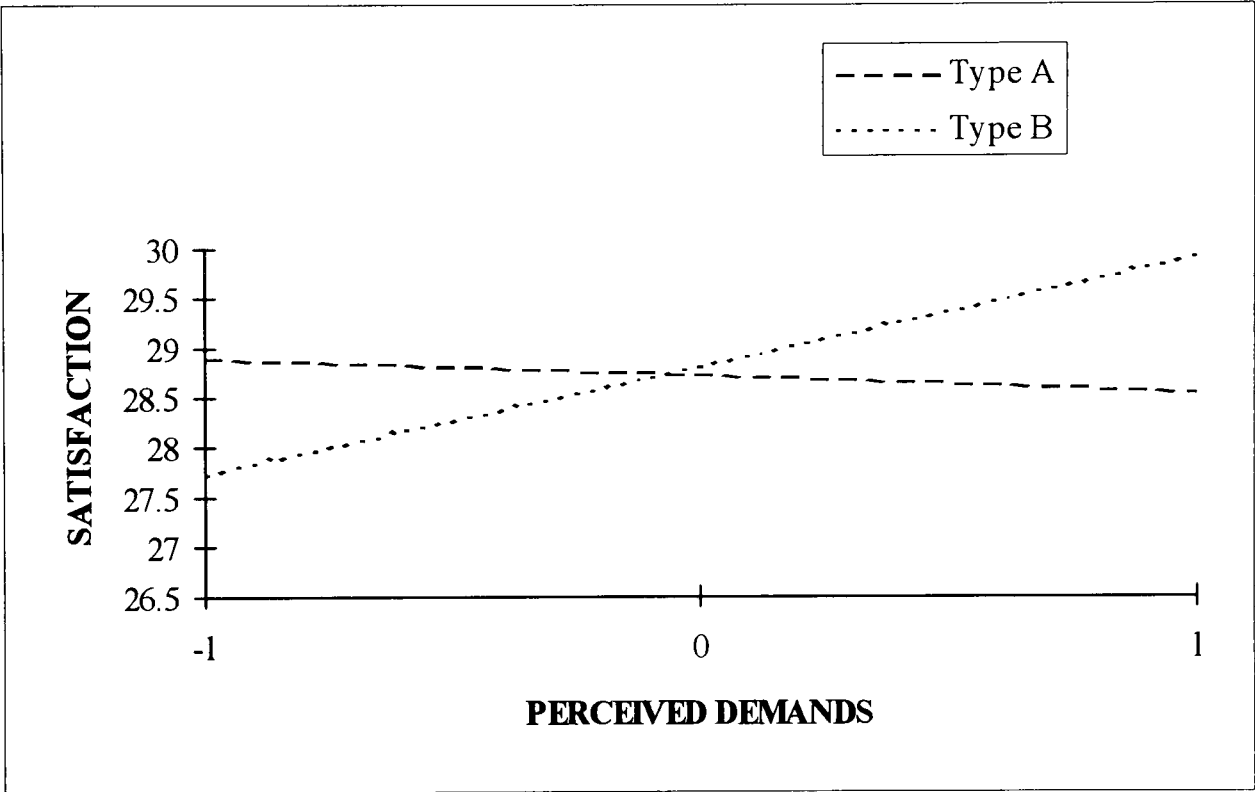


Figure 7.14 Interaction between perceived demands and TABP in the prediction of job satisfaction. (Satisfaction = -.046 TABP + .459 demand - 0.629 TABP x Demand + 28.78).

7.4.4 *Process differences according to job grade*

Potential moderation effects of job grade were discussed in Section 3.3.4. In particular, Karasek and Theorell (1990) suggest that levels of perceived control may play a different role at higher levels of the bureaucratic hierarchy. To examine potential moderation of the influence of control by management grade, interaction terms were created using dummy variables to represent the three management grades: these were used to predict psychological distress and job satisfaction, after statistical control for the additive base model. The procedure is described in Norusis (1976). Junior management grade was used as the reference category: H2 and H3 are the dummy codes for middle and senior management respectively.

In the prediction of psychological distress the *control x management level* interaction set did not contribute significantly ($\Delta R^2 = 0.004$, ns). That is, the influence of control on psychological distress, although significant, did not differ according to management grade. In contrast, job satisfaction was significantly influenced by the management interaction set ($\Delta R^2 = 0.018$, $p < 0.05$), such that the relationship between control and satisfaction was weaker for middle managers than for either junior or senior managers (the difference in slopes between junior and senior managers was not statistically significant). Middle managers do not appear to derive the benefits high control opportunities enjoyed by both their more junior and more senior colleagues. This finding is presented in Figure 7.15.

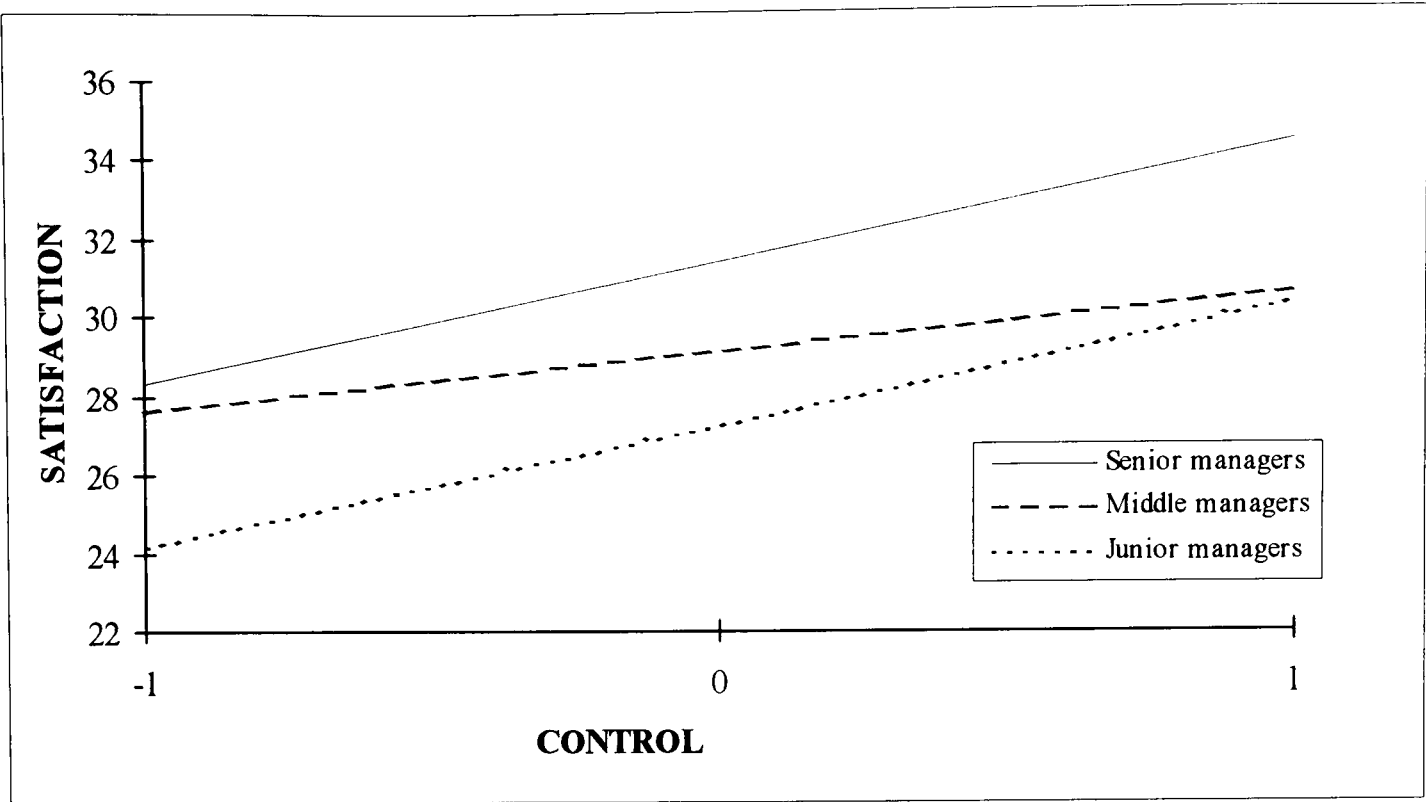


Figure 7.15 Graphs of the relationship between perceptions of control and job satisfaction for junior, middle and senior managers. (Satisfaction = 1.87 H2** + 3.76 H3** + 3.10 control** - 1.62 control x H2* - .023 control x H3 + 27.26).

7.4.5 Comment on moderators

In summary, there was little evidence of consistent moderation of work stressors by either situational or individual variables. Where significant effects for interaction blocks were reported, the form of the interaction was not consistently in agreement with theoretical expectations. Furthermore, the incremental contribution to explained variance in outcomes by the interaction block was always relatively small, even if statistically significant, when compared with the variance explained by main effects. This is a finding consistent with recent reviews of stress-buffering effects (Chaplin, 1991; Evans et al., 1994), and empirical investigations of moderation by control within a retail work environment (Jimmieson and Terry, 1993).

7.5 Summary and conclusions

In this chapter several aspects of the stress process have been examined in some detail. It was shown that different work roles have associated with them different levels of potential stressors, but also that the types of people working in these roles vary systematically according to some of the personality dimensions measured. Indices of strain were also found to be higher among lower grade managers, a finding consistent with the literature relating health and social class (e.g. Lundberg, 1991; North et al., 1993).

The relative contributions of individual differences and work characteristics in influencing job satisfaction and psychological distress were examined in Section 7.3. The major influence on job satisfaction was job characteristics, whereas psychological distress was more strongly influenced by personality. This suggests that job satisfaction is the outcome more amenable to change through job redesign.

More detailed analysis revealed that, controlling for other predictors, job satisfaction was predicted by age, job grade, perceived control, support from senior colleagues and (low) role ambiguity. In contrast, psychological distress was associated with marital status (married), introversion, neuroticism and (high) work demands. These findings are broadly similar to those reported in the pilot study (Chapter 5), with a different research sample. More specifically, in both samples, job satisfaction was associated with control and social support, while psychological distress was explained by perceived demands and neuroticism. Furthermore, these findings are consistent with the stress research literature generally. In particular, this study adds to the evidence that demand is associated with psychological distress, and control associated with job satisfaction (e.g. Broadbent, 1995).

The association of marital status with psychological distress was only apparent after statistical control for neuroticism, and is in the opposite direction to that reported in

previous research (e.g. Thoits, 1987; Russell et al. 1987). This discrepancy may be due to the fact that these researchers did not statistically control for the influence of personality. However, Parkes (1990) reported that married teachers experienced better mental health even after controlling for work and personality characteristics (including neuroticism). Therefore, it might be that being married is more compatible, in terms of mental well-being, with occupations such as teaching, than with the long and irregular work hours of retailing.

Like earlier studies, the present study demonstrated cross-sectional correlations between internal LOC and job satisfaction, and also several work resources (see Table 6.8). In reviewing the LOC literature, both Spector (1982) and O'Brien (1984) note the difficulty in determining the causal direction such established associations. Using hierarchical regression methods, LOC was shown to influence job satisfaction through indirect pathways. In particular, by assuming personality to precede work perceptions, the influence of LOC on job satisfaction was shown to be mediated by perceived control, role ambiguity, and support from senior colleagues. What remains unclear in this analysis is whether “internals” are differentially employed in more positive work conditions, or whether they merely perceive the conditions differently.

Furthermore LOC was associated with an objective measure of job grade. Combining these findings, internals are found to be employed in higher job grades (which are characterised by high levels of control, role clarity, and a supportive social environment) and these work resources are then associated with higher satisfaction. Thus, consistent with theoretical models of the stress process (e.g. House, 1981; Lazarus and Folkman, 1994), affective outcomes are more strongly associated with work perceptions than objective work characteristics. However, further research is also required to unravel the direction of causation between personality and job grade. A longitudinal study in which trait measures are taken before entry into a job would be necessary to determine the extent to which the

work environment influences personality. Existing literature suggests that it is a relationship of reciprocal causation (Kohn and Schooler, 1982; Andrisani and Nestel, 1976).

Moderation or buffering effects have received considerable attention in the stress literature in recent years: these were examined in Section 7.4. However, as has been the conclusion in recent reviews, moderation effects were inconsistent and accounted for a relatively small proportion of variance in strain outcomes (Chaplin, 1991; Evans et al., 1994). In particular, Karasek's Demand-Control interaction was in the opposite direction to that proposed for the prediction of symptom report: the combination of high demands and high control was associated with high symptom levels. Karasek has suggested that such findings may be expected in upper levels of the bureaucratic hierarchy, however further research is required to determine with greater specificity for which job types increased control is beneficial. Greater theoretic specification about precisely which stressor-strain relations are buffered by proposed individual and situational moderators might also result in more conclusive findings in this area.

In conclusion, additive main effects regression models provided an explanation of substantial proportions of variance in both satisfaction and psychological distress without the addition of more complex interactions. However, a better understanding of causal processes might be gained from the analysis of the joint influence of individual and work characteristics, particularly indirect pathways of mediation.

8. The Causes and Consequences of Stress in Retail Managers

8.1 Latent variable modelling with cross-sectional data

8.1.1 *An introduction to latent variable modelling*

In Chapter 7, several variables were found to have an indirect or mediated influences on strain outcomes. To examine a mediation effect using ordinary regression models, several analyses must be performed. Structural equation modelling offers a procedure in which multiple direct and indirect effects can be tested simultaneously. Thus relationships among independent variables may be examined in addition to those between dependents and independents. Furthermore, structural equation modelling allows the simultaneous estimation of models predicting more than one outcome. Finally, it has long been recognised that the variables used in stress research are measured with error: the use of latent variables allows the researcher to account for this measurement error in all constructs.

The theoretical model which underlies the analyses presented in this section is illustrated in Figure 8.1: it is drawn from the Michigan framework. This model represents the interrelationship of three sets of factors: “potential stressors”, strain outcomes, and modifying variables. Modifying variables may be either individual or situational, and may have both direct and indirect effects on strain outcomes: indirect effects are those effects which are mediated through potential stressors.

It has been recommended that latent variable modelling should follow a two-step procedure. Firstly, confirmatory factor analysis should be used to develop a measurement model which describes the relationship between manifest or observed variables and latent factors. Once the structure of latent factors has been established, relationships between them

can then be examined in structural equation models (Anderson and Gerbing, 1988). In accordance with this recommendation, the measurement models for the constructs to be assessed are described in Section 8.1.2. Following this, in Section 8.1.3 a series of nested structural models based on past research and developed theory are described. All latent variable models were fitted using EQS/Windows version 4.04 (Bentler and Wu, 1993), and a pentium processor. Results of maximum likelihood estimation are reported, as this is the more common procedure reported in the published literature, however very similar results were obtained using “robust” estimation.

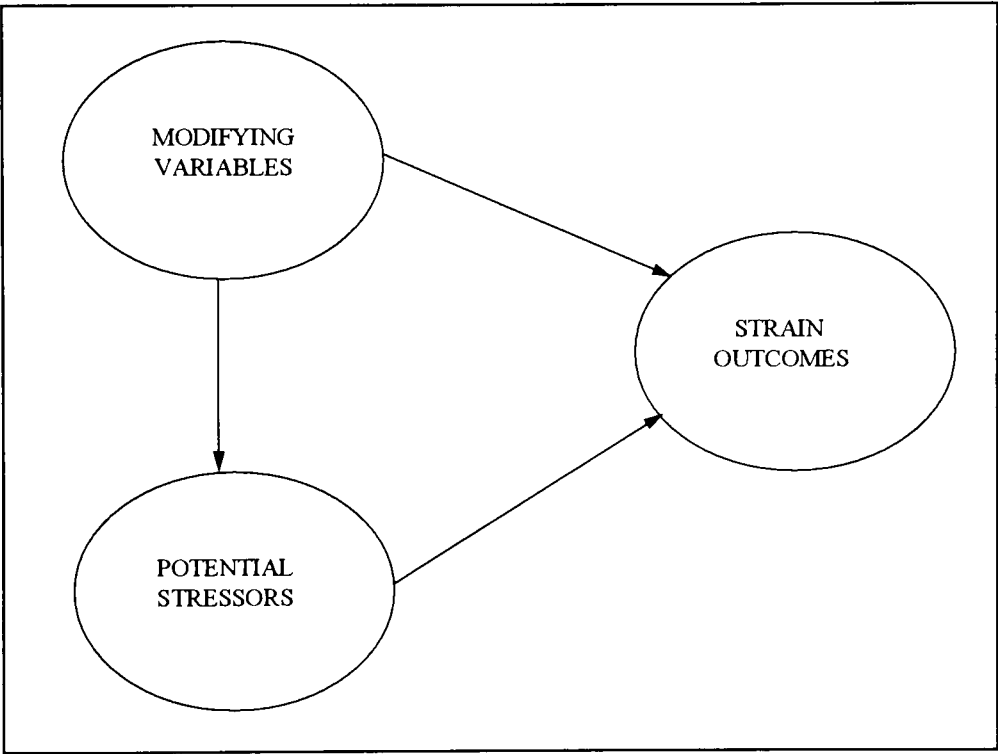


Figure 8.1 Path diagram illustrating the joint influence of potential job stressors and modifying variables on strain outcomes. Individual and situational modifying variables may have both direct and indirect (mediated or confounding) influences on strain outcomes. In addition, job stressors influence strain directly.

8.1.2 *Measurement models describing latent variables*

Although some statisticians recommend sample sizes of only 100-150 for estimation of latent variables (e.g. Anderson and Gerbing, 1988; Breckler, 1990), others (e.g. Bentler, 1989; Tanaka, 1987) note that the sample size requirements increase with the complexity of the model. Therefore, in the present analyses (N= 247) the models tested were simplified to include only those variables central to the psychosocial stress process. Seven latent constructs were chosen: two outcomes (mental health and job satisfaction), one trait (neuroticism) and four job characteristics (perceived demand, control, social support and role clarity). The two outcomes were selected due to the evidence that each is determined by distinct combinations of individual and work characteristics, and the predictor variables were chosen on the basis of the results of the regression analyses presented in Section 7.2. Of the traits examined, only neuroticism was found to influence *both* job satisfaction and psychological distress. Furthermore statistical control for neuroticism in analysis of self-report data has been widely recommended (e.g. Brief et al., 1988). Finally, the four job characteristics were those which had significant effects in multiple regression, after control for individual differences.

First, confirmatory factor analyses were conducted separately for each latent factor. The mental health latent factor was constructed using the 4 specific mental health subscales (anxiety, depression, somatic symptoms and social dysfunction) as manifest variables. However, for the other latent factors, the manifest variables used were short scales derived by splitting the full questionnaire scales described in Chapter 6. Confirmatory factor analyses are presented in Table 8.1. To allow adequate degrees of freedom for parameter estimates (“identification”), in smaller confirmatory models it was necessary to impose constraints. Specifically, for the demand, control, support, and satisfaction latent factors, error variances

of manifest subscales were constrained to be equal, that is each subscale was assumed to be an equally accurate estimate of its associated latent factor.

Several indices are available to assess the global fit of latent factor models. One assessment of goodness of fit is that chi-square, χ^2 should be non-significant (i.e. indicate that there is no discernible discrepancy between the observed covariances and the covariances predicted by the model). However this criterion is considered to be very conservative, and so an alternative fit index, the CFI was developed to assess global fit: Bentler (1992) stated that $CFI > 0.90$ indicates acceptable fit. A third fit heuristic is that $\chi^2/\text{degrees of freedom}$ should be less than 3 (Fiest et al., 1995). In the models presented, the main criterion used to assess overall fit is the CFI, with the difference in χ^2 between two models being used to compare competing models, as recommended by Breckler (1990).

In Table 8.1 it is seen that fit for the majority of proposed latent variables was excellent according to all three criteria. A better fit for the role conflict and ambiguity scales can be achieved with a model of two correlated factors, rather than a single role clarity scale ($\chi^2 = 8.2$, 8 df; $CFI = .985$). However the single factor model is adequate, and results in a simpler overall model for use in complex structural models.

An overall assessment of fit of the whole measurement model can be made in a single confirmatory factor analysis (as described by Fiest et al., 1995). The variance of each latent factor was scaled to 1, and all latent factors were allowed to covary freely. The full measurement model is shown in Figure 8.2. Standardised coefficients for all pathways are shown, but covariances between latent factors are omitted for clarity. The significance of each pathway may be assessed with a z statistic (coefficient/standard error). All specified pathways between manifest and latent variables were statistically significant $p < 0.01$. Furthermore, overall model fit was adequate according to two of the three fit heuristics described above ($\chi^2 = 487.52$; $CFI = 0.915$; 255 df; $\chi^2/\text{df} = 1.91$).

LATENT AND MANIFEST VARIABLES	No. items	CFI	χ^2	df	χ^2 / df
MENTAL HEALTH		.992	5.06	2	2.53
Anxiety	7				
Depression	7				
Somatic symptoms	7				
Social dysfunction	7				
JOB SATISFACTION		.995	3.469	2	1.73
Satisfaction 1	4				
Satisfaction 2	3				
Satisfaction 3	3				
NEUROTICISM		.999	2.56	2	1.28
Neuroticism 1	3				
Neuroticism 2	3				
Neuroticism 3	3				
Neuroticism 4	3				
SENIOR SUPPORT		.991	2.32	1	2.32
Senior support 1	3				
Senior support 2	3				
PERCEIVED CONTROL		.992	3.29	2	1.65
Control 1	5				
Control 2	5				
Control 3	4				
PERCEIVED DEMANDS		.958	17.23	2	8.62
Demand 1	7				
Demand 2	7				
Demand 3	6				
ROLE CLARITY		.932	44.1	9	4.9
Role ambiguity 1	2				
Role ambiguity 2	2				
Role ambiguity 3	2				
Role conflict 1	3				
Role conflict 2	3				
Role conflict 3	2				

Table 8.1 Summary of goodness of fit indices for individual confirmatory factor analyses of each latent variable. N = 247.

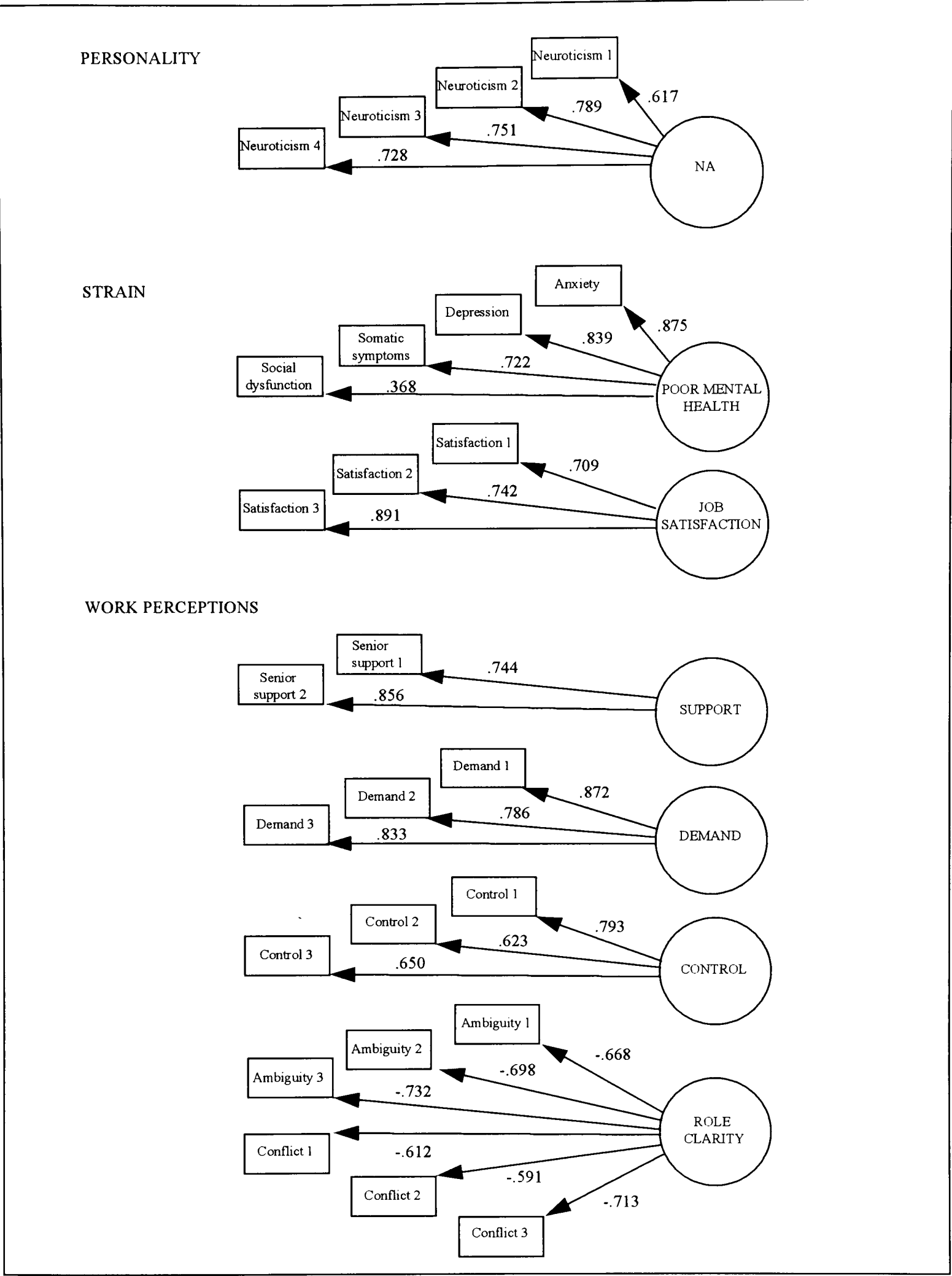


Figure 8.2 Overall measurement model, showing standardised coefficients for pathways between manifest and latent variables; covariances between latent variables are omitted for clarity.

8.1.3 *Structural models examining relationships between latent variables*

Several models were tested using structural equation modelling, following the general model in Figure 8.1: stressors and modifying variables jointly influence strain outcomes. While stressors do this in a direct manner, modifying variables may exert both direct and indirect influences. Indirect influences are those mediated by job stressors. Of the variables included in the model, neuroticism, social support and perceived control have all been previously found to have both mediated and main effects on strain outcomes (see Chapter 3).

Model 1 specifies direct effects between all independent and dependent variables. This model is illustrated in Figure 8.3, including standardised parameter estimates for structural pathways between factors. As shown in Table 8.2, the fit of Model 1, including only direct effects was relatively poor, although most of the structural pathways were statistically significant.

Model 2 includes all direct effects from Model 1, but in addition relationships between all independent variables were estimated by allowing them to covary freely. This model is similar to that implied in multiple regression analysis. Allowing covariance resulted in a better fit according to the reduction in $\chi^2 = 168.56$ for loss of 10 df. Model 2 is illustrated in Figure 8.4. However, although overall model fit was adequate, not all specified pathways were statistically significant.

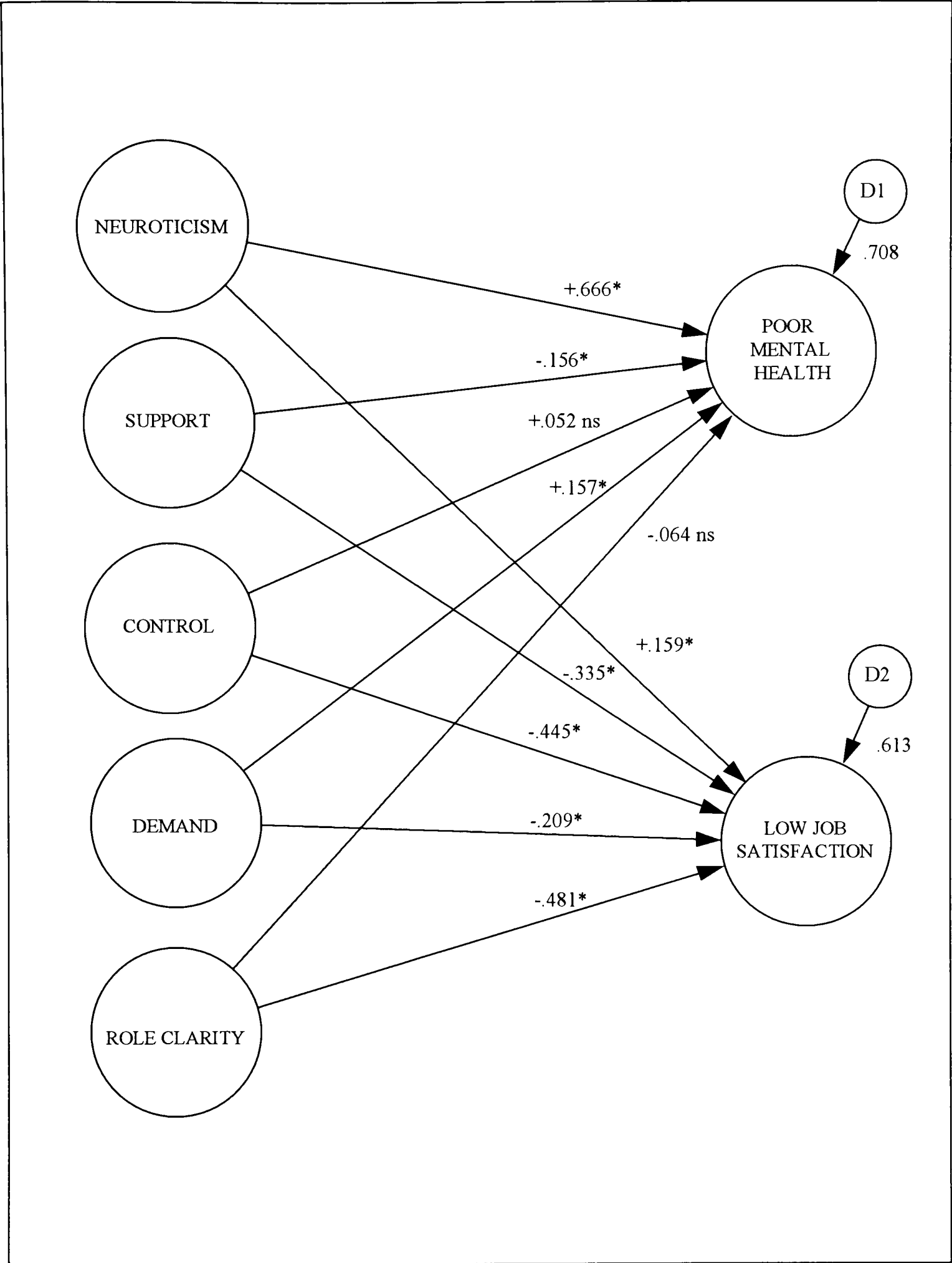


Figure 8.3 Model 1. Path diagram of structural model in which only direct effects of job characteristics and personality on strain outcomes are considered. Path coefficients are taken from the standardised construct equations. * $p < 0.05$.

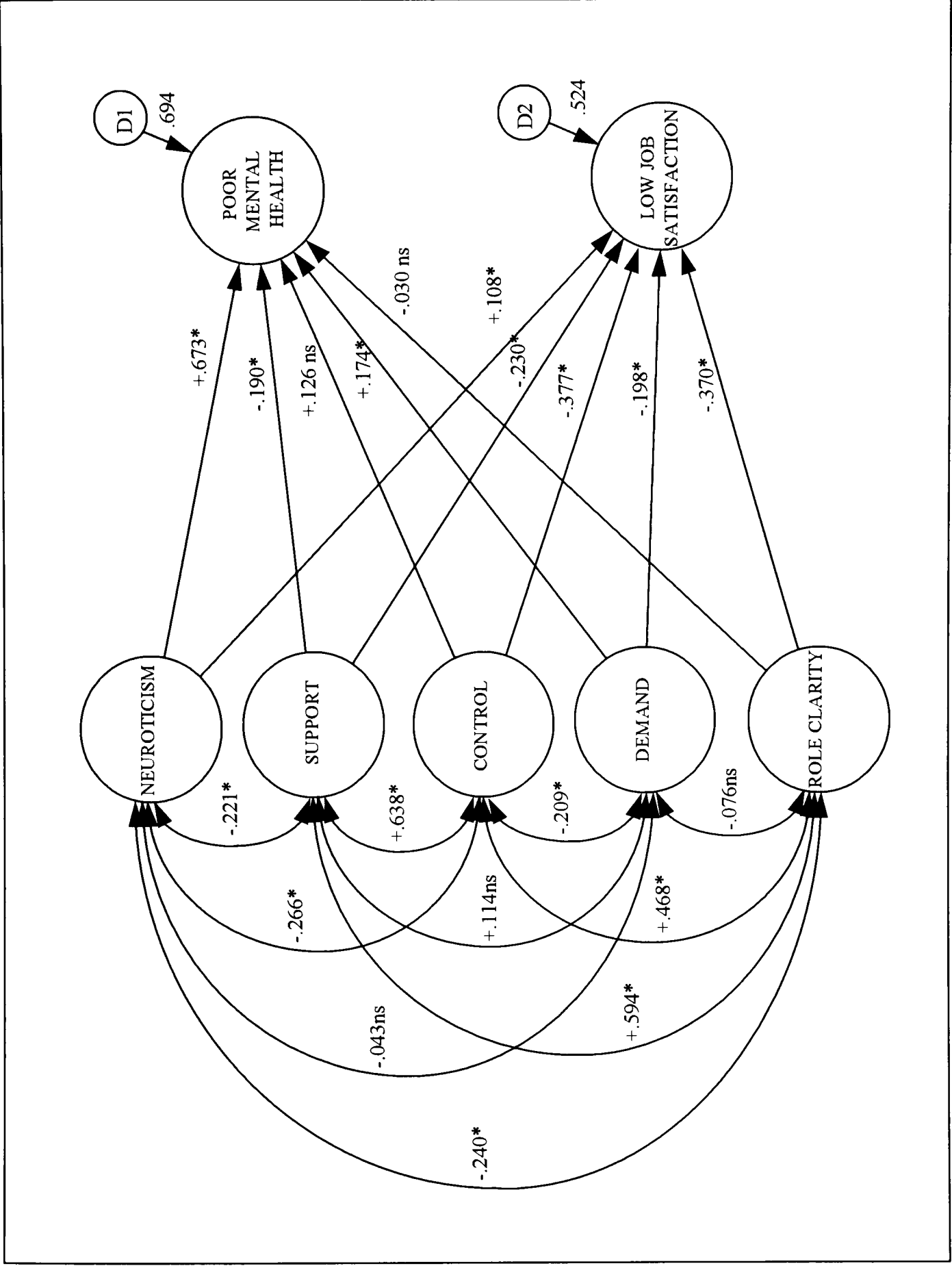


Figure 8.4 Model 2. Path diagram of structural model including direct effects of job characteristics and personality on strain, and correlations between all independent variables.

MODEL	CFI	χ^2	df
Model 1 Direct effects model	.864	637.56	265
Model 2 Covariance model	.922	469.69	255
Model 3 Structural model deleting insignificant pathways from Model 2	.922	473.18	260
Model 4 Structural model, deleting insignificant pathways from Model 3	.912	479.30	263
Model 4a Structural model Control and clarity → support	.905	523.28	263
Model 4b Structural model Demand → control	.920	481.39	263
Model 5a satisfaction → mental health	.921	479.23	262
Model 5b mental health → satisfaction	.921	478.83	262

Table 8.2 Summary statistics for goodness of fit for a series of structural models.

In Model 3, pathways noted to be insignificant in Model 2 were dropped (i.e. specified to be zero). In addition, covariances between personality and work characteristics were specified as structural relationships, rather than correlations.

The direction of causation in Model 3 is based on theoretical grounds and past empirical findings. Thus neuroticism, being a stable trait, is specified as a cause rather than effect of the job perceptions to which it is related (see Appendix I for a discussion of this point). In Sections 3.2.1.3 and 3.2.2.2 research in which control and social support are shown to have mediated influences on strain were discussed. In particular, the influence of

control on mental health and job satisfaction has been shown to be mediated by other work characteristics, particularly, role conflict and ambiguity (Jackson, 1983; Jimmieson and Terry, 1993; Schaubroeck and Jennings, 1991; Lee and Ashforth, 1993). Similarly, social support may have effects on potential stressors, which in turn determine strain responses (Ganster and Victor, 1988): reduction of conflict and ambiguity with increased support has been demonstrated by Lee and Ashforth (1993), and Tetrick (1992). Therefore neuroticism, social support and control were specified as modifying variables in Model 3, that is they were specified as causally influencing the work characteristics to which they are related. Furthermore, Krause (1987) reported a mediated influence of support on strain by control. Thus, the relationship between support and control was specified such that the provision support is proposed to result in higher perceptions of control.

Model 3 was found to have adequate fit, with the same CFI as Model 2 (.922). However, Model 3 has 5 additional degrees of freedom, for an increase in χ^2 of only 6.12 relative to Model 2, and is therefore more parsimonious than Model 2. However, again, not all specified structural pathways were themselves statistically significant. Specifically, pathways from neuroticism to role clarity and control did not reach statistical significance; similarly, the pathway from control to role clarity was not significant. In Model 4, these three pathways were also dropped. Model 4 is represented in Figure 8.5.

Structural equation modelling allows the direction of causation between latent factors to be specified in either direction. Thus, in addition to theoretical arguments, SEM allows the relative fit of models in which contrasting causal processes are specified to be compared. In some cases it is possible to simultaneously assess bi-directional relationships. However in the current model, there were insufficient degrees of freedom to allow this type of analysis, resulting in problems of under-identification or resorting to unjustified constraints.

Consequently alternative causal processes are assessed by comparison of relative fit of models with the same degrees of freedom.

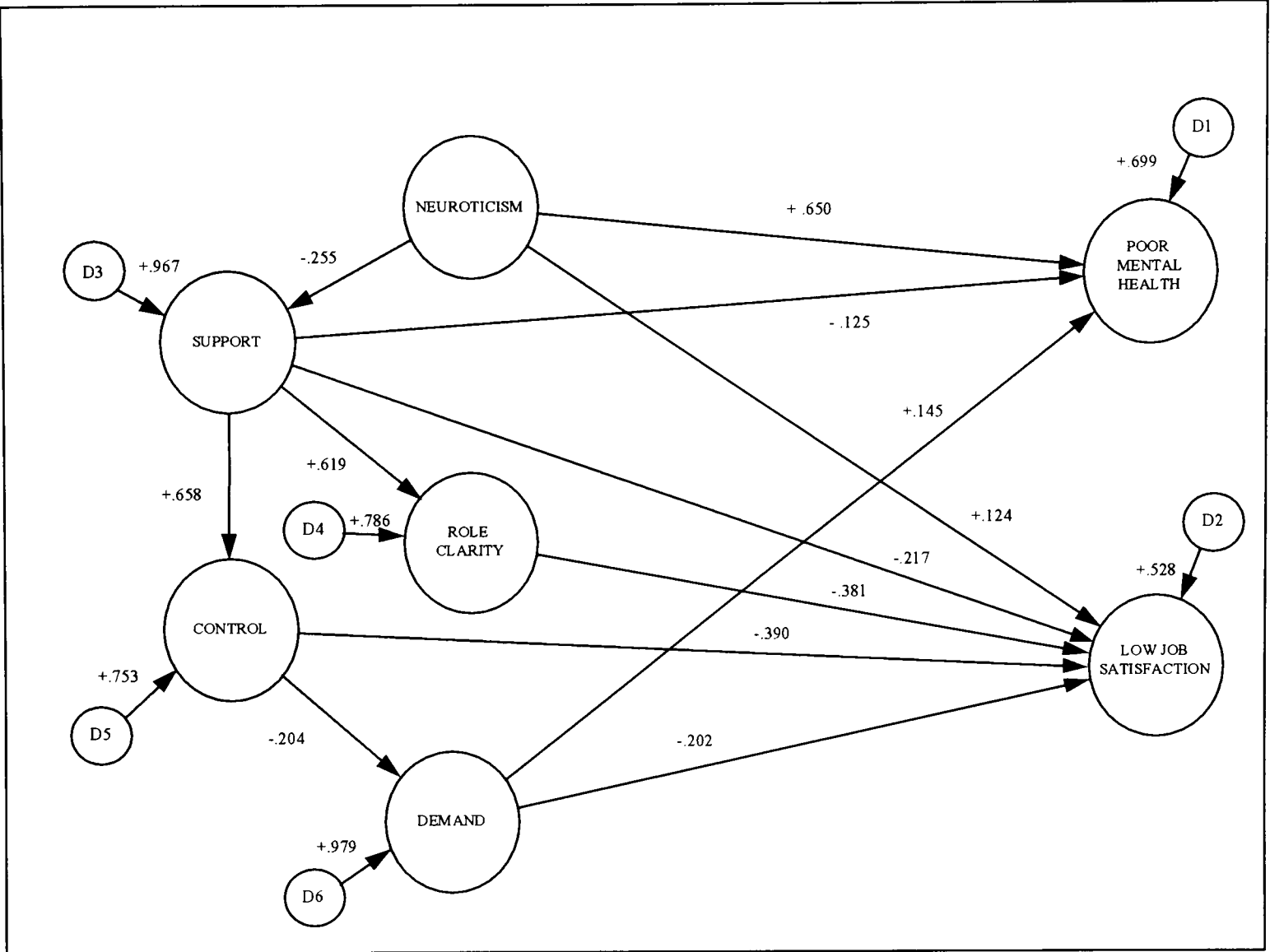


Figure 8.5 Model 4. Path diagram showing mediated and direct relationships between neuroticism and job characteristics in predicting mental health and job dissatisfaction.

