



Understanding the risks of stress: A cognitive approach

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Understanding the risks of stress: A cognitive approach

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The practice of systematic assessment of psychosocial hazards in the workplace is required under Health and Safety legislation. Risk assessment is a necessary but not sufficient condition for risk management. Risk management also requires effective risk communication in order that people can be informed of hazards and how to minimise or eliminate exposure to those hazards or consequent harm. Effective risk communication requires knowledge of peoples' understanding of hazards and attendant risks so that messages can be tailored to suit the audience.

In this research, we explore understandings - or mental models - of psychosocial hazards. In a series of studies, we show that people do have elaborate mental models of psychosocial hazards: that these mental models predict subsequent levels of important personal and organisational phenomena such as well-being and performance: and that variation in mental models of psychosocial hazards might be explained by a limited number of dimensions.

In the final part of the research, we develop and validate an instrument to assess mental models of psychosocial hazards. We conclude the report by explaining the implications of a cognitive approach for psychosocial risk management, and how to use the instrument developed in the research for psychosocial risk management.

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1. Executive Summary

In this report, we argue that a cognitive approach to psychosocial hazards can supplement existing approaches to psychosocial risk management. We take an approach based on the premise that people have mental models of psychosocial hazards that allow inferences to be drawn on: whether a hazard is likely to influence emotions or mood; whether a hazard has implications for the pursuit of goals; and the best means of dealing with the hazard or its consequences.

In a qualitative study, we investigated this premise. We found that people have elaborate mental models of psychosocial hazards, which may include the causes of those hazards, the affective and other consequences of those hazards and views on effective personal, managerial and organisational risk reduction strategies.

In three diary studies, we found that mental models of psychosocial hazards may have important individual and organisational consequences. Specifically, we found that some aspects of mental models predict levels of subsequent psychological well-being and performance. The evidence for these predictive effects suggests causal processes insofar that these effects were observed where data collection was longitudinal, measures of well-being and performance were taken in close temporal proximity to changes in performance and well-being and the effects were observed even after a number of statistical controls.

We replicated the finding that some aspects of mental models are related to psychological well-being in larger scale survey research. We also found that aspects of mental models were associated with intention to leave employment with an organisation. These associations emerged even after a variety of statistical controls. There was qualified evidence that aspects of mental models are related to putting greater effort into work. We also found evidence that mental models of psychosocial hazards are associated with individual differences, socio-cultural factors and types of psychosocial hazard.

In the survey research, we found that people appear to make judgements of the impact of psychosocial hazards across three dimensions – the impact on work goals; impact on health and spillover; and impact on affect at work. People appear to make judgements concerning effective risk reduction strategies for named hazards across three dimensions. These are organisation process changes, personal avoidance and managerial support. Initial analyses of an instrument used to assess these dimensions indicates the reliability and validity of this instrument.

The results of this research highlight a number of avenues for taking forward research into the consequences and causes of psychosocial risk. The results also indicate how a cognitive approach can inform psychosocial risk management in ways related to: psychosocial risk communication; new approaches to psychosocial risk assessment; and new approaches to psychosocial risk reduction.

2. Introduction

Recent research indicates that around 17% of the British working population report finding their job very or extremely stressful, and around 43% report finding their job moderately stressful (Smith, Johal, Wadsworth, Smith & Peters, 2000). As well as being related to a range of health outcomes (Smith *et al*, 2000), stress symptoms may have an impact on quality of working life, motivation, work performance, short term sickness absence and anti-social work behaviours (Daniels & Harris, 2000). Whilst there is debate concerning the scientific definition of stress (Briner, 1997a), many researchers believe that it is useful to view stress as a process (Lazarus & Folkman, 1984). In attempting to illuminate this process, most models of occupational stress place aversive job conditions as antecedents of a range of negative affective, physiological and behavioural outcomes. Such aversive job conditions are also referred to as psychosocial hazards (Cox & Griffiths, 1996), and include poor relationships at work, lack of role clarity, little control over the work environment, high work demands and poor physical working environments (e.g. Cooper & Marshall, 1976; Warr, 1999).

Despite a large body of evidence in this area, there still remains a great deal of controversy and debate concerning the processes by which psychosocial hazards influence important outcomes such as psychological well-being, physical health and performance (Briner, 1997a). Lazarus (1999) argues this is so because stress researchers – and occupational stress researchers in particular – have largely ignored people’s interpretations of aversive conditions. Lazarus argues that without considering people’s interpretations, then it is impossible to understand why some people show a negative reaction to some events, whilst others show no reaction but react negatively to other events. From this perspective then, a cognitive explanation – focusing on how people interpret work events – is an important element in understanding the occupational stress process.