In Model 4a, role clarity and control were specified as causes rather than consequence of social support, while the remainder of Model 4 was unaltered. Similarly, in Model 4b high perceptions of control were specified to result from low levels of demand, while the remainder of the model remained the same as Model 4. Both Models 4a and 4b resulted in a larger χ^2 values than Model 4, indicating that the causal directions originally

specified provides the better fit. However in the case of the demand-control relationship, (Model 4 b) this difference in model fit was not statistically significant.

Finally, although mental health and job satisfaction were significantly correlated (see Table 6.8), this association has not been specified in the above models. Both directions of causal association were assessed in Models 5a and 5b. The resulting models had very similar fit to Model 4, for a loss of only 1 degree of freedom. Thus Model 4 (the less constrained model) is considered to be the superior model. Furthermore, the pathway between mental health and satisfaction was not statistically significant in either model, indicating that the two strain outcomes share variance only due to their common association with individual and work characteristics.

Thus, of the models presented, Model 4 is selected as the most parsimonious. Overall Model 4 does not have the highest CFI, nor the lowest χ^2 . However, of the models with 263 degrees of freedom, Model 4 has the lowest χ^2 , and comparing this model to more constrained models (fewer degrees of freedom) its χ^2 is not significantly larger relative to the release of constraints.

Model 4 indicates that neuroticism, support from senior colleagues and control have both direct and mediated effects on strain outcomes, that is they each act as modifying variables. Perceived demands and role clarity were also found to have direct effects on strain indicators. In addition both demands and role clarity acted as mediators, being influenced by other variables in the model. Job dissatisfaction was associated with poor role clarity, low control, low support, *low* demand, and high neuroticism, while poor mental health was associated with high neuroticism, low support and *high* demand. Note particularly, that the influence of demand on job satisfaction was the opposite to the influence on mental health. This finding is consistent with Jimmieson and Terry's conclusion that "having a demanding job does not necessarily mean that it will be unsatisfying" (1993, p. 195). In fact, the present

sample appear to find demanding jobs highly satisfying, after controlling for salient individual and work characteristics. However this is not positive for their mental health.

Comparing the structural models (Section 8.1) with the results of regression (Section 7.2), several broad similarities are apparent. In particular, job characteristics are more strongly associated with job dissatisfaction than with mental health, while the opposite is true of neuroticism. Also the signs (direction) of association are consistent in the two techniques. However, uncontrolled measurement error in multiple regression may have obscured some stressor-strain relations. In particular, the association of neuroticism and demand with job satisfaction did not reach statistical significance in regression analysis, but was significant in structural models. Similarly the relationship between support and mental health was not significant in the regression models; however the mental health measure used in the regression analysis was not the same as that used in the structural model.

Finally the structural models allow a more parsimonious examination of mediation processes within the stress process. However it must be noted that this analysis was based on cross-sectional data and, although analyses are consistent with particular causal processes, they are not proof of causation.

8.2 Introduction to longitudinal research

In Chapter 4, a critique of cross-sectional surveys was made. In particular it was argued that a single time period of data collection does not enable competing causal processes to be distinguished. In contrast, longitudinal research can be used to establish a temporal asymmetry between proposed causes and effects rather than merely relying on theoretical arguments to establish a “presumed temporal order” (Cox, 1992).

Given the relative stability of the measures of stressors and strains commonly utilised in work stress research, the best predictor of any outcome tends to be a previous measure of the same outcome, i.e. prior level of strain (Grant, Patterson, Olshen and Yager, 1987; Nelson and Sutton, 1990). Such strong autocorrelation can leave the researcher with little residual variance in outcome measures to predict, once pre-existing levels have been controlled. Nonetheless, if independent and dependent variables are both measured at several time points, the impact of the change in potential stressors on the change in outcomes can be assessed. If an association between these changes can be established, there is a stronger argument for causal association than would be gained from a simple cross-sectional correlation (Broadbent, 1995; Kasl, 1991; Spector, 1994).

Two drawbacks of longitudinal panel research are the time and consequent expense of data collection, and the inevitable attrition of subject numbers, resulting in reduced sample sizes for analyses requiring complete data. With smaller sample sizes, the number of variables which can be validly investigated often necessitates testing of simpler models than might be attempted with cross-sectional data. A correlation matrix of the questionnaire scales included in the longitudinal analyses is presented in Table 8.3.

Several options for analysis of longitudinal data are available. In Section 8.3 overall trends are explored. These analyses are designed to detect, at a group level, whether changes occurring within the company during the survey year had a significant impact upon

either work experiences or strain responses. Section 8.4 presents longitudinal structural equation models based on all 3 waves of survey data. The general model used in these analyses controls for the stability in both job characteristics and outcomes across survey waves: separate longitudinal models are presented for the prediction of job satisfaction and mental health. These analyses take advantage of latent variable modelling techniques to control for measurement error: this is particularly important in longitudinal studies as errors are usually correlated over time and may give rise to spurious associations (Bryk and Raudenbush, 1987).

Variable name	Demand			Control			Senior support			Peer support			Role conflict			Role ambiguity		
	T1	T2	T3	T1	T2	T3	T1	T2	T3	T1	T2	T3	T1	T2	T3	T1	T2	T3
Demand T1	.68																	
Demand T2	.65	.71																
Demand T3	-.22	-.02	-.03															
Control T1	-.22	-.20	-.17	.64														
Control T2	-.10	-.06	-.06	.63	.66													
Control T3	-.16	-.14	-.12	.46	.40	.43												
Senior support T1	-.11	-.11	-.10	.28	.44	.38	.69											
Senior support T2	-.16	-.12	-.11	.39	.36	.50	.58	.60										
Senior support T3	-.08	-.05	-.05	.25	.15	.15	.29	.18	.22									
Peer support T1	.03	.04	.10	.12	.07	.13	.10	.12	.04	.44								
Peer support T2	-.08	-.05	-.05	.25	.10	.19	.18	.08	.12	.45	.45							
Peer support T3	.26	.17	.14	-.31	-.22	-.20	-.44	-.30	-.27	-.13	-.02							
Role conflict T1	.25	.17	.18	-.30	-.33	-.28	-.40	-.52	-.36	-.10	.03		.63					
Role conflict T2	.25	.20	.29	-.21	-.22	-.35	-.38	-.47	-.54	-.11	-.03		.53	.67				
Role conflict T3	.02	-.08	-.09	-.23	-.08	-.04	-.42	-.26	-.21	-.11	-.07		.64	.44	.32			
Role ambiguity T1	.01	-.14	-.13	-.28	-.22	-.22	-.25	-.34	-.31	-.14	-.15		.46	.58	.41	.59		
Role ambiguity T2	.03	-.07	-.16	-.23	-.14	-.23	-.16	-.19	-.39	-.06	.01		.46	.45	.47	.48	.68	
Role ambiguity T3																		
GHQ-12 T1	.10	.02	.08	-.21	-.12	-.24	-.30	-.19	-.15	-.15	.04		.31	.25	.23	.22	.21	.18
GHQ-12 T2	-.04	.07	.00	-.07	-.06	-.14	.00	-.17	-.06	-.05	.04		.04	.22	.09	.00	.26	.14
GHQ-12 T3	-.02	-.01	.02	-.12	-.06	-.28	-.05	-.13	-.18	-.12	.00		.00	.11	.13	-.04	.18	.27
Anxiety T1	.17	.08	.09	-.22	-.03	-.19	-.18	-.06	-.06	-.09	-.02		.20	.23	.13	.18	.21	.16
Anxiety T2	.02	.15	.06	-.11	-.01	-.12	-.01	-.11	-.03	.00	.05		.06	.20	.09	.01	.20	.13
Anxiety T3	.01	.00	.11	.01	.09	-.14	.05	-.01	-.01	-.02	-.02		.03	.04	.11	-.04	.12	.22
Depression T1	.10	.12	.15	-.17	-.08	-.23	-.24	-.06	-.13	-.09	.07		.19	.13	.13	.13	.12	.13
Depression T2	-.02	.06	.00	-.01	.03	-.10	-.07	-.16	-.08	.01	.01		.14	.21	.15	.08	.23	.21
Depression T3	-.06	.00	-.02	-.05	.09	-.19	-.02	-.02	-.09	-.07	.03		-.02	.10	.13	-.01	.10	.23
Social Dysfunction T1	-.02	-.01	.08	.00	-.05	-.07	-.17	-.17	-.10	-.07	.16		.14	.14	.23	.03	.06	.07
Social Dysfunction T2	-.10	-.04	-.10	.00	-.04	-.05	.11	-.10	-.01	.05	.07		-.04	.09	.02	-.06	.17	.08
Social Dysfunction T3	-.03	.02	-.09	-.12	-.07	-.25	-.02	-.09	-.19	-.08	.05		-.05	.05	.06	-.05	.07	.19
Somatic symptoms T1	.14	.08	.09	-.17	-.10	-.30	-.29	-.24	-.15	-.14	-.05		.17	.23	.20	.11	.18	.15
Somatic symptoms T2	.00	.01	-.03	-.09	-.01	-.12	-.04	-.12	-.03	-.04	-.01		.01	.09	.10	-.01	.19	.16
Somatic symptoms T3	-.08	-.09	-.10	.00	.08	-.11	.07	-.10	-.01	.04	-.05		-.10	.06	.08	-.10	.12	.11
Job satisfaction T1	-.06	.04	-.02	.53	.42	.45	.57	.44	.46	.22	.03		-.51	-.50	-.51	-.50	-.42	-.43
Job satisfaction T2	-.14	-.05	-.07	.48	.46	.48	.45	.50	.44	.21	.11		-.40	-.56	-.57	-.37	-.52	-.45
Job satisfaction T3	-.08	-.02	-.09	.52	.43	.57	.43	.41	.58	.14	-.05		-.38	-.45	-.55	-.30	-.38	-.49

Variable name	GHQ-12			Anxiety			Depression			Social dysfunction			Somatic symptoms			Job satisfaction		
	T1	T2	T3	T1	T2	T3	T1	T2	T3	T1	T2	T3	T1	T2	T3	T1	T2	T3
GHQ-12 T1																		
GHQ-12 T2	.37																	
GHQ-12 T3	.37	.42																
Anxiety T1	.75	.33	.32															
Anxiety T2	.39	.82	.34	.50														
Anxiety T3	.30	.41	.77	.43	.51													
Depression T1	.74	.31	.39	.71	.43	.43												
Depression T2	.39	.74	.31	.39	.74	.43	.35											
Depression T3	.36	.42	.80	.39	.44	.72	.47	.43										
Social Dysfunction T1	.65	.23	.22	.32	.17	.15	.38	.28	.25									
Social Dysfunction T2	.14	.71	.18	.03	.42	.11	-.02	.48	.13	.17								
Social Dysfunction T3	.26	.17	.71	.14	.03	.33	.19	.08	.50	.26	.19							
Somatic symptoms T1	.59	.35	.37	.61	.44	.39	.61	.32	.39	.36	.15	.24						
Somatic symptoms T2	.34	.58	.34	.31	.66	.38	.35	.56	.34	.13	.34	.10	.38					
Somatic symptoms T3	.20	.35	.53	.29	.40	.65	.27	.29	.56	.08	.21	.28	.37	.38				
Job satisfaction T1	-.40	-.06	-.13	-.28	-.10	-.06	-.33	-.09	-.12	-.20	.08	-.11	-.27	-.14	-.05			
Job satisfaction T2	-.31	-.27	-.27	-.28	-.28	-.19	-.26	-.23	-.22	-.11	-.08	-.15	-.32	-.27	-.22	.76		
Job satisfaction T3	-.36	-.25	-.37	-.29	-.26	-.27	-.32	-.23	-.29	-.22	-.07	-.27	-.29	-.24	-.21	.75	.77	

Table 8.3 Correlation matrix of longitudinal measures. N= 154, correlation coefficients significant at p<0.05 shown in bold.

8.3 Examining trends over time

Although at the outset of this research project it was not anticipated that the manager group would experience major changes during the survey period, two significant points should be noted. Specifically, the second survey period coincided with the busiest trading period of the year, that is the “Christmas rush”, and furthermore, between the second and third surveys, major restructuring of the company management was announced. Open-ended questions at the end of the questionnaires indicated that both changes were of considerable concern to employees, and so it was of interest to determine if these expressed concerns were reflected in either work perceptions or strain responses.

To investigate trends over the 3 survey waves, a series of repeated measures multivariate analyses of variance were performed using the MANOVA procedure in SPSS. As for ordinary MANOVA, this allows correlated dependent variables to be examined simultaneously, thus reducing probability of Type I error. In addition, the repeated measures aspect of the analysis allows a test of changes over time.

8.3.1 *Changes in job characteristics*

Differences in job characteristics according to work environments were revealed in the analyses described in Section 7.1. Therefore all analyses of trends over time included additional tests for main and interactive effects of management grade and location. All effects, main and interactive, are displayed in Table 8.4. Higher order effects are examined before lower-order ones, and main effects are only discussed for those variables not involved in higher order interactions. In particular, management grade was not involved in

any significant interactions, but was found only have main effects. The main effects for management grade replicated those discussed in Chapter 7, that is more senior managers reported longer working hours and more demanding work content, but this occurred within a context of greater perceived control, social support and role clarity.

Effect	Pillai's Trace	F	df	signif.
INTERACTION EFFECTS				
Grade x location x time	.104	1.31	(24, 1184)	ns
Grade x location	.091	1.15	(12, 290)	ns
Grade x time	.055	<1	(24, 1184)	ns
Location x time	.075	1.92	(12, 588)	p < .05
MAIN EFFECTS				
Grade	.257	3.57	(12, 290)	p < .001
Location	.272	8.98	(6, 144)	p < .001
Time	.094	2.41	(12, 588)	p < .01

Table 8.4 Multivariate tests of significance for changes in job characteristics across the three survey periods, N=155. Job characteristics included were control, demand, support from peers, support from senior colleagues, role conflict and role ambiguity.

Location and time were found to have a significant multivariate interaction. The form of this interaction was further investigated through univariate analyses. Significant univariate effects for the *location x time* interaction were observed for role conflict ($F = 3.13, p < 0.05$), with marginally significant effects also for role ambiguity ($F = 2.46, p < 0.1$) and support from senior colleagues ($F = 2.72, p < 0.1$). The form of the interaction is illustrated in Figure 8.6 for role conflict by the patterns of group means in each location over time. Increasing role conflict was observed for the retail group, such that the relative advantage in role clarity observed May 1993 had been eroded by May 1994. Patterns of

group means for both senior colleague support and role ambiguity were consistent with this, that is conditions generally worsening over time, particularly in the retail domain.

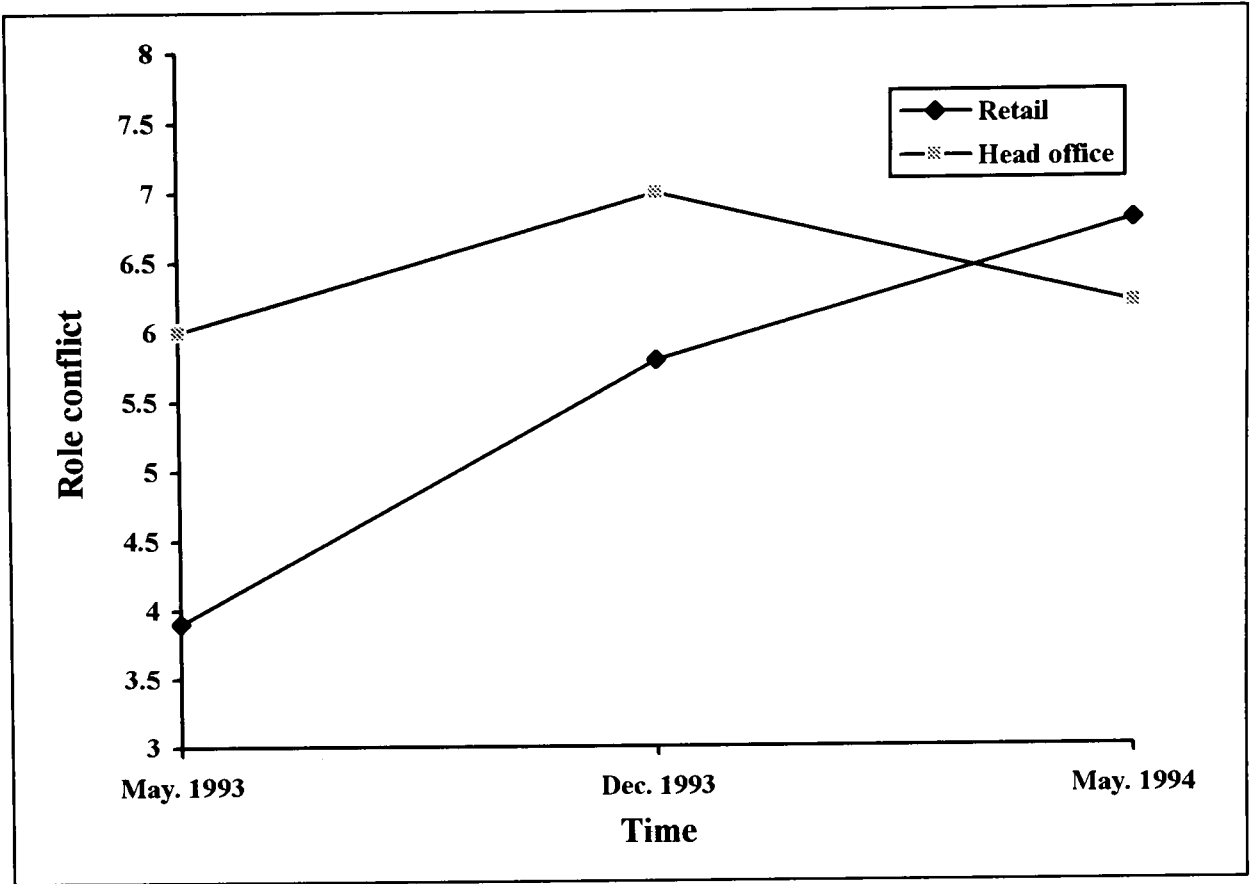


Figure 8.6 Patterns of group means for perceived role conflict over time. (N= 155; 74 retail, 81 head office)

8.3.2 Changes in strain responses

The strain responses examined for trends were job satisfaction, anxiety, depression, social dysfunction, and physical symptoms. Although correlated, these scales do not contain any overlapping items. Again, effects of management grade and location were statistically controlled. MANOVA results are summarised in Table 8.5, and reveal no significant interaction effects. There were however main effects for both management grade and time.

Effect	Pillai's Trace	F	df	signif.
INTERACTION EFFECTS				
Grade x location x time	.045	<1	(24, 1248)	ns
Grade x location	.107	1.43	(12, 306)	ns
Grade x time	.080	1.06	(24, 1248)	ns
Location x time	.040	1.07	(12, 620)	ns
MAIN EFFECTS				
Grade	.260	3.811,	(12, 306)	p<0.01
Location	.033	<1	(6,152)	ns
Time	.284	8.56,	(12, 620)	p<0.01

Table 8.5 Multivariate tests of significance for changes in strain outcomes across the 3 survey periods. N=158. Strain indices included were job satisfaction, anxiety, depression, social dysfunction and somatic symptoms.

The main effect for management grade again replicated that described in Section 7.1, with more senior managers reporting lower levels of strain (job satisfaction, physical symptoms). The multivariate main effect for time was also significant. Univariate effects for time were found for physical health ($F = 4.14$, $p < 0.05$) and job satisfaction ($F = 47.88$, $p < 0.001$): these trends are graphed in Figures 8.7 and 8.8. The main feature of Figure 8.7 is the peak of symptoms in December 1993¹. This reflects an expected annual cycle, with employees experiencing poorer health during winter. The fact that a peak in symptoms occurred in both head office and retail managers (i.e. no significant *location x time* interaction) suggests that this was not an effect of the Christmas rush, as head office managers are not affected by increased December workload. In contrast, in Figure 8.8 mean levels of job satisfaction fall over the three successive surveys. This trend cannot be

¹ The difference between symptoms in May 1993 and May 1994 was not statistically significant ($t < 1$, ns).

attributed to seasonal variation, but is likely to be underlain by the company restructuring occurring at that time, and affecting all employees.

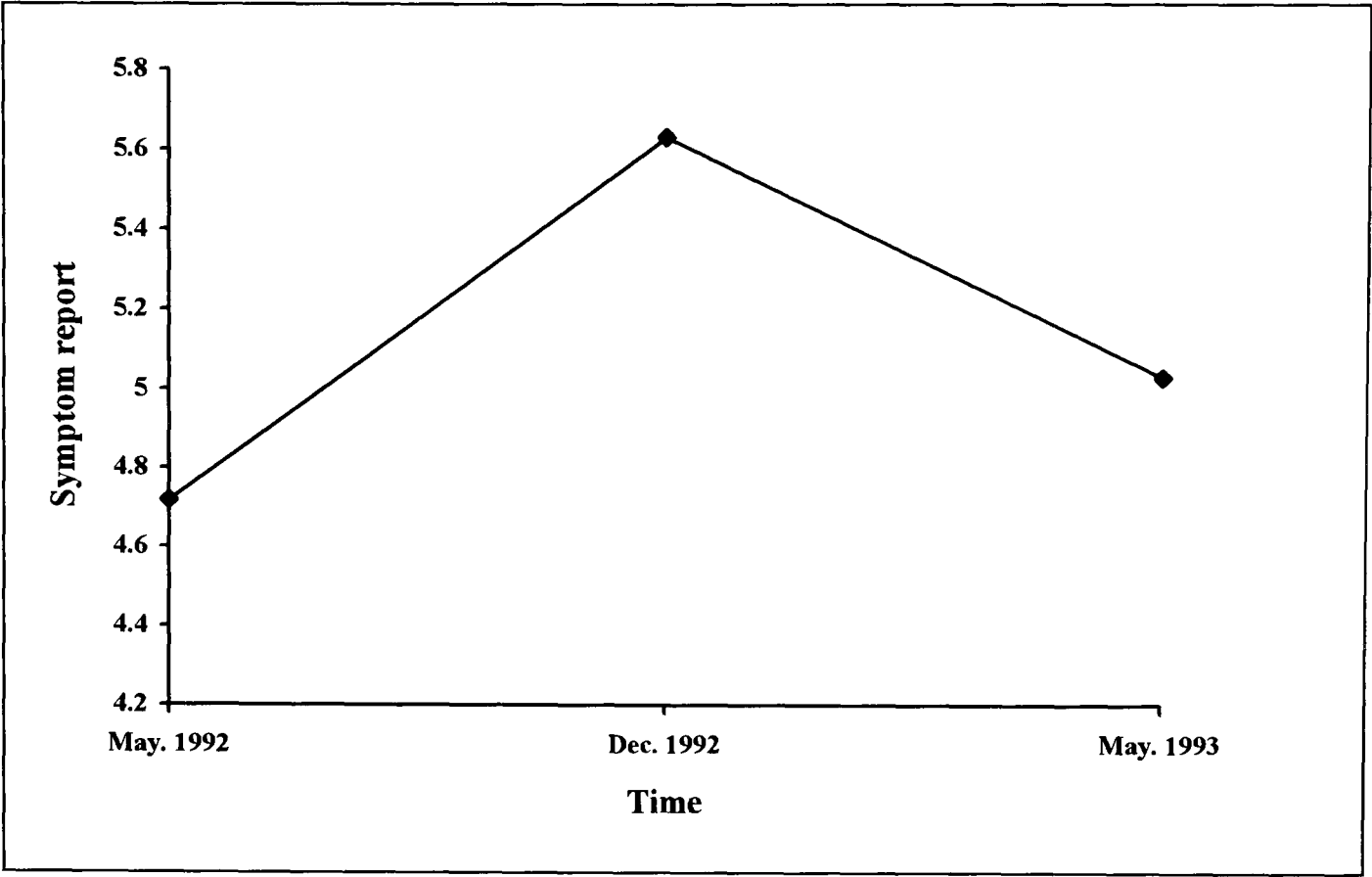


Figure 8.7 Mean levels for report of physical symptoms over time. N = 158.

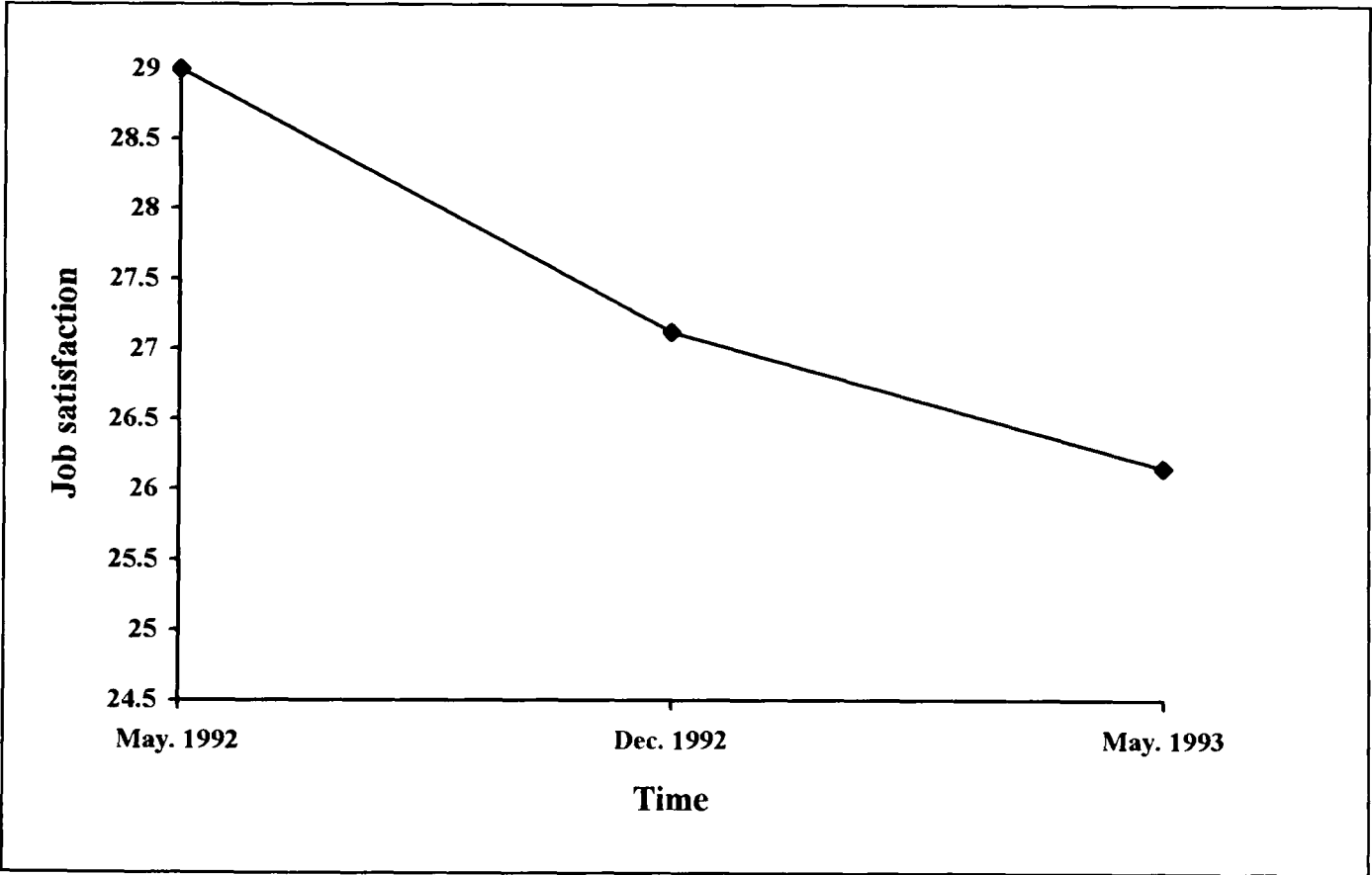


Figure 8.8 Mean levels for job satisfaction over time. N= 158.

8.4 Longitudinal models to predict strain using latent variables

8.4.1 *Predicting job satisfaction over time*

Structural equation modelling techniques were used to model changes in job satisfaction over time in order to gain a greater understanding of the processes underlying these changes. An autoregressive model was utilised in this analysis, and this general underlying model is presented in Figure 8.9. This model recognises that strain levels (in this case, job satisfaction) are largely predicted by pre-existing levels of strain. Similarly, job characteristics are generally stable, and therefore correlated over time. This stability, or autocorrelation, is represented in Figure 8.9 as double lines (=).

Furthermore, as was demonstrated in the models presented in Section 8.1, job characteristics are related to the outcomes at each time point. Thus, in this model, the relationships between job characteristics and strain at Times 2 and 3 take into account the autocorrelation within both independent and dependent variables. The association represented as line A, indicates the extent to which job variables at Time 2 (residualised for Time 1 levels of these variables) predict job satisfaction at Time 2 (also residualised for Time 1). That is, line A represents the association between the *change* in job variables and the *change* in job satisfaction. Similarly, line B represents the association between the changes in each of these variables between Times 2 and 3. This form of analysis therefore allows stronger conclusions regarding the causal nature of associations between these variables than the cross-sectional analyses presented previously.

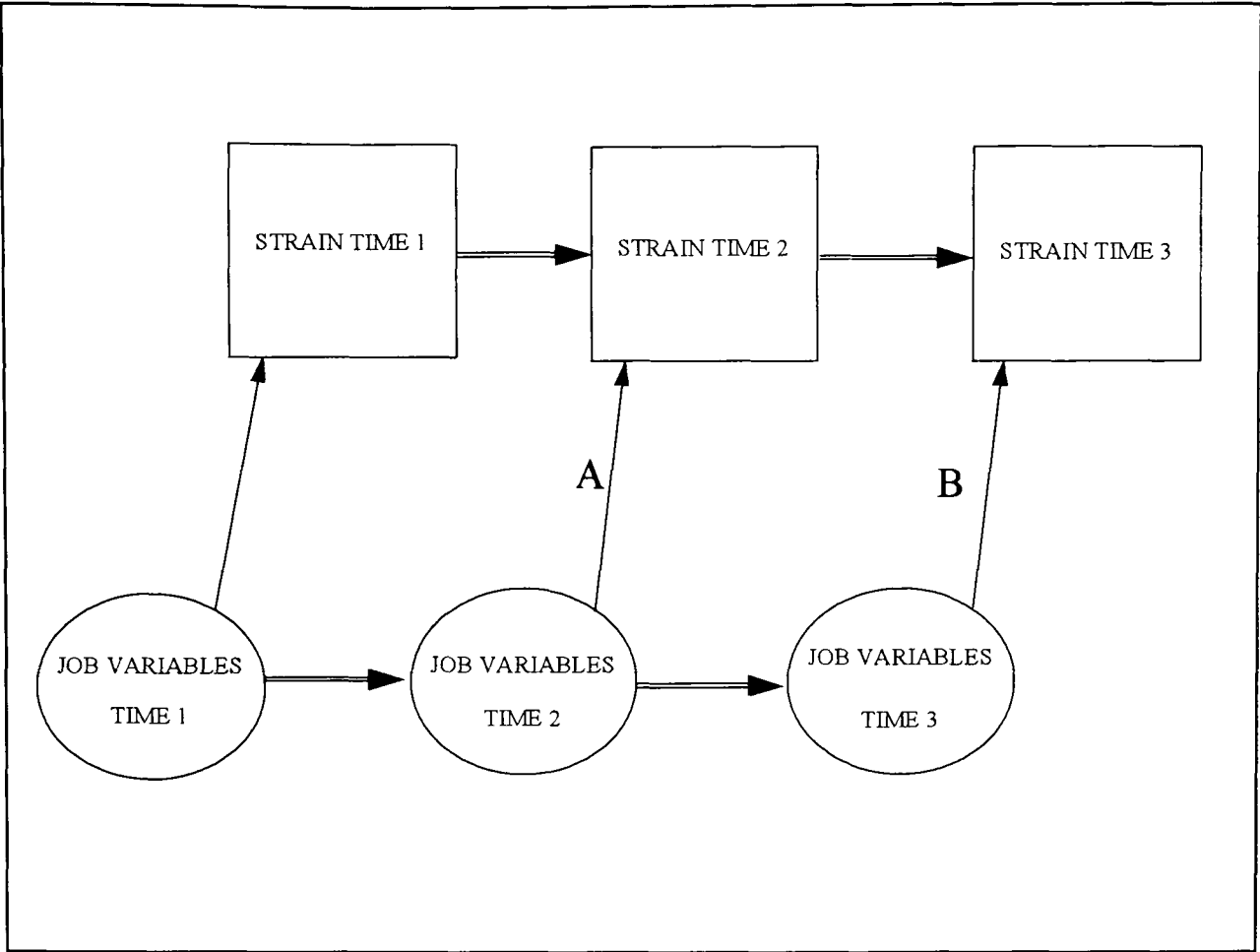


Figure 8.9 General autoregressive model to describe changes in strain over time.

Complete data for all three survey waves were available for a sample of 148 employees. Although this is a sufficient sample size for latent variable modelling (Breckler, 1990), the number of manifest variables included in the longitudinal models was restricted in consideration of recommendations by Bentler (1989). The influence of stable individual differences are omitted from this model. Although individual differences can affect initial job characteristics and levels of strain (as shown in Chapter 7), their influence on subsequent levels of strain operates through the autocorrelation of factors over time. Furthermore the choice of job characteristics selected for inclusion in this analysis builds on the results of the cross-sectional analyses presented above. In both the regression and structural equation analyses presented, it was found that job satisfaction was associated with, perceived control, support from senior colleagues and role ambiguity. Role ambiguity and senior support were also found to vary over time in the repeated measures MANOVAs presented in Section 8.3,

lending support to the idea that these changes might contribute to the observed changes in job satisfaction. As in the mediated model presented in Section 8.1 (Figure 8.5), social support is modelled to allow both direct and indirect effects on job satisfaction at each time point.

Thus latent variables at each of the three times were constructed for job satisfaction, senior colleague support, perceived control and role ambiguity (12 latent variables in all). Furthermore, as the same measures were repeated over time, the error terms associated with each of the repeated manifest variables were allowed to correlate over time. The goodness of fit of the overall measurement model was assessed in a single confirmatory factor analysis, by specifying the relationships between manifest and latent variables, but allowing latent factors to covary freely. This model indicates that there is good correspondence between the proposed measurement model and observed covariances: $\chi^2 = 540.02$ (399 df, $p < 0.001$); CFI = 0.954; $\chi^2/\text{df} = 1.35$.

A path diagram for the proposed longitudinal model is presented in Figure 8.10. Most specified pathways were statistically significant. As was reported for the cross-sectional analysis, social support has main and mediated effects on job satisfaction at Time 1, while ambiguity and control also have independent direct effects on job satisfaction in the expected direction. At Time 2, change in job satisfaction was predicted by change in ambiguity and control, but not support, although support continued to have mediated effects through ambiguity and control. Finally, at Time 3, change in job satisfaction was predicted by change in support, ambiguity and control. The overall fit of this model was good: $\chi^2 = 665.486$, (442 df, $p < 0.001$); CFI = .928; $\chi^2/\text{df} = 1.50$.

The proposed model predicts job satisfaction from prior levels of satisfaction as well as job characteristics. Both satisfaction and job characteristics are quite stable over time. Of more importance to our understanding of the stress process, after controlling for this

stability, the changes observed in job satisfaction are associated with changes in social support, role conflict and perceptions of control over time. Furthermore, the signs of all coefficients were consistent with expectations: all stability coefficients were positive; social support, control and job satisfaction were all positively associated with each other; and role ambiguity was negatively associated with job satisfaction and social support.

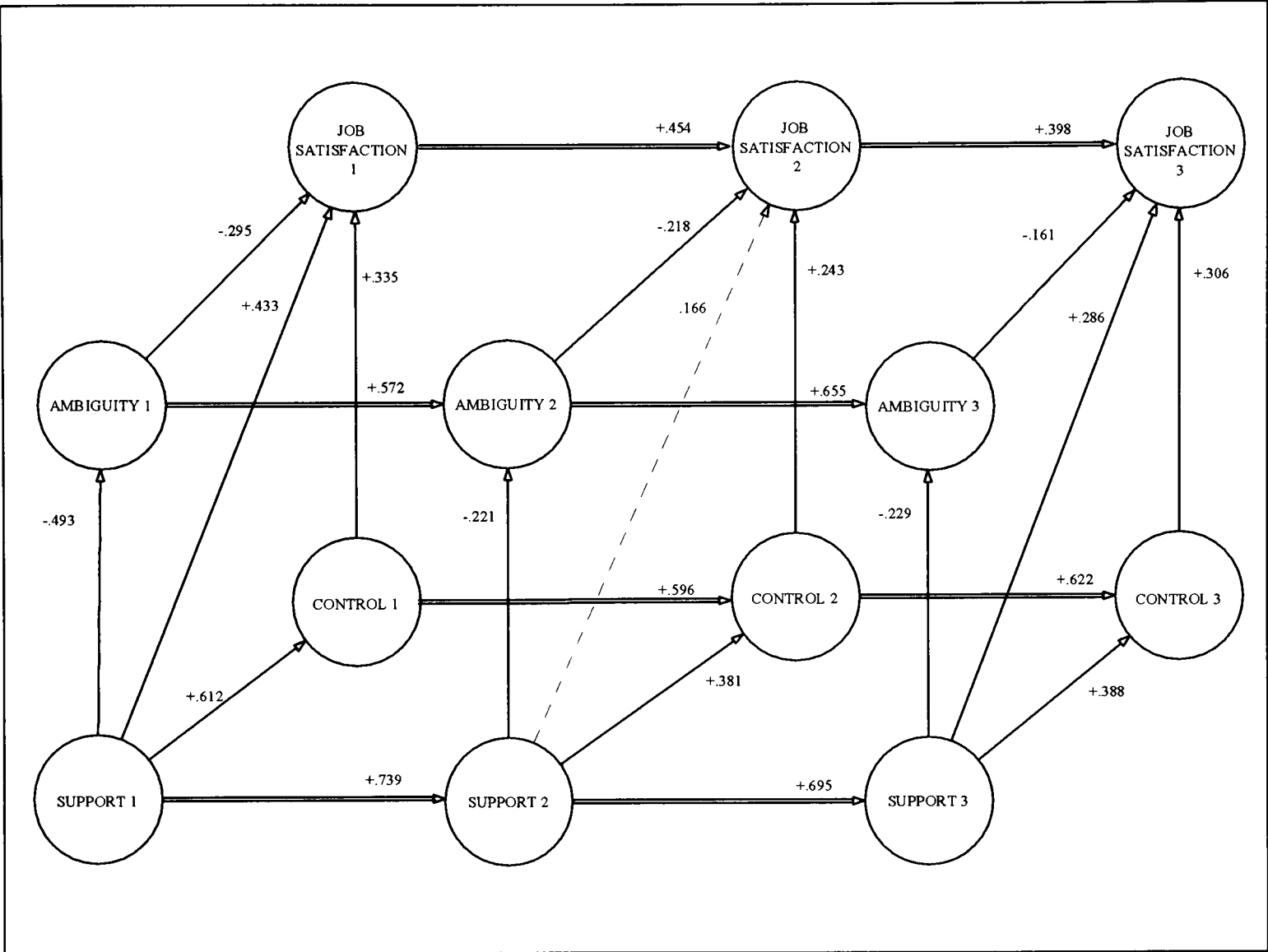


Figure 8.10 Path diagram illustrating the longitudinal influence of support, control and ambiguity on job satisfaction. Autocorrelations between variables are shown as double arrows. Standardised parameters for all pathways between latent variables are shown: unbroken lines indicate 1-tail significance of $p < 0.01$. Manifest variable loadings and error terms for the latent variables have been omitted for clarity.

It is sometimes argued that job satisfaction should be construed as a cause of job perceptions rather than an effect (e.g. Caldwell and O'Reilly, 1982). This hypothesis was tested by creating a model with additional pathways between levels of satisfaction at Time 1 and 2 and subsequent job perceptions (i.e. at Time 2 and 3 respectively). The overall fit of this alternative model was also adequate: $\chi^2 = 650.86$ (df = 436), CFI = .931, $\chi^2/\text{df} = 1.49$. Furthermore comparing this to the previous model indicated that the change in χ^2 of 14.63 for a loss of 6 degrees of freedom was a slight improvement ($0.01 < p < 0.05$) on the model presented in Figure 8.10.

However, of the six additional pathways included, only three were statistically significant: job satisfaction at Time 1 predicted perceptions of support at Time 2, and job satisfaction at Time 2 predicted perception of support and ambiguity at Time 3. Thus, job perceptions (particularly of social support) are influenced *by* prior levels of job satisfaction, in addition to their influence *of* current satisfaction. Furthermore, the inclusion of these additional pathways resulted in autocorrelation of support over time being reduced to below conventional statistical significance. That is, the apparent stability of perceptions of support is accounted for through a recursive relationship with job satisfaction.

8.4.2 *Predicting mental health over time*

The same underlying model depicted in Figure 8.9 was used to model mental health outcomes over time. The job characteristics which were found to have direct effects on the mental health in cross-sectional analysis presented in Section 8.1 were job demands and social support. These two variables were selected to model mental health outcomes longitudinally. In addition, the influence of neuroticism was entered at Time 1, as this has

been shown to have substantial impact on mental health measures (e.g. Moyle, in press). Thus a total of 10 latent variables were constructed. Confirmatory factor analysis of the measurement model indicated good fit: $\chi^2 = 507.234$ (362 df, $p < 0.001$); CFI = 0.950; $\chi^2/\text{df} = 1.40$. The longitudinal structural model for mental health is presented in Figure 8.11.

As for the job satisfaction model, in fitting this longitudinal model, autocorrelations of latent variable over time were specified, and the errors of repeated manifest measures were allowed to covary. The proposed model showed overall good fit with the data: $\chi^2 = 579.55$ (df = 394, $p < 0.001$); CFI = .936; $\chi^2/\text{df} = 1.47$. However, looking at the significance of pathway parameters it may be seen that although neuroticism, support and demand predicted mental health cross-sectionally at Time 1, the *change* in mental health over time was not significantly contributed to by the change in either support or perceived demands.

Thus mental health appears to be best predicted by pre-existing symptom levels. Although these are related to job characteristics in a cross-sectional analysis, the covariance between residualised job characteristics and outcomes were not significant. One reason for this finding may be the relative stability of general mental health in the sample over the survey period (see Section 8.3.2): the significant peak in physical symptoms in December 1993 would be obscured by the stability in anxiety, depression and social dysfunction.

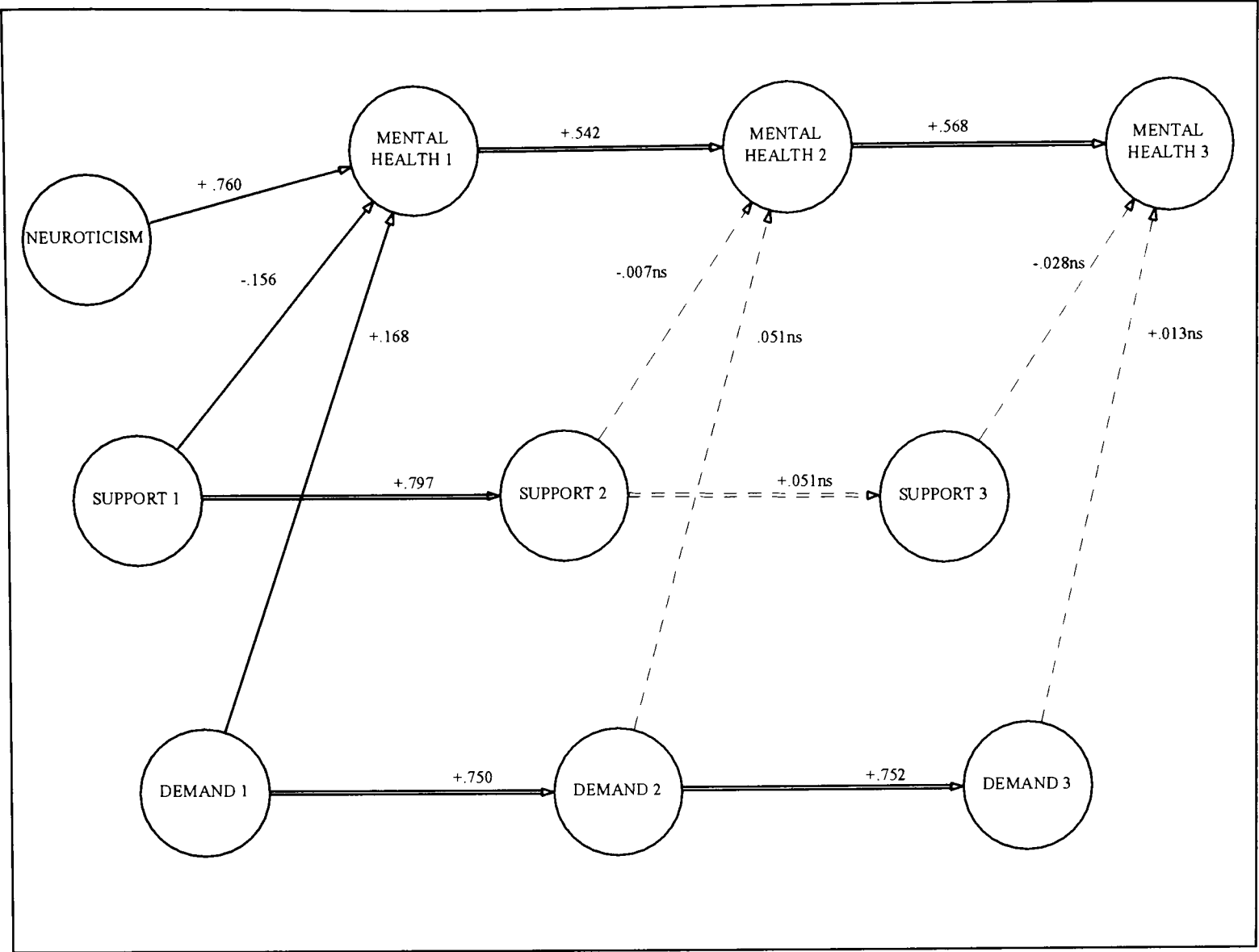


Figure 8.11 Path diagram illustrating the longitudinal influence of neuroticism, support, and demand on mental health (anxiety, depression, somatic symptom and social dysfunction). Autocorrelations between variables over time are shown as double arrows. Standardised parameters for all pathways between latent variables are shown: unbroken lines indicate 1-tail significance of $p < 0.01$. Manifest variable loadings and error terms for the latent variables have been omitted for clarity.

An additional model, specifying relationships between job characteristics and neuroticism as in the cross-sectional analysis, was also fitted ($\chi^2 = 573.53$, $df = 390$; CFI = 0.937; $\chi^2/3 = 1.47$). This model did not result in a significant improvement of fit relative to the simple direct effects model ($\Delta\chi^2 = 6.02$, 4 df , $p > 0.05$), and therefore the model depicted in Figure 8.11 is considered the better model to describe the longitudinal data.

8.4.3 *Alternative analyses*

The sample size of 148 used in the present analyses is adequate for latent variables models according to the criterion of minimum $N = 100$ -150 (e.g. Breckler, 1990; Anderson and Gerbing, 1988). However, Bentler's (1989) more conservative guide of a ratio of between 5 and 10 to 1, of sample size to parameters estimated, suggests that the solutions reported here may not be trustworthy. According to this criteria, sample sizes of at least 200, but preferably 400, are required to test with confidence the longitudinal models presented. An alternative method of analysis accounts for measurement error of constructs using scale reliabilities (alphas, reported in Chapter 6), rather than through estimation of a measurement model with multiple manifest variables for each latent factor. This method reduces the number of parameters estimated and is therefore sometimes preferred with smaller samples (as used for example by Schaubroeck et al., 1989 and Tharenou, 1993).

The longitudinal models for job satisfaction and mental health were therefore repeated using this alternative method, with very similar results to the models presented above.

For the longitudinal job satisfaction model, the comparative fit index indicated adequate fit, although not as good as for the full model: $\chi^2 = 141.69$ ($df = 43$, $p < 0.001$);

CFI = .911; $\chi^2/\text{df} = 3.30$. Furthermore the sign and significance of the structural pathways were identical to the model in Figure 8.10.

Similarly, the alternative analysis of the mental health model, revealed adequate overall fit: $\chi^2 = 85.09$ (df = 32, $p < 0.001$); CFI = .907; $\chi^2/\text{df} = 2.66$. However, compared with the model in Figure 8.11, there was one additional structural pathway which reached significance (the stability pathway between support at Times 2 and 3).

8.5 Summary and conclusions

Structural equation modelling using the Time 1 data was broadly consistent with the findings presented in Chapter 7, using multiple regression. As recommended by Brief et al. (1988), the relationships between self-report of work characteristics and strain were assessed after statistical control for negative affectivity (neuroticism): both mental health and job satisfaction were significantly predicted by work characteristics, after controlling for the effects of neuroticism. Job satisfaction was predicted by perceptions of control, social support and role clarity in both regression and SEM analyses, and mental health was predicted by work demands in both forms of analysis.

However, some associations were less robust: in particular, SEM revealed significant associations of neuroticism and perceived demands with job satisfaction, and social support with mental health. These relationships were apparent in simple correlations presented in Table 6.8, but were not significant in the multiple regressions in Chapter 7. Thus some associations are sensitive to control for measurement error, and/or the inclusion of additional background factors in multiple regression, while others are statistically significant in all forms of analysis.

SEM also allowed the simultaneous testing of mediational pathways. Using hierarchical multiple regression, Moyle (in press) demonstrated the mediation of the influence of neuroticism on job satisfaction by perceptions of control at work. The model presented in Figure 8.4 extends this finding, revealing mediated influences through work perceptions more generally, and in particular through social support: neuroticism influenced both mental health and job satisfaction through direct and mediated pathways.

In addition, the mediation of social support and perceived control through role conflict and ambiguity, has been reported in several studies (e.g. Lee and Ashforth, 1993).

The model presented in Section 8.1 is consistent with a mediated influence of social support, but not control through role clarity: latent factors representing control and role clarity were not significantly associated. However, it should be noted that the strongest evidence of control-clarity-mental health mediation comes from the literature relating to employee participation (e.g. Jackson, 1983; Schaubroeck and Jennings, 1991), where increased participation is assumed to be equivalent to increases in control. It may be that participation also results in improvements in social support. If this is the case, then the present finding of mediated influence of support through role clarity is also consistent with the participative decision-making (PDM) literature. Schaubroeck et al. (1989) also failed to link perceived control to role conflict and ambiguity in their structural equation analysis.

Furthermore social support was shown to have indirect influence on job satisfaction through perceptions of control. This is a pathway that has been previously suggested by other researchers (e.g. Ganster and Victor, 1988; Krause, 1987), although past research has tended to use locus of control measures for perceptions of control. It is also a result consistent with positive outcomes of PDM: PDM programmes improve communication and support from senior colleagues, which results in increased control (as well as role clarity), and thus reduced strain.

An additional mediated pathway also revealed in the model presented, was the mediation of control through levels of demand: that is, employees with high levels of control perceive lower levels of demand, and low demand has implications for strain. However, the direction of causation of this association was not demonstrated unequivocally: it could equally be that under conditions of high work demands, employees perceive reduced control, and therefore experience poorer outcomes. Further research, using longitudinal data and preferably objective manipulations of demand or control, is required to assess this causal process.

In a recent review of the social support literature, Ganster and Victor (1988) called for studies in which mediating processes are specified and assessed. Although not experimental in design, as recommended by Ganster and Victor, the present study investigated mediators of social support, elucidating mechanisms through which support is related to strain outcomes. The structural model developed with the Time 1 data identified important causal roles of social support, revealing both direct and indirect effects on job satisfaction and mental health: indirect influences were those mediated through role clarity and perceptions of control. Furthermore the present findings build on past research in that the outcomes of mental health and job satisfaction were simultaneously predicted, whereas past research examining mediators of social support has tended to focus on one type of outcome (e.g. Lee and Ashforth, 1993; Tetrick, 1992).

Longitudinal analyses revealed that perceptions of some work conditions (role clarity and the supportiveness of senior colleagues) worsened during the survey period. Furthermore, employee responses, as indicated by both job satisfaction and health, were also found to be poorer at the end of the survey than initially. Taken together, these findings suggest that the changes experienced in the company during the survey period, most notably major management restructuring, had negative consequences at an individual level, in terms of work perceptions and satisfaction.

However, it is not clear from the present study whether these negative outcomes were short-lived, associated with the uncertainty of the transition period, or whether adaptation to the new structure would occur over time. A follow-up survey is required to investigate this possibility. Furthermore, because the survey was not designed specifically to look at responses to this change, there was no comparison or control group, who did not undergo restructuring. Therefore, it is possible that, due to the voluntary nature of the research participation, employees who continued to participate throughout the survey, were

disproportionately those who were experiencing difficulties in their work. These cautions must be borne in mind in interpreting the trends presented.

From a process viewpoint, the relationships between job characteristics and strain outcomes are more robust to these potential biases. Both job satisfaction and psychological well-being were found to be strongly correlated over the three survey waves, despite the trends in means. By controlling for this autocorrelation, and the similar stability in work environment measures, it was possible to investigate the relationships between changes in work characteristics and outcomes over time using latent variable models. Although sample size limited longitudinal analyses to relatively simple models of the stress process, the findings of these longitudinal analyses reinforce the causal arguments made on the basis of cross-sectional analyses. Not only was job satisfaction associated with social support, role ambiguity and perceptions of control in cross-sectional analyses, but *changes* in job satisfaction were associated with *changes* in these work perceptions over time.

In contrast, although work characteristics explained significant variance in mental health cross-sectionally, changes in work characteristics did not explain changes in mental health. Thus, consistent with the findings of Grant et al. (1987), the best predictor of mental health over time was prior mental health status. This stability in mental health is also consistent with the findings of the regression analyses, that mental health is largely explained by stable personality characteristics.

Finally, latent variable modelling of both cross-sectional and longitudinal data was consistent with social support as a cause of job satisfaction and mental well-being, operating through direct and indirect mechanisms. Therefore, any intervention which improves social support at work could be expected to have effects on both employee satisfaction and well-being.

9. The Relocation Study

9.1 Introduction

It was noted in Chapter 2 that although workplace changes are widely considered to result in strain at an individual level, systematic research into the stress associated with the transition period has been relatively rare. Furthermore research into transition stress has suffered from at least one of three methodological weaknesses: cross-sectional data, which does not allow control for levels of stressors and strain prior to the change period; the reliance on subjective ratings of the change period by participants, leading to difficulties of retrospective bias in their self-reports; and the absence of a control or comparison group to separate effects of the change and the passage of time. As discussed in Chapter 4, a more sound methodology for investigating transition stress is to adopt a longitudinal quasi-experimental design. Thus, in the present relocation study, employees who moved to a new work setting were compared with a similar group of employees, who were not relocated. Furthermore, all participants were surveyed before, during, and after the transition; thus all questions referred to current work situations, rather than requiring subjects to make subjective comparisons with the past.

New store openings, and the associated relocation of personnel, present a substantial challenge to the participant company. During 1993-94, 23 new branches were opened, one third of which replaced older branches. Although these store openings produced over 5,000 new full- and part-time jobs, a substantial proportion of personnel in a new store, particularly management, were drawn from existing branches in the same geographic region.

The present chapter describes a study of personnel relocation associated with new branch openings. Theory and past research suggests that the transition period is associated

with negative strain outcomes (e.g. Levi, 1994; Roberts and Glick, 1981), possibly mediated by changes in work characteristics, such as demand and control (Fisher, 1989). Furthermore past research suggests that negative responses to change might be alleviated by adaptive personal characteristics, in particular an internal locus of control (e.g. Ashford, 1988; Callan et al., 1994), and situational factors, including increased social support and control (e.g. Callan, 1993; Karasek, 1990).

Sections 9.2 and 9.3 outline the methodology of the study and the psychometrics of the questionnaires used. Section 9.4 presents the results of cross-sectional analysis of the first survey wave. As was reported for the manager sample, variance in job satisfaction and psychological distress were explained by different sets of factors; job satisfaction being more closely associated with job characteristics and psychological distress with individual differences. Using repeated measures analysis of variance, Section 9.5 examines the evidence that a transfer to a new branch is experienced as stressful. Employee responses during the transition period are further analysed using path analysis to investigate mechanisms through which the negative effects of relocation might be minimised. All findings are summarised in Section 9.6.

9.2 Participants and procedure

9.2.1 *Research design*

A quasi-experimental design was used to examine employee responses to a job relocation. Three new branches were selected for investigation. Each of these new stores was built as a replacement for an older, smaller store; the majority of employees who worked at the old store were offered a transfer to the new branch. Thus, many employees underwent only a minor work change, in that they continued to carry out essentially the same job, but in a new work environment. In addition, several employees were promoted, or moved sideways into new positions with the transfer. Although the majority of non-managerial employees from the existing store were directly transferred to the new store, management of new stores is usually composed of a mix of managers selected from other stores in that region.

The survey was limited to full-time employees who had been working within the company before the new store opening. This allowed employees to be initially assessed approximately six weeks prior to the store opening, while working in a familiar environment. They were surveyed again six weeks after the opening, and finally in a six month follow-up. The spacing of survey waves was arranged in consultation with experienced personnel managers. In general, personnel (particularly non-managerial employees) are selected for transfer to a new store only six weeks prior to opening, this schedule determined the timing of the first survey wave. It was appreciated that the opening period would be extremely busy, and would not therefore allow time for questionnaire completion. Hence, the second wave of questionnaires was sent six weeks after the opening, with questions referring to perceptions of work in the new store. Finally, it was estimated that the transition would be complete in six months, and any “transition stress”

would have subsided by this time. Thus, the three waves were expected to capture a “before”, “during” and “after” view of the branch opening.

To allow control for wider time-dependent changes, such as seasonal variations, changes in the economic climate, and company restructuring, each new store was matched to a comparison, or control branch. Comparison branches were selected to be in the same geographic region, of a similar size, and serving a population comparable to that of the new store. New and comparison branches were surveyed in pairs, linked to the new store opening time-table. This research design allowed employees experiencing a work transition to be compared with employees in an on-going work situation.

Survey dates for each store are given in Table 9.1. Although three new branches due to open in Summer 1993 were selected, building delays and other unforeseen difficulties resulted in these openings being staggered. However, the use of comparison stores meant that this was not a major source of disruption to the research. A further complication in the research design occurred with the decision not to close the old Store E with the opening of new Store E, resulting in a smaller number of staff transfers between these two stores than originally anticipated. As occurred in the manager survey, before any contact by the researcher, all potential participants were sent an introductory letter by the Retail Director. If no response was received to a questionnaire within one month, reminders were sent. Finally, to ensure confidentiality, all completed questionnaires were returned directly to the Department of Experimental Psychology using prepaid address labels.

Branch name	Date of questionnaire 1	Date of questionnaire 2	Date of questionnaire 3
Store A (new)	May 20 1993	July 26 1993	January 6 1994
Store B (comparison)	May 27 1993	July 26 1993	January 6 1994
Store C (new)	September 1 1993	November 8 1993	February 1 1994
Store D (comparison)	September 11 993	November 8 1993	February 1 1994
Store E (new)	December 11 993	March 28 1994	July 13 1994
Store F (comparison)	December 1 1993	March 28 1994	July 13 1994

Table 9.1. Longitudinal survey design for new branches study.

9.2.2 Response rates

A total of 412 questionnaires was sent out to the six selected branches. Of these, 177 (43.0%) returned the first questionnaire, but full response was only obtained for 85 participants (20.6%). Only employees who had responded to previous questionnaires were included in each subsequent survey. A breakdown of response over the three survey waves, is given in Figure 9.1 for new and comparison branches.

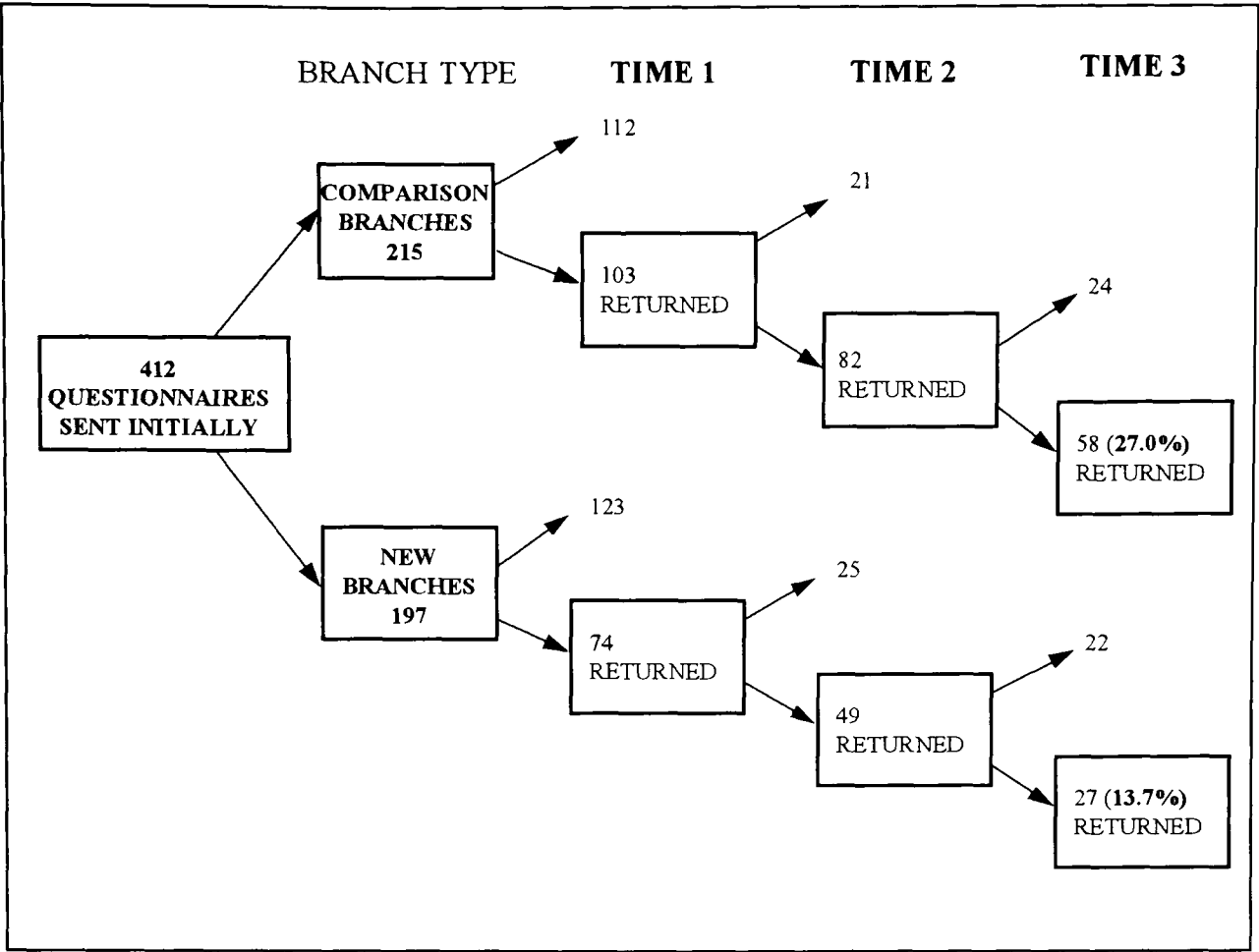


Figure 9.1 Flowchart of response rates for each survey wave in new and comparison stores.

Comparisons between responders and non-responders were possible in terms of several variables derived from company records. There were no significant differences in terms of job grade, tenure, or age. However, response rates were significantly higher in the comparison stores relative to new branches ($\chi^2 = 21.8$, 5 df, $p < 0.05$); women were more likely to respond than men ($\chi^2 = 5.64$, 1 df, $p < 0.05$); and non-responders had higher rates of work absence than responders ($t = 2.27$, 381 df, $p < 0.05$, for number of spells of absence 1993-94).

Furthermore, comparisons between full and partial responders were made in terms of responses to the first questionnaire. The only variable which showed a significant difference between these groups was the number of hours worked per week: partial responders reported higher numbers of working hours ($t = 2.17$, 173 df, $p < 0.05$). In terms of other reported job characteristics, personality variables and strain indices, there were no significant differences between full and partial responders.

In summary, the relatively low response rate in the branches survey combines with some indication of bias operating in volunteers, to limit the extent to which conclusions from the analyses which follow can be generalised: it appears that those employees experiencing high work pressure are less likely to have responded to the questionnaires. Therefore the survey sample is not necessarily representative of the wider population of branch employees.

9.2.3 *Description of sample*

Respondents sampled at Time 1 ranged in age from 16 to 69 years (mean = 36.36); they had an average length of service of 8.04 years, with 4.26 years in their current roles; 56.9% of the sample was female. Educational attainment was categorised in terms of formal qualifications; the distribution is shown in Table 9.2. For the purposes of comparisons within branches, rather than a full breakdown according to job grade, the sample was divided into management and non-management groups. The distribution of respondents according to this categorisation is shown for each branch in Figure 9.2. Management tended to be over-represented relative to their proportion within branches, because of the research focus on full-time employees (many non-management positions are part-time), combined with a higher response rates of managers than non-managers.

Educational attainment	percentage
No formal qualifications	42.4
O levels (or equivalent)	30.0
A levels (or equivalent)	14.4
Higher education (degree)	3.0

Table 9.2 Distribution of sample according to educational attainment



Figure 9.2 Distribution of sample by branch and job grade

9.3 Psychometric of questionnaire scales

9.3.1 Questionnaire design

The questionnaires for the relocation study were closely based upon those used in the manager study. Again, scales with established psychometric properties were used where appropriate. However, in consideration of the lower levels of educational attainment of this sample, the overall questionnaire was shorter than that used in the manager study. More specifically, the role conflict and ambiguity scales were omitted, shorter demand and control scales were adapted from Karasek (1979), a shorter Type A behaviour scale was adapted from the Framingham Type A Behaviour Pattern Scale (Haynes et al., 1978), and only the general psychological distress (GHQ-12) and somatic symptoms scales from the General Health Questionnaire were included. Those scales not discussed in previous chapters are reproduced in Appendix II, and are briefly described below.

Demand and control scales. The demand and control scales were adapted from Karasek (1979). They comprise seven items concerning pace and challenge of work demands, and eight items concerning decision latitude and discretion at work. All items were presented as a series of statements to be rated according to how well they applied to the respondents work situation, using a Likert response format from 1 (not at all) to 4 (very much indeed). Principle components analysis with varimax rotation revealed a two factor solution with good separation into the designated subscales.

TABP scale. The measure of Type A behaviour was adapted from the Framingham Type A Behaviour Pattern scale comprising nine items which have been shown to be strongly

predictive related to the incidence of coronary heart disease (Haynes et al., 1978). Principle components analysis confirmed a single factor structure of this scale.

9.3.2 Reliability: internal consistency and stability of scales

Internal consistencies and retest reliabilities for all questionnaire scales are shown in Table 9.3: internal consistencies were all within an acceptable range. Retest reliabilities, or stability coefficients, although indicating statistically significant correlation over time, were relatively low for many of the work characteristics scales, particularly over the full survey period (T1-T3). This finding indicates that there was some variance in work characteristics between surveys, as might be expected given the changes that were being experienced.

RELIABILITY COEFFICIENT		INTERNAL CONSISTENCY			TEST-RETEST RELIABILITY		
SCALE	Wave	T1	T2	T3	T1-T2	T2-T3	T1-T3
	N	172-175	118-120	97-100	116-118	86-87	96-99
PERSONALITY	Number of items						
1. Extraversion	12	.88	*	.88	*	*	.91
2. Neuroticism	12	.80	*	.81	*	*	.76
3. Social Desirability	12	.78	*	.73	*	*	.80
4. Type A Behaviour	9	.69	*	.72	*	*	.72
5. Locus of Control	16	.80	*	.80	*	*	.66
WORK CHARACTERISTICS							
6. Demands	7	.79	.79	.80	.46	.52	.42
7. Hours worked per week	1	*	*	*	.49	.72	.74
8. Control	8	.83	.85	.83	.78	.82	.79
9. Social support: Colleagues	3	.76	.86	.81	.55	.72	.59
10. Social support: Seniors	6	.88	.85	.85	.61	.77	.59
STRAIN INDICES							
11. Job satisfaction	10	.82	.85	.81	.63	.78	.69
12. Cognitive Failures	12	.82	.87	.86	.77	.83	.74
13. GHQ-12	12	.88	.91	.89	.58	.71	.59
14. Somatic symptoms	7	.80	.88	.80	.53	.62	.41

Table 9.3 Internal consistencies and retest reliabilities
* shown where reliability coefficient could not be calculated.

9.3.3 Descriptive statistics: means, standard deviations and correlations

The means and standard deviations of the questionnaire measures are given in Table 9.4. The positive skew of the absence data, particularly number of days absent should be noted: other continuous scales more closely approximate a normal distribution. In addition, correlations among all measures are set out in Table 9.5. Some interesting patterns emerge from these correlations. For example, perceived work demand was not significantly correlated with the number hours worked, indicating that heavy workload is not necessarily associated with longer hours worked.

Measure	Mean	Standard deviation
DEMOGRAPHIC FACTORS		
1. Age	35.98 years	12.66
2. Gender (F=1, M=0)	55% female	
3. Tenure	7.74 years	6.09
PERSONALITY		
4. Extraversion	7.33	3.61
5. Neuroticism	5.24	3.05
6. Social Desirability	5.75	2.99
7. Type A Behaviour	26.04	5.47
8. Locus of Control	45.48	10.53
WORK CHARACTERISTICS		
9. Job Grade (9 point scale; 1= base grade)	4.23	2.07
10. Demands	20.82	4.01
11 Hours worked per week	42.83	11.03
12 Control	19.02	5.51
13 Social support: Colleagues	5.34	2.17
14 Social support: Senior colleagues	9.91	4.34
STRAIN INDICES		
15 Job satisfaction	26.97	5.61
16 GHQ-12	11.49	6.31
17 Somatic symptoms	5.08	3.41
18 Absence spells	2.12 spells	2.41
19 Absence days	7.21 days	11.29

Table 9.4. Means and standard deviations for all questionnaire scales and some background variables. Calculated for sample with complete data at Time 1 N= 160, except for absence data, N=150.

MEASURE	INDIVIDUAL DIFFERENCES								WORK CHARACTERISTICS							STRAIN	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	
INDIVIDUAL DIFFERENCES																	
1. Age																	
2. Gender (F=1, M=0)	.18																
3. Tenure	.24	-.05															
4. Extraversion	-.24	.06	-.30														
5. Neuroticism	-.11	.02	.08	-.16													
6. Social Desirability	.27	.19	.05	-.16	.01												
7. Type A Behaviour	-.23	-.05	-.06	.29	.05	-.19											
8. Locus of Control	-.03	-.13	-.05	-.19	.12	-.01	.02										
WORK CHARACTERISTICS																	
9. Job Grade (9 level scale)	-.19	-.28	.41	.05	-.02	-.35	.27	-.11									
10. Demands	-.07	.00	.01	-.11	.12	.01	.23	-.08	.11								
11. Hours worked per week	-.24	-.30	.06	.07	-.13	-.22	.20	.20	.37	.05							
12. Control	-.17	.00	.15	.22	-.06	-.17	.18	-.46	.41	-.08	.20						
13. Social support: Colleagues	-.15	.13	.07	.14	-.01	-.07	.16	-.26	.06	-.13	.09	.37					
14. Social support: Senior colleagues	-.01	.03	.06	-.05	.01	-.01	.05	-.41	.03	-.30	.03	.51	.46				
STRAIN INDICES																	
15. Job satisfaction	.05	.13	.13	.11	-.10	.07	.08	-.59	.09	-.24	.00	.60	.37	.63			
16. Psychological distress (GHQ-12)	-.10	.07	.05	-.07	.48	-.14	.07	.22	.09	.28	-.06	-.11	-.09	-.18	-.21		
17. Somatic symptoms	-.20	.18	-.12	.06	.39	-.06	.17	.15	.00	.22	.04	-.05	.00	-.10	-.17	.62	

Table 9.5. Matrix of intercorrelations among survey variables (Pearson r). Intercorrelations were calculated from measures included in the first questionnaire, for respondents with complete data (N=160 for most measures). All correlations for which p<0.05 are shown in bold.

9.4 Cross-sectional analysis of stress process

9.4.1 *Comparisons between managers and non-managers*

Multivariate analyses of variance (MANOVAs) were carried out to examine broad differences between management and non-management respondents at Time 1. Analyses were grouped into variables assessing personality (TABP, LOC, extraversion, neuroticism, social desirability), job characteristics (demand, control, hours worked, support from colleagues, support from seniors), and strain outcomes (psychological distress, physical symptoms and job satisfaction). Although there were no multivariate differences in strain between managers and non-managers, there were significant differences in job characteristics (Pillai's Trace =.225, $F= 9.52$, $p<0.001$) and in personality characteristics (Pillai's Trace =.170, $F= 6.66$, $p<0.001$). Examination of univariate tests within each of these groups revealed that managers, relative to non-management employees, were higher in Type A and internal LOC, and lower in social desirability response. In terms of job characteristics, managers reported longer working hours and higher perceived demand, but also higher levels of control. Group means for these variables, together with univariate tests of significance are shown in Table 9.6. These trends are consistent with the literature outlined in Section 3.3.4 concerning work characteristics and job grade, and may also be seen as an extrapolation of the trends reported within management grades in Chapter 7.

Variable	Managers (N=69)		Non-managers (N=105)		Significance of difference (t-test)
	Mean	SD	Mean	SD	
JOB CHARACTERISTICS					
Hours worked	46.2 hours	11.28	40.1 hours	10.24	p<0.01
Control	21.4	4.79	17.2	5.42	p<0.01
Demand	21.4	3.52	20.4	4.24	p<0.05
Colleague support	5.56	1.89	5.28	2.36	ns
Senior support	9.93	4.31	10.15	4.34	ns
PERSONALITY					
Type A	27.56	4.84	24.60	5.91	p<0.01
Work locus of control	43.44	9.21	46.81	11.27	p<0.05
Neuroticism	5.16	3.12	5.09	3.07	ns
Extraversion	7.80	3.74	7.14	3.60	ns
Social desirability	4.67	2.85	6.77	2.90	p<0.01
STRAIN					
Psychological distress (GHQ-12)	11.89	5.79	10.93	5.30	ns
Physical symptoms	4.93	3.20	5.17	3.60	ns
Job satisfaction	27.72	5.17	26.67	5.78	ns

Table 9.6 Group means for managers and non-managers on the questionnaire scales.

9.4.2 Hierarchical regression analyses

Hierarchical multiple regression analyses were conducted to examine the relative contribution of individual and job characteristics in explaining variance in job satisfaction and psychological distress, as described in section 7.3.1 for the manager sample. An additional variable included in analysis was branch type, which distinguished employees moving to a new branch from the comparison group. The results of these analyses, which are broadly similar to those reported for the management sample, are summarised in Table 9.7, and illustrated in stacked bar charts in Figure 9.3. The specific findings for job satisfaction and psychological distress are discussed in more detail in Sections 9.4.3 and 9.4.4 respectively.

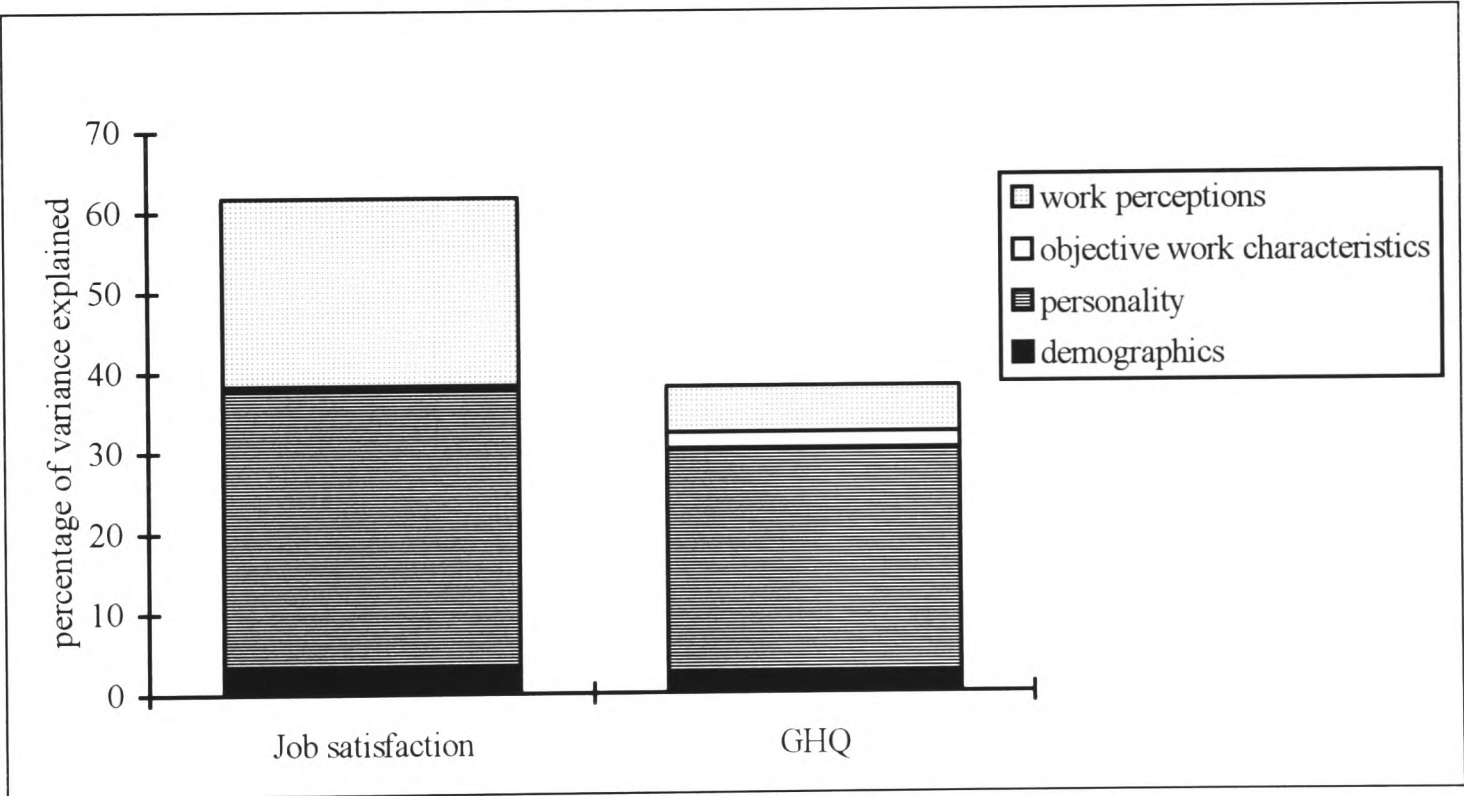


Figure 9.3 Stacked bar charts indicating percentage of variance in outcome measures explained by the full regression models. In these 4-step hierarchical analyses variable sets were entered in the order shown in Table 9.7.