It would be a mistake to assume that those who advocate a cognitive perspective necessarily also advocate intervention purely at the individual level. There is mounting evidence of convergence of cognitive processes in work groups, organisations and even industries (Porac, Thomas & Baden-Fuller, 1989; Daniels, Johnson & de Chernatony, 2002). The social nature of cognition in organisational environments then indicates that interventions informed by a cognitive perspective can take place at the level of work groups, organisations or even industries. It is in the area of communication about psychosocial hazards that interventions so informed might be most effective (Daniels, 1996a).

In order to advance understanding of the cognitive processes by which job conditions cause psychological or physical harm, and to provide a platform for incorporating cognitive elements into interventions, it is necessary to develop methods for assessing the major cognitive elements of interpretations of psychosocial hazards. Therefore, the main objective of this research is to develop and validate an appropriate method for evaluating interpretations of psychosocial hazards at work.

In order to develop and validate an appropriate method, it is first necessary to demonstrate that people do interpret psychosocial hazards. That is, it is necessary to demonstrate that people’s perceptions and attitudes toward psychosocial hazards encompass more than awareness that such hazards are present in the work environment. As we will explain in the next chapter, we expect cognitive interpretations of psychosocial hazards to be much more elaborate and include information on the affective and other consequences of psychosocial hazards, as well as information on what might be done about such hazards. In the fourth chapter of this report, we describe an initial qualitative study of this proposition. The results of the study did indicate that

peoples' cognitive interpretations of psychosocial hazards might include information on their causes, consequences and what might be done to control the psychosocial hazard or its consequences. This qualitative study also allowed us to identify some of the major elements of interpretations of psychosocial hazards.

Even so, demonstrating that people do have elaborate interpretations of psychosocial hazards does not in itself indicate that they have any real effect on the processes of occupational stress. Without such evidence, there may be little point in pursuing a cognitive agenda for research and intervention in this area. Therefore, in the fifth chapter of this report, we describe three diary studies that examine whether interpretations of psychosocial hazards have an influence on subsequent indices of psychological well-being, performance and physical symptoms. These diary studies do indicate such causal effects exist.

Together, the qualitative study and the diary studies indicate the importance of a cognitive approach to understanding occupational stress. In the sixth chapter of the report then, we report the development and validation of a normative instrument to measure such interpretations by using a survey methodology. In order to show that the instrument can be used to inform interventions, we examine the measurement properties of the instrument. Not only do we assess the underlying structure of the instrument to identify the major dimensions of cognitive interpretation of psychosocial hazards, we examine the ability of the instrument to provide consistent measurements. Further, since the nature of cognitive processes in organisations also reflect the social nature of organisations, we might anticipate measurements on the instrument to be associated with a range of social variables, as well more personal variables and variables identified as related to interpretations of psychosocial hazards in the diary studies.

We conclude the report by examining the implications of the findings for psychosocial risk management, and how the instrument might be used in the process of psychosocial risk management. In the next chapter, we outline the theoretical basis of the report, as well as specifying – in broad terms – the nature of cognitive interpretations of psychosocial hazards and the relationships we might expect to find.

3. Theoretical background

In this chapter, we begin by explaining why we expect cognitive interpretations of psychosocial hazards to influence aspects of psychological well-being. The nature of these interpretations is theoretically well articulated (Power & Dalgleish, 1997), and hence plays a central role in much of this report. We then explain the role for a cognitive approach in psychosocial risk management. Finally, we explain the relationships that we examine in this report.

3.1. Cognition and affect

In the rest of this report, we use the term ‘affect’ rather than ‘emotion’ or ‘mood’ (Parkinson, 1995). ‘Emotion’ denotes feelings towards an event, object or person. ‘Mood’ denotes feelings that are not linked to a specific event, object or person. ‘Affect’ is more general and subsumes the other terms. We use the terms ‘dysphoric affect’ and ‘dysphoria’ to refer to unpleasant affects such as anxiety, sadness and boredom. We use the terms ‘euphoric affect’ and ‘euphoria’ to refer to pleasant affects such as happiness and enthusiasm.¹

At the centre of many approaches to occupational stress are negative affective experiences (Briner, 1997a). A central idea is that dysphoric affective reactions to work can be deleterious to psychological health, physical health and behaviours related to performance (Schuler, 1985; Weiss & Cropanzano, 1996; Danna & Griffin, 1999). Also, whilst psychological well-being consists of a number of components, including affective well-being, competence, aspiration, autonomy, integrative functioning and satisfaction (Andrews & McKennell, 1980; Diener, 1984; Warr, 1990, 1994; Ryff & Keyes, 1995), measures of affective well-being are amongst the most important, if not the most important, indicators of psychological well-being (Diener & Larsen, 1993; Warr, 1994). Affective well-being reflects the frequent experience of positive affect and infrequent experience of negative affect (Diener & Larsen, 1993). Consequently, theoretical approaches that explain the development of negative affective experience or poor affective well-being may be especially useful for understanding the occupational stress process.