Independent Variables	Job satisfaction			Psychological distress (GHQ-12)		
	ΔR^2	β at entry step	Final step β	ΔR^2	β at entry step	Final step β
BACKGROUND FACTORS	.033ns			.026ns		
Age		.044	.117~		-.089	-.020
Gender		.117	.037		.089	.151*
Marital status		-.110	-.026		-.095	-.137
Education		-.065	.054		-.010	-.086
PERSONALITY	.346**			.277**		
Extraversion		-.038	-.020		-.018	.023
Neuroticism		-.065	-.063		.444**	.423**
Social Desirability		.059	.112~		-.165*	-.150*
Locus of Control		-.580**	-.318**		.191**	.158*
Type A Behaviour		.131	.078		.038	-.017
OBJECTIVE WORK FEATURES	.004ns			.020ns		
Branch type		-.013	-.056		.056	.069
Job grade		.076	-.003		.156~	.178*
WORK PERCEPTIONS	.234**			.057*		
Hours worked per week			-.038			-.048
Perceived demands			-.085			.196**
Perceived control			.304**			-.077
Colleague support			.032			-.040
Support from senior colleagues			.310**			-.043
Overall R^2	.618**	df (16, 146)		.381**	df (16,145)	

Table 9.7 Hierarchical regression analyses predicting job satisfaction and general well-being from demographic variables, personality measures and work characteristics.

Dummy coding: gender 0 = male; 1 = female; marital status 0 = single, widowed, separated; 1 = cohabiting or married; education ordinal coding: 4 levels as in Table 9.2; branch type: 0 = control, 1 = new. ~ $p < 0.10$ * $p < 0.05$ ** $p < 0.01$

9.4.3 *Explaining variance in job satisfaction*

As was reported in the manager study, in the present study work characteristics explained a much higher proportion of variance in job satisfaction than in psychological distress. However, in contrast to the manager study, demographic variables were less important in explaining variance in job satisfaction within this sample. In particular, age was marginally associated with satisfaction. From the final regression equation (controlling for the simultaneous effects of all independent variables), high job satisfaction was associated with an internal locus of control, combined with perceptions of high control and support from senior colleagues. The association of satisfaction with control and support from senior colleagues replicated the manager survey. However in contrast to the manager survey, the relationship between internal LOC and satisfaction was not mediated by work perceptions.

In addition, it was noted that (low) perceived demands and (high) colleague support were associated with job satisfaction if entered into the model prior to perceived control and senior support. Follow-up analyses revealed that high colleague support and low perceived demands are associated with high senior colleague support. All three factors are associated with high job satisfaction, but statistically controlling each effect for the other two reveals that only senior support is a statistically significant predictor of job satisfaction. This effect is illustrated in Figure 9.4. In the path diagram senior colleague support is assumed to causally influence other work perceptions (as was shown in Section 8.1 for the manager sample), making this effect one of confounding. However from this cross-sectional data set, it is alternatively possible that the direction of causality between these variables is reversed, such that the influence of colleague support and perceived demands is mediated by senior colleague support. A significant influence of control perceptions on job satisfaction was independent of these relationships.

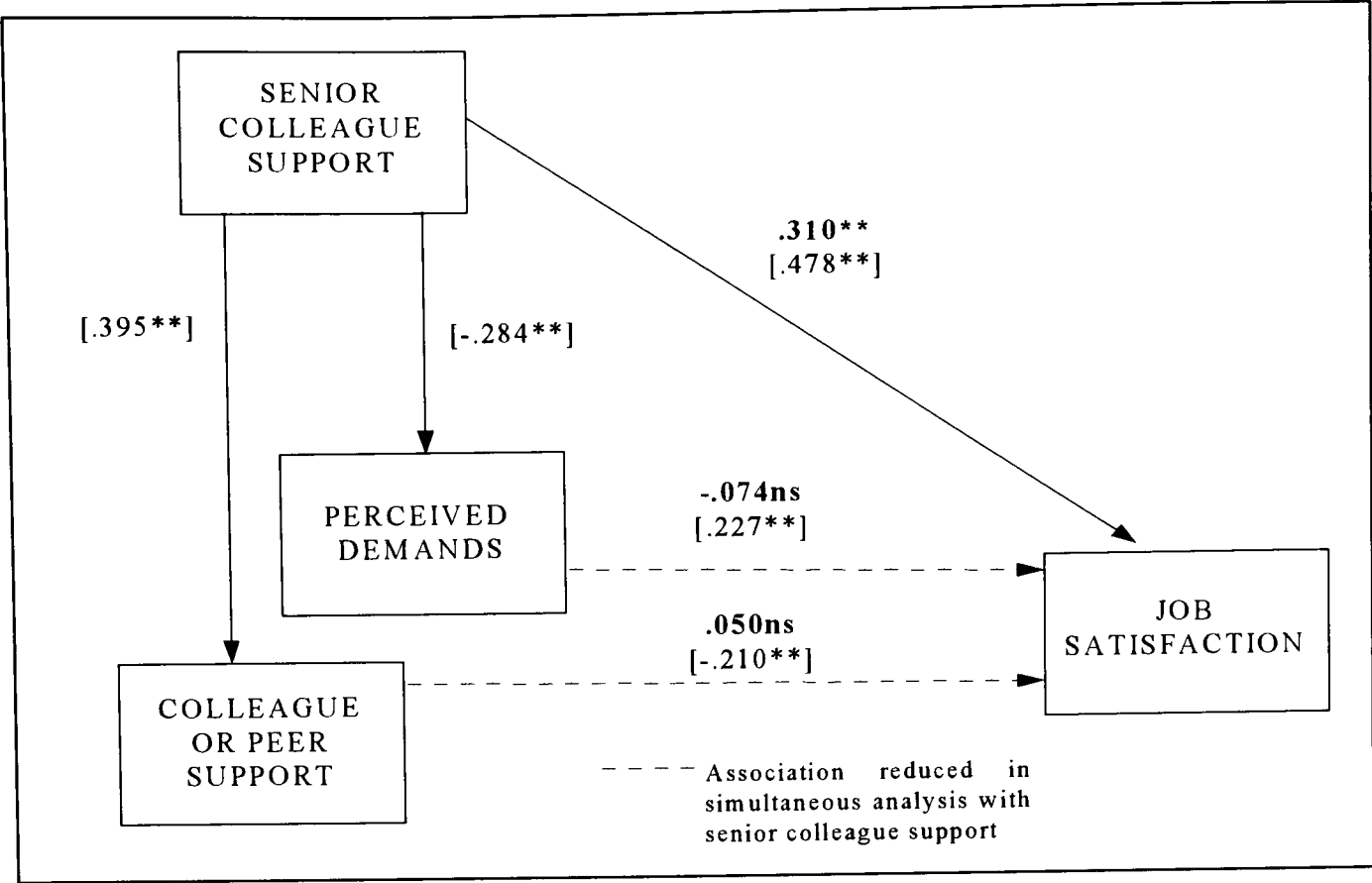


Figure 9.4 Path diagram illustrating the joint influence of senior colleague support, peer support and perceived demands on job satisfaction. The association of perceived demands and colleague support with job satisfaction is confounded by senior colleague support.

Partial correlations between pairs of variables, controlling for the influence of individual differences and objective work features, are shown in square brackets: all three work perceptions are significantly associated with job satisfaction. However, in the simultaneous regression analysis, where the effect the three work perceptions are controlled for the influence of each other, only senior colleague support is found to significantly predict job satisfaction. Standardised regression coefficients, β s, shown in bold. $** p < 0.01$

9.4.4 Explaining variance in psychological distress

In the prediction of GHQ, high levels of symptoms were associated with high neuroticism, low social desirability, an external locus of control and high work demands. Suppression effects for gender and job grade were also noted. In the first step of the analysis, gender was not significantly associated with symptom report. However after controlling for personality factors, women reported higher levels of psychological symptoms. Locus of control was responsible for this effect: for any particular level of locus of control there is an association between gender and well-being, although overall gender and well-being were not

significantly correlated. Similarly the association between job grade and symptom report was found to be strengthened after statistical control for work perceptions: for any particular combination of work perceptions, symptom report increases with job grade.

Furthermore, as discussed in the prediction of job satisfaction, there was a confounding of the effects of senior support and perceived demand on symptom report. In the full simultaneous analysis, demand perceptions had a direct influence on strain. Again, the direction of causality between senior colleague support and demands cannot be determined from the cross-sectional data. However, based on the findings reported in Section 8.1, it is reasonable to assume that senior colleague support is the causal factor, and therefore this effect is consistent with the mediation of senior colleague support through perceptions of demand. The effect is illustrated in Figure 9.5.

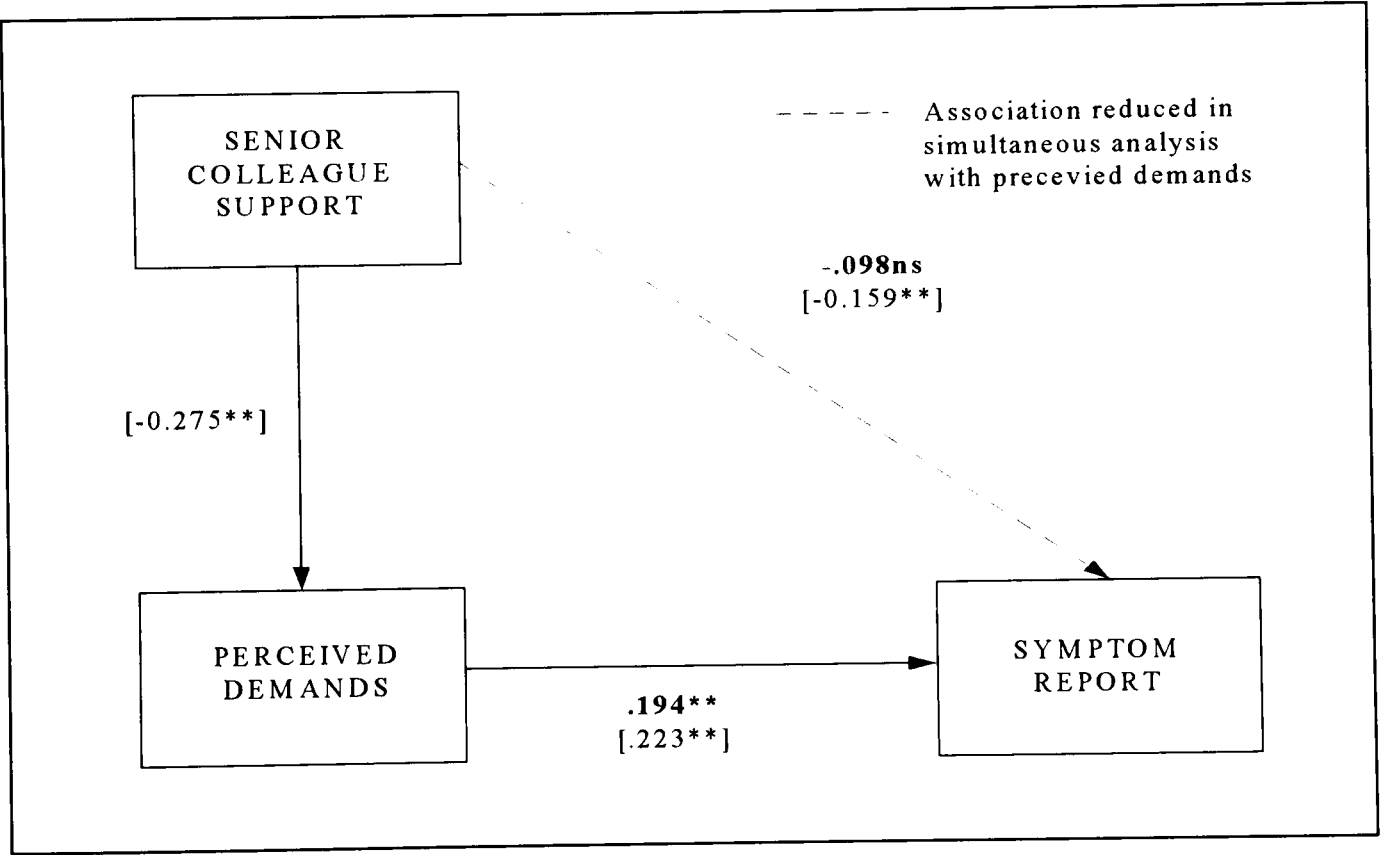


Figure 9.5 Path diagram illustrating the joint influence of senior colleague support and perceived demands on psychological symptom report. The association between senior colleague support and symptom report is mediated by perceived demands.

Partial correlations between pairs of variables, controlling for the influence of individual differences and objective work features, are shown in square brackets: both perceived demands and senior colleague support are significantly associated with symptom report. In the simultaneous regression analysis, perceived demands significantly predict symptom report. Standardised regression coefficients, β s, shown in bold. $** p < 0.01$.

A regression model, similar to that set out in Table 9.7, was also used to predict physical (somatic) symptoms. The results were broadly similar to those reported for psychological distress: higher levels of physical symptoms were predicted by age (younger), gender (female), (high) neuroticism and (high) perceived demands. (Full model $R^2 = .307$, $df = 16,145$).

9.4.5 *Summary of cross-sectional analysis*

The findings presented in this section are mostly consistent with those reported for analyses with the management sample. For example, differences in work perceptions between management and non-management may be seen as a continuation of trends noted within management grades. Similarly, predictors of job satisfaction and psychological distress are broadly similar to those reported within the management survey. Thus, although different work pressures are experienced at different levels of the bureaucratic hierarchy, the stress *process* is quite similar in terms of which factors are predictive of strain outcomes.

One unexpected finding was the positive association of job grade with symptom levels, in the full regression model. This is the opposite trend to the general class gradient in physical and mental health reported by others (e.g. Lundberg, 1991), and found in the manager survey. It is however consistent with that reported by Parkes (1992) between supervisors and workers in the oil industry. It may be that differences in terms of mental health between managerial and non-managerial personnel only occur prior to control for differences in work perceptions: for example North et al. (1993) reported that statistical control for work characteristics reduced observed differences in sickness absences between employees in different job grades.

Finally, the finding that branch type was *not* significantly associated with strain outcomes in this cross-sectional analysis indicates that there were no initial differences between pre-relocation and comparison stores. Therefore any differences in strain following relocation cannot be attributed to pre-existing differences between the two groups.

9.5 Relocation as a stressor

9.5.1 Analysis of trends

To examine the impact of job relocation, repeated measures analysis of variance (ANOVA) was carried out using data from all three questionnaires, and dividing the sample into employees moving to a “new store” and those working in a “comparison stores”. The analysis of variance procedure allows tests of effects for time, branch type (“new” or “comparison”), and *time x branch* interaction. In addition job grade was included as a covariate because this factor was found to be confounded with branch type: the proportion of management to non-management personnel who responded to the survey varied in the different branches.

ANOVAs were conducted to look at possible changes in both work characteristics and strain outcomes. All analyses were for subjects with complete data over the three surveys, reducing the sample size to N=85. Differences in work characteristics (reported number of hours worked, perceived demand and control, senior colleague support, peer support) and strain outcomes (psychological distress, physical symptoms, job satisfaction) over time and between the two branch are displayed in Table 9.8.¹

¹ An alternative analysis strategy might have employed multivariate analysis of variance (MANOVA) to examine multivariate trends over time, as described in Chapter 8 for the manager sample. However, in the light of Wall and Clegg’s (1981) finding of differential rates of change in both work perceptions and strain outcome in response to job redesign, it was decided that several univariate ANOVAs would more powerfully detect any trends. Nonetheless two MANOVAs (work characteristics and strain outcomes) were carried out in addition to the ANOVAs described here. Findings from these analyses were consistent with the univariate analyses: there were no significant multivariate effects for work characteristics; there was a significant multivariate effect for strain outcomes over Time ($F = 5.76, p < 0.001$), with a marginally significant Time x branch type interaction ($F = 1.86, p < 0.1$).

Measure	Branch type (between subjects: df = 1,82)	Time (within subjects: df = 2, 166)	Branch by Time (within subjects: df = 2, 166)
Work Characteristics			
Hours worked	F = 1.76, ns	F<1, ns	F<1, ns
Perceived demand	F<1, ns	F<1, ns	F = 1.67, ns
Perceived control	F<1, ns	F = 2.43, ns	F = 1.72, ns
Peer support	F<1, ns	F = 3.79, p < 0.05	F <1, ns
Senior colleague support	F = 1.59, ns	F = 2.27, ns	F<1, ns
Strain outcomes			
Psychological distress (GHQ-12)	F = 6.19, p < 0.05	F = 6.25, p < 0.01	F = 5.80, p < 0.01
Somatic symptoms	F = 1.31, ns	F = 9.90, p < 0.01	F = 1.34, ns
Job satisfaction	F = 1.16, ns	F = 8.81, p < 0.01	F <1, ns

Table 9.8. Summary of results of analyses of variance (ANOVAs) to examine trends in work characteristics and strain outcomes over time and between branch types. N=85.

There was no evidence of differences in job characteristics between branch types over the survey period. That is, despite the conventional wisdom that the relocation period is associated with for example, increased work pressures, these were not revealed by the questionnaire measures used. The only statistically significant trend in the ANOVAs was a decline in peer support over time. Mean scores for peer support over the three surveys, are graphed in Figure 9.6 for both branch types.

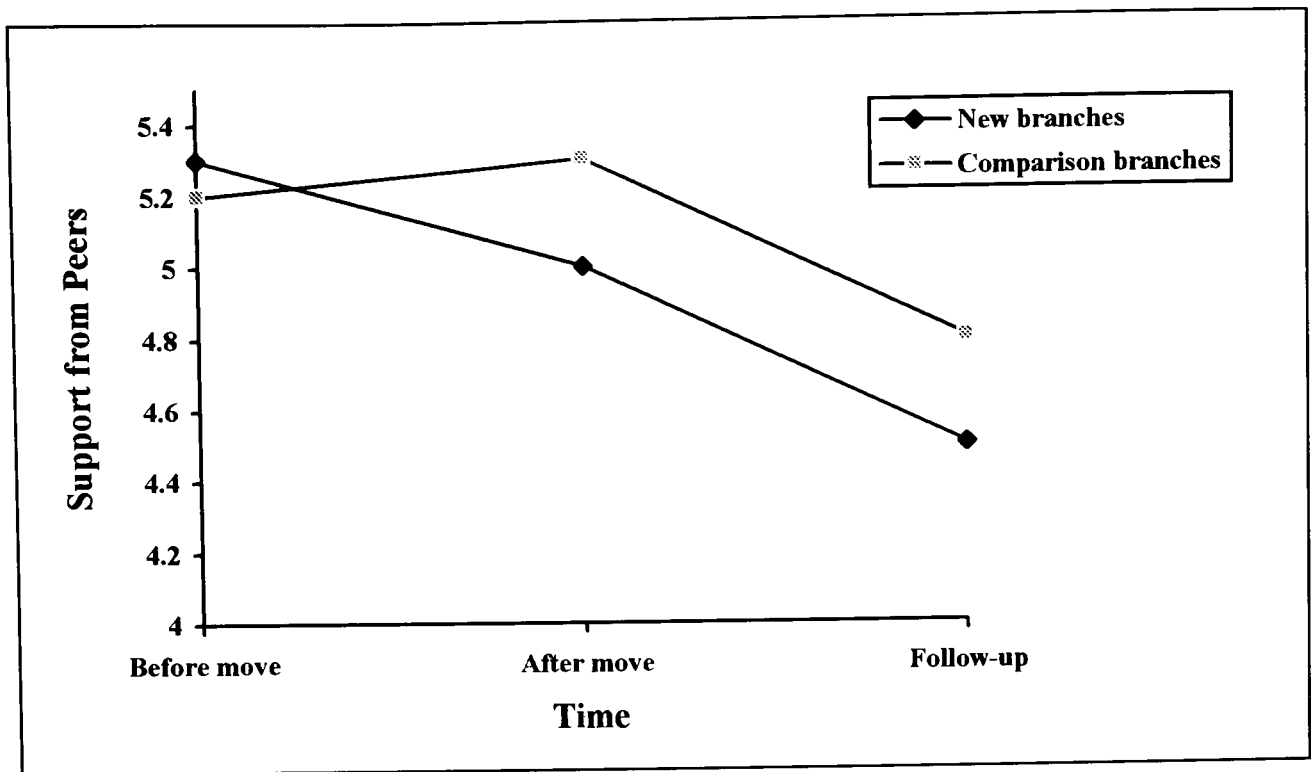


Figure 9.6 Changes in peer support over time. Note that the difference between branch types over time was not statistically significant.

Each of the strain outcomes was also found to vary significantly over time. In the case of psychological distress, change over time included a interaction effect with branch type. This interaction is shown in Figure 9.7: within the comparison branches, personnel maintained a steady (low) level of psychological symptoms, whereas personnel moving into a new branch experienced higher symptom levels coinciding with the move, and which were still apparent six months later. Furthermore, job satisfaction and somatic symptom report were observed to worsen over the survey period. This main effect for time is consistent with overall patterns of change observed and discussed for the management sample, and might be attributed to wider company changes during the survey period, rather than the relocation.

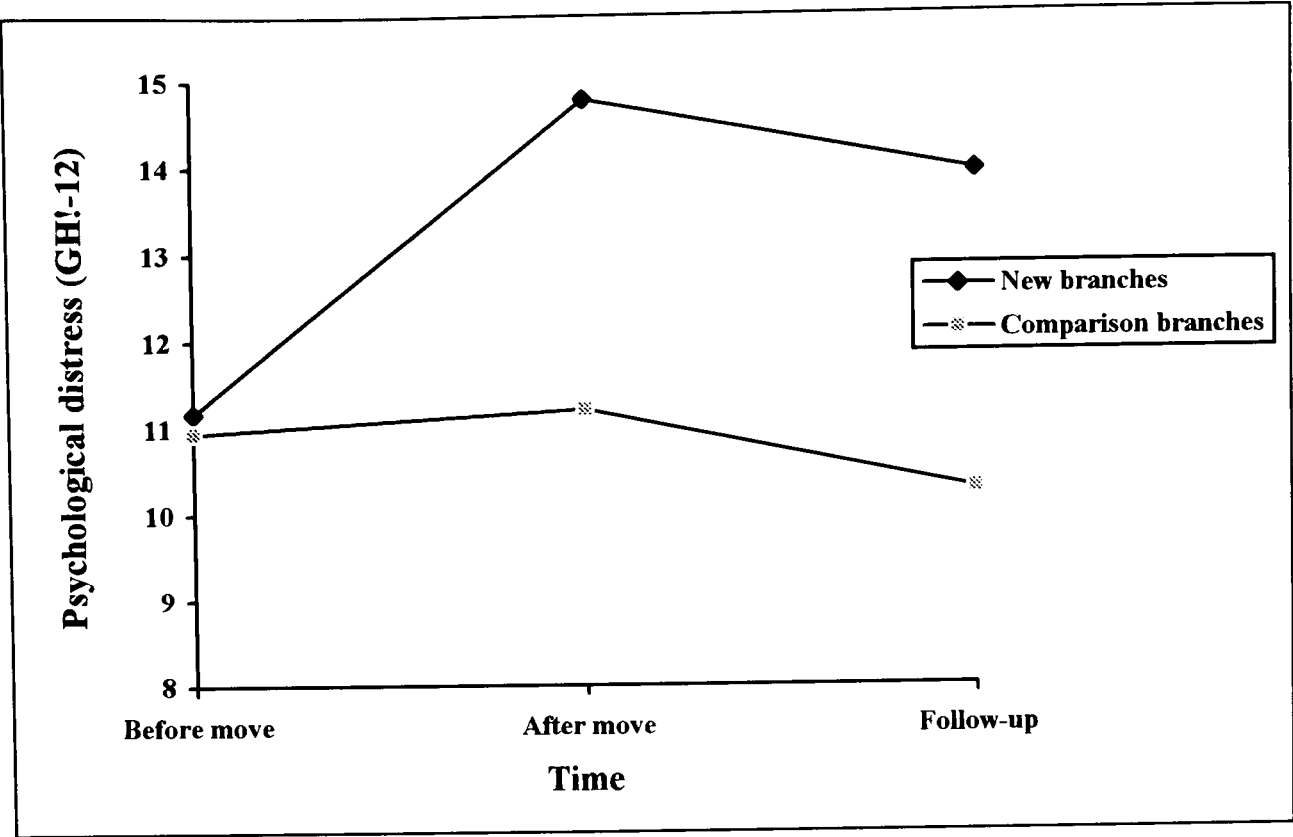


Figure 9.7 Interaction effect between time and branch type for psychological distress.

In summary, although it was expected that working in a “new” store during the opening period would be significantly different to working in a “comparison” branch, these differences were not reflected in the perceived job characteristics measured in the survey. However, group differences were apparent in psychological symptoms, with employees who moved to a new store reporting higher levels of distress six weeks *and* six months after the move. This pattern occurred within a broader picture of generally increasing levels of strain in all employees during the survey period.

9.5.2 Path models to explain changes in psychological distress

The differential change in symptoms of psychological distress (GHQ-12) between personnel working in new and comparison branches, reported in the previous section, supports the hypothesis that the relocation process is experienced as stressful.

The cross-sectional analyses presented in Section 9.4.3 showed that psychological distress was associated with a range of individual differences (gender, neuroticism, social desirability, and locus of control) and with job grade. One work characteristic (perceived demands) was found to directly predict symptom levels. Furthermore, self-report of symptom levels tends to be stable over time, such that the best predictor of future symptom levels is a prior measure of symptom report (Grant et al., 1987).

Thus, psychological distress at Time 2 (the transition period), was expected to be predicted by perceived demands at Time 2, and branch type (i.e. “new” versus “comparison”). As perceived demands did not change significantly with relocation, these two factors were expected to have independent effects on distress (i.e. changes in perceived demands do not mediate the effects of store relocation). In addition, Time 1 symptom levels were expected to predict symptoms at Time 2, and, by controlling for this stability, individual differences were not expected to have any additional influence.

This simple, direct effects model for the prediction of Time 2 psychological distress is illustrated in Figure 9.8, together with standardised regression coefficients (β s). Individual differences entered hierarchically as a subsequent block did not add significantly to the prediction of distress ($\Delta R^2 = .059$, ns). Similarly, other Time 2 work characteristics and perceptions (including job level), as a block contributed only marginally to prediction of distress ($\Delta R^2 = .048$, $p < 0.05$), with no individual variable making a significant unique contribution.

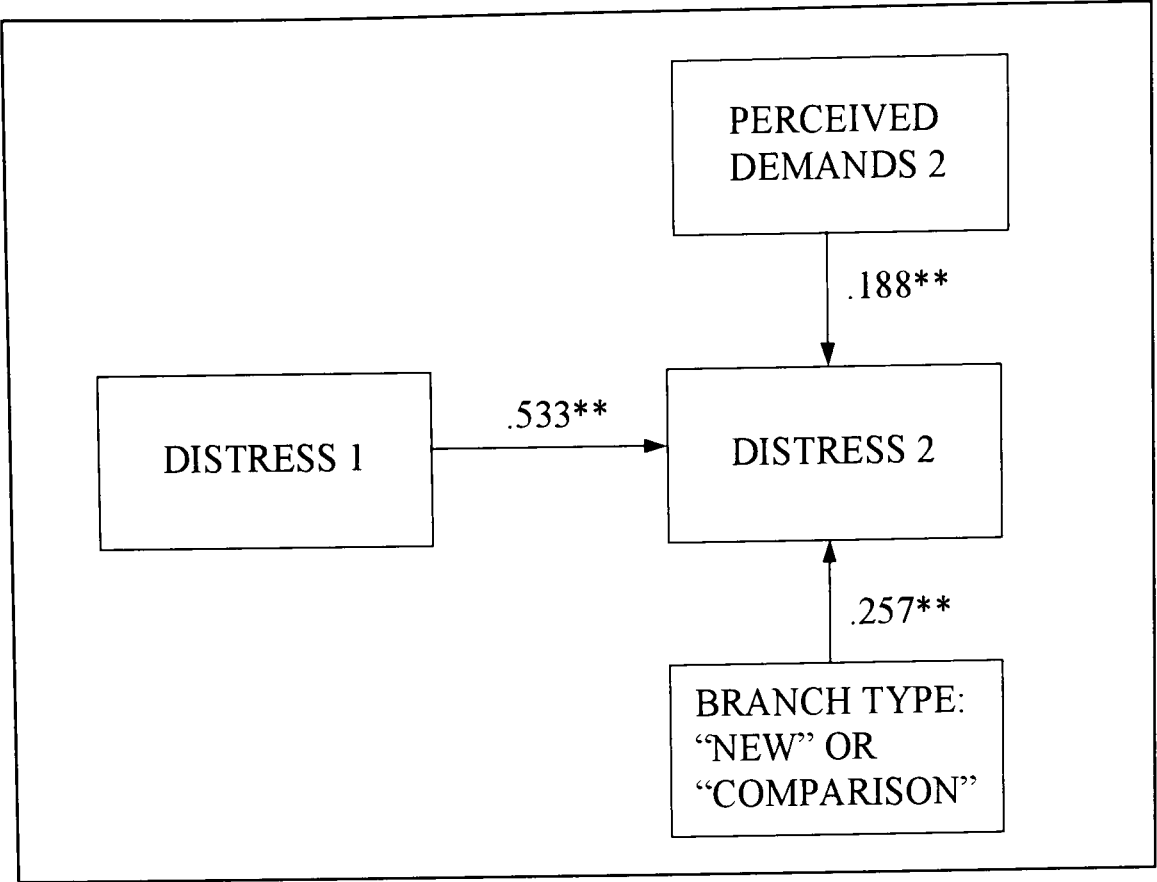


Figure 9.8 Path diagram illustrating influence of prior levels of distress, perceived demands and job relocation (branch type) on psychological distress at Time 2; showing standardised regression coefficients (β s). The regression model accounted for 43.6% of the variance in Distress-2, $F = 28.85$, $p < 0.001$. ** $p < 0.01$.

Two interactive mechanisms through which psychological symptoms at Time 2 might be modified can be suggested; either the relationship between Demand 2 and Distress 2, or that between Branch Type and Distress 2, and might be moderated (buffered) by individual or situational characteristics. From the literature review presented in Chapter 3, the most likely situational moderators are perceived control and support from senior colleagues, with potential individual moderators being locus of control, Type A and neuroticism. Multiplicative interaction terms for each of these potential moderators with “branch type” and perceived demands were created and tested in separate hierarchical multiple regression analyses: in each case, the interaction term was entered following the first order term for the proposed buffer and the predictors of distress shown in Figure 9.9. Three interaction terms were found to contribute significantly to prediction of psychological

distress at Time 2. The results of the final simultaneous analyses for each of the proposed buffers are summarised in Table 9.9, and the interactions graphed in Figures 9.9 to 9.11.

MODEL	Model 1: TABP as buffer of perceived demands	Model 2: Control as buffer of Relocation	Model 3: Social support as buffer of Relocation
Independent Variables	Unstandardised Regression Coefficients (Bs)		
Distress at Time 1	3.69**	3.54**	3.56**
Relocation (1 = new branch; 0 = comparison)	1.67**	2.02**	1.51**
Demand 2	0.96*	1.28**	1.21**
TABP	0.94		
TABP x Demand 2	0.93*		
Control 2		-1.30**	
Control 2 x Relocation		-1.03*	
Support from senior colleagues			-1.39**
Support x Relocation			-1.11*
R ² model	.466 (df = 5,111)	.491 (df = 5,112)	.504 (df = 5,112)

Table 9.9 Regression analyses revealing moderation of demands-distress and relocation-distress relationships by individual and situational characteristics. * p<0.05; ** p<0.01

To facilitate interpretation of interaction effects, all independent variables were standardised before the analysis, and unstandardised regression coefficients (Bs) were used to graph interactions at the average (zero) level of variables not included in the interaction (as recommended by Finney et al., 1984).

The influence of perceived demands on psychological symptoms was moderated by TABP. This effect is illustrated in Figure 9.9: Type B personality characteristics buffered the negative impact of high demands in terms of distress. Similarly, the high symptom levels associated with relocation to a new store were buffered by both high levels of perceived control and high support from senior colleagues. These effects are illustrated in Figures 9.10 and 9.11 respectively.

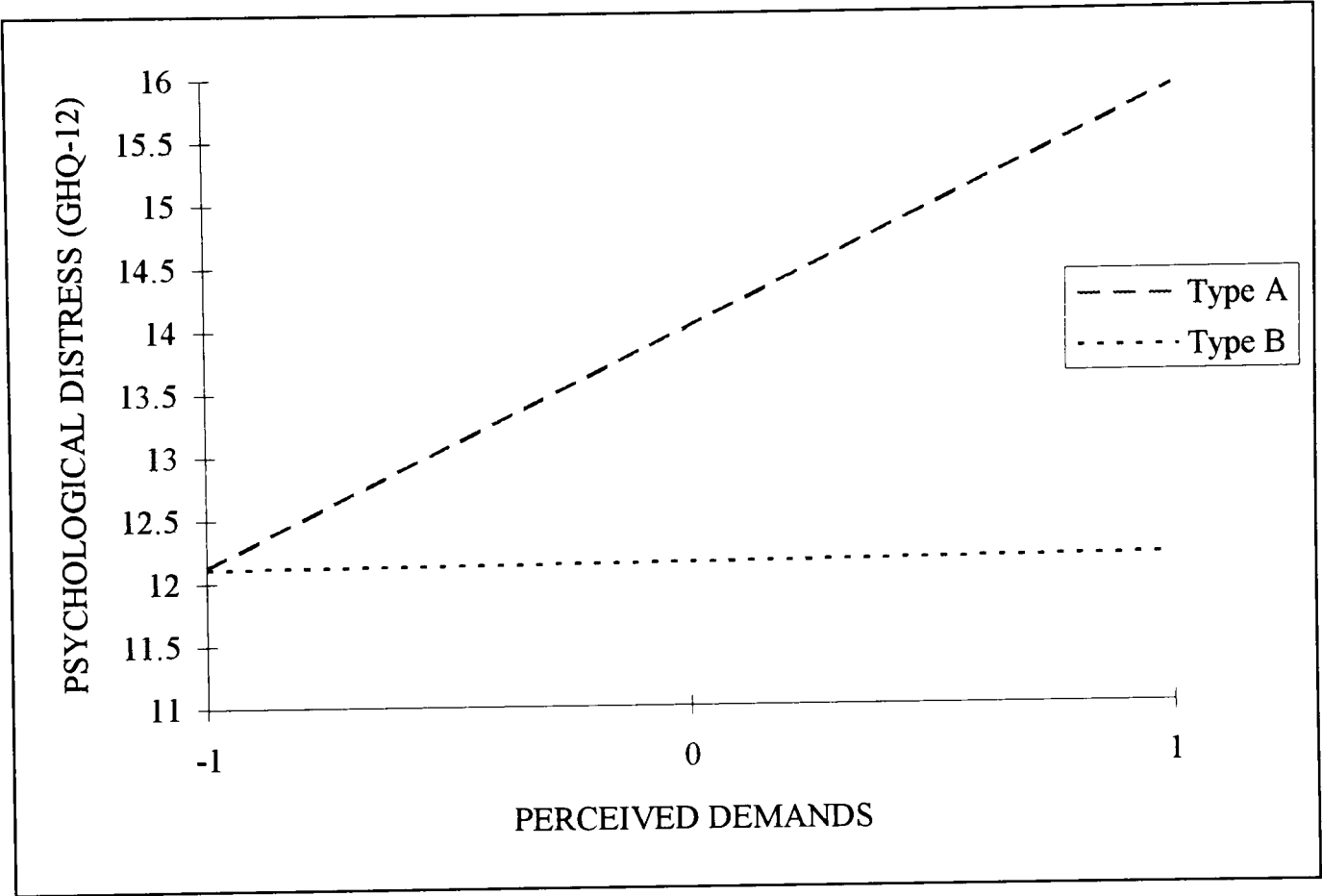


Figure 9.9. Buffering effect of Type B behaviour on the relationship between perceived demands and psychological distress.

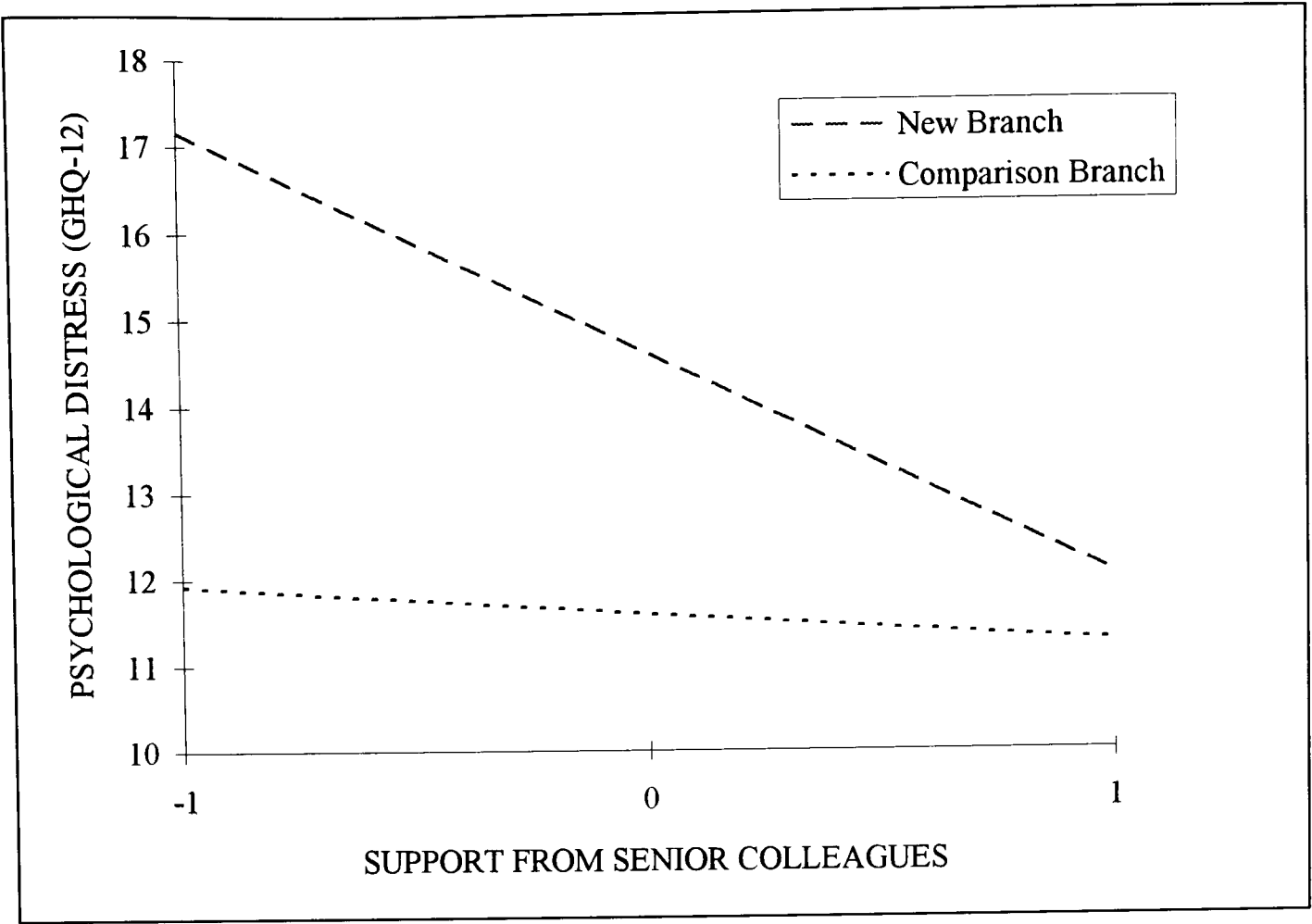


Figure 9.10 Buffering effect of support from senior colleagues on the impact of job relocation on psychological distress.