Cognitive approaches to affect have a long history (Lazarus, 1999) and are now gaining popularity (Mathews, 1993). This popularity may stem from the inherently cognitive nature of mental life, the success of cognitive approaches in explaining many areas of mental and social behaviour (e.g. Fiske & Taylor, 1984; Eysenck & Keane, 1990), the ability of cognitive approaches to affect to integrate evolutionarily adaptive functions of different affective experiences (Oatley & Johnson-Laird, 1987) or the success of cognitive approaches in explaining the development and maintenance of affective disorders (Williams, Watts, MacLeod & Mathews, 1997).

Taking a cognitive approach, we assume that ‘what a creature does is, in large part, a function of the creature’s internal representation of its environment’ (D’Andrade, 1984, p. 88). These internal representations are constructed through a process of simplification and categorisation based on salience (Lingle & Ostrom, 1980) and contiguity (Schank, 1982; Schacter, 1989). Walsh (1995) gives a comprehensive listing of the proliferation of terms referring to these cognitive representations. The common ideas underlying these are that knowledge is represented in organised structures in memory, and that these structures can be retrieved and synthesised with other structures to guide attention, comprehension, recall and behaviour. Here, we use the

¹ We use these terms rather than positive or negative affect, since the positive affect and negative affect have very precise definitions in the well-known circumplex model of affect (Watson & Tellegen, 1985).

term ‘mental model’² to refer to these cognitive representations (after Johnson-Laird, 1983, 1989). Mental models offer heuristics that limit the majority of information processing to that which is relevant to a given task (Abelson & Black, 1986, Anderson, 1991). By selecting which information is most appropriate, mental models influence discourse (Edwards, 1991), decision making (Anderson, 1991), behaviour (Fiske & Taylor, 1984) and inferences on what might happen next in given situations (Galambos, Abelson & Black, 1986). It is the function that mental models play in guiding inferences that allow Power & Dalgleish (1997) to explain how mental models influence the development of affective experience.

Power & Dalgleish propose two major processes through which events influence affective experience. In the first process, mental models allow a person to make inferences about whether an event or situation has implications for an individual’s goals. If an inference is made that the event or situation will impede or prevent progress toward goals, then the individual will experience affective states commonly associated with the experience of stress - such as sadness, anxiety or anger. In the second process, an event or situation activates a mental model of events or situations of the same nature that have been learnt to reduce goal progress. Such mental models already contain connections to the cognitive experience of affect because of past inference of goal relevance. It is these connections to the experience of affect which trigger the experience of that affect (Bower, 1981). Since these mental models already contain connections to the experience of an affect, there need be no inference concerning goal progress. Therefore, if an event or situation has been learnt to cause negative affective experience because of past consequences for the pursuit of goals, then further experience of that event or situation will cause the experience of negative affective states.

An important corollary of Power & Dalgleish’s approach is that it is the interpretation of events or situations that is important. In the context of psychosocial hazards, we would not expect mental models to have an effect on well-being unless a psychosocial hazard is present in the environment. That is, in taking a cognitive approach, we do not neglect the importance of features of the work environment and their influence on well-being and health.

The function of negative affective experience is to direct activity toward reducing that negative affective experience (Oatley & Johnson-Laird, 1987). We would therefore expect mental models of events or situations additionally to contain information on what might be done to reduce the experience of negative affective experience (Daniels, Harris & Briner, 2001). In turn, we might expect people to attempt to enact strategies to reduce negative affective experience (Weick, 1995), although different organisational environments will vary in the latitude they give people to do so.

Importantly then, according to Power & Dalgleish, people hold mental models of affective episodes. These mental models allow inferences concerning the impact of events or situations on progress toward goals and can contain information on the impact of the event or situation on past affective experience. It is the information about goals or the impact on affective experience then that causes affective experience. We would therefore expect mental models of psychosocial hazards to contain information concerning the likely impact of psychosocial hazards on important goals – such as performing one’s job well or avoiding work conditions that threaten physical health. We would also expect mental models of psychosocial hazards to contain information on the direct consequences of those hazards for affective experience. Finally, since the function of negative affective experience is to direct action toward reduction

² We use the term *mental model* as a generic term that subsumes more specific terms used in both the cognitive and organisational literatures, such as ‘script’, ‘schema’, ‘knowledge structure’ or ‘belief structure’ (see e.g. Walsh, 1995). *Mental models* can include more or less accurate representations of social or physical reality, as well as beliefs about more abstract phenomena. *Mental models* can then include moral and ethical components, as well as elements relating to the nature, causes and consequences of phenomena. The more specific term ‘health belief’ is subsumed under the more generic term ‘mental model’.

of that experience, we might also expect mental models of psychosocial hazards to contain information regarding what might be done to reduce exposure to the psychosocial hazard or attenuate its consequences.