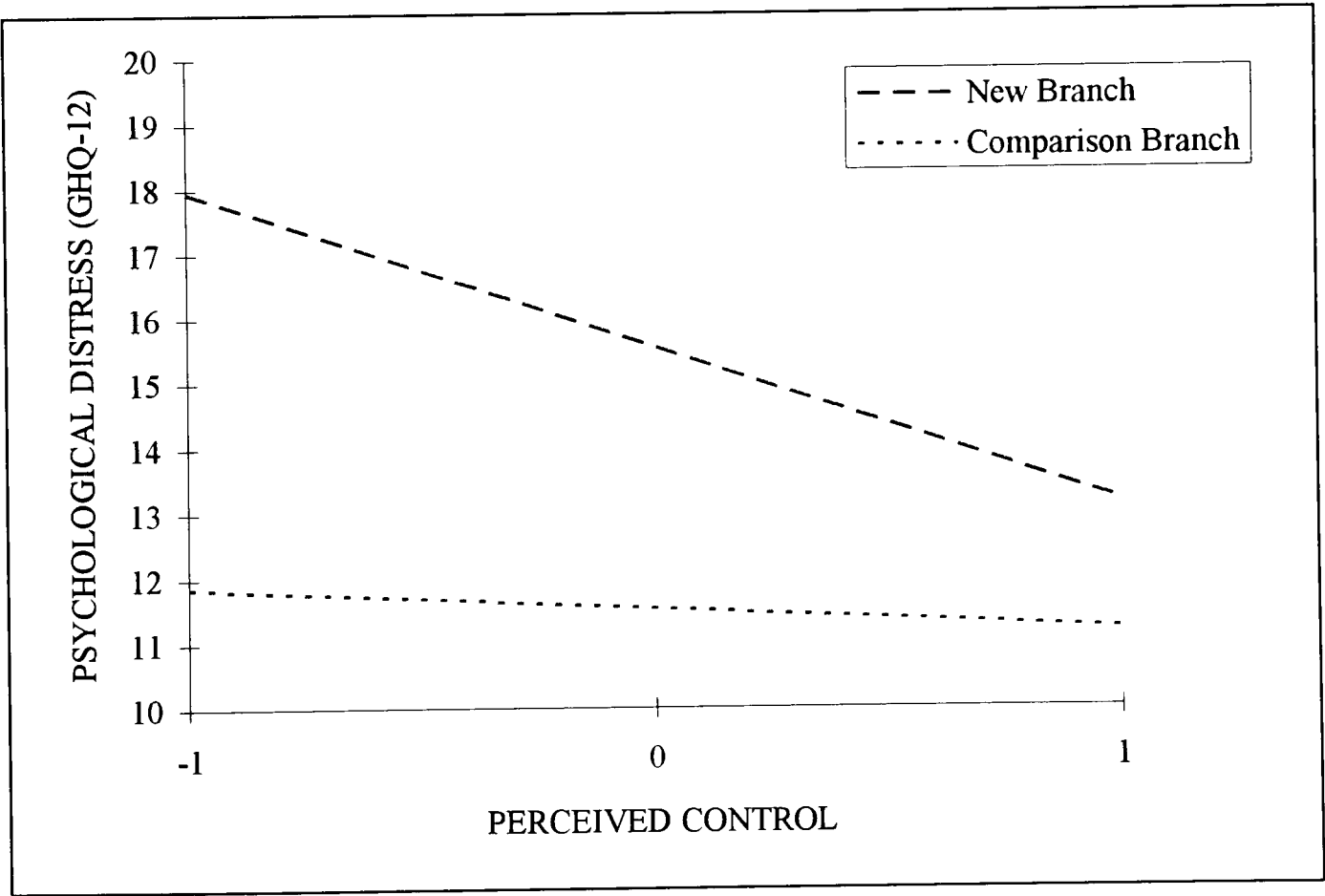


Figure 9.11 Buffering effect of perceived control on the impact of job relocation on psychological distress.

A further regression analysis was carried out in which the simultaneous buffering effects of TABP, support and perceived control were examined. However this simultaneous analysis revealed that including both control and social support and their respective interaction terms, resulted in neither interaction term reaching statistical significance. It is concluded therefore that the shared variance between these variables is responsible for the observed buffering effect. For the purposes of illustration, only social support is retained in the full model, as this factor accounted for slightly more of the overall variance in psychological symptoms than perceived control. A model accounting for a similar percentage of the variance in Distress at Time 2 could equally be constructed, substituting perceived control for support. The full model is shown in Figure 9.12.

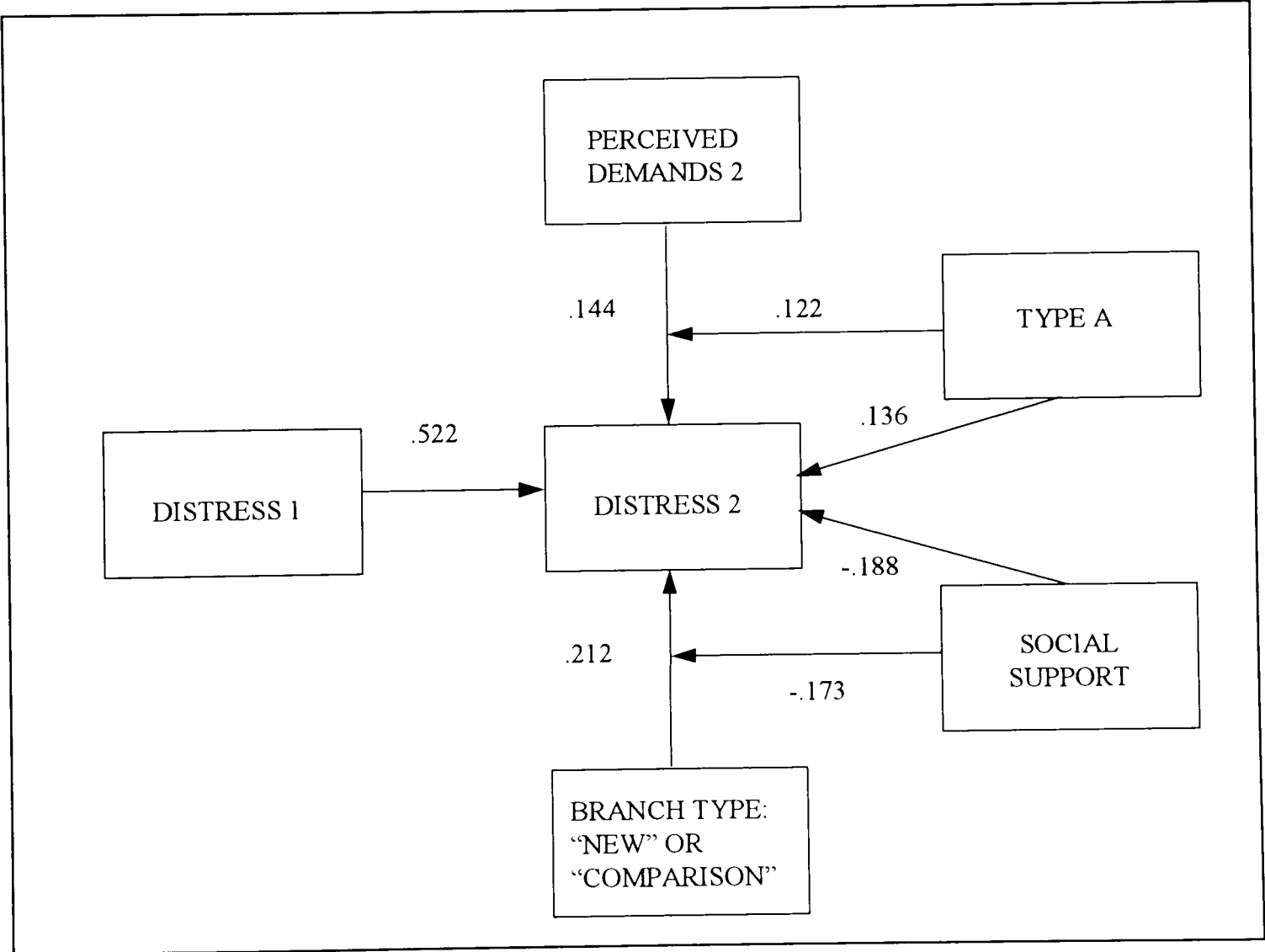


Figure 9.12 Path diagram representing the moderation of the effects of relocation and perceived demands on psychological distress, by social support and Type A behaviour respectively. All variables were standardised before the analysis and path coefficients shown are unstandardised Bs. Model $R^2 = .528$.

In summary, Time 2 psychological distress was strongly predicted by level of distress at Time 1, which itself is associated with several individual differences as described in Section 9.4.4 (not shown Figure 9.13). After control for initial level of symptoms, Time 2 distress was additionally associated with high perceived demands and job relocation. The impact of perceived demands on psychological distress was buffered by Type A behaviour, such that persons low in Type A characteristics (Type Bs) were resilient to the negative effects of high demands. This finding is consistent with predictions from the Type A literature and similar to a result reported by Parkes (1991b) for relationship between perceived demands and anxiety in driving examiners.

Similarly, the effect of job relocation on psychological distress was buffered by high control and high support from senior colleagues. That is, negative effects associated with job relocation were reduced when the new work environment was perceived as supportive and offering opportunities for control, a finding consistent with research on workplace change outlined in Section 2.2.6.

9.6 Summary and Conclusions

Although some differences in individual and job characteristics were found between managers and non-managers, in terms of the stress *process*, results from the relocation study replicated quite closely the findings reported for the manager sample. This finding suggests that the same processes underlie the aetiology of stress at all levels of the bureaucratic hierarchy. More specifically, job satisfaction is closely linked to job characteristics, particularly perceptions of control and social support. In contrast, psychological and physical symptom report was related to work demands and personality characteristics (particularly neuroticism).

The quasi-experimental design of this study allowed responses to change as a stressor to be separated from responses to other work characteristics. In particular, and consistent with expectations, employees transferred to new branches showed an increase in psychological distress at that time. What was not anticipated was that higher distress levels were sustained over the following six months: it had been expected that employees would have adapted to the new work situation within this time. Furthermore, longitudinal path analysis using regression techniques revealed that, after controlling for initial levels of psychological symptoms, psychological distress at Time 2 was predicted independently by perceived demands and by the move to a new store. Contrary to the suggestion of Fisher (1989), the impact of workplace change was not mediated by perceptions of either demand or control. That is, analyses were unable to account for the difference in symptoms between the new and comparison stores in terms of differences in individual or work characteristics.

However, Type B behaviour characteristics were found to be adaptive to high work demands, buffering the relationship between perceived demands and distress. Furthermore, the negative effects of relocation were buffered by social support and control at work.

Thus, consistent with the literature on transition stress, the negative impact of work relocation was reduced under conditions of high support and control during the change period (e.g. Callan, 1993; Israel, et al. 1991; Zuboff, 1988). Although past research also suggest that an internal locus of control will buffer the negative impact of work transitions (e.g. Ashford, 1988; Callan et al., 1994), neither locus of control, nor other individual differences were found to have any influence (either direct or moderating) on psychological distress during the transition , after control for prior levels of distress.

10. Predicting Work Absences

10.1 Absence as an outcome of the stress process

It is estimated that absenteeism costs British industry between £9 billion and £13 billion a year (Watkins, 1994). In Section 2.4.4 absence from work was noted as an organisationally relevant outcome of the stress process. Furthermore, a common criticism of stress research is the reliance on self-report data, which may be subject to several forms of bias. Statistical control for pertinent personality characteristics, such as negative affectivity, partially addresses this issue. However, the use of independent measures, in conjunction with self-reports, strengthens causal interpretation. Therefore prediction of absence may be both potentially valuable to industry, and further our understanding of the stress process.

The retail studies provided an opportunity to combine subjective questionnaire data with independent information. In addition to job grade and location, discussed in previous chapters, absence data was available from company records for a subset of the research sample. To maximise sample size, the manager and relocation research groups were combined where possible to examine relationships between questionnaire measures and absence.

10.2 Overview of absence research

10.2.1 *Correlates of absence*

The most usual reason given by employees for discretionary work absence is ill health. Although research has demonstrated associations between absence and health variables such as body-weight, symptom report and smoking behaviour (e.g. Leigh, 1991; Marmot, 1994; North et al., 1993; Parkes, 1987), absence is also associated with several other factors. Steers and Rhodes (1978) proposed a model to explain levels of sickness absence, based on ability to attend and attendance motivation. In this model they suggest that “work stress symptoms” may result in absence. Their review of the literature revealed that several factors, relevant to the stress process were associated with work absence. In particular, job level, job scope (e.g. skill use, variety), and job satisfaction were associated with better attendance. Leadership style and co-worker relations (similar to the social support measures used in the present study) were also associated with absence, but only in a minority of the studies reviewed.

However, subsequent research has not always been consistent with this review. For example, although Leigh (1991) found that hazardous working conditions and inflexible work hours predicted absence, job satisfaction did not. An association of low control with high absence has also reported by several other researchers in a variety of work settings (e.g. Jackson, 1983; Karasek, 1990; Pierce and Newstrom, 1983; Remondet and Hansson, 1991; Marmot, 1994). However, Spector and Jex (1991) found no significant correlation of absence with any job characteristic (including autonomy) in a sample of public servants.

In contrast, job level has consistently been related to attendance. For example, Taylor (1976) reported that occupational grade of UK post office staff was negatively associated with absence. Lower absence among managers, relative to their employees, has also been reported by Cooper and Bramwell (1992) in the brewing industry, and by Johns (1994) in public utilities. North et al. (1993) attempted to explain job grade differences in absence in the UK civil service. They found that after controlling for health-related behaviours (smoking and alcohol consumption), work characteristics of low control, low variety, fast pace, low support and low satisfaction contributed significantly to differences in attendance. However, even after this adjustment, grade differences remained “substantial”.

In an extensive review of the literature on employee “withdrawal” (lateness, absence and turnover), Clegg (1983) criticised the methodology of existing research. In particular, he noted that causal conclusions were often drawn from data that could be interpreted in several ways. More specifically, he noted a failure of researchers to control for potential confounding variables, to use longitudinal data with appropriate timing, and to consider alternative causal pathways. In contrast to the Steers and Rhodes’ model, Clegg’s empirical investigation of absence in blue-collar workers revealed that absence predicted subsequent job satisfaction and not vice versa.

Using similarly strong methodology, Tharenou (1993) conducted a longitudinal study of electrician’s apprentices, which was analysed with structural equation modelling. She found that positive supervisory style (particularly supportiveness) led to less uncertified absence, which in turn predicted job satisfaction, training achievement, and supervisor-rated performance: reverse causal pathways were not significant. Both Clegg (1983) and Tharenou (1993) demonstrated strong correlations between prior and subsequent absence, confirming that, like other measures

of strain, absence behaviour is relatively stable, and this stability needs to be taken into account in analyses.

Absence has also been associated with variables not considered in models of psychosocial stress. For example, Taylor and Pocock (1972) reported relationships between commuting patterns and absence in London office workers, with longer commutes predicting higher certified and uncertified absences. Also, Kerr and Vos (1993) showed that participation in fitness programmes was associated with reduced total absence.

Finally, the influence of individual differences on absence behaviour is incorporated in Steers and Rhodes' model (1978). However, empirical work has more often focused on demographic factors than personality. In particular, women (especially mothers of small children) have been found to have high rates of absence (Leigh, 1991; North et al., 1993). Furthermore, higher levels of education are associated with good attendance (Leigh, 1986), although this finding may be confounded with occupational level. The evidence for age is mixed, with significant associations in both directions reported (Leigh, 1991). A study investigating the influence of personality on absence was conducted by Arsenault and Dolan (1983). However the findings were complex: Type A, LOC and a set of job stressors (role conflict and ambiguity, skill underutilisation) combined interactively such that Type A internals and Type B externals showed the greatest absence response to stressors.

10.2.2 *Measurement issues in absence research*

Researchers measure work absences in a variety of ways. For example, some researchers analyse self-reports of absence (e.g. Leigh, 1991; Spector and Jex, 1991), while others seek independent archival data (e.g. North et al., 1993; Parkes, 1987). Self-report of absence, as with other self-reports, is prone to subjective bias. Relative to archival data, self-reports, and independent reports by managers systematically underestimate absence levels (Harrison and Shaffer, 1994; Johns, 1994). However, use of archival absence records may entail a different set of biases. For example, not all companies routinely keep absence records (particularly for managers and professionals) and consent to access these records may be difficult: therefore samples used in archival research may not be representative of any general populations. Furthermore, company records of absence may be distorted by the interpretations and attributions of those maintaining the records (Harrison and Shaffer, 1994).

A typical distinction in archival research is between short absences, and longer spells. As most companies require a medical certificate for longer absences, these are usually interpreted as “involuntary” sickness absences, whereas shorter spells are seen as including a voluntary aspect. Using this distinction, Parkes (1987) reported that symptoms of social dysfunction predicted short absences spells (<3 days), but not longer certified absences. Conversely, Kerr and Vos (1993) found an association of regular exercise only with longer absence spells (>2 days). However, such a distinction may be artificial (Harrison and Shaffer, 1994), as the lack of a medical certificate need not imply that absence is voluntary. Furthermore, both illness and voluntary absence might potentially be interpreted as strain outcomes.

A further issue in absence measurement is whether to use “absence frequency” or “time lost” measures. Although time lost measures are more easily translated into a monetary value, frequency measures are more stable and have fewer psychometric problems (Hammer and Landau, 1981); frequency measures are therefore most commonly used (e.g. Parkes, 1987; North et al., 1993). In particular, absence measures tend to be significantly skewed, and censored at zero, making them inappropriate for analysis in statistics which assume a normal distribution. Some researchers have analysed transformed absence measures (e.g. square root) to normalise a skewed distribution (e.g. Clegg, 1983; Johns, 1994; Parkes, 1987). However transformation does not always adequately address the distribution problem. Therefore, as the inappropriate use of ordinary least-squares regression (OLS) may underestimate R, Hammer and Landau (1981) recommend alternative forms of analysis, specifically Tobit analysis. Tobit analysis was designed to handle variables censored or truncated at zero and with a long right tail. Leigh (1991) provides a non-technical discussion of the use of Tobit analysis for absence prediction.¹

¹ Greene (1990) and Maddala (1990) provide mathematical discussions Tobit analysis.

10.3 Description of absence measures

Absence records for both the manager sample and the relocation sample were sought from company archives for the financial year prior to the study (1992-3) and the year including the study (1993-4). The records of the company concerned are such that when no absence record was found, it may indicate that either the employee was not absent during that period, or alternatively that the employee had left that section of the company. This resulted in large amounts of missing absence data. Rather than assuming zero absence for all missing records, every effort was made to follow-up missing cases, but where perfect attendance could not be confirmed, respondents were dropped from the sample. This procedure probably resulted in an under-representation of employees with perfect attendance, particularly in the manager sample². Table 10.1 indicates the number of respondents for whom absence data were acquired. To maximise the power of absence analyses, the relocation and manager samples were combined for analysis.

Respondents	Absence data '92-'93	Absence data '93-'94	Complete absence data '92-'94
Manager sample	45	76	28
Relocation sample	126	164	123
Combined samples	171	240	151

Table 10.1 Availability of absence records for manager and relocation samples.

² In particular, no absences were recorded for any senior manager during the survey period. This lack of variance among senior managers suggested that they might distort analyses. Furthermore, absence records for senior managers were maintained separately from other employees, with the possibility that absences were not recorded to the same criteria as for the rest of the sample.

Only certified sickness absences were analysed. Company policy is that absences of less than one working week are self-certified, and longer absences require a doctor's certificate, but this distinction was not made in the present study. However, both absence duration (total number of days absent) and frequency (number of absence spells) measures were analysed. Frequency distributions of both measures are shown in Figures 10.1 and 10.2 for 1993-4 for the combined sample ($N = 240$).

As suggested by Hammer and Landau (1981), the histograms reveal that absence data is significantly skewed and censored. This is particularly true of absence duration (days absent), in Figure 10.1. The histogram reveals that the majority of respondents were rarely absent, while a few were absent for long periods. Furthermore, in neither case would a normal distribution be created by a square-root or log transformation.

The average number of days absent during the survey was 7.9 ($sd = 13.6$ days), $N = 240$). Although this average probably over-estimates absence rates in the whole survey sample, it is quite similar to absence reported by Johns (1994) for utility company employees (7.5 days) and less than that reported by Spector and Jex (1991) for civil service employees (10.4 days)³.

³ It should be noted that the mean absence duration for the subsample for whom absence data was available for 1992-3 and 1993-94 ($N = 142$) was significantly higher than the total 1993-94 sample (see Table 10.2), reflecting the bias in availability of records for employees who were more often absent.

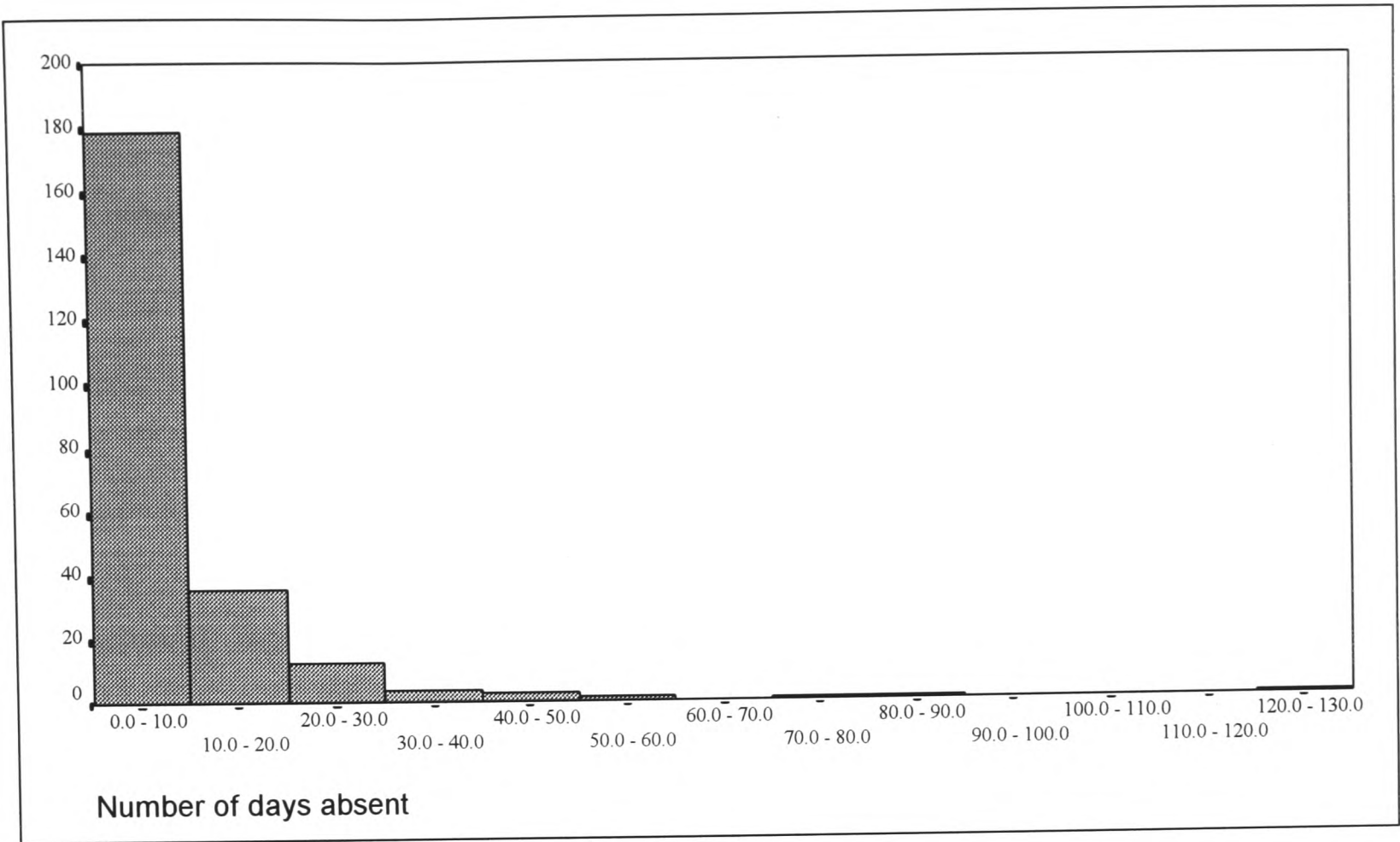


Figure 10.1 Absence duration. Distribution of number of days absent during 1993-4 (N=240).

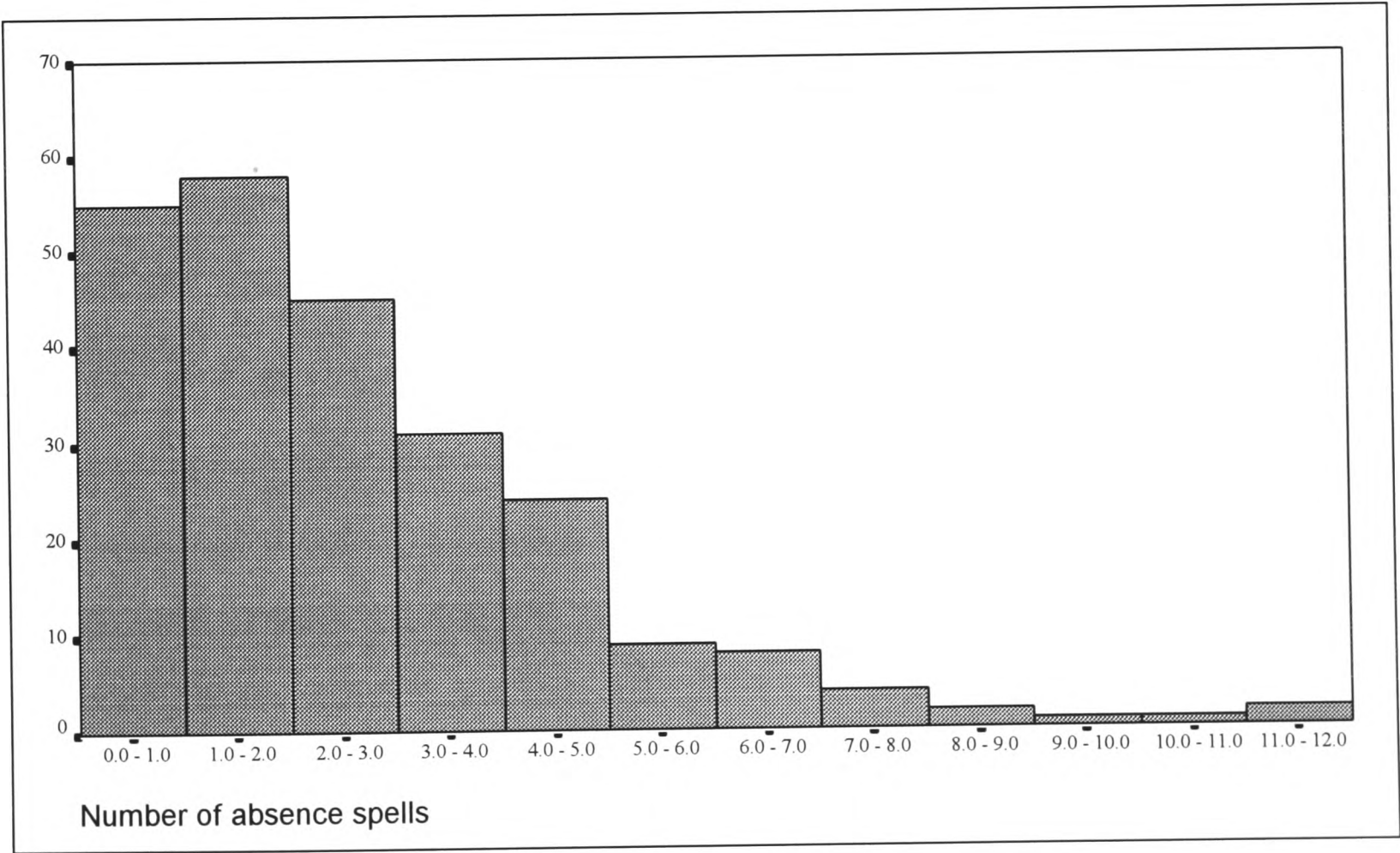


Figure 10.2 Absence frequency. Distribution of number of absent spells during 1993-4 (N=240).

10.4 Predicting absence frequency

10.4.1 *Description of independent variables*

Analyses were conducted to predict absence for the 1993-4 financial year. Questionnaire data were taken from the first of the three questionnaires completed by participants. However, because the two retail samples were combined for these analyses, the independent variables from questionnaires were not collected at a single time point, but at different times for the different samples. Therefore, absence over a one year period was predicted from work characteristics and individual differences reported at a point during the first half of that year, and known to be moderately stable over that period (see test-retest correlations in Chapters 6 and 9).

From the research literature outlined above, potential predictors of absence are prior absence patterns, employee fitness, job grade, age, sex, education, perceived control, social support, job satisfaction, and commuting time. Several measures of employee fitness were available from the questionnaires; specifically self-report of physical health (somatic symptoms), psychological well-being (GHQ-12), smoking behaviour and exercise patterns. Absence records for the previous year, job grade, age and sex were provided from company records. Measures of education, peer support, senior colleague support and job satisfaction were the same for both retail samples, as described in Chapters 6 and 9. Similarly, all respondents reported the average time (in minutes) taken to commute to work each day. As different scales were used to measure perceived control in the two samples, the relationship between control and absence could only be examined for a subset of respondents (the “relocation” sample).

In addition to examining these previously reported correlates of absence, the relationship between personality and absence is investigated in exploratory analyses including neuroticism, social desirability, extraversion and locus of control, the four measures common to the whole sample. The rationale for this exploratory analysis is that personality measures are commonly associated with self-reported health, and therefore might also predict illness and hence absence from work. For example Hurrell and Murphy (1991) reported that an external locus of control is usually associated with higher symptom report. Similarly, the association of neuroticism with self-report of poor health has been well-established (e.g. McCrae, 1990). However, previous attempts to relate work absences to personality have resulted in findings difficult to interpret (Arsenault and Dolan, 1983).

10.4.2 Correlations with absence

Summary statistics and correlations with work absence are presented in Table 10.2 for all potential predictors. Caution is advised in interpreting the zero-order correlations in Table 10.2: the censoring of absence measures may result in a biased estimation (usually an under-estimation) of the true association between two variables (see Leigh, 1991). Nonetheless, simple correlations can be used to gain some indication of patterns of association. In particular, absence days and spells for the two years are significantly correlated, indicating consistency in attendance from year to year. Furthermore correlations with potential predictors of absence are consistent with the literature outlined in Section 10.2.1. Specifically, absence frequency was significantly correlated with self-report of physical and psychological symptoms, gender (women

more often absent), lower job grade, lower perceived control, and lower job satisfaction. Also, extraverts and people with an external locus of control were more frequently absent than introverts and internals.

Measure	Descriptives		Correlations with	
	Mean	Standard deviation	Duration 1993-4	Frequency 1993-4
Absence duration 1992-3 (N = 142)	10.5	13.2	.34	.34
Absence frequency 1992-3 (N = 142)	3.2	2.5	.22	.54
GHQ-12	11.3	5.4	.19	.30
Somatic symptoms	5.2	3.4	.27	.38
Regular exercise (0 = no; 1 = yes)	86% yes		-.01	.02
Smoker (0 = no; 1 = yes)	29% smokers		-.01	.10
Job grade (12 point scale)	5.1	2.3	-.19	-.19
Age	35.8	11.6	.01	-.10
Gender (0 = male; 1 = female)	48% female		.13	.18
Education (4 point scale)	1.1	.98	-.12	-.09
Support from peers	5.2	2.1	.10	-.03
Support from senior colleagues	9.8	4.2	.09	-.11
Job satisfaction	27.4	5.6	.02	-.13
Commuting time	27.5	24.6	.02	.07
Perceived control (N = 146)	18.9	5.6	-.04	-.19
Extraversion	7.2	3.5	.04	.14
Neuroticism	5.2	3.1	.08	.12
Social desirability	5.5	3.1	.10	.05
Locus of control	45.3	10.2	.02	.14

Table 10.2 Summary statistics and zero-order correlations of absence measures with potential predictors of absence. Unless otherwise state, statistics were calculated for respondents with complete data, N = 217. Correlations significant at the .05 level are printed in bold.

10.4.3 Tobit analyses

More detailed analyses were carried out using Tobit analysis as applied in LIMDEP (Greene, 1992), in which parameter estimates are corrected for the censoring of absence data. Predictions of absence frequency are reported here, due to the greater use of this measure in the published literature, however very similar results were obtained for absence duration.

The results of two Tobit analyses are presented in Table 10.3. To take advantage of the maximum sample size ($N = 224$), the first model predicts absence frequency from the set of independent variables identified as correlates of absence (except perceived control), and without statistical control for prior absence rates. In the second model, absence frequency for the 1992-3 was also included as a predictor, reducing the sample with complete data to $N = 140$. Additional analyses were conducted to investigate the influence of perceived control and the four dispositional measures.

Unlike OLS, Tobit analysis does not provide an overall goodness of fit statistic for each model. However the significance of each coefficient can be calculated from the t-ratio with its standard error; in Table 10.3 statistically significant predictors ($p < 0.05$) are marked with an asterisk. Furthermore, nested models can be compared using a likelihood ratio test⁴

In Model 1, the significant predictors of absence spells were self-report of somatic symptoms, job grade and commuting time. All associations were consistent with past research and theory, that is more frequent absences were recorded for individuals reporting more symptoms of poor health, in junior levels of the company hierarchy, and those with a more lengthy commute to work each day.

⁴ $-2(\text{difference of model log-likelihood functions})$ is distributed as a χ^2 distribution (Maddala, 1983).

Independent variables	Tobit coefficients	
	Model 1 (N=221)	Model 2 (N = 140)
Spells absent 1992-1993	not included	0.460**
GHQ-12	0.032	-.004
Somatic symptoms	0.213**	0.227**
Regular exercise (0 = no; 1 = yes)	0.015	0.014
Smoker (0 = no; 1 = yes)	0.192	0.121
Job grade (12 point scale)	-0.204*	-0.256**
Age	-0.022	-0.032
Sex (0 = male; 1 = female)	.331	-0.832
Education (4 point scale)	-0.143	-0.551*
Support from peers	-0.027	-0.013
Support from senior colleagues	-0.080	-0.102
Job satisfaction	0.008	0.057
Commuting time	0.019**	0.007
Model Log-Likelihood	-431.39	-264.80

Table 10.3. Summary of Tobit analyses. Coefficients are untransformed.
* $p < 0.05$; ** $p < 0.01$.

In Model 2, prior absence frequency, was added to control for the potential confounding of results by habitual absence behaviour. Although absence frequency was significantly predicted by prior absence, both somatic symptom report and job level significantly contributed to the explanation of absence frequency after control for this stability. That is symptom report and job level were predictive of *change* in absence frequency. In addition, education level

predicted absence in this model, indicating that those with higher education are less likely to be absent (after controlling for prior absence).

To compare Models 1 and 2, Model 1 was re-estimated with the same (reduced) sample as Model 2 ($N = 140$). The same pattern of associations was obtained with this reduced sample, with the exception that the coefficient for commuting time did not reach statistical significance. The log-likelihood function of model was -279.99, and comparing the two models indicated that Model 2 was a significant improvement on Model 1 ($\chi^2 = 29.98$, 1 df, $p < 0.01$), confirming the importance of prior absence as a predictor of future absence.

To examine the influence of perceived control on absence, two models were estimated with the “relocation sample” ($N = 111$). Firstly, Model 2 was re-estimated for this sample, then an additional model, including perceived control was estimated. The difference between these two models was not statistically significant ($\chi^2 = 1.46$, 1df), indicating that levels of perceived control did not add significantly to prediction of absence frequency. However, with this smaller sample, the variable age reached significance, such that older employees recorded fewer absences.

A fourth model was estimated in which neuroticism, extraversion, social desirability and locus of control were added to Model 2. Although the zero-order correlations presented in Table 10.2 indicate that higher absence is associated with extraversion and an external locus of control, in the simultaneous Tobit analysis, the coefficients associated with these traits did not reach statistical significance. Furthermore the log-likelihood function of this model (-257.71) indicated that it was not a significant improvement on Model 2 ($\chi^2 = 14.20$, 4 df, ns).

Tobit analyses to predict absence duration gave very similar results: greater absence was predicted by past absence (days absent 1992-3), report of somatic symptoms and job level.

10.5 Discussion

Employee absence in 1993-4 was predicted using Tobit analysis to account for the censoring of absence data at zero. In light of the critique of absence research by Clegg (1983), the analyses described in this chapter were designed to facilitate a causal interpretation. In particular, the influence of several proposed causes of absence was assessed simultaneously to control for potential confounding. Moreover, for a reduced sample it was possible to statistically control for stability in absence behaviour. Furthermore, by using questionnaire and company data collected in the first half of the year, a degree of temporal asymmetry between proposed causes and effect was established. Clegg further recommends that alternative causal processes must be considered.

From the simultaneous Tobit analysis, change in absence frequency was predicted by self-report of somatic symptoms, job level, and education level. Although the somatic symptoms scale asks respondents about symptom levels in the previous six weeks, it was associated with absence over a 12 month period. That people who report poorer physical health are more often absent from work, validates the use of self-report of health as an organisationally relevant outcome of the stress process, and replicates an earlier findings by Parkes (1987) and Marmot (1994). However, the association with absence over a relatively long time period calls into question the face validity of a scale which purports to measure “current” health status relative to “usual” health. Longer long-term prediction suggests that this scale also taps chronic health status, and it is this which predicts absence behaviour. This interpretation is consistent with Mechanic’s (1980) suggestion that symptom report scales are influenced by lifelong health experiences.

The finding of better attendance for higher job level and more educated employees also replicates several studies discussed at the beginning of this chapter (e.g. Leigh, 1991; North et al., 1993). Furthermore, the simultaneous prediction of absence by both measures confirms that they are not confounded in the present analysis. However, the precise mechanism through which education and job level are associated with attendance is not clear. North et al. (1993) demonstrated that the higher job level is associated with positive work characteristics, which mediate the influence on attendance. This finding was not replicated in the present study: other work characteristics were not associated with absence in the Tobit analyses.

It may be that the measures of psychosocial work characteristics used in the present study were not sufficiently sensitive to reveal such associations. Alternatively, the factors measured may not be important predictors of absence in a retail context. Informal discussions with company employees suggest that the association with job level might be due to a company culture of good attendance in higher managerial positions (even when ill). An alternative explanation is that an employee's attendance record is taken into account when considered for promotion, and therefore employees with low absence may be more likely to be promoted. To test this hypothesis would require longitudinal research with a considerably longer span than the present study, for example examining patterns of attendance over an employee's career.

Some other factors also predicted absence behaviour, but not consistently in all analyses. In particular, in Model 1, Taylor and Pocock's (1972) finding that longer commuting times are associated with higher absence was replicated. However, commuting time did not predict absence frequency within the reduced samples, nor was it related to the time lost measure. Likewise, age was predictive of better attendance, but only within the relocation sample.

Differences in findings between different samples leads one to question the robustness of these associations. Further research, with larger, more representative samples is required.

Also interesting are the variables which were not associated with absence. Despite consistent associations between personality and self-reports of health (e.g. Hurrell and Murphy, 1991; McCrae, 1990), none of the trait measures included here were predictive of absence in the Tobit analysis. It is possible however, that other trait measures (e.g. conscientiousness, type A behaviour) may be more relevant to work attendance: these warrant further investigation.

Apart from the trait measures, all variables included in the models presented have been associated with absence in past research, however only a few were significantly associated with absence in the present simultaneous analyses. In particular, contrary to the Steers and Rhodes (1978) model of work absence, job satisfaction was not an important correlate of work absence. Although the zero-order correlation of (dis)satisfaction and absence frequency was significant, statistical control for background variables reduced the association between job satisfaction and attendance to a statistically insignificant level: Clegg (1983) reported a similar finding. Similarly, gender and perceived control have often been associated with attendance, but in the present study only correlations and not the more rigorous Tobit analysis showed associations of these factors with absence. Differences in research samples as well as statistical procedures between studies make it difficult to identify why all factors were not predictive of absence in the present study.

In summary, absence from work was predicted by a combination of prior absence patterns, health perceptions (somatic symptom report), individual differences (education level), and work characteristics (job level). However causal processes could not be unequivocally established with the present data. Although it is implausible that absence patterns cause

education differences, job level may be an effect rather than cause of good attendance. Future research should investigate in more detail causal mechanisms and mediating factors through which job level is associated with work attendance. The nature or the relationship between self-report of symptoms and absence also warrants investigation. In particular, stronger causal inferences could be made if symptom report precedes the period in which absence is recorded, rather than occurring during the absence period, as in the present study. Furthermore, several psychosocial and health-related variables, associated with absence in previous research, did not contribute to absence prediction in the present study. Research using the same forms of statistical analysis with different occupational samples might reveal why there are inconsistencies in the predictive power of these factors between studies.

11. General Discussion and Conclusions

11.1 The present research

The research programme described in this thesis investigated the roles of psychosocial factors in the work stress process. More specifically, the Michigan Model was used as a framework within which to examine direct and indirect influences of individual differences and work characteristics in the development of strain. Strain indicators of particular interest were job satisfaction, physical and psychological health, and absence from work. Each of these responses was examined separately, as past research has shown them to be differentially influenced by the psychosocial factors under investigation.

Several theories of work stress were reviewed, together with past research identifying potential predictors of strain. Murphy et al. (1992) note that the stress process may operate uniquely in different work domains and organisations, and therefore the first step in any intervention aimed at stress reduction should be the identification of key stressors. Thus, one objective of the present research was to identify work characteristics conducive to stress in the work domains examined. Three research settings were described. A cross-sectional preliminary study (the “pilot study”) was conducted with respondents working in a range of white collar work environments, with an emphasis on professional and managerial work. The two main studies were conducted in a large retailing company; the first study involved managers in a range of head office and retailing functions (the “manager study”), and the second study included all levels of branch personnel (the “relocation study”).

Psychosocial rather than physical characteristics of work were the focus of this research. Not only are psychosocial factors less well understood than physical stressors, but also their effects are ubiquitous, potentially influencing employees in all types of work.

Similarly, although the strain responses examined can be influenced by factors beyond the work domain, these were not considered in detail, as it is the work sphere in which employers are able to intervene and have a responsibility to do so.

Chapter 4 reviewed some of the methodological problems with past research in this area. These difficulties were considered in the design of research described here. In particular, criticisms of self-report data have been addressed in several ways. Specifically, statistical control for negative affectivity and social desirability was used to reduce artificial inflation of correlations between independent and dependent variables. In addition, independent information regarding some job characteristics and work absence were combined with self-report data. Similarly, longitudinal research designs allowed responses to objective workplace changes to be examined. Furthermore, although participation in the research was voluntary, the provision of information from the company data base in the main studies, allowed an assessment of potential selection biases.

Several reviewers have recommended that multivariate statistical techniques are best suited to the complex models proposed in the stress literature (e.g. Murphy et al., 1992; Sauter et al., 1990). In particular structural equation modelling with longitudinal data has been recommended to help establish causal relations. Therefore, both multiple regression and latent variable modelling techniques were used to enable more rigorous tests of hypotheses than have often been reported elsewhere. For example, by examining the simultaneous influence of several independent variables, potential confounding was assessed. However, as recommended by Schmitt (1994), these complex analyses were supplemented with simpler techniques to facilitate communication of findings.

11.2 The Michigan Model: direct and indirect influences

11.2.1 Introduction

In Chapter 1 several popular theories of work stress were described. In particular, it was noted that “psychological” models of work stress, based on a transactional approach, are a significant improvement on the simpler stimulus-based and response-based stress models. It was further argued that, of these psychological models, the Michigan Model provides the most encompassing framework to guide research. The Michigan Model incorporates more specialised models, such as Role Stress Theory, Karasek’s Demand-Control Model and Sutton and Kahn’s Stress Antidote Model, and furthermore it specifies more clearly testable research hypotheses than the Person-Environment Fit Model or Lazarus’ Transactional Model.

In this section the influences of individual and work characteristics on strain are discussed. Essentially three types of influence are described in the Michigan Model. These are direct effects, moderation effects and mediated effects: all were examined in the present studies. Direct effects are statistically easiest to test and have been widely researched; these are discussed in Section 11.2.2. Interaction effects, or moderation, form the basis of the Demand-Control and Stress Antidote Models. Moderation is also incorporated in the Michigan Model, and evidence in support of these models is discussed in Section 11.2.3. Finally, empirical tests of mediation effects have only more recently been reported: these pathways describe the intermediate processes through which stressors and strains are related, and are therefore important for the understanding of the stress process. Evidence of mediation is discussed in Section 11.2.4.

Each of these pathways is discussed with reference to different strain responses. In reviewing research findings, most confidence is placed in findings which are robust to minor differences in methodology such as sampling, psychometrics of measures, and forms of statistical analysis. It is these associations which are most likely to be replicated in different settings.

11.2.2 Direct effects

Much of the research investigating stressor-strain relations has been criticised for not considering potential confounding of correlations, for example by individual differences (Brief et al., 1988), and sociodemographic factors (Albright et al., 1992). Therefore in addition to reporting simple correlations, multivariate analyses were used to assess simultaneously direct effects of proposed stressors and those of potential confounders. In all three research samples, multiple regression revealed that the effects of work characteristics, as a block, explained significant incremental variance after statistical control for sociodemographic and personality differences. Thus, contrary to some critiques of the stress literature (e.g. Brief et al., 1988; Costa and McCrae, 1987), associations identified between work characteristics and strain cannot be dismissed as spurious artefacts of poor research methodology.

More specifically, in each study, measures of perceived control and support from senior colleagues were associated with job satisfaction; similarly, high work demands were consistently related to poor mental health. Not only were these associations replicated across research samples, but also associations were found using two measures of demand and control, and three different measures of mental health. Furthermore, with the manager

sample, these associations were demonstrated in both multiple regression and structural equation modelling. In addition, modelling of longitudinal data for the manager sample controlled for the stability of work perceptions and strain outcomes over time: this model revealed that changes in satisfaction were associated with changes in perceptions of control and social support.

These associations also replicate previously reported research (e.g. Chay, 1993; Ganster and Schaubroek, 1991; Hesketh and Schouksmith, 1986), and support the argument of Broadbent (1985, 1995) that there are specific predictors of mental health and job satisfaction. The practical implication of this finding is that the same intervention will not necessarily reduce both types of strain, even opposite effects might result. For example, analyses presented in Sections 7.4.2 and 8.1 suggest that increasing job demands would increase job satisfaction among managers, however this would also reduce their psychological health.

Measures of role conflict and ambiguity were only included in a subsample of the pilot study and in the manager study. However, in support of Role Stress Theory, these factors were associated directly with job satisfaction in both groups¹. Despite the psychometric difficulties in separating the two scales, analyses with the manager sample revealed that role ambiguity rather than conflict, was specifically associated with reduced satisfaction. Furthermore, change in role ambiguity was associated with change in job satisfaction in a longitudinal structural equation model.

Direct effects of individual differences were also assessed using multivariate analyses. The most consistent finding was an association of neuroticism with symptom report, which has also been widely reported in the literature (e.g. Eysenck, 1991; Watson and Clark, 1984). This finding was consistent across all samples, using both regression and

¹ Analyses for the subsample of the pilot study group are reported in Moyle (1994)

structural equation analyses, and three different measures of health. Neuroticism was not however strongly associated with job satisfaction or absence from work. Therefore, statistical control for the influence of neuroticism as a potential confounder of stressor-strain relations is more important if the outcome is self-reported health than other measures of job strain. Locus of control was also related to strain in several of the multivariate analyses, however, contrary to the review by Hurrell and Murphy (1991), an internal locus of control was more often associated with high job satisfaction than with better health.

Other individual differences were associated with strain outcomes only inconsistently across the three studies. However, where statistically significant, these associations were in the same direction as reported in past literature: lower strain was reported by older, extraverted respondents with higher social desirability scores. One exception, discussed in Section 7.3, was the finding that married managers reported higher levels of psychological distress than their single counterparts, after controlling for other individual and work characteristics. This finding was explained in two ways: first research which has shown marriage to be beneficial to mental health has generally not controlled for differences in personality (e.g. Thoits, 1987; Russell et al. 1987); and second, it may be that marriage is less compatible with the demands of retail management than for other careers.

Finally, analysis of work absences revealed that absence is predicted by a different combination of factors than either self-reported health or job satisfaction. After controlling for demographic and work characteristics, and past absence behaviour, the significant predictors of absence frequency were job grade, health perceptions and education level. The only factor in common with prediction of self-reports of strain was job grade, which also had direct effects on job satisfaction among retail managers, and psychological health among branch personnel. However, in the analyses of self reported strain, the influence of job grade was mediated by individual and work characteristics (discussed in Section 11.2.4);

this was not the case for prediction of absence. Within the framework of the Michigan Model, the prediction of work absence over a 12-month-period from self-report of current health can be seen as a direct relationship between short-term and more enduring outcomes.

11.2.3 Interaction effects

Moderation hypotheses were tested in Chapter 7 with data from the manager sample at Time 1. This was the largest of the three research samples ($N = 244$), and was selected because Chaplin (1991) recommends that large samples are required to reliably detect interaction effects. Several stress theories propose buffering of stressor-strain relations. In particular, the Demand-Control and Stress Antidote Models both suggest that an interaction of demand and control will predict a range of strain outcomes. In addition, social support and some traits have been proposed to interact with stressors generally, to predict strain. Therefore multivariate multiple regression was used to test interaction effects, simultaneously assessing the moderation of several stressor-strain relations. This procedure reduces the probability of a Type I error, relative to repeating analyses for each stressor-strain pair with each proposed moderator, although the technique is a conservative test of any specific interaction effect. Furthermore, to control for potential confounding, a range of background factors were statistically controlled prior to the testing of interaction effects.

Although interactions between demand and control were statistically significant, they explained only a small incremental variance relative to an additive model of main effects. Furthermore, the form of the interaction was only consistent with Karasek's model for job satisfaction and not for health-related outcomes. Nonetheless, the direction of direct effects of demand and control on health-related outcomes was consistent with Karasek's theory:

poor health was associated with high demands and low control. It was concluded that, in the domain of retail management, control is not an antidote to the stress of high work demands. This is a finding consistent with previous work using managerial samples (e.g. Hurrell and Lindstrom, 1992), and in a retailing context (Jimmieson and Terry, 1993), as well as reviews of research in other work domains (e.g. Kristensen, 1995; Sauter and Hurrell, 1989). Indeed, Karasek and Theorell (1990) have suggested that the model may operate differently at higher levels of the bureaucratic hierarchy. Future research requires more detailed specification about in which work domains increased control opportunities will be beneficial.

Multivariate multiple regression was also used to examine potential moderation of general stressor-strain relations by control, social support, Type A behaviour, locus of control and neuroticism. Of the proposed buffers, only Type A was found to have significant multivariate interaction effects. However, the form of univariate interactions was not consistent with theory nor past research. Similarly, in light of Karasek and Theorell's (1990) suggestion that control may operate differently for higher management levels, interactions with management level were tested on an exploratory basis. These analyses revealed that middle managers did not derive the benefit of high control experienced by junior and senior management. It is possible that middle managers experience control as responsibility without power: more detailed research is required to investigate if specific aspects of control are responsible for this effect.

In Chapter 9, psychological distress in the second survey was predicted by job relocation and perceived demands. The stressor "relocation" was moderated by social support and perceived control, while Type B behaviour buffered the impact of perceived demands. Although the moderation effects described in these analyses were consistent with

theoretical expectations, they accounted for only a small proportion of the variance in psychological distress.

It is therefore concluded that moderation effects are not generally supported by the empirical evidence in the present research. Effects in the predicted direction were not consistently found, and in any case the incremental contribution to explanation of outcomes was small. There are several plausible reasons why previously reported interaction effects were not significant in the current data set; some of these were outlined in Chapter 4. In particular, multivariate tests for general moderation effects are a conservative test of any unique stressor-moderator-strain combination: development of more specific theory regarding moderation is required to allow more powerful hypothesis-testing. Furthermore, the relatively homogeneous nature of the retailing sample may have resulted in insufficient variance in the measures of interest for interaction effects to be detected. Nonetheless, when the focus of analysis and potential intervention is within a specific company rather than at a national level, it appears that the greatest potential for change will be brought about from a theory based in additive effects.

Finally, some researchers suggest that interaction effects should be tested with longitudinal rather than cross-sectional data (e.g. Cleary and Kessler, 1982; Cohen and Edwards, 1989). For example, Lin and Ensel (Ensel and Lin, 1991; Lin and Ensel, 1989) reported stronger buffering by social support using lagged interaction terms than in cross-sectional analysis. Such analyses were not conducted with the present data, as complete longitudinal data were not available for a sufficiently large number of respondents to test interaction effects reliably. Nonetheless longitudinal analysis offers a more sound test of buffering hypotheses and should be used in future research.

11.2.4 Mediation effects

Examination of joint influences of work characteristics and individual differences revealed several indirect pathways of influence. As is not possible to distinguish between mediation or confounding statistically with cross-sectional data, interpretation is based on presumed temporal ordering according to theory (e.g. that traits precede work perceptions). Mediation was examined using multiple regression and structural equation modelling to develop path models which explain in more detail how stressors and strains are related.

Several mediation pathways were described for the manager sample in Chapters 7 and 8. Hierarchical multiple regression analyses with cross-sectional data revealed joint mediation of the effect of internal LOC on job satisfaction by work perceptions (role ambiguity, control and social support). In addition, the positive association between job grade and satisfaction was reduced by statistical control for LOC. This finding can either be interpreted as a confounding of LOC and grade, or as the mediation of the influence of job grade by LOC (if one assumes that job grade can causally influence work locus of control). However, these mediation effects were not replicated in the relocation study for branch personnel. That is, in the relocation study LOC and job grade had direct influences on job satisfaction in the simultaneous regression analysis.

The mediated influence of LOC by perceived control has received some empirical and theoretical attention in the literature, however reviews of the LOC literature (Hurrell and Murphy, 1991 and Spector, 1982) have concluded that evidence for this effect is inconsistent. The contradictory findings in the present studies add to this inconsistency. Perceived control was a joint mediator of LOC only in the manager study. However, the relocation study did not include a measure of role ambiguity, which was an important factor

in the joint mediation process. Therefore it may be that LOC influences, and is mediated by work perceptions generally, and not just perceptions of control.

Indirect relationships among work perceptions were also examined using structural equation modelling with the manager data. Past research has demonstrated mediation of social support by role conflict and ambiguity and by control perceptions (e.g. Dompierre et al., 1993). The structural equation model of cross-sectional data was consistent with this: the influence of social support on job satisfaction and mental health was partially mediated by perceptions of control and “role clarity” (conflict and ambiguity combined). Longitudinal modelling of job satisfaction was also consistent with the mediation of social support: after controlling for stability in work perceptions and satisfaction, the influence of social support on satisfaction was mediated by perceived control and role ambiguity. Furthermore, the stability in perceptions of social support was mediated by job satisfaction over time.

Additional mediation effects revealed in structural equation modelling involved perceived control and demands. The model presented in Figure 8.4 was consistent with control influencing mental health via perceived demands, i.e. that higher levels of control result in lower perceived demands and hence better mental health. However a different mediation process fitted the data equally well, i.e. that lower demands result in higher perceptions of control and hence higher job satisfaction. Neither causal process been reported elsewhere in the literature and therefore needs further investigation to clarify the relationship. Furthermore, this model incorporates mediated as well as direct effects of neuroticism. Not only was neuroticism found to have direct effects on mental health and job satisfaction, but neuroticism also influences strain via social support and other work perceptions. This is a finding broadly consistent with mediated effects of neuroticism reported elsewhere (e.g. Moyle, in press; Terry et al. 1993), using hierarchical regression

analysis, and with research which has demonstrated that social support perceptions can be influenced by individual differences (Chay, 1993; Ganster and Victor, 1988).

Finally, in the relocation study (Chapter 9) it was reported that senior colleague support confounded the relationship between perceived demands and peer support with job satisfaction. However, this process assumes that support from senior colleagues causally influences other work perceptions. An equally valid interpretation is that senior colleague support mediates the influence of perceived demands and peer support.

In conclusion, the results of the analyses presented indicate that individual and work characteristics may influence strain through indirect, mediated pathways. In particular, mediation by role conflict and ambiguity is consistent with several findings already reported by other researchers (Jackson, 1983; Jimmieson and Terry, 1993; Lee and Ashforth, 1993; Schaubroeck and Jennings, 1991). A better understanding of these pathways would contribute substantially to our understanding of the aetiology of strain.

To distinguish between the different causal processes discussed here requires longitudinal analysis, preferably with an experimental intervention to ensure objective differences in proposed stressors (Ganster and Victor, 1988). A shorter time lag than that in the present studies may also be an advantage, as the introduction of time differences may lead to an underestimation of true associations between variables (Frese and Zapf, 1988). Furthermore, it is bad practice to conduct exploratory and confirmatory analyses with the same data set (Breckler, 1990). Thus future research should attempt confirmation of the mediation effects described here with a separate data set, particularly those effects not previously reported. Finally, to replicate the longitudinal structural equation analyses described in Chapter 8 ideally requires a larger sample (Bentler, 1989).

11.3 Change as a stressor

11.3.1 *Change research*

The literature on responses to workplace change contains much anecdotal evidence that change is experienced as stressful and will be resisted by employees (e.g. Beard, 1993; Duck, 1993; Zuboff, 1988). Moreover, research into transition stress suggests that workplace change can result in reduced physical and psychological well-being (e.g. Karasek, 1990; Munton, 1990), and that organisations which adapt to change may have a competitive advantage (Buchanan, 1989). However, this research has generally used cross-sectional surveys in which perceptions of and responses to change are measured simultaneously and retrospectively. Even where longitudinal research designs have been employed, research has been based on single samples (e.g. Ashford, 1988; Begley and Czajka, 1993). Therefore, when interpreting research findings, it is not possible to separate effects due to the change and those due to the passage of time.

Nevertheless, the research which has been conducted suggests that the negative impact of company-initiated change can be reduced by increasing employee control, social support and communication (e.g. Callan, 1993; Karasek, 1990; Zuboff, 1982; Israel et al., 1991). Furthermore, there is some suggestion that coping with the change process may be facilitated by specific personality traits, particularly an internal locus of control (Ashford, 1988; Callan, 1993). This literature was discussed in Chapter 2.

The present research allowed a more rigorous examination of the transition period than many past studies. The longitudinal design of both the manager and relocation studies, allowed assessment of intraindividual change, through statistical control for initial levels of stressors and strain. Furthermore, in the relocation study, a comparison group was selected

who were not relocated. This procedure distinguishes between responses to relocation and changes occurring in the normal seasonal cycle of trading. In addition, by testing for pre-existing differences between groups, it was possible to eliminate the possibility that employees were selected for relocation on the basis of existing differences in well-being.

11.3.2 Organisational restructuring during manager study

During the longitudinal manager study, described in Chapter 8, two significant changes occurred. The first was seasonal variation, with the second survey wave coinciding with the peak trading period of Christmas: this seasonal peak was expected affect the retail managers but not the head office group. The second change was the announcement of major company restructuring, just prior to the third questionnaire: this affected all employees.

Analysis of managers' well-being over this period revealed a significant peak in physical symptom report in the second survey wave. However, as this trend occurred in both head office and retail groups, it may be attributed to cooler winter weather, rather than Christmas workload: there was no corresponding peak in perceived work characteristics at this time, and psychological well-being was unaffected. Thus, it appears that the seasonal "rush" in the retailing sector is managed appropriately to reduce negative impact. To confirm this finding, future research might investigate symptom levels at an alternative seasonal rush (e.g. Easter), when physical health is unlikely to be affected by adverse weather.

Over the three survey waves, job satisfaction among managers declined significantly. Furthermore, structural equation modelling was consistent with changes in satisfaction being caused by changes in work conditions, specifically social support, control and role

ambiguity. Thus reduced satisfaction was attributed to the expectation and announcement of company restructuring, resulting in lowered feelings of control and support, and increased role ambiguity; a finding consistent with the literature on transition stress. For example Israel et al. (1992) noted that even where changes are intended to reduce strain in the long run, they tend to be associated with negative outcomes initially.

However, it was not clear from the time span of the present study, whether job dissatisfaction was a short-lived response during the transition phase, or if it would be a permanent consequence of the new structure. An additional follow-up study of these managers might provide an answer. Furthermore, without a comparison group, it is not possible to eliminate changes other than the restructuring as potential causes of the observed trends.

11.3.3 Relocation study

The relocation study adopted a quasi-experimental design, in that it was both longitudinal and incorporated a comparison sample. Although relocation to a new store was associated with increased psychological distress, this effect was not mediated by changes in the work perceptions measured; in particular, perceived work demand was an independent predictor of distress. Future research might include a wider range of more sensitive work environment measures to identify the particular job characteristics which change during relocation. Nonetheless, perceived control and social support were found to moderate the negative experience of the transition. This finding is consistent with suggestions of several researchers in this field, who recommend increased participation and communication during

any change (e.g. Callan, 1993; Karasek, 1990; Zuboff, 1988), although statistical moderation has not been previously demonstrated.

The idea that individual differences might contribute to more adaptive coping with change has been suggested by some researchers (Ashford, 1988; Callan, 1993). However in the present study, although some traits were associated differences in distress cross-sectionally, once pre-existing levels of distress were statistically controlled, there was no evidence that traits contributed to better outcomes during the transition.

Although experienced personnel managers anticipated that six months is a sufficient period for employees to adapt to a new work setting, six months after each branch opened, their employees still reported significantly higher levels of psychological distress than those in the comparison branches. The process of adaptation to change requires further study. For example Griffin (1991) found that job satisfaction and performance of bank tellers showed different patterns of change over a four- year period following job redesign.

11.4 Methodological limitations of the present research

Although designed in the light of criticisms of the stress research literature, the methodologies used in the present studies were constrained by several practical limitations. In particular, as with much stress research, there was a heavy, although not exclusive reliance on self-report data. However, the few independent measures which were obtained were not commensurate with self-report measures. Therefore there was no opportunity for the assessment of the validity of self-report versus independent measures, for example in a multitrait-multimethod matrix (Campbell and Fiske, 1959). Future research might incorporate observer or co-worker ratings of job characteristics, which lend themselves to this style of analysis (e.g. Spector and Jex, 1991).

The investigation of work absences further emphasises the difficulties involved in obtaining objective and independent measures. Specifically, the manner in which company absence records were maintained resulted in a small and unrepresentative sample of employee records to analysed; greater detail about the reasons given for each absence spell would allow more fine-grained analysis regarding the causes of different types of absence.

In the present studies, complex mechanisms, such as mediation and moderation, were generally examined with cross-sectional data to take advantage of the more complete data at Time 1. Although SEM allows testing of competing causal mechanisms, better evidence of causation is derived from longitudinal research. Thus, although empirical findings from the structural equation modelling can be said to be consistent with a priori causal mechanisms, they do not prove causality. The models presented should be replicated with larger, longitudinal research samples, to allow testing of reverse and reciprocal causal processes. For example, to examine relationships between personality and work characteristics, longitudinal research should ideally be conducted which spans an

individual's career. In this way, influences of work conditions on the development of particular traits could be examined in addition to personality as a presumed determinant of work choices and perceptions.

The longitudinal structural equation models presented were constructed with relatively small samples for this type of analysis. Even relatively simple models with latent variables, require large samples once extended through time. For example a longitudinal sample of approximately 350 would provide a more satisfactory test of the job satisfaction and mental health models presented in Chapter 8. Likewise, the attrition of participants in the relocation study resulted in a sample too small to adequately apply latent variable modelling to the relocation process.

To examine responses to change, the design of the longitudinal studies presented here could be improved. More specifically, responses to organisational restructuring by the managers were confounded with other changes occurring during the research period. The incorporation of a comparison group, in a quasi-experimental design would overcome this difficulty. Such a design was used in the relocation study. However, this stronger methodology was countered by a lower response rate and potentially unrepresentative sample of respondents who participated in all three waves of the study. The timing of survey waves also requires reconsideration. A lag of six months, as in the manager study, may obscure causal relationships between work characteristics and health, in an occupational setting where work groups and task requirements are constantly changing. Moreover, in the relocation study, it was found that six months was too short a time span in which to examine the full effects of new branch openings.

In order to draw conclusions about relationships between objective work characteristics and organisationally relevant outcomes, researchers require access to independent information, rather than relying on questionnaire data. Furthermore, if

companies can provide data on variables such as job characteristics, employee performance, turnover, and work absence, the applicability of research findings will be maximised. Intervention studies, particularly if organised in an appropriate experimental design, also offer a potential solution.

11.5 Future directions for stress management and research

In light of the poor evidence for the efficacy of stress management programmes (e.g. Ganster, Mayes, Sime and Tharp, 1982; Sauter et al., 1990), preventative stress management, focusing on job redesign rather than individual treatment has been widely recommended (Burke, 1993; Murphy et al., 1992). Moreover, Murphy et al. (1992, p 341) note that “universal solutions to work stress are unlikely to be successful because stress problems often require solutions that are more or less unique to each organization.” Therefore a preliminary stage in any intervention should be the identification of key stressors in the relevant occupational setting. This has been one aim of the present research.

The models of the work stress process developed in this thesis, demonstrate that work characteristics are differentially related to specific measures of strain. Therefore, before designing any intervention, it needs to be decided which outcomes are to be maximised (e.g. employee health, satisfaction, productivity or work attendance); only then can the efficacy of any intervention be assessed.

In the manager study, the main work characteristics associated with job satisfaction were social support, control, and role clarity; increases in any of these work characteristics should increase satisfaction. Similarly, in employee health (physical and psychological measures combined) was related to work demands and social support. Furthermore, the negative impact of work relocation on psychological health was buffered by high levels of control and social support. Therefore an intervention which increases perceptions of social support, particularly from senior colleagues, would be expected to result in improvements in both satisfaction and health. It is anticipated that such an intervention would benefit all employees, but particularly those undergoing a significant change in their work. Furthermore, the results of the absences analyses suggest that improvements in attendance

would be expected to follow from an intervention which improves self-report of employee health.

Thus the next stage in stress management could be to introduce a programme which increases support from supervisors and managers. Introduction of such an intervention would provide a valuable opportunity for evaluation. In addition to establishing the strain-reducing benefit of job redesign, intervention studies can make a substantial contribution to academic understanding of causal mechanisms in the stress process. In particular, intervention studies allow rigorous testing of theoretical models, for example with objective differences between work environments in experimental and quasi-experimental designs.

Several popular management strategies, for example Total Quality Management (Deming, 1982; Walton, 1989) and Stratified Systems Theory (Jaques, 1976), aim to increase employee participation, role clarity, and the supportiveness of work environments. Such strategies therefore offer benefits in terms of strain reduction. However, in a recent review of work stress interventions, Murphy et al. (1992) noted that rigorous scientific evaluation of this type of intervention is rare. Indeed, the volume which they edited (Quick, Murphy and Hurrell, 1992), contains more descriptive than evaluative research. Other reviews (e.g. Reynolds and Shapiro, 1991; Sauter et al., 1990) have discussed in more detail the methodological problems of many intervention studies. In particular few studies have incorporated control groups or longitudinal designs. Notable exceptions, in which job redesign has been appropriately evaluated have been reported for introduction of participative decision-making (e.g. Israel et al., 1992; Jackson, 1983), autonomous workgroups (Wall and Clegg, 1981; Wall et al., 1986), task enrichment (Griffin, 1991), and reduction of workload (Meijman et al., 1992; Parkes, 1995). However, none of these studies have specifically investigated a manipulation of social support.

It is further recommended (e.g. Murphy et al., 1992; Sauter et al., 1991) that the outcome measures of any evaluation scheme should include a cost-benefit analysis, by taking into account organisationally relevant outcomes including worker performance, turnover, and absence. Of course, the ability of academic researchers to incorporate such measures is dependent upon a high level of co-operation by the company being studied. This point was illustrated in the present research programme by the difficulties experienced in obtaining complete absence records for research participants. However, if scientific knowledge is to be translated into applied practice, such collaboration is essential.

A final caution on intervention is offered by Beer, Eisenstat and Spector (1990, p 161), who recognise that the enthusiasm of some companies for adopting new management strategies can result in resistance to change, “By promoting skepticism and cynicism, programmatic change can inoculate companies against the real thing”. They suggest that management need to allow sufficient time for any programme to work before abandoning it in favour of the next.

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APPENDIX I

The role of negative affectivity in the stress process: Tests of alternative models

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ABSTRACT

The prominence of the personality trait of Negative Affectivity (NA) in the stress literature has increased over the last decade. Negative affectivity has been widely reported both to have direct effects on measures of strain, and to act as a potential confounding variable of stressor-strain relations in self-report research (Watson and Clark, 1984). However, more recent work has demonstrated that NA can also moderate environment-outcome relationships, acting as a vulnerability factor in the stress model, or alternatively that its influence may be mediated through perceptions of the work environment. In the present study, these four possible pathways through which NA may be implicated in job satisfaction and symptom report were examined.

In terms of symptom report, NA was found to have direct effects, to act as a partial confound, and to play a significant moderating (vulnerability) role. In contrast, for the prediction of job satisfaction, the influence of NA was found to be mediated through perceptions of the work environment. It is concluded that *all* these potential roles of NA should be more thoroughly considered in future stress research.

INTRODUCTION

Negative affectivity (NA) is defined as a mood-dispositional dimension reflecting pervasive individual differences in the experience of negative emotion and self-concept (Watson and Clark, 1984); trait anxiety (Spielberger, Gorsuch and Lushene, 1970) and neuroticism (Eysenck and Eysenck, 1975) are commonly used measures of NA. Most recent research, particularly in the USA, has focused on the role of NA as a potential confounding variable in stressor-strain relations. This focus has overshadowed the other possible roles of NA in the stress process. A conceptual framework of the stress process has been put forward by James House and his colleagues (e.g. House, 1981; Israel, Schurman, Hugentobler and House, 1992). Examining NA as an individual characteristic within this paradigm throws further light on the mechanisms through which NA might be implicated in stressor-strain relations. In this model of the stress process, objective conditions are mediated through individual stress perceptions to influence short-term responses and long-term strain outcomes: individual or situational characteristics may condition or “modify”, directly or indirectly, each step in this process. Casting NA as a “modifying” variable in this model, reveals four pathways through which this individual difference may influence strain outcomes.

The focus of the present study is in examining relationships between perceptions of the psychosocial work environment and indices of (short-term) strain, and how NA might be implicated in these relationships. Although it is possible for several of the pathways specified by this paradigm to operate simultaneously, to clarify the four potential pathways through which NA might act to influence strain, each is presented individually in Figures 1 a) to 1 d). The direction of causality implied by the arrows in these figures is based on the assumption that NA is a stable trait that precedes experience of the work environment and strain outcomes. Similarly, exposure to the work environment is assumed to precede the onset of strain.

Figure 1.

Four possible pathways through which negative affectivity might influence strain outcomes.

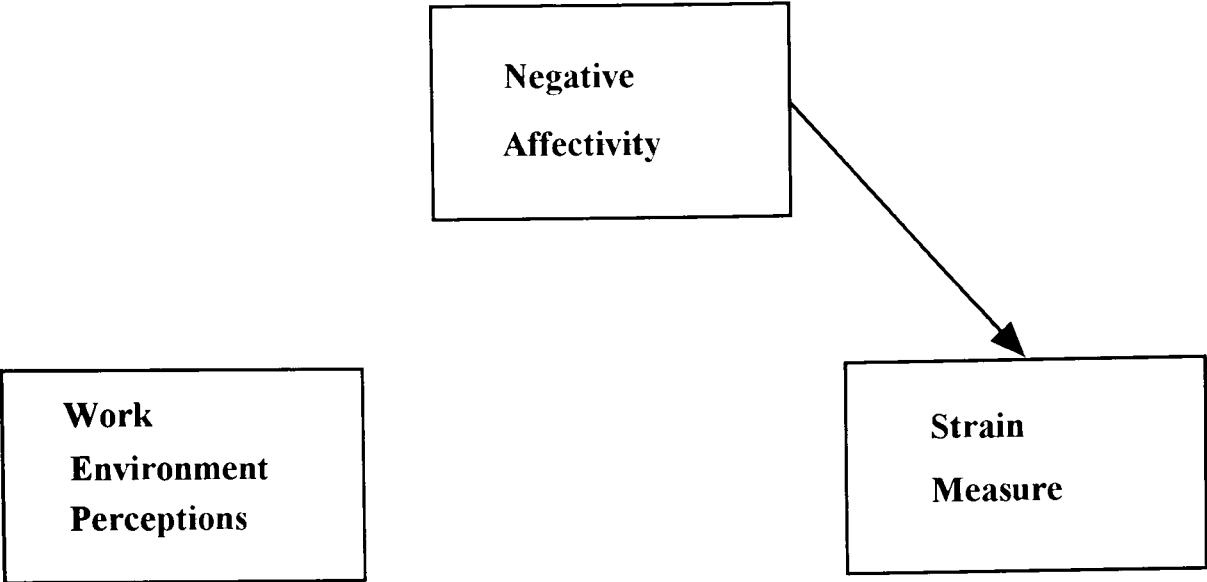


Figure 1 a)

NA has a direct effect on the strain measure. This occurs independently of any relationship between either variable and perceptions of the work environment.

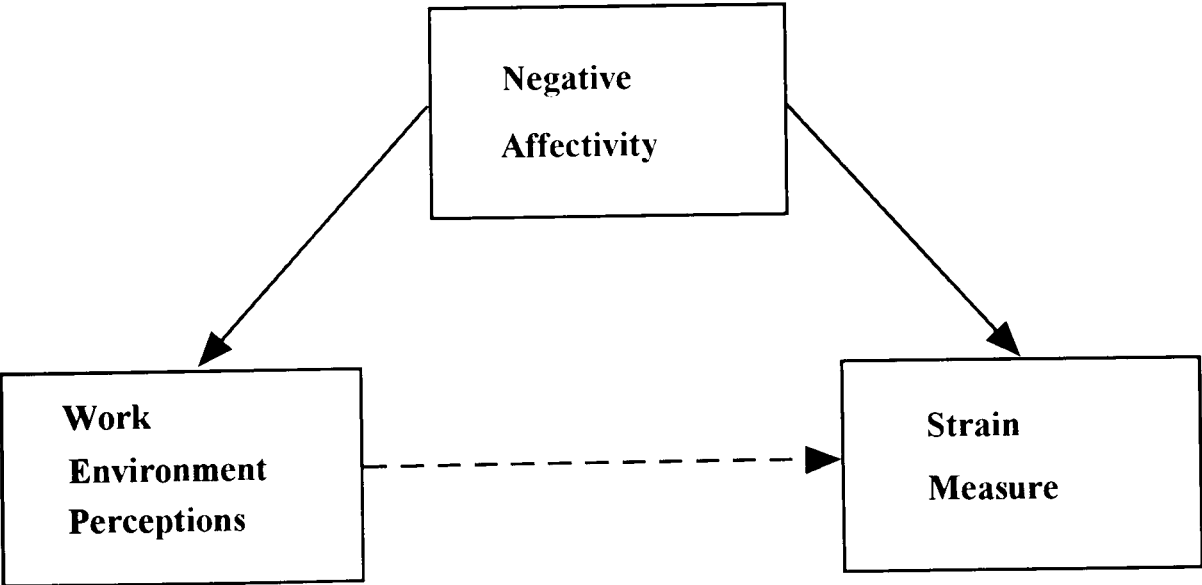


Figure 1 b)

NA as a confound, giving rise to spurious correlation between environment and strain measures. The association between work environment perceptions and strain is reduced when the influence of NA is controlled (shown as a dashed arrow).

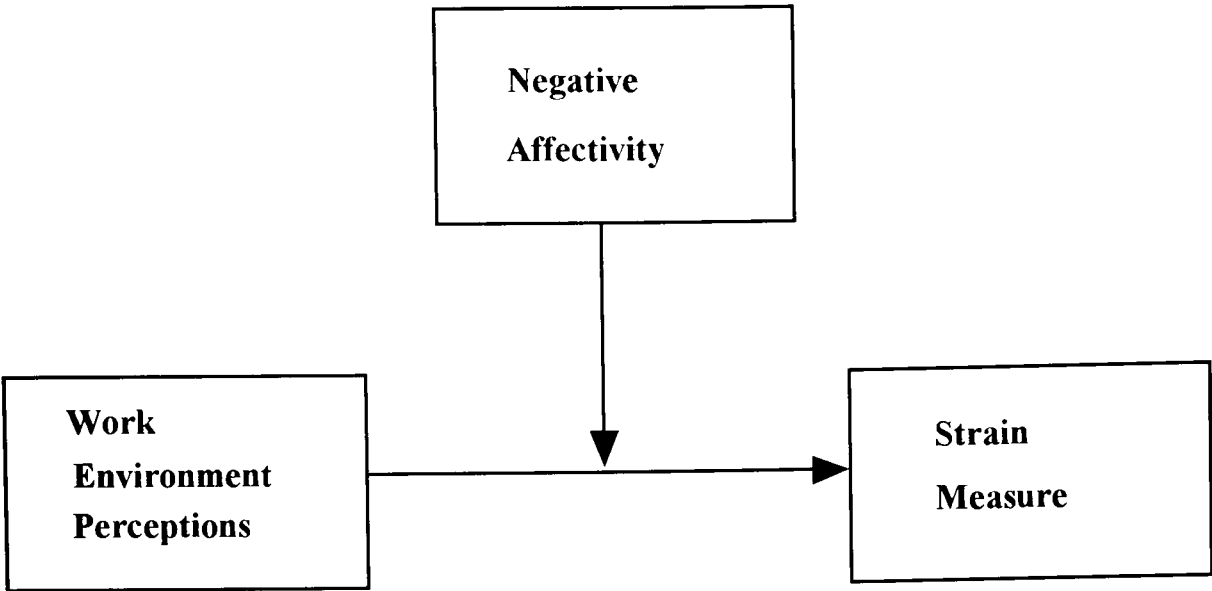


Figure 1 c)
NA as a moderator: an individual's level of NA of will determine their response to features of the environment.