3.2. Cognition and psychosocial risk communication

We expect mental models to play a role in the process by which psychosocial hazards influence well-being. We also expect that they might be important for psychosocial risk communication. In this section, we explain why we expect this. We do so by first outlining the application of the risk management framework to psychosocial hazards. We proceed by outlining the importance of risk communication to risk management, and how mental models influence the way people attend to risk communications and the enactment of risky behaviours.

Scientific approaches to risk assessment/risk management see risk as a function of the probability of some undesired consequence of an event and the seriousness of the undesired consequence, which implies exposure to a hazard (Warner, 1992). Cox and his associates have pointed to the usefulness of a risk assessment/risk management framework in the area of psychosocial hazards and occupational stress (e.g. Cox & Cox, 1993; Cox & Griffiths, 1996). In this approach, risk assessment is a crucial part of establishing the relationship between a hazard and physical and psychological harm. Consequently, decisions can be taken on the optimal strategies to reduce the consequences of hazards or the probability of their occurrence (cf. Warner, 1992).

Whilst various processes of risk assessment have been proposed for psychosocial hazards at work (e.g. HSE, 1995; Cox & Griffiths, 1996; Briner, 1997b), researchers recognise that establishing robust dose-response relationships for psychosocial hazards is a difficult task (Graveling, 1991; Cox & Griffiths, 1996; Briner & Rick, 1998), given the inexact nature of measurement and that managers or employees are able to enact risky behaviours. In turn, this may explain the equivocal findings in the literature concerning psychosocial risk management strategies (Parkes & Sparkes, 1998; Briner & Reynolds, 1999). Nevertheless, difficulties in establishing robust dose-response relationships, inexact measurement and the enactment of risky behaviours are also true of physical and technological hazards (e.g. Schrader-Frechette, 1985). In this area, risk communication is now a complementary approach to risk assessment within the overall risk management framework. Indeed, Daniels (1996a) considers effective risk communication a potentially effective means of influencing adoption of psychosocial risk reduction strategies.

Within the risk communication perspective, risk management is considered a political process, in which various stakeholders are subject to their own cognitive and cultural biases (Hood, Jones, Pidgeon, Turner & Gibson, 1992). It is these cognitive and cultural biases that guide risky or risk averse behaviour, the interventions considered most suitable and the information people attend to (Handmer & Penning-Rowsell, 1990; Thompson, Ellis & Wildavsky, 1990). In short, beliefs about the relative costs to health and benefits to performance of psychosocial hazards will influence the psychosocial hazards people are willing to bear, the risk reduction strategies they consider appropriate and the extent to which they attend to communications concerning psychosocial hazards. Therefore, to achieve scientifically sound and politically acceptable decisions, it is important to adopt a participatory approach to risk communication that incorporates the views of stakeholders into risk management decisions (National Research Council, 1989). This is because the success of risk communications is influenced by their consonance with recipients' mental models (Handmer & Penning-Rowsell, 1990). Risk communications that are consonant are more likely to be attended to, and subsequently more likely to result in behavioural change to less risky behaviours or adoption of risk reduction programmes. Therefore, to achieve successful and participatory risk communication, it is

essential to first understand the cognitive and social determinants of perceptions of hazards and their associated risks (Fischhoff, 1989).

There are two main approaches to the study of risk perception - the psychometric and the cultural (Pidgeon, Hood, Jones, Turner & Gibson, 1992). The former attempts to explain the cognitive processes underlying risk perception, while the latter attempts to explain the social influences on risk perception. Extrapolating from research on physical hazards, Daniels (1996a) has shown conceptually how these approaches can be applied to risk communication on psychosocial risks at work.

The psychometric approach to risk perception attempts to identify the characteristics of perceived hazards and relate these characteristics to the perception of risk. This approach suggests that two major dimensions account for public perceptions of physical and technological hazards: the catastrophic potential or dread of the hazard and the unfamiliarity of the hazard. Slovic (1987) proposed that hazards scoring high on both these factors are more likely to be associated with public concern and changes in behaviour. The psychometric approach can be criticised for failing to explain the *origins* of risk perceptions and merely describing the basic *content* of risk perceptions. Nevertheless, the psychometric approach does suggest that mental models of psychosocial risks can be assessed using attitude measurement techniques and are possibly accounted for by a finite number of underlying dimensions (Fischer, Morgan, Fischhoff, Nair & Lave, 1991; Hubert, Barny & Moatti, 1991).