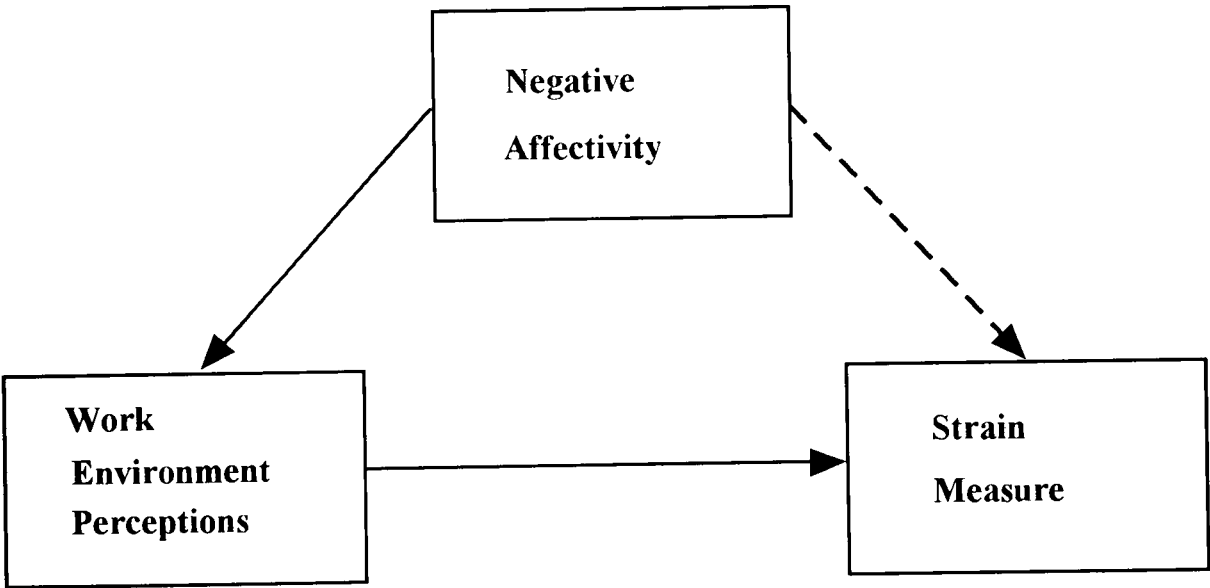


Figure 1 d)
The influence of NA is mediated through perceptions of the work environment. the association between NA and strain is reduced when the influence of work environment perceptions is controlled (shown as a dahsed arrow).

The introduction will first consider the evidence in support of these four NA roles and will then outline the conditions under which work perceptions and strain outcomes might be susceptible to the influence of NA.

Direct effects of NA

A consistent finding is that people who are high in NA also score highly on self-report symptom scales such as the General Health Questionnaire (e.g. Goldberg, 1972; Watson and Clark, 1984). This finding has led to some debate as to whether high NA individuals experience poorer health, or merely report greater distress. The strongest evidence of a direct link between NA and physical health has been put forward by Eysenck (1991) who reported higher death rates (from cardiovascular disease and cancer) in people with high neuroticism scores, in a 13 year prospective study. The contrasting view suggests that, although NA is related to *complaints* about health, its links with actual disease are unproven (e.g. Costa and McCrae, 1987; McCrae, 1990; Watson and Pennebaker, 1989). Either way, there is an undeniable relationship between NA and commonly used health measures.

NA as a confounding variable

The most frequent reference to NA in the stress literature is in a debate about whether this trait might act as a confounding (nuisance) variable, spuriously inflating correlations between self-report measures of stressors and strains. There are two aspects to this issue. First, there are psychometric difficulties of content overlap between conceptually different scales. Second, there are problems of general response bias operating over all self-report indices.

Schroeder and Costa (1984) suggested that content overlap between scales designed to measure stressful life events, neuroticism, and health outcomes was the cause of correlations between life stressors and illness reported in the literature. They found that when items of potential content overlap were removed from these scales, correlations between stressors and strains were not significant. However, other researchers have argued that stressor, strain and neuroticism scale items are conceptually distinct, and that research in

which this methodological issue has been suitably addressed continues to reveal substantial correlations between stressor and strain scales (Maddi, Bartone and Pucetti, 1987; Schaubroek, Ganster and Fox, 1992)

An alternative explanation for the observed correlations between self-reported stressors and strains, is that NA underlies a general response tendency, which acts to inflate the correlation between self-report scales (e.g. Costa and McCrae, 1987; McCrae, 1990). In several investigations it has been demonstrated that the correlations between self-reports of stressors and strains are reduced when the common variance attributable to NA is partialled (e.g. Brief, Burke, George, Robinson and Webster, 1988; Payne, 1988; Burke, Brief and George, 1993). These findings have called into question a large proportion of psychological stress research, which rests upon demonstrated correlations between self-reports of stressors and self-reports of strain. Watson, Pennebaker and Folger (1987), represent the extreme view in this confounding variable debate. They concluded, 'To the extent various self-report measures all tap the same underlying NA construct, presumed "independent variables" and "dependent variables" in many stress studies may represent little more than different measures of the same thing - and that *thing* is not necessarily the construct of stress, but perhaps merely the predisposition to respond negatively' (p155).

However, other stress researchers, cautioning against throwing the proverbial baby away with the bath water, have reported convergent validity of self-report measures with independent assessments of stressors and strains, including physiological outcomes (e.g. Frese, 1985; Spector, Dwyer and Jex, 1988). Furthermore, although controlling statistically for NA has been shown to weaken the correlations between stressors and strains, such correlations often remain statistically significant. Chen and Spector (1991) explicitly made this point, but examples are numerous, including papers where the emphasis is on the nuisance properties of NA, (e.g. 9 of the 15 stressor-strain relations reported by Brief et al., 1988 remained statistically significant after controlling for NA).

Finally, analysis of discrepant findings suggests that some types of stressors and some types of outcomes are particularly susceptible to NA contamination. Specifically, measurements of life stress generally require subjects to make subjective judgements about stressor impact, whereas in work stress research, job stressor instruments are more objective,

asking subjects to note the presence or absence of some feature (Schaubroek and Ganster, 1991; Schaubroek et al., 1992, Chen and Spector, 1991). Similarly, the reduction in variance attributable to the environment that occurs when controlling for NA is much larger in the prediction of symptom report than for job satisfaction (Burke et al., 1993; Chen and Spector, 1991; Schaubroek and Ganster, 1991; Schaubroek et al., 1992; Terry, Nielsen and Perchard, 1993). Two explanations for this difference have been put forward: either different types of outcomes (affective versus health outcomes) are differentially influenced by NA or, alternatively, the observed differences may be a methodological artefact due to the positive framing of satisfaction questionnaires, compared with the negative framing of symptom report scales.

NA as a moderator of stressor-strain relations

Taking a different view of NA, Spielberger et al. (1970), characterised trait anxiety (a measure of NA) as a tendency to react adversely to social and psychological stressors, that is, as a vulnerability factor. Parkes (1990) tested this hypothesis in a sample of trainee teachers and found that NA not only acted to inflate correlations between work perceptions and outcomes (mental well-being) but, more specifically, NA moderated the relationship between work demands and well-being. High NA individuals perceived their work environment as being generally more stressful, and also showed a more reactive response to the same level of perceived demands, when compared with their low NA counterparts. NA did not however act to moderate the impact of work support. Comparable NA-moderation has been reported Denney and Frisch (1981) and Bolger and Schilling (1991) for responses to life stressors. Similarly, Schaubroek and Ganster (1991) cited an unpublished finding in which neurotic (high NA) introverts were more reactive to stressors in terms of symptom report, in a three-way interaction effect.

The evidence with regard to affective outcomes is less clear. In a laboratory setting, Larsen and Katelaar (1991) reported stronger induction of negative mood in subjects with a high neuroticism scores; similarly Parasuraman and Cleek (1984) reported that affective reactions to work overload were moderated by NA. In contrast, Levin and Stokes (1989) tested the moderation hypothesis with respect to the prediction of satisfaction, in a

laboratory setting, but found that there was no interaction effect: both high and low NA subjects responded favourably to task enrichment.

Indirect effects of NA

A fourth possible role of NA is an indirect, mediated pathway whereby, although not directly related to a specific outcome, NA may act to influence perceptions of the work environment, which in turn are associated with strain. This role, although alluded to in general discussions of negative affectivity (e.g. Costa and McCrae, 1980, 1987; Watson and Clark, 1984), has not received direct attention in many empirical investigations. Staw, Bell and Clausen (1986, p61) described the role of personality in this process as follows, 'People may bring a positive or negative disposition to the work setting, process information about the job in a way that is consistent with this disposition, and then experience job satisfaction or dissatisfaction as a result.' Levin and Stokes (1989) explored these indirect effects empirically and found evidence for mediation of the relationship between NA and job satisfaction through work perceptions. However, the affective measure used by Levin and Stokes to some extent confounds positive and negative affectivity, as posited by Watson and Tellegen (1985). More recently, Terry et al. (1993) replicated this finding in the prediction of job satisfaction, using neuroticism as the measure of NA. Furthermore, like Levin and Stokes, Terry et al. demonstrated that the influence of NA in the prediction of mental health was direct rather than mediated.

Potential work stressors

The work stress literature identifies several features of the work environment that act as potential sources of stress. The amount and type of workload, the degree of autonomy or discretion at work, and the supportiveness of colleagues have been identified as central features of the work environment (Johnson and Hall, 1988; Payne and Fletcher, 1983; Parkes, Mendham and von Rabenau, 1994). In addition to these well established work characteristics, measures of organisational culture may also be important in influencing strain outcomes (Schriber and Gutek, 1987; Landy, Rastegary, Thayer and Colvin, 1991).

Workload. Quantitative workload or demand is usually positively associated with strain. This has been a common finding among stress researchers, particularly in the prediction of anxiety (e.g. Broadbent, 1985) but also in relation to more general psychological distress (Bromet, Dew, Parkinson and Schulberg, 1988; Karasek, 1979; Karasek and Theorell, 1990; Perrewe and Ganster, 1989).

Fluctuations in demand. The degree to which work demands are continuous as opposed to fluctuating, has received little attention in the past, but may also be a potential work stressor. The difficulties created by a fluctuating workload may be related to the unpredictability of fluctuations, as uncertainty of work demands has been identified as a potential source of strain (Sutton and Kahn, 1986; Tetrick and LaRocco, 1987).

Control or discretion. The level of discretion or control available to an individual in his or her work situation has been widely investigated and generally found to be negatively associated with strain; low control predicting high strain (see Parkes, 1989 for a review, or Spector, 1986 for a meta-analysis).

Social support. The balance of evidence regarding social support indicates that lack of support can have direct, additive effects on strain outcomes (Landsbergis, Schnall, Deitz, Friedman and Pickering, 1992; Loscocco and Spitze, 1990; Melamed, Kushnir and Meir, 1991; Schaubroek et al., 1992), although it may also buffer stressor-strain relations (Cohen, 1988; House, 1981; Wells, 1982). It is the direct effects of social support that will be considered in the present study. Wells (1982) found that support from superiors is particularly important with respect to work stress; accordingly this is examined here.

Time orientation. Schriber and Gutek (1987) suggested that time is a basic dimension of organisations, which can affect employee performance and satisfaction. Two aspects of time orientation are considered here: the importance of quality versus speed of work, and the degree to which a company plans for the future. The requirement to produce high quality work, particularly when individuals are operating under tight time constraints, necessitates decisions about quality versus quantity trade-offs, and is a potential source of conflict. Similarly, the time horizon of a company may greatly impact upon work organisation and attitudes (Jaques, 1989).

Measures of strain

Strain is not a unidimensional construct. Conventional strain outcomes such as satisfaction, anxiety, frustration, depression, arousal and symptomatology have been found to be differently influenced by variations in work demand, control and support (Broadbent, 1985; Evans, Shapiro and Lewis, 1993; Hesketh and Shouksmith, 1985; Spector, 1987; Steptoe, 1989; Warr, 1990). For example, job satisfaction has been found to be more closely associated with level of control than with physical or behavioural measures of strain (Jackson, 1989; Ganster, 1989; Sauter, 1989). Furthermore, as outlined above, the influence of NA on stressor-strain relations may also vary according to the outcome of interest (Schaubroek and Ganster, 1991). Accordingly, in the present study, models for two distinct outcomes will be examined: for job satisfaction, and for physical and psychological symptom report (well-being).

Research Hypotheses

On the basis of the research findings presented, it is argued that negative affectivity can act to influence strain measures through each of the four pathways represented in Figure 1, and thus all potential pathways should be examined. Furthermore, the relative importance of each process depends upon the outcome measure of interest. Thus, the influence of NA on job satisfaction is predicted to be different from that on the symptom report measure (Burke et al., 1993; Schaubroek et al., 1992).

In particular, different studies have previously shown NA to play direct, confound and moderator roles in the prediction of symptom report. For job satisfaction, the direct and confound roles of NA are expected to be less important, whereas the mediated influence of this disposition through perceptions of the work environment warrants empirical investigation. The potential moderating role of NA in the prediction of job satisfaction is less clear, as the limited available research evidence is somewhat contradictory regarding this role. Specific hypotheses are listed below, together with reference to the models presented in Figure 1 where appropriate.

- H1 NA will be correlated with self-report ratings of both the work environment and outcomes. (A direct effect: Figure 1 a))
- H2 The five work environment measures will jointly predict both job satisfaction and well-being.
- H3 Controlling for NA will reduce stressor-strain associations, but this effect will be less marked for the prediction of satisfaction than for well-being (as reported, by Brief et al., 1988). After control for NA, statistically significant stressor-strain associations will remain. (NA as a partial confounding variable : Figure 1 b))
- H4 NA will moderate the relationship between work environment measures and well-being, such that high NA acts as a vulnerability factor (as reported by Parkes, 1990). On an exploratory basis, the potential moderating role of NA in the relationship between the work environment and job satisfaction will also be tested. (NA as moderator: Figure 1 c))
- H5 In the prediction of job satisfaction, the effect of NA is expected to be mediated through work environment perceptions (as reported by Levin and Stokes, 1989 and Terry et al., 1993). The evidence for strong direct effects of NA in the prediction of symptom report suggests that significant mediated effects are unlikely. (NA mediated through work perceptions: Figure 1 d))

METHOD

Subjects

The 143 participants in this study were drawn from three general work groups: 21 from small businesses, 36 from a branch of a national bank, and 86 from a business consultancy company. Response rates in the three groups were 70%, 45% and 57%, respectively, which are similar to those reported by other researchers working in applied settings (e.g. McLaney and Hurrell, 1988; Spector, 1987). Although all participants were involved in office work, a wide range of occupations and work environments were covered to ensure suitable variance on the work measures of interest.

Respondents' ages ranged from 17 years to 59 years, (mean 32.8 ± 8.2 years); 39% of the sample were female, and 74% lived with a partner. In terms of level of education, the sample reported much greater education than the general population: the predominance of university education (27.3% with a university degree, a further 29.4% with a higher degree) is particularly noteworthy, and was spread between the small business and consultancy groups.

Measures

Work demands measures. Perceived workload, and fluctuations in workload were measured using self-report scales adapted from Sauter (1989). The Sauter demands scale consisted of 20 items taken from the Work Environment Scales (Insel and Moos, 1974) and the Michigan Institute for Social Research scales (Caplan, Cobb, French, Harrison and Pinneau, 1975). In a study of health complaints in office workers, Sauter (1989) used this scale to show that (high) demand and (low) control were associated with high reported illness and job dissatisfaction. All items were presented in a 5-point Likert response format. The workload scale (14 items) was found to have a high internal consistency, $\alpha = 0.83^1$. Consistency in the shorter fluctuations in workload scale (6 items) was lower at $\alpha = 0.61$: although relatively low, internal consistencies in this range are frequently cited for shorter

¹ All reported alphas are standardised.

scales in the applied research literature (e.g. Rafaeli, 1986; Sage and Koslowsky, 1994; Spence, Helmrich and Pred, 1987).

Control. Level of decision latitude or control was also measured using items from Sauter's (1989) scales. The 14-item control scale demonstrated good internal consistency, $\alpha = 0.78$. All the Sauter items were presented in the questionnaire as a single mixed work environment scale.

Social support. The support from senior colleagues scale was taken from House's (1981) social support measure. The senior support subscale is composed of 6 items, concerning the extent to which senior colleagues are helpful, reliable and competent with respect to difficulties encountered at work. All questions were answered on a 4-point response format ranging from 0 (not at all supportive) to 3 (very supportive). The scale had an internal consistency of $\alpha = 0.89$.

Time Orientation. This 4-item scale was adapted from Schriber and Gutek's (1987) Time-At-Work questionnaire. Sample items are "Doing things right is better than doing things fast", and "Planning for the future is important here". Again, items were presented in a 5-point Likert response format; a high score indicates time orientation emphasising quality (over speed) and a strong future orientation of the company. The items were presented together with other Time-At-Work subscales, which are not included in the current analysis due to their similarity to the Sauter work demands and control scales. Although capturing two aspects of time culture, as reported by Schriber and Gutek, these four items were found to load onto a single factor in a principal components analysis. Internal consistency of the scale was $\alpha = 0.70$.

Well-being. Well-being was assessed using a 12-item scale from the General Health Questionnaire (GHQ-12, Goldberg, 1978). This scale asks respondents to indicate the extent to which they have experienced a list of somatic and affective symptoms over the past six weeks, relative to their "usual" level of health. The scale has been shown to have good reliability and validity for working populations (Banks, Clegg, Jackson, Kemp, Stafford, and Wall, 1980), and has been validated against clinical ratings of mental health (Banks, 1983). In the present sample, internal consistency was $\alpha = 0.90$.

Job satisfaction. The 10-item job satisfaction scale was adapted from Caplan et al. (1975), and asked respondents to rate various features of their job on a 4-point scale from "very dissatisfied" (1) to "very satisfied" (4). These features included physical working conditions, working hours and shift arrangements, future work prospects, consultation about changes, co-workers, and the ways skills and abilities are utilised. The scale was found to have a high internal consistency of $\alpha = 0.82$.

Negative Affectivity. Eysenck and Eysenck's (1975) neuroticism scale was devised for gauging the extent to which an individual tends to be worried, anxious, or pessimistic, and is widely used as a measure of negative affectivity (Watson and Clark, 1984). In this study the short, 12-item scale was used (Eysenck, Eysenck and Barrett, 1985). Internal consistency for this sample was $\alpha = 0.84$.

Statistical treatment

The role of NA was examined separately for job satisfaction and symptom report through multiple regression analysis procedures. A significant additive term for NA indicates a direct effect as illustrated in Figure 1 a).

Baron and Kenny's (1986) prescription for testing a mediation effect using regression methods, is statistically the same as that used to test NA as a confounding variable (Brief et al., 1988). Firstly, NA must be correlated with both the proposed stressor (environmental measure) and the outcome measure. Secondly, the environment measure must significantly predict the outcome measure. Finally, the outcome is simultaneously regressed onto the stressor variable and NA. The result of this simultaneous regression reveals whether NA or the proposed stressor is the mediator. If, in the simultaneous equation, NA is found to predict the outcome while the stressor variable is reduced to an insignificant level, this demonstrates a confounding effect (Figure 1 b)). If, however, it is the NA term that is significantly reduced, then the environmental measure (proposed stressor) would be seen to be the mediator (Figure 1 d)). The four potential environmental stressor variables were examined for potential mediation in a single simultaneous step (rather than in separate analyses) to reduce the probability of Type I error.

To test for NA as a moderator, it is necessary to enter the cross-product terms of NA

and each hypothesised stressor in a separate block in a hierarchical regression analysis, following the entry of both the stressor variables and NA as first-order terms (Cohen and Cohen, 1983; Baron and Kenny, 1986). Extending Parkes' (1990) analysis, which investigated the moderation of social support and demand by NA, all five stressor-NA product terms were entered simultaneously and their significance tested in the final hierarchical step. As recommended by Finney, Mitchell, Cronkite and Moos (1984), all continuous measures were standardised before analysis to assist in interpretation of interaction effects (at the average level of all other variables).

RESULTS

Means, standard deviations and intercorrelations

Table 1 presents the means, standard deviations and Pearson intercorrelations for each of the questionnaire variables. From this table, GHQ score (symptom report) is seen to be significantly correlated with each of the work environment measures, in addition, job satisfaction was correlated with control, senior colleague support, and time orientation. Furthermore, NA was significantly correlated with both outcomes of interest, and also with two of the five work environment measures.

Measure	mean	SD	2	3	4	5	6	7	8
1. GHQ-score	11.33	5.74	-.48**	.55**	.18*	.25**	-.26**	-.34**	-.24**
2. Satisfaction	26.95	5.17		-.20*	.11	.00	.39**	.59**	.51**
3. Neuroticism	4.69	3.47			.04	.13	-.27**	-.20*	.03
4. Demands	53.69	7.23				.11	.20*	-.21*	-.15
5. Fluctuations in workload	16.50	3.36					.03	-.03	-.04
6. Control	44.09	8.41						.16	-.23**
7. Support from Senior Colleagues	10.20	4.16							.56**
8. Time Orientation	14.19	3.54							

Table 1. Means, standard deviations, and Pearson intercorrelations of variables.

Note. Correlations have been calculated only for subjects with complete data, N = 129.
* $p < .05$, ** $p < .01$

Hierarchical regression analyses: Prediction of GHQ score and job satisfaction

The four potential roles of NA in the stress process were tested using multiple regression analyses, separately for each of the outcomes. The results of these analyses are presented in Tables 2 and 3. Model 1, ("NA Model"), shows the prediction of each outcome from NA alone, and is a test of hypothesis 1. Similarly, Model 2, ("Environment Model"),

predicts each outcome from the five environment variables entered simultaneously and is a test of hypothesis 2. Models 1 and 2 may be seen as alternative first steps of a hierarchical regression, with Model 3, ("Additive Model") in which the environment variables and NA are combined additively, as the second step. Comparison of Model 3 to Models 1 and 2 indicates the contribution made by NA and the environmental variables corrected for each other, and thus addresses hypotheses 5 and 3 respectively. Model 4 ("Interactive Model") also includes the five (multiplicative) interaction terms, and is the third step in a hierarchical analysis, testing hypothesis 4, the moderation hypothesis. Unstandardised regression coefficients (B values) were determined for each model, such that every term was corrected for all other terms in the equation at that point.

NA model (Step 1-a): Testing hypothesis 1. Negative affectivity was significantly associated with GHQ score and job satisfaction. The NA model was significant for both outcome measures: GHQ score, $F(1,128) = 56.62$ $p < .001$; job satisfaction, $F(1, 129) = 5.18$, $p < 0.05$.

Perceived environment model (Step 1-b): Testing hypothesis 2. The five environmental variables were also significant joint predictors of both outcomes: GHQ score, $F(5,124) = 8.94$, $p < 0.001$; job satisfaction, $F(5, 125) = 35.11$, $p < 0.001$.

Additive model (Step 2): Testing hypotheses 3 and 5. In the additive model each outcome was predicted by the simultaneous regression of NA and the four environment variables. Comparing the environment (step 1-b) and additive models, NA was found to add significantly to the prediction of GHQ score ($\Delta R^2 = .190$, $p < .001$), but for job satisfaction, the incremental improvement in prediction was negligible ($\Delta R^2 = .003$, ns). Furthermore, for job satisfaction the predictive power of the environmental variables (as indicated by the B values for each model) was not found to be greatly affected by the inclusion of NA. In contrast, for the prediction of GHQ score a reduction in the size of the regression coefficients associated with each of the environmental variables is noted.

MODEL	Model 1: NA model (step 1-a)	Model 2: Perceived environment model (step 1-b)	Model 3: Additive model/ (step 2)	Model 4: Interactive model (step 3)
Source	Unstandardised regression coefficients (B)			
Neuroticism (NA)	.551***	-	.464***	.471***
Workload	-	.160*	.143*	.130*
Fluctuations in load	-	.222**	.157*	.150*
Control	-	-.330***	-.222**	-.239**
Support	-	-.142	-0.041	-.070
Time orientation	-	-.210*	-.261**	-.248**
NA x workload	-	-	-	.036
NA x fluctuations	-	-	-	.143*
NA x control	-	-	-	-.206**
NA x support	-	-	-	.221**
NA x time	-	-	-	-.275**
Model R ²	.307***	.265***	.455***	.532***

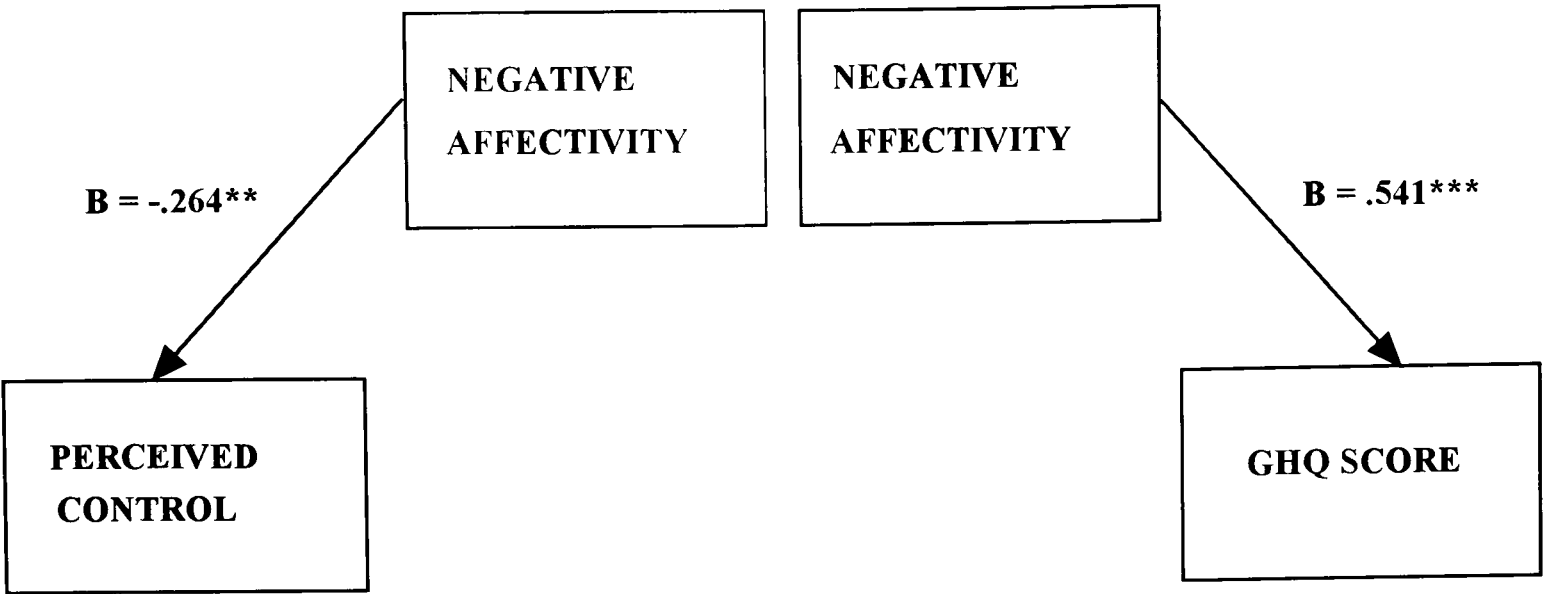
Table 2. Hierarchical regression analysis predicting **GHQ score (symptom report)** from NA, work demands, fluctuations in workload, and social support from senior colleagues. Analyses based on subjects with complete data, N = 129. * $p < .05$, ** $p < .01$; *** $p < .001$.

MODEL	Model 1: NA model (step 1-a)	Model 2: Perceived environment model (step 1-b)	Model 3: Additive model (step 2)
Source	Unstandardised regression coefficients (B)		
Neuroticism (NA)	-.118	-	-.055
Workload	-	.150*	.152*
Fluctuations in load	-	.002	.009
Control	-	.418***	.406***
Support	-	.283***	.272***
Time orientation	-	.456***	.462***
Model R ²	.039*	.584***	.587***

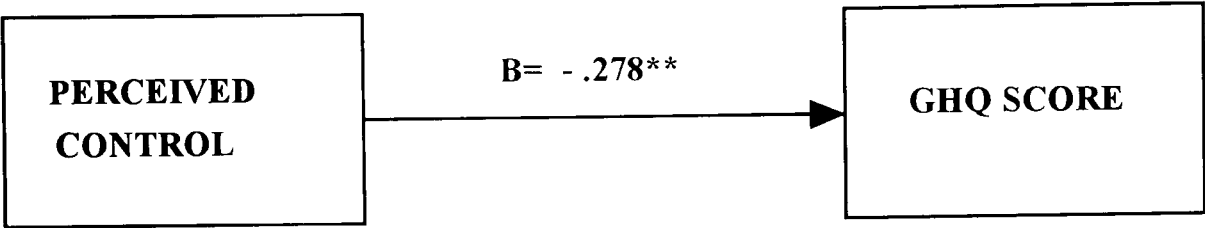
Table 3. Hierarchical regression analysis predicting **job satisfaction** from NA, work demands, fluctuations in workload, and social support from senior colleagues.
Analyses based on subjects with complete data, N = 130. * $p < .05$, ** $p < .01$; *** $p < .001$.

For example, the regression coefficient associated with control was reduced by one third when NA was included in the regression equation to predict GHQ score. A diagrammatic representation of this confound effect is shown in Figure 2. When considered alone, rather than in the full simultaneous model, the reduction in predictive power of control is sufficient to reduce the significance of the regression coefficient below acceptable levels. It should be noted, however, that this association was not reduced to zero, and must be interpreted as a *partial* confound only (Cox and Ferguson, 1991). Moreover, even with NA included in the full regression model, associations between the stressor variables and GHQ score remained statistically significant.

STEP 1: In separate analyses, NA predicts both perceived control and GHQ score



STEP 2: Perceived control significantly predicts GHQ score



STEP 3: In a simultaneous analysis with NA, the relationship between perceived control and GHQ score, is found to fall below statistical significance (dashed line).

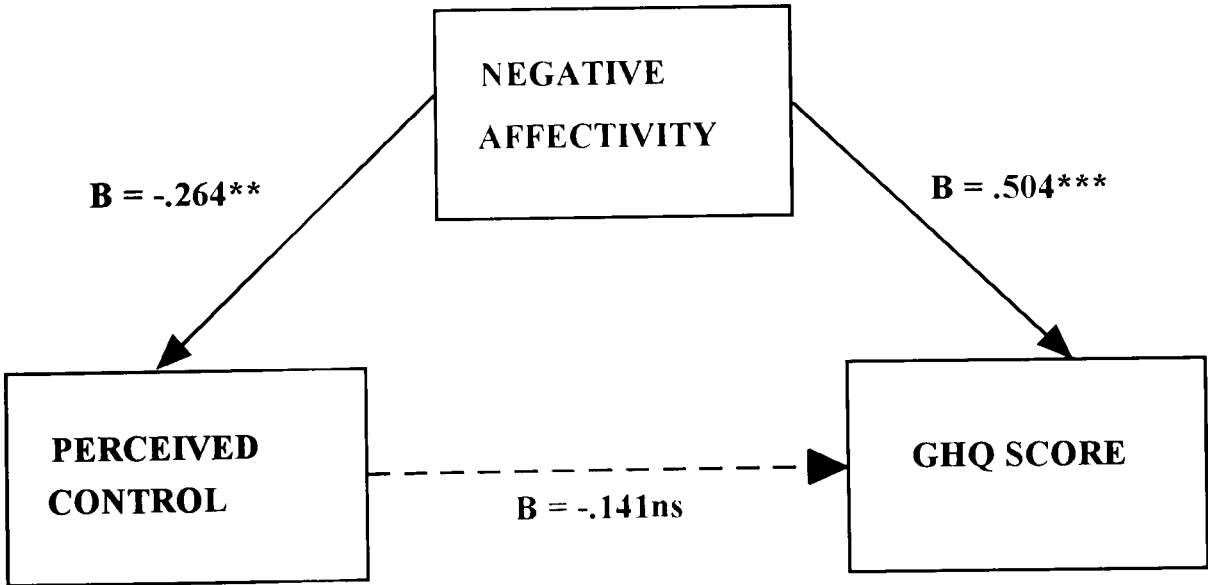


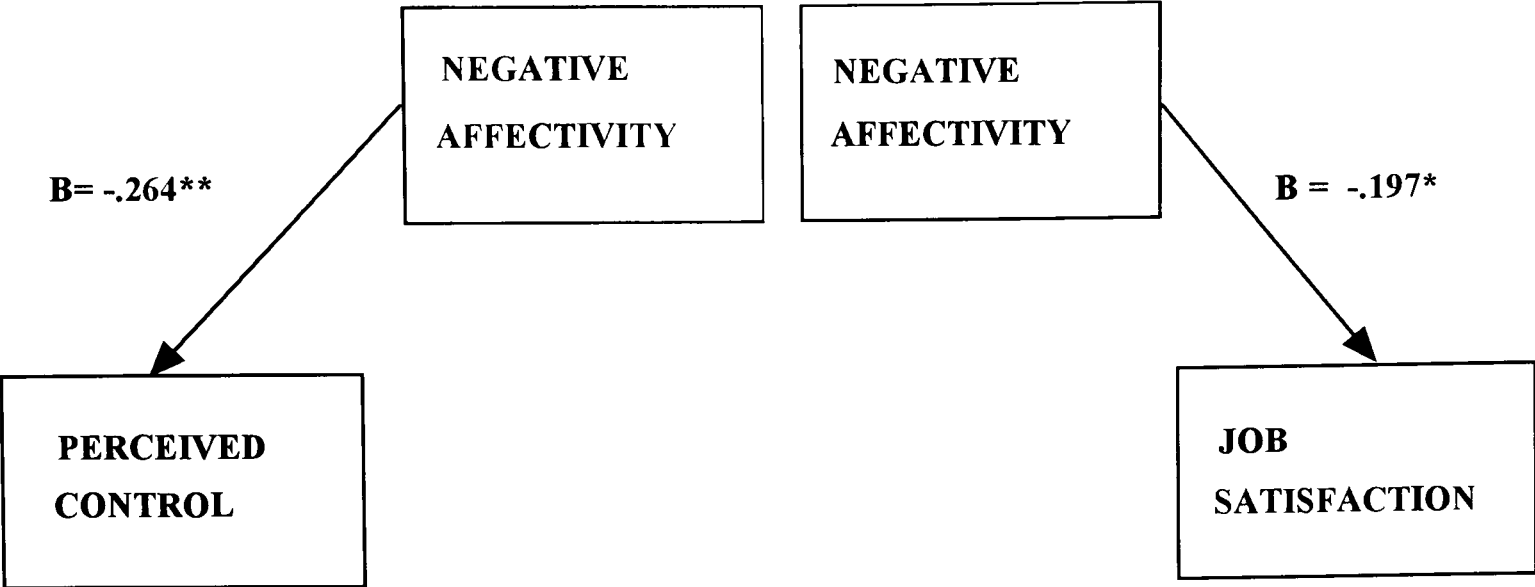
Figure 2. NA partially confounding the relationship between perceived control and GHQ score.

note:the regression coefficients shown here are from analyses including only these 3 variables, not the full simultaneous analysis.

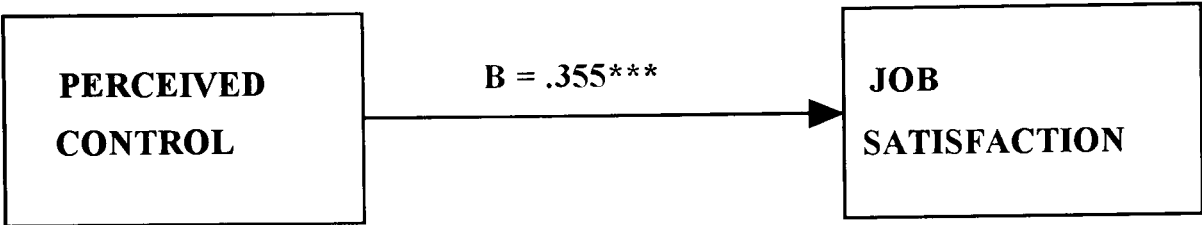
Analyses based on subjects with complete data, N = 130. * $p < .05$, ** $p < .01$; *** $p < .001$

The prediction of job satisfaction from the combination of NA and the work environment measures revealed a mediation effect. Although a significant association was observed between NA and job satisfaction in the NA model (Model 1), in the Additive Model (Model 3), which also included the work environment measures, NA was not found to make a significant contribution. More detailed analysis revealed a mediation of the influence of NA through perceptions of control, illustrated in Figure 3. When job satisfaction was regressed onto perceived control and NA, it was the association between NA and satisfaction that was reduced to a level below conventional statistical significance. Thus, whereas NA was found to partially confound (or inflate) the association between perceived control and strain in terms of GHQ score, in the case of job satisfaction, the influence of NA was mediated through perceived control.

STEP 1: In separate analyses, NA predicts both perceived control and job satisfaction



STEP 2: Perceived control significantly predicts job satisfaction



STEP 3: In a simultaneous analysis, the relationship between NA and job satisfaction, is (partially) mediated through perceptions of control; relationship between NA and satisfaction reduced to below statistical significance (dashed line).

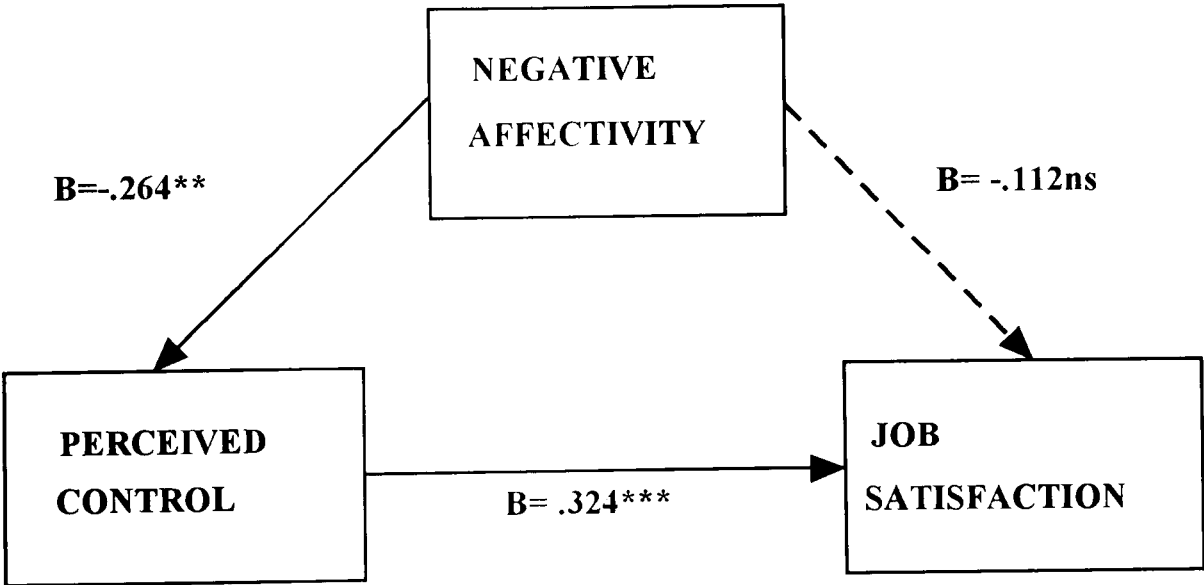


Figure 3. Impact of NA on job satisfaction, partially mediated by perceptions of control.

note:the regression coefficients shown here are from analyses including only these 3 variables, not the full simultaneous analysis.
Analyses based on subjects with complete data, N = 131. * $p < .05$, ** $p < .01$; *** $p < .001$

Interactive model (Step 3): Testing hypothesis 4.

Expanding upon Parkes' (1990) analysis, the final step of the hierarchical regression analysis was the introduction of NA cross product terms for each of the work environment measures (workload, fluctuations in demand, control at work, social support from senior colleagues, time orientation), forming the Interactive Model (Model 4) for each outcome.