The cultural approach to risk perception attempts to explain the origin of various risk perceptions by describing their social, institutional and political bases (Douglas & Wildavsky, 1982). Theoretical and empirical work within social theory, organisation theory and risk have all indicated that social groups share perceptions and beliefs about reality, including risk (DiMaggio & Powell, 1983; Kasperson, Renn, Slovic, Brown, Emel, Kasperson & Ratick, 1988); that these perceptions influence collective action (DiMaggio & Powell, 1983; Johnson, 1987; Kasperson *et al*, 1988; Thompson *et al*, 1990; Scott, 1994, 1995); and that these perceptions can be shared amongst actors within nation states, industries, organisations, departments and professions (Johnson, 1988; Spender, 1989; Daniels *et al*, 1994, 2002; Hodgkinson & Johnson, 1994; Bowman & Daniels, 1995; Scott, 1995). Whilst not explicitly concerned with perceptions of risk, cultural approaches have been applied successfully both empirically and theoretically to occupational stress research, and have indicated the possibility of a collective element in how people construe psychosocial hazards (Barley & Knight, 1992; Meyerson, 1994).

The cultural approach to risk perception is based mainly upon the grid/group model of culture (Thompson *et al*, 1990) according to which the shared beliefs and attitudes of social groups or institutions can be arranged along two dimensions; group and grid. The group dimension is defined as 'the extent to which an individual is incorporated into bounded units' (Thompson *et al*, 1990, p. 5). The grid dimension refers to the 'degree to which an individual's life is circumscribed by externally imposed prescriptions' (Thompson *et al*, 1990, p. 5). Within these two dimensions, four discrete and coherent cultural types can be derived. These can be labelled 'fatalist', 'hierarchist', 'egalitarian' and 'individualist'. Each cultural type is associated with a distinct set of beliefs about the nature of the world and the nature of risk. These cultural types are sometimes referred to as cosmologies. The fatalist belief is that there is little that can be done about risk. The hierarchist belief is that risks are best controlled by organisational leaders or government institutions. The egalitarian belief is that no level of human-imposed risk is tolerable. The individualist belief is that individuals have the freedom to choose the level of exposure they will tolerate.

We might then expect differences in mental models of psychosocial hazards amongst people with different cultural attitudes. In turn this may help explain why different groups have different attitudes toward psychosocial hazards and psychosocial risk management. For instance, Reynolds & Shapiro (1991) report that managers – with presumably more individualist attitudes (Daniels, 1996a) – prefer individually targeted interventions, yet trade unionists – with presumably more egalitarian attitudes – prefer organisationally focused interventions. Further, we might expect different cultural attitudes to be associated with differential enactment of psychosocial hazards (Barley & Knight, 1992), and mental models of psychosocial hazards to mediate this enactment. For example, individualists may impose long working hours on themselves, believing this is the best way to enhance performance and that people regulate their own risk tolerance. Egalitarian employee groups may resist such attempts to impose long working hours. As these examples illustrate, enactment may occur on several levels. As noted in the discussion of the generation of affect by mental models, we might expect individuals to attempt to enact strategies to reduce negative affective experience. Managers may attempt to impose psychosocial hazards on their employees if they believe the hazards have no consequences for employee health or performance, or they believe employees regulate the consequences of such hazards themselves. Collective behaviours may be adopted where actors share mental models (Greenwood & Hinings, 1996): We may expect to see collective enactment where groups of workers share aspects of their mental models.

In many ways then, mental models of psychosocial hazards may influence the attention given to information about psychosocial hazards, attitudes concerning the effectiveness of psychosocial risk reduction strategies and enactment of psychosocial hazards. Understanding these mental models may help to tailor psychosocial risk messages to address workers' concerns about such risks, to correct 'cognitive blindspots' in the impact of psychosocial hazards on physical health and other important work goals and to ensure that information on personal and organisational risk reduction is readily assimilated into existing mental models. Further, as noted in the earlier section on the role of mental models in the generation of affect, mental models of psychosocial hazards may have a causal influence on affective experience.

3.3. Relationships examined in this research

As outlined above, we may expect mental models of psychosocial hazards to be associated with a number of variables. If a cognitive approach to stress is to be viable then, we would expect measures of mental models of psychosocial hazards to demonstrate a number of relationships. We will now explain these relationships.

In discussing Power & Dalgleish's cognitive model of affect (1997), we anticipated that mental models of a psychosocial hazard should cause negative affective experiences. Further, since such mental models are expected to contain information that enable inferences regarding goal progress, we might also expect mental models of a psychosocial hazard to predict progress toward goals. This may reflect: i) an accurate judgement concerning the impact of that hazard on goals; ii) biased information processing (Williams *et al*, 1997); or iii) enactment of behaviours that reduce the likelihood of achieving a particular goal (Weick, 1995). As an example of the first process, a person who believes working at a poorly designed work station causes back ache may begin to experience back ache when working at that work station, because the poor design of the work station really does cause back ache. As an example of the second process, a person who believes working long hours causes gastric pains may start to experience such symptoms when exposed to the hazard. This is because the experience of working long hours directs cognitive processing toward information consistent with mental models of that hazard – such that the person is more likely to notice gastric symptoms. As an example of the last process, we might expect a person who believes lack of work control reduces work performance to reduce effort when they experience little control over the work

environment. This is because the person believes there is little that can be done to maintain or improve work performance, so expending effort is futile. In this research, we pay particular attention to performance and physical health – this is because it is a reasonable assumption to expect that most people will be motivated to perform their job well – or at least not perform badly - and that people will be motivated to work in environments that do not harm their physical health (Daniels *et al*, 2001). We also anticipate that people will be motivated to reduce work events they consider to cause negative affective experience or impede progress toward goals. As noted above, this may take place at an individual level, or at a collective level (Greenwood & Hinings, 1996) – in which groups exhibit reductions in the experience of psychosocial hazards because of their collective efforts or because of the beliefs of a work group’s manager concerning psychosocial hazards. Therefore, we also expect mental models of psychosocial hazards to be associated with subsequent reductions in those hazards.

To summarise anticipated consequences of mental models of psychosocial hazards, we expect that mental models of psychosocial hazards will be related to:

- a) negative affective experience at work;
- b) reduced progress toward individual goals;
- c) reduced work performance;
- d) increased experience of physical symptoms;
- e) reduced experience of psychosocial hazards – at an individual and collective level.

Each of these propositions was tested in three diary studies reported in chapter 5. Some of the relationships that were found to be robust were examined further in the survey study reported in chapter 6.

Our discussion of mental models of risk indicates that there might be a number of influences on mental models of psychosocial hazards. The cultural approach to risk perception suggests that different cultural attitudes – or cosmologies - may be associated with different mental models of psychosocial hazards. Notwithstanding individuals’ cultural attitudes, we might expect an influence of discrete social groups, such as organisations or job roles, to influence mental models of psychosocial hazards (cf. Bowman & Daniels, 1995), or enactment of those hazards. This may reflect sharing of information within bounded social units, socialisation into dominant professional cultures, or the influence of senior managers’ cultural attitudes or more specific beliefs about psychosocial hazards.

We might expect a number of biographic variables to be related to mental models of psychosocial hazards (Smallman, 1998). For example, different societal practices in the socialisation of men and women into adult working and career roles may lead to differential pursuit of goals, tolerance of risk and even the experience of psychosocial hazards. Age may be associated with different mental models of psychosocial hazards because of changes in societal practices in socialisation into the employment relationship or pursuit of different goals at different stages in the life cycle (Super, 1980). Length of employment may also have an influence on mental models of psychosocial hazards, which may reflect exposure to different hazards during organisational entry, amplification of health risk with greater experience in a particular job or organisation (cf. Smallman, 1998) or simply the process of socialisation into the shared organisational, functional or departmental views of a psychosocial hazard.

This discussion of biographic influences on mental models of psychosocial hazards intimates that the nature of psychosocial hazards themselves might influence mental models of those hazards – rather than other variables less concerned with the immediate work environment. Indeed for Power & Dalglish (1997), it is personal experience that is the primary influence on mental models of psychosocial hazards – since there has to be a personal inference at some point in an individual’s history that such events and situations influence progress toward goals.

Nevertheless, whilst we might expect a role for a number of attitudinal, social and demographic factors – as well as for psychosocial hazards themselves, we may also expect a role for trait well-being. Williams *et al* (1997) present a model of individual vulnerability to affective disorders based on empirical observations that people with poor trait well-being are more vulnerable to such disorders in the first place and also find it more difficult to recover from such disorders. According to Williams *et al*, it is not individual differences in trait well-being or the dimensions of personality associated with such individual differences that drive the causal processes involved. Rather, they predict that people with poor trait well-being have developed mental models of the environment that directs information processing toward negative information and hence the experience of extremes of poor affective well-being. Whilst such mental models may be the product of heritability or childhood experiences, it is equally plausible these mental models reflect chronic exposure to poor environmental conditions (Dollard & Winefield, 1998). Notwithstanding, Williams *et al*'s observations indicate that we might expect a relationship between trait well-being and mental models of psychosocial hazards.

Finally, as we outlined above, we expect mental models of psychosocial hazards to include information on strategies for limiting exposure to the hazard or attenuating its effects. In this sense, we then expect an association between mental models of psychosocial hazards and attitudes toward the effectiveness of different forms of stress management interventions.

To summarise expected antecedents of psychosocial hazards, we might expect mental models of psychosocial hazards to be related to:

- f) cultural attitudes;
- g) membership of organisations or job roles;
- h) biographic factors;
- i) the psychosocial hazard under consideration;
- j) trait well-being.

We might also expect:

- k) associations between mental models of psychosocial hazards and perceived effectiveness of different forms of stress management interventions.