The interaction terms, as a block, contributed significantly to the prediction of GHQ score ($\Delta R^2 = .077$, $p < .01$), with all but the NA×Workload terms making a significant unique contribution. NA was found to be a moderator of the relationship between the perceived work environment and GHQ score. The final model was significant, $F(11,118) = 12.19$, $p < 0.001$, explaining 53.2% of the variance in GHQ score.

NA was found to act as a vulnerability factor in the stressor-strain relationship, such that individuals high in NA reacted more poorly to negative features of their work. This occurred in addition to overall higher symptom reports by high NA individuals (the direct effect). To illustrate these effects, the NA×Fluctuations and NA×Control interactions are presented in Figures 4 and 5 respectively, for the mean level (standardised score equal to zero) for all variables not involved in each interaction (Finney et al. 1984). Values of one standard deviation above and below the mean were taken to represent high and low levels of each variable. From the figures, it may be seen that high NA individuals react poorly to fluctuating workload and low control opportunities; conditions of steady workload (low fluctuations) and high control opportunities reduce impact of high NA. The same pattern was observed for time orientation: high NA individuals who work in long-term time orientation companies report negligible symptoms of strain. For social support, it was found that low NA individuals derive greater benefit (reduced symptoms) from supportive senior colleagues than high NA employees. Taken together, these findings indicate that high and low NA individuals generally respond to work perceptions in quite distinct ways.

In contrast, the block of interaction terms did not contribute significantly to the prediction of job satisfaction ($\Delta R^2 = .027$, ns). NA does not play a significant moderator role with respect to job satisfaction. As this step was not significant, B values have not been included in Table 3. The Environment Model (Model 2), provides a more parsimonious prediction of job satisfaction, explaining 58.7% of the variance.

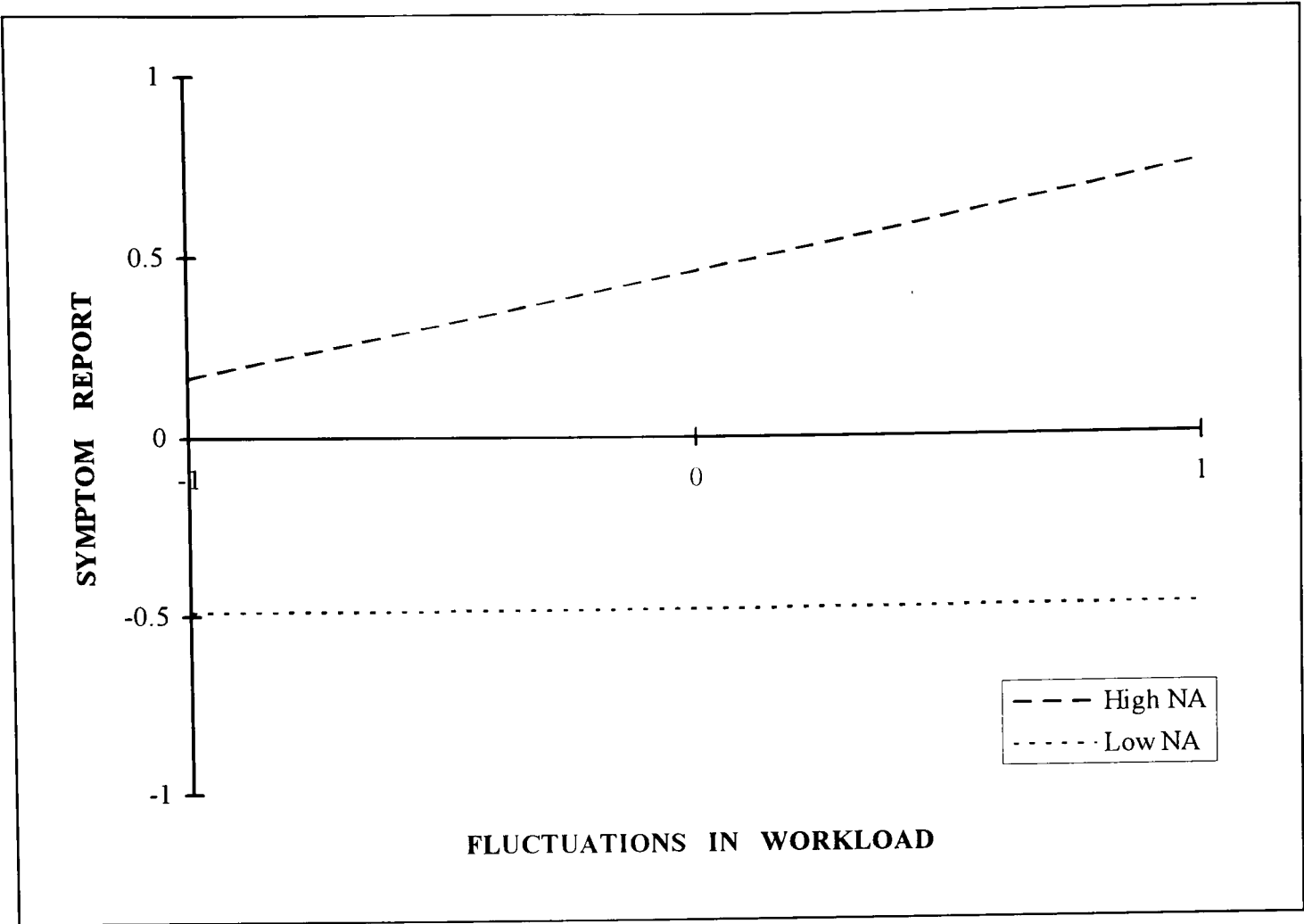


Figure 4 Moderating (vulnerability) effect of NA on fluctuations in workload

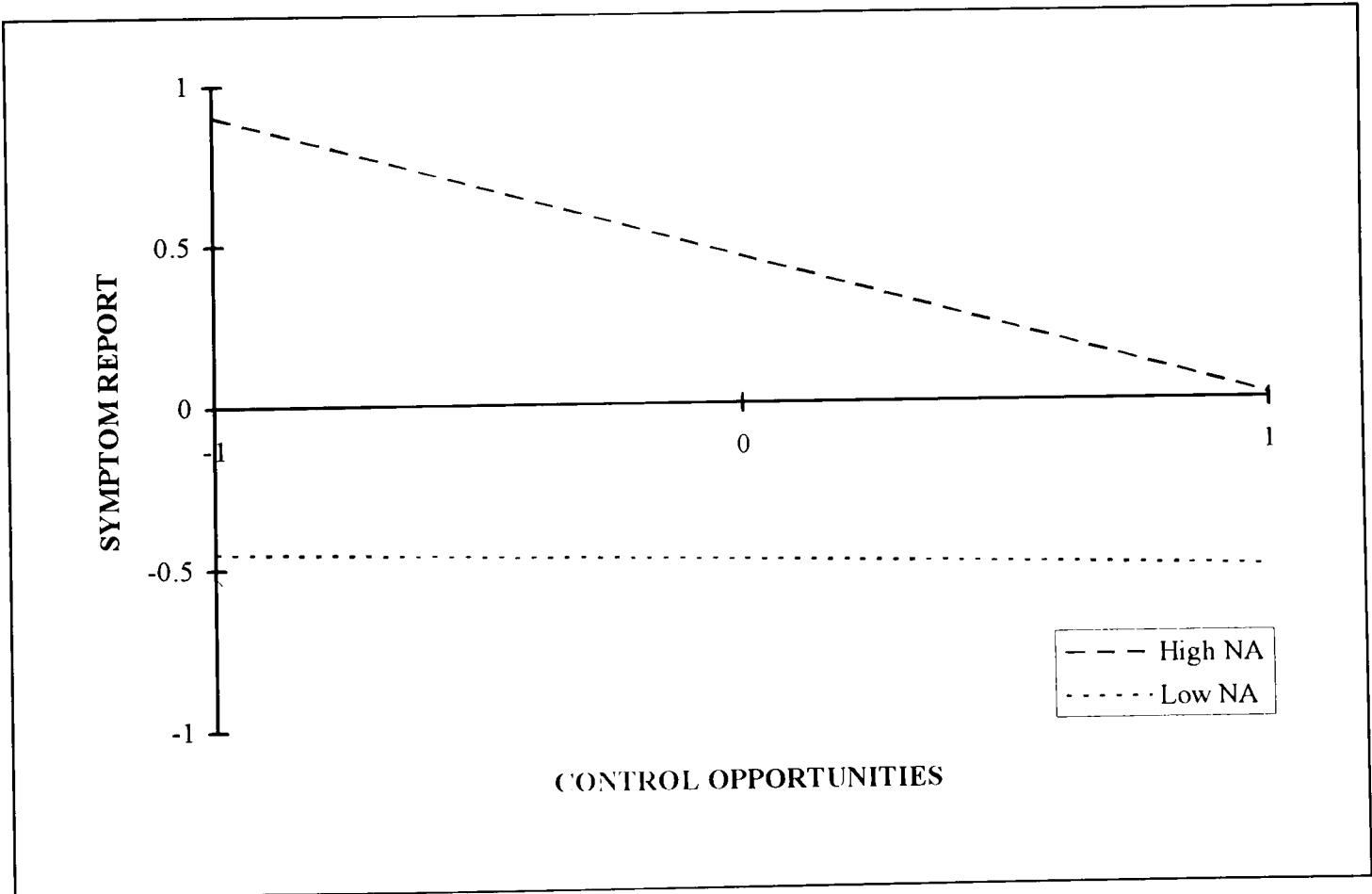


Figure 5 Moderating (vulnerability) effect of NA on perceptions of control

Further analyses: Other individual differences as predictors of strain.

Many other individual difference variables, besides NA, have been implicated in the stress process. It was therefore considered important to establish that the inclusion of such variables did not affect the findings of the present analyses. Demographic variables of age, gender, level of education and marital status have been shown to be predictive of satisfaction and symptom report in published studies (e.g. Parkes, 1990; Ranchor and Sanderman, 1991). Thus a further analysis was conducted for each of the outcome measures, in which the four demographic variables were entered as a preliminary block, prior to the hierarchical regression analyses described above. However, this block did not significantly predict either outcome ($R^2_{\text{satisfaction}} = 0.040$ ns; $R^2_{\text{GHQ-score}} = 0.035$ ns), nor did control for these variables significantly alter the contributions of the other terms as described above.

Furthermore, it has been suggested that the individual difference “positive affectivity” (PA) might act to confound positively toned self-report scales, such as job satisfaction, in a way that parallels the influence of NA on negatively toned scales like symptom report (e.g. Burke et al., 1993; Schaubroek and Ganster, 1991). Therefore the same statistical treatment as described here for NA was used to examine the potential roles of PA in influencing job satisfaction and symptom report.² Although extraversion was found to be significantly correlated with job satisfaction, this trait did not make a significant unique contribution once the environmental variables were added into the model: the influence of PA on job satisfaction was an indirect one, mediated through perceptions of the work environment. PA was not found to be significantly associated with level of symptom report. The potential moderating influence of PA was also tested: for neither job satisfaction, nor symptom report was the PA interaction block found to add significantly to the additive model.

²PA was measured using the 12-item extraversion scale of the EPQ-R (Eysenck et al., 1985).

DISCUSSION

The present study contributes to the understanding of the stress process in two ways. Firstly, it is apparent that no single pathway or mechanism accounts exclusively for the impact of NA on stress outcomes. Rather, the process is a complex one with four possible pathways, all of which were demonstrated in the present study. Secondly, it has been shown that the different strain outcomes, specifically job satisfaction and symptom report, are predicted by different models of the stress process, and not by a single general model.

The intercorrelations among negative affectivity, stressors and strains

Negative affectivity was found to be correlated with both outcome measures, and with two of the four work environment measures, offering partial support for hypothesis 1. Symptom report and job satisfaction were also correlated to different degrees with the work environment measures, and in addition several of the work environment measures were correlated with each other. However, although job satisfaction and symptom report were significantly and negatively correlated, the strength of their relationships to the other measures were quite distinct, and not merely the inverse of one another (in agreement with Evans et al., 1993 and Steptoe, 1989). In particular, symptom report showed a much closer association with NA than did job satisfaction: report of symptoms was significantly correlated with NA, workload, fluctuations in workload, lack of control at work, low social support from superiors. In contrast, job satisfaction was correlated with low NA, high control at work, high support from superiors, and time orientation of the company.

The relationship between stressors and strains

Both job satisfaction and symptom report were significantly predicted by the joint influence of the work perception measures, thus supporting hypothesis 2. With respect to the individual contributions made by each of the environment measures, some differences may be noted. Job satisfaction was predicted by high levels of support, control, workload and time orientation: fluctuations in workload did not contribute to the prediction of job satisfaction. Symptom report, in contrast, was predicted by low levels of control, high

workload, high fluctuations in workload, and short-term time orientation. These findings are generally consistent with the literature as outlined in the introduction.

One unpredicted correlation should however be noted, namely the positive correlation between workload and job satisfaction. That is, work demands were a positive job feature in this model. An explanation for this effect was found in follow-up analyses, which examined some further individual differences. The relationship between work demands and job satisfaction was confounded by locus of control, such that people with an internal locus of control were found to report higher job satisfaction and higher work demands. Once locus of control was controlled, this association was reduced to below accepted significance levels³.

NA as a confound

There was some evidence that NA acted as a nuisance variable by inflating correlations between self-report of environment and outcome variables, as reported by Brief et al. (1988) among others. This role of NA can only occur when NA is found to predict both the independent and dependent variables. However, Table 1 indicates that NA is not highly correlated with *all* measures of the work environment; therefore NA cannot *generally* account for observed correlations between work environment measures and strain.

Furthermore, when NA was statistically controlled in the regression analyses (Model 3), work environment-strain relationships were only substantially reduced for the prediction of GHQ score and in no case was total confounding (reduction to zero) observed. Moreover, there was no evidence of NA confounding the relationship between work environment measures and job satisfaction. This differential confounding effect, dependent upon outcome, is also consistent with findings outlined in the introduction (Chen and Spector, 1991; Burke et al., 1993; Schaubroek and Ganster, 1991; Schaubroek et al., 1992, Terry et al., 1993), and supports hypothesis 3.

³Locus of control was measured with the 16-item Work Locus of Control Scale (Spector, 1988).

Mediated effect of NA

Comparison of the Models 1 (NA Model) and 3 (Additive Model) as nested steps in a hierarchical regression analysis showed that the first-order term for NA was not a significant predictor of job satisfaction, once other independent variables were included in the equation. This implies that there is a mediated pathway through work environment measures, specifically perceptions of control. High NA individuals reported lower control opportunities at work, which in turn have implications for job satisfaction (represented diagrammatically in Figure 3).

It may be that NA acts to colour perceptions of the work environment or, alternatively, it may be that high NA individuals select, are placed in, or create work roles that have objectively fewer opportunities to exert control (Watson et al., 1987). Furthermore, no such pathway was evident in the prediction of symptom report, thus replicating the findings of Levin and Stokes (1989) and Terry et al. (1993): thus hypothesis 5 was supported. Moreover, the closer relationship of control with job satisfaction than with symptom report is consistent with findings reported elsewhere (e.g. Jackson, 1989; Ganster, 1989; Sauter, 1989). The exact mechanism through which control at work mediates the influence of personality would merit examination in future research. For example, use of objective work environment measures in addition to perception scales, would allow the relationship between objective and subjective control measures to be examined, and any influence of NA on this relationship to be considered.

NA as a moderator, or vulnerability factor

Evidence that NA plays a moderator role was found for the prediction of symptom report: the NA interaction block as a whole made a significant contribution to the prediction of well-being, but not of job satisfaction. Inspection of Figures 4 and 5 shows that low NA individuals generally experienced few symptoms (the direct effect), *and* that for them, symptom report was not significantly related to work demands and constraints (a buffering effect): low NA individuals did however benefit from the support of their senior colleagues. In contrast, high NA individuals showed higher symptom levels (a vulnerability effect) with fluctuating workload, low control, and low future and quality orientation (time orientation);

furthermore, they did not derive the benefit from social support that was obtained by their low NA counterparts.

These interactions are of a form consistent with that reported by Parkes (1990) between general work demands and NA. The failure to replicate Parkes' NA×Workload interaction in the present study requires further investigation. One plausible explanation may lie in the fact that the present sample did not show the direct association between workload and symptom report that has been found in research with other populations. Furthermore, the work characteristics scales used in the present study included other aspects of work demands (namely quality and workload fluctuations), which may be more salient to this group of employees. That NA was not found to be a significant moderator of work environment stressors in the prediction of job satisfaction, is a replication of Levin and Stokes (1989). Taken together, these findings support hypothesis 4.

Specificity of stress model according to outcome: a summary of findings

Focusing on the prediction of the two different types of outcome through hierarchical multiple regression, it is very clear that symptom report and job satisfaction do not represent opposite ends of some generalised "strain" dimension: each outcome was predicted by quite different combinations of independent variables. An additive model, including only work environment terms, provided the best prediction of job satisfaction. The role of NA in the prediction of job satisfaction was limited to an influence mediated by work environment measures. In contrast, GHQ score showed significantly improved prediction with the addition of both the NA first order term, and the block of NA×Work environment product terms. Negative affectivity was thus seen to have a dual role in the prediction of symptom report, with high NA individuals generally experiencing poorer well-being and, in addition being more vulnerable to environmental stressors than their low NA counterparts. The practical implication of these findings is that different strain indices cannot necessarily be improved through the same mechanisms. Rather than simply aiming to reduce "stress" or "strain", one needs to select the desired outcome (e.g. job satisfaction, anxiety, physical health) and examine the model that describes the aetiology of that specific outcome.

Conclusions regarding the roles of negative affectivity

The results presented here indicate that NA is an important factor to be included in stress research. NA was implicated in the stress process through all four possible pathways, though not simultaneously for any single outcome. Although NA may act as a nuisance variable by confounding self-report measures of stressors and well-being, controlling for NA revealed that this was only a *partial* confounding effect. Albeit attenuated, significant relationships between the work environment measures and GHQ score remained with NA included in the regression analysis as a covariate. This finding is consistent with Brief et al. (1988), but does not support the more extreme view that NA underlies *all* correlations between self-reports of stressors and strains (e.g. McCrae, 1990; Watson et al., 1987). Furthermore, the confounding role was found to be of relevance only to the prediction of symptom report, and not the affective measure of job satisfaction.

Although job satisfaction was significantly predicted by NA alone (Model 1), the additive term for NA was not significant when work environment measures were also included in the model (Model 3). NA does not account for relationships observed between work stressors and low job satisfaction. This finding also contradicts the arguments of Watson, McCrae and their colleagues, who suggest that high NA individuals will report negatively about *all* aspects of their environment, whether it is stressful or not. The only role of NA in the prediction of job satisfaction was one mediated through perceptions of control at work.

The moderator and mediator roles have been neglected in most stress research: simple use of first-order terms in multiple regression analyses does not fully capture the predictive power of this trait. In addition to controlling for NA in order to address the confound issue, future research should also routinely investigate the moderating and mediating pathways.

Finally, returning to the conceptual framework of the stress process described in the introduction, it can be argued that any individual difference variable could operate through the four pathways described here for NA. Systematic examination of all the potential modifying roles of traits such as Positive Affectivity, Locus of Control, Hardiness, and Type A Behaviour in the stress process could provide important contributions to a deeper

understanding of the influence of personality in the stress process.

Limitations of the current study and suggestions for future research

The current study was not designed to provide a definitive test of models of the stress process, nor even the prediction of job satisfaction and symptom report. It was intended to demonstrate that NA can operate through several alternate (though not necessarily competing) pathways to influence two commonly used indices of strain. To maintain this focus, many constructs that are also potentially influential in these processes have been omitted. Additional work factors of relevance might include role conflict and ambiguity (Rizzo, House and Lirtzman, 1970), support from co-workers and non-work sources (House, 1981), as well as objective or independent measures of workload and content. Similarly, although some additional individual differences were controlled in follow-up analyses, this list was not exhaustive: Type A personality, psychological hardiness, achievement motivation, and general ability might also usefully be examined in this context.

There are several more specific limitations of the present study, including a relatively small sample size and the use of some measures that are not well developed, specifically the fluctuations in workload scale, and the time orientation scale. These two factors result in relatively low statistical power of the analyses, particularly for interaction effects, and hence the possibility that real effects may not have reached statistical significance. (Busmeyer and Jones, 1983). The fact that these two scales were found significantly to predict outcomes, despite quite low internal consistency, suggests that these constructs warrant further examination, and hence improved measures should be developed. In addition, the use of volunteer subjects with a limited range of occupations has resulted in a participant group that is not representative of the general population. Follow-up of part of the respondent sample suggested that volunteers were more likely to be female, with lower perceived workload, and higher levels of social support. Thus the present study requires replication with different occupational groups; a larger total sample would also allow the investigation of a greater number of potentially influential variables.

As with much research in this area, the causal inferences drawn are based on theoretical rather than empirical grounds. In all models presented, traits (specifically NA)

are presumed to precede the work context, which in turns precedes affective and physical outcomes, and hence this is the presumed direction of causality. Longitudinal research, particularly if combined with independent data sources, would allow an investigation of the validity of these assumptions, and hence lead to a more detailed understanding of these different processes.

The reason why job satisfaction and symptom report are predicted by different models warrants more detailed investigation. It may be that low satisfaction represents a different type of strain outcome (i.e. affective rather than physical), or alternatively, this finding could be an artefact of the positive wording of the job satisfaction scale, as has been recently suggested (Schaubroek et al., 1992; Burke et al., 1993). To test the hypothesis that only negatively worded scales are susceptible to contamination by NA requires the construction of negatively worded or balanced job satisfaction scales, to allow comparison with the currently used positively worded scales. Similarly, measures other than negatively-toned symptom checklists should be used to gauge physical and mental health. Finally, having demonstrated that the role of NA differs for the prediction of job satisfaction and symptom report, it would be logical to investigate the role of NA in the prediction of other strain indices, such as specific mental health measures (e.g. anxiety, depression), physical health, absence from work, and work performance.

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APPENDIX II

Questionnaire scales

All questionnaire scale items which were created or altered for inclusion in the present research are presented in this appendix.

1. DEMAND AND CONTROL (Pilot and Manager studies).....	AII-2
2. DEMAND AND CONTROL (Relocation study)	AII-5
3. TIME URGENCY	AII-6
4. ROLE CONFLICT AND AMBIGUITY	AII-8
5. TYPE A BEHAVIOUR (Pilot and Manager studies)	AII-9
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1. **DEMAND AND CONTROL (Pilot and Manager studies)**

[C] = Control item; [D]= Demand item

Your current job

Please use the following pages to describe your present job, by circling the number on each scale that best represents your view of your work. For instance, if your response to the first question is "Rarely/never", circle the number 1 against that question, if your answer is "Very often", circle the number 5.

		Rarely/ never	Occa- sionally	Some- times	Fairly- Often	Very often
1	How often does your job require you to work very fast? [D]	1	2	3	4	5
2	How often does your job let you use your skills and knowledge you learned during school/college education? [C]	1	2	3	4	5
3	How often can you control the speed at which you work? [C]	1	2	3	4	5
4	How often do you have to push yourself to get work accomplished? [D]	1	2	3	4	5
5	How often does your job require your full attention? [D]	1	2	3	4	5
6	How often is there a great deal to be done?[D]	1	2	3	4	5
7	How often can you choose the kind of work you do? [C]	1	2	3	4	5
8	How often does your job leave you with little time to get things done? [D]	1	2	3	4	5
9	How often are you given a chance to do the things you do best? [C]	1	2	3	4	5
10	How often does your job require you to work very hard? [D]	1	2	3	4	5
11	How often can you use skills from your previous work experience and training? [C]	1	2	3	4	5

Now indicate how often you experience each of the following changes in your job.

		Rarely/ never	Occa- sionally	Some- times	Fairly- Often	Very often
12	A marked increase in the workload [D]	1	2	3	4	5
13	A marked increase in the amount of concentration required on your job [D]	1	2	3	4	5
14	A marked increase in how fast you have to think [D]	1	2	3	4	5

These questions also refer to your present job. In this case, please respond along the scale from 1= "Hardly any", to 5 = "A great deal/many":

		Hardly any	A little/ few	Some	A lot	A great deal/many
15	How much time do you have to think and contemplate? [-D]	1	2	3	4	5
16	How much do you take part with others in making decisions that affect you? [C]	1	2	3	4	5
17	How much workload do you have? [D]	1	2	3	4	5
18	What quality of work do others expect of you? [D]	1	2	3	4	5
19	How many projects, assignments, or tasks do you have? [D]	1	2	3	4	5
20	How much do you participate with others in helping set the way things are done on your job? [C]	1	2	3	4	5
21	How many lulls between heavy work load periods do you have? [-D]	1	2	3	4	5
22	How much do you decide with others what part of a task you will do? [C]	1	2	3	4	5
23	How much do you day-dream on the job? [-D]	1	2	3	4	5

On the scale below, please indicate the extent to which you agree or disagree with each of the statements as they apply to your present job. Circle one number per item, where 1="Disagree strongly", and 5 "Agree strongly". If the statement does not apply to your current position, please circle NA for "not applicable".

		Disagree strongly			Agree strongly	
		1	2	3	4	5
24	The work is really challenging. [D]	1	2	3	4	5
25	Few people have any important responsibility at work. [-C]	1	2	3	4	5
26	Senior colleagues keep a rather close watch on the work being done. [-C]	1	2	3	4	5
27	There is constant pressure to keep working. [D]	1	2	3	4	5
28	There is a strict emphasis on following policy and regulation. [-C]	1	2	3	4	5
29	There always seems to be an urgency about everything. [D]	1	2	3	4	5
30	People have a great deal of freedom to do what they like. [C]	1	2	3	4	5
31	People cannot afford to relax. [D]	1	2	3	4	5
32	People are encouraged to make their own decisions. [C]	1	2	3	4	5
33	Nobody works too hard. [-D]	1	2	3	4	5
34	People are expected to follow set rules in doing their work. [-C]	1	2	3	4	5

2. DEMAND AND CONTROL (Relocation study)

[C] = Control item; [D]= Demand item

Your current job

1. Please use this page to describe your work by circling the number on each scale which best represents your view.

For instance, if you think the first statement applies "very much indeed" to your work, circle them number 4 against that statement; if you thing it applies "not at all" circle number 1; and circle 2 or 3 for an in between response. Please respond to all of the statements in the list.

	not at all		very much indeed	
1. Not enough time to do the work. [D]	1	2	3	4
2. Allows you to have a say on the job. [C]	1	2	3	4
3. Excessive amount of work. [D]	1	2	3	4
4. Allows you to take part in decision-making. [C]	1	2	3	4
5. Work gives rise to conflicting demands [D]	1	2	3	4
6. Have to work fast. [D]	1	2	3	4
7. Allows you to make your own decisions. [C]	1	2	3	4
8. Creative. [C]	1	2	3	4
9. Allows freedom. [C]	1	2	3	4
10. Have to work very hard. [D]	1	2	3	4
11. Allows opportunities to learn new things. [C]	1	2	3	4
12. Repetitive. [-C]	1	2	3	4
13. Lots of work to do. [D]	1	2	3	4
14. Work requires a high degree of skill [C]	1	2	3	4
15. No time to finish tasks. [D]	1	2	3	4

3. TIME URGENCY

In these questions we are asking not about your specific job, but about general attitudes and culture in your place of work.

		Strongly disagree			Strongly agree		
1	People here feel that deadlines don't really matter.	1	2	3	4	5	
2	This company invests in the future.	1	2	3	4	5	
3	Working fast is not important here.	1	2	3	4	5	
4	People get upset when you are late to work.	1	2	3	4	5	
5	Most people here cannot set their own work schedules.	1	2	3	4	5	
6	If people arrive an hour late for work they will feel "rushed" all day.	1	2	3	4	5	
7	Doing things right is better than doing things fast.	1	2	3	4	5	
8	It is very important to be "on time" for everything.	1	2	3	4	5	
9	People just expect to "kill time" on the job.	1	2	3	4	5	
10	Most people can take breaks when they want to.	1	2	3	4	5	
11	Staying on schedule is important here.	1	2	3	4	5	

Again, concerning your place of work,

		Strongly disagree			Strongly agree	
12	No one cares if you are late returning from meal and other breaks.	1	2	3	4	5
13	Planning for the future is important here.	1	2	3	4	5
14	People here do <i>not</i> have the freedom to use their time the way they choose.	1	2	3	4	5
15	People are expected to work very fast.	1	2	3	4	5
16	All our work is tightly scheduled.	1	2	3	4	5
17	It is better to make a <i>poor</i> decision <i>quickly</i> than a <i>good</i> decision <i>slowly</i> .	1	2	3	4	5
18	People don't care what time you arrive for work.	1	2	3	4	5
19	People expect their work to be routine.	1	2	3	4	5
20	Most people can work at their own pace.	1	2	3	4	5
21	It is easy to find time to plan something new.	1	2	3	4	5
22	People do most of their work under deadlines.	1	2	3	4	5

4. ROLE CONFLICT AND AMBIGUITY

[A] = Ambiguity item; [C] = Conflict item

On the scales provided below, please indicate the degree to which each of the following statements is true of your job.

		very false					very true	
		1	2	3	4	5	6	7
1.	What needs to be done is always fully explained. [A]							
2.	I have to do things that would be better done differently. [-C]							
3.	I can always obtain adequate assistance to complete assignments. [C]							
4.	I feel uncertain about how much authority I have. [-A]							
5.	I receive incompatible requests from two or more people. [-C]							
6.	I know exactly what is expected of me. [A]							
7.	It is never necessary to go against a rule or policy in order to carry out assignments. [C]							
8.	I work with two or more groups who operate differently. [-C]							
9.	There are no clear, planned goals or objectives for my work. [-A]							
10.	The different people to whom I am responsible are consistent in the standards of work that they expect. [C]							
11.	It is very clear what my responsibilities are. [A]							
12.	I have to take on assignments without adequate resources and materials to execute them. [-C]							
13.	It is not clear to me how I should allocate my time. [-A]							
14.	I never have to work on unnecessary things. [C]							

5. TYPE A BEHAVIOUR (Pilot and Manager studies)

[A] = ACHIEVEMENT STRIVINGS
[I] = IMPATIENCE-IRRITABILITY
* ITEM DELETED FOR MAIN STUDY

How well do the following traits describe you? Please circle the number on each scale which best applies to you.

For example, if you "strongly agree" that the first statement describes your behaviour, circle the number 5 against that statement; if you think that it does not describe your behaviour at all (i.e. "strongly disagree") circle number 1. Circle numbers 2, 3, or 4 respectively if an intermediate score is appropriate. Please respond to each of the statements in the list.

	Strongly disagree				Strongly agree
1. I tend to work quickly and energetically. [A]	1	2	3	4	5
2. I often feel very pressed for time. [I]	1	2	3	4	5
3. I am told that I eat too fast. [I]*	1	2	3	4	5
4. People that know me well agree that I tend to do things in a hurry. [I]	1	2	3	4	5
5. My everyday life is filled with challenges to be met. [A]	1	2	3	4	5
6. At work and in other activities, I go "flat out". [A]	1	2	3	4	5
7. I have a strong need to excel at things. [A]	1	2	3	4	5
8. Compared to the average person in my occupation, I am much less responsible. [-A]	1	2	3	4	5
9. I talk more rapidly than most people. [I]	1	2	3	4	5
10. I eat rapidly, even when there is plenty of time. [I]	1	2	3	4	5
11. I have held several different job titles over the last ten years. [A]	1	2	3	4	5
12. I am bossy and dominating. [A]	1	2	3	4	5
13. When people who are talking to me take too long to come to the point, I tend to finish their sentence for them. [A]	1	2	3	4	5
14. I would prefer a promotion to an increase in pay. [A]	1	2	3	4	5
15. I don't feel rushed, even when under pressure. [-I]	1	2	3	4	5
16. I like work that is slow and deliberate. [-A]	1	2	3	4	5
17. I eat more slowly than most people [-I]*	1	2	3	4	5

18.	I am a hard-driving person. [A]	1	2	3	4	5
19.	I usually speak more loudly than most people. [I]	1	2	3	4	5
20.	I frequently bring work home at night. [A]	1	2	3	4	5
21.	I set deadlines for myself, at work and other things. [A]	1	2	3	4	5
22.	I prefer to linger over a meal, and enjoy it. [-I]*	1	2	3	4	5
23.	I am competitive. [A]	1	2	3	4	5
24.	My present job has more prestige than my job of ten years ago. [A]	1	2	3	4	5
25.	People I know well agree that I tend to do most things in a hurry. [I]*	1	2	3	4	5
26.	I am ambitious. [A]	1	2	3	4	5
27.	I regularly perform two tasks simultaneously. [A]	1	2	3	4	5
28.	I am a slow deliberate talker. [-I]	1	2	3	4	5
29.	I consider myself to be easy-going. [-I]	1	2	3	4	5
30.	I often try to persuade others of my point of view. [A]	1	2	3	4	5

ADDITIONAL ITEMS INCLUDED IN MAIN STUDY

Now please answer these questions about your work. Again, use the scale provided to indicate the degree to which each item occurs in your work.

	Never	Sometimes	Always		
28.	At the end of your working day, does your work stay in your mind so that you think about it after working hours?				
	1	2	3	4	5
29.	How frequently does your work stretch you to the limits of you energy and capacity?				
	1	2	3	4	5
30.	How frequently do you feel uncertain, or dissatisfied with how well you are doing at work?				
	1	2	3	4	5

6. TYPE A BEHAVIOUR (Relocation study)

*To what extent do the following traits and qualities apply to you?
Please circle the response that best describes you.*

	Not at all	A little	Some- what	Fairly well	Very well
1. Hard-driving and competitive	1	2	3	4	5
2. Bossy and dominating	1	2	3	4	5
3. Having a strong need to excel in most things	1	2	3	4	5
4. Tends to eat too quickly	1	2	3	4	5
5. Usually pressed for time	1	2	3	4	5
6. Dislikes having to wait for anything	1	2	3	4	5

Now please answer these questions about your work

	Never	Sometimes			Always
7. At the end of your working day, does your work stay in your mind so that you think about it after working hours?	1	2	3	4	5
8. How frequently does you work stretch you to the limits of you energy and capacity?	1	2	3	4	5
9. How frequently do you feel uncertain, or dissatisfied with how well you are doing at work?	1	2	3	4	5

7. JOB SATISFACTION

How satisfied are you with the following aspects of your job?

For each of the items below, please circle a number on the scale to indicate your satisfaction with that particular aspect of your work.

		Very dissatisfied			Very satisfied
1	Physical working conditions (e.g. lighting, noise, temperature)	1	2	3	4
2	The people you work with	1	2	3	4
3	The way your department is run	1	2	3	4
4	The working hours and shift arrangements	1	2	3	4
5	The interest and skill involved in your job	1	2	3	4
6	The way your abilities are used	1	2	3	4
7	Your future work prospects	1	2	3	4
8	Your usual take-home pay	1	2	3	4
9	The extent to which you are consulted about changes in the work situation	1	2	3	4
10	Your job as a whole, taking everything into consideration	1	2	3	4

8. HEALTH QUESTIONS

[GHQ] = 12 - ITEM GHQ
[SOM] = SOMATIC SYMPTOMS
[DYS] = SOCIAL DYSFUNCTION
[DEP] = DEPRESSION
[ANX] = ANXIETY

General Health Questionnaire.

*The questions below ask whether you have had any medical complaints, and how your health has been in general, **over the last six weeks**. Please answer the questions by circling the response which you think most nearly applies to you.*

OVER THE PAST SIX WEEKS HAVE YOU:-

1	Been perfectly well and in good health? [SOM]	Better than usual	Same as usual	Worse than usual	Much worse than usual
2	Lost much sleep over worry? [ANX] [GHQ]	Not at all	No more than usual	Rather more than usual	Much more than usual
3	Been managing to keep your-self busy and occupied? [DYS]	More so than usual	Same as usual	Rather less than usual	Much less than usual
4	Been able to feel warmth and affection for other people? [DEP]	More so than usual	About same as usual	Less so than usual	Much less than usual
5	Been feeling in need of a good tonic? [SOM]	Not at all	No more than usual	Rather more than usual	Much more than usual
6	Had difficulty in staying asleep once you are off? [ANX]	Not at all	No more than usual	Rather more than usual	Much more than usual
7	Been taking longer over the things you do? [DYS]	Quicker than usual	Same as usual	Longer than usual	Much longer than usual

QUESTIONNAIRE SCALES

AII-14

8	Experienced periods of sadness? (more than half a day) [DEP]	Not at all	No more than usual	Rather more than usual	Much more than usual
9	Been feeling run down and out of sorts? [SOM]	Not at all	No more than usual	Rather more than usual	Much more than usual
10	Felt constantly under strain? [ANX] [GHQ]	Not at all	No more than usual	Rather more than usual	Much more than usual
11	Felt on the whole you were doing things well? [DYS]	Better than usual	About the same	Less well than usual	Much less well
12	Had to make a special effort to face up to things (i.e. everyday problems)? [DEP]	Not at all	No more than usual	Rather more than usual	Much more than usual
13	Felt that you are ill? [SOM]	Not at all	No more than usual	Rather more than usual	Much more than usual
14	Been getting edgy and bad-tempered? [ANX]	Not at all	No more than usual	Rather more than usual	Much more than usual
15	Been satisfied with the way you've carried out your work? [DYS]	More satisfied	About same as usual	Less satisfied than usual	Much less satisfied
16	Woken unusually early in the morning? [DEP]	Not at all	No more than usual	Rather more than usual	Much more than usual
17	Been thinking of yourself as a worthless person? [GHQ]	Not at all	No more than usual	Rather more than usual	Much more than usual
18	Been getting any pains in your head? [SOM]	Not at all	No more than usual	Rather more than usual	Much more than usual
19	Been getting scared or panicky for no good reason? [ANX]	Not at all	No more than usual	Rather more than usual	Much more than usual

20	Felt that you are playing a useful part in things? [GHQ] [DYS]	More so than usual	Same as usual	Less useful than usual	Much less useful
21	Regretted much or your past? [DEP]	Not at all	No more than usual	Rather more than usual	Much more than usual
22	Been getting a feeling of tightness or pressure in your head? [SOM]	Not at all	No more than usual	Rather more than usual	Much more than usual
23	Found everything getting on top of you? [ANX]	Not at all	No more than usual	Rather more than usual	Much more than usual
24	Felt capable of making decisions about things? [DYS] [GHQ]	More so than usual	Same as usual	Less so than usual	Much less capable
25	Felt that life is too much effort? [DEP]	Not at all	No more than usual	Rather more than usual	Much more than usual
26	Been having hot or cold spells? [SOM]	Not at all	No more than usual	Rather more than usual	Much more than usual
27	Been able to face up to your problems? [GHQ]	More so than usual	Same as usual	Less able than usual	Much less able
28	Been feeling nervous and strung-up all the time? [ANX]	Not at all	No more than usual	Rather more than usual	Much more than usual
29	Been able to enjoy your normal day-to-day activities? [DYS] [GHQ]	More so than usual	Same as usual	Less so than usual	Much less than usual
30	Been able to think as quickly as usual? [DEP]	More so than usual	About same as usual	Less so than usual	Much less than usual
31	Felt you couldn't overcome your difficulties? [GHQ]	Not at all	No more than usual	Rather more than usual	Much more than usual

32	Been able to concentrate on whatever you're doing? [GHQ]	More so than usual	Same as usual	Less so than usual	Much less than usual
33	Been feeling unhappy and depressed? [GHQ]	Not at all	No more than usual	Rather more than usual	Much more than usual
34	Been losing confidence in yourself? [GHQ]	Not at all	No more than usual	Rather more than usual	Much more than usual
35	Been feeling reasonably happy, all things considered? [GHQ]	More so than usual	About same as usual	Less so than usual	Much less than usual