Each of these relationships was examined in the survey research reported in chapter 6. Additionally, in chapter 6, we use the survey data to examine the underlying dimensions of mental models of psychosocial hazards, and the measurement properties of the tool developed to assess mental models of psychosocial hazards. If the tool is to be a valid and reliable tool, then it should exhibit consistency in measurement. Further, if it is to be a valid tool, then we should find evidence for at least some of the relationships outlined in the final section of this chapter (a-k).

Before we are able to proceed with developing a tool to assess mental models of psychosocial hazards, we will need to demonstrate that such mental models exist, and – as discussed earlier in this chapter – that they contain information concerning the influence of psychosocial hazards on affect, information concerning progress toward goals and information concerning strategies to reduce exposure to psychosocial hazards or attenuate their consequences. In the next chapter, we report such a study.

4. Qualitative Study

The aim of the research was to develop appropriate methods for evaluating perceptions of psychosocial hazards at work. In order to do this we need first to establish the existence and nature of mental models of psychosocial hazards. In this initial qualitative study, we sought to examine:

- i) do people hold mental models of affective experience at work ?
- ii) can mental models of affective experience at work be represented ?
- iii) what are mental models of psychosocial hazards comprised of ?

Methods used to elicit mental models are called ‘cognitive mapping techniques’ and the resulting representation a ‘cognitive map’. Maps provide a frame of reference for what is known or believed (Fiol & Huff 1992). Fiol & Huff (1992) suggest three broad classes of maps. These are: i) maps of attention, association and importance of concepts; ii) maps showing dimensions of categories and cognitive taxonomies; iii) causal maps including: maps showing knowledge and beliefs of influence, causality and system dynamics; maps showing the structure and conclusion of arguments; and maps of schemes, frames and perceptual codes.

Power and Dalgleish’s theory (1997) indicates the importance of eliciting mental models using methods appropriate to the type of mental model under investigation. Our concern is with how hazards are perceived to cause impediments to goal progress or dysphoric affect and Power & Dalgleish emphasise beliefs about such causal links within mental models. Therefore, we have chosen to use causal maps that focus on schematic frames and perceptual codes. A variety of cognitive mapping methods can be employed in this regard (c.f. Kelly, 1955; Bougon, 1983; Eden, Ackerman & Cropper, 1992). The visual card sort (Daniels, de Chernatony & Johnson, 1995) was chosen because it is a technique that enables rapid, open-ended elicitation of beliefs. Initially this technique was developed to show cognitive classification structures (Daniels *et al*, 1995), but has been extended to include procedures for representing perceived causal relationships amongst concepts (Johnson, 1998).

4.1. Sample

Senior managers in nine organisations were approached for this study. Eight organisations agreed to participate. Organisations were contacted so that the participants would be drawn from one larger (number of employees > 1000) and one small/medium sized organisation (number of employees < 200) in each of the following sectors: manufacturing, non-professional service, professional service and public service. This varied sampling frame enabled us to draw conclusions about a range of job types, organisational contexts and work conditions. Senior managers were asked to nominate discrete work teams to take part in the study.

The large and small manufacturing organisations specialised in aerospace and pneumatic components, respectively. Data were collected from a team of fabrication workers and a team of assembly workers. A large call centre, which specialised in telecommunications, represented the large organisations from the service sector. Data were collected from a team of customer service advisors. A small restaurant represented small organisations from the service sector. Data were collected from both serving and kitchen staff. The large and small professional organisations both specialised in a range of legal and financial services, and data were collected from a team of solicitors and a team of accountants respectively. A small school was used to represent small public sector organisations and data were collected from teachers from different subject disciplines. Finally, a unit of a large utility was used to represent large public sector organisations. Data were collected from a group of managers each with responsibility for the

same services in different areas of the same municipal location, all of whom reported to the same unit manager.

Forty six participants (31 male, 15 female) from work groups (including 11 managers, 2 female, 9 male) in eight organisations agreed to take part in the study. The participants had a mean age of 35.5 years, and had been working for their organisation for an average of 6.4 years.

4.2. General Procedure

Data were collected by the visual card sort method during individual semi-structured interviews. During the interview, concepts and the relationships between the concepts were mapped onto paper to show which factors were thought to be related to affective experience at work and, if so, how they were related. The interviews usually lasted between 30 minutes to one hour per participant.

4.2.1. Interview

The semi-structured nature of the interview was intended to maximise elicitation of concepts thought to be important to the current research. An interview schedule was developed to access the main features and processes by which features of the work environment were perceived as harmful or beneficial to health, performance and well-being.

Interview Schedule for Workers

Stage 1 - Affect: The participants were first asked to describe a specific affect ('feeling') they had experienced at work over the previous two weeks. We did not limit participants to describing dysphoric affect since the causes and consequences of dysphoric affect are not necessarily the reverse of euphoric affect (Warr, 1987).

Stage 2 - Primary job conditions: Working from the affect identified in Stage 1, participants were then asked to describe what it was about their work that caused the affect.

Stage 3 - Secondary job conditions: Participants were then asked to describe the causes of the work features directly related to the named affect – in other words, what it was that they perceived caused those work conditions which directly cause the affect (e.g. a participant might name 'long hours culture' as a direct cause of working long hours, which in turn was reported as the cause of a named affect such as anxiety). This level of questioning was used to examine more distant causes related to work processes, such as the wider role of institutions, technology and other organisational arrangements.

Stage 4 – Risk reduction: Participants were then asked to explain in turn what they and their managers could do to enhance or decrease the feelings or causes of the feelings, and subsequently if work or organisational processes could be changed to enhance or decrease the feelings or causes of the feelings. We chose to focus on personal coping, managerial support and organisational level strategies given the emphasis of these forms of risk reduction in both the descriptive and prescriptive literature on work stress (Lazarus & Folkman, 1984; Murphy, 1988; Doherty & Tyson, 1998; Moyle, 1998).

Stage 5 - Consequences: Last, participants were asked to explain both the immediate and long-term consequences of their affect and other concepts already elicited. Several theories of stress have supposed a variety of behavioural, psychological and physiological outcomes of experienced stress in the workplace (Cooper & Marshall, 1976; Cooper, 1996; Warr, 1987). We also felt it important to include questions on the consequences of affect since Power &

Dalgleish (1997) suggest that affect related mental models include goal relevant information. We focused our questioning on consequences related to work performance, health and well-being, since it is reasonable to assume that competent work performance, good health and well-being are goals for most if not all workers (Warr 1987; Epstein & Katz, 1992).

Interview Schedule for Managers

A similar set of questions were used to elicit managers' mental models of the causes and consequences of their team members' affective experience at work, as follows:

Stage 1 Affect: The manager was first asked to consider how work had made the employees they are responsible for feel over the past two weeks and to describe a specific affect ('feeling') that came to mind. Similar to the workers, we did not limit participants to describing dysphoric affect.

Stage 2 - Primary job conditions: Working from the affect identified in Stage 1, the managers were then asked to describe what it was about employees work that they believed to have caused the affect.

Stage 3 - Secondary job conditions: The managers were then asked to describe the causes of the work features directly related to the named affect.

Stage 4 – Risk reduction: Managers were then asked to explain in turn what their employees could do to enhance or decrease the feelings or causes of the feelings, what they could do as managers to decrease or enhance their employees feelings or the causes of their feelings and subsequently if work or organisational processes could be changed to enhance or decrease the feelings or causes of the feelings.

Stage 5 - Consequences: Last, managers were asked to explain both the immediate and long-term consequences of the named affect and other concepts already elicited to describe aspects of health, well-being and performance.

Mapping Procedure

Step 1: Following each level of questioning the elicited responses were written onto 'Post-it'TM notes and then passed to the participant to check their accuracy.

Step 2: The participant was then asked to arrange the 'Post-it'TM notes on the table to show how they were or were not causally related to each other and concepts already elicited. This occurred after each level of questioning.

Step 3: As the participant explained the links, the interviewer sketched a map of the concepts showing the direction of linkages. In order to keep track of the question being addressed, the concepts were colour coded according to the stage of questioning.

Step 4: The participant was shown the map and asked to check whether it accurately represented their views after each set of concepts had been added.

Constant checks for face validity were made throughout the mapping exercise by asking the participant to check the sketched map after each line of questioning. Further, by continually showing the participant the map and allowing the participant to rearrange the 'Post-it'TM notes, we were able to maximise elicitation of the links whilst checking the validity of the mapping.

4.2.2. Analysis

Since the mapping method elicited maps unique to each participant, it was necessary to code the map data. We decided to use template analysis. This is a widely used approach in qualitative research and involves producing a list of codes (a 'template') representing themes identified in the data, some of which will have been defined *a priori*, but modifications and additions can be made as the research team become familiar with the data (King, 1998). King (1998) maintains that the best starting point in constructing an initial template is the interview schedule. Main questions can serve as higher order codes. In the work stress literature there exist several categorisation schemes for coding job conditions (Cooper & Marshall, 1976; Warr, 1987), risk reduction strategies (House, 1981; Latack & Havlovic, 1992) and outcomes associated with affective experience (Cooper & Marshall, 1976; Warr, 1987; Weiss & Cropanzano, 1996). The current research used some of these existing categorisation schemes as initial templates. However, the coding protocol was refined through several iterations of data coding following Huff & Fletcher's (1990) recommendations to modify coding protocols as more experience is gathered with the data. The final protocol and examples for each category are shown in table 4.1 and explained below.

Stage 1: Affect

Affect at work initially were classified according to Watson & Tellegen's circumplex model (1985) and included high and low negative affect and high and low positive affect. Affect was classified as follows: high negative – for example, anxiety, nervous, tense, pressured, frustrated and rushed; low negative affect – for example, patient and relaxed; high positive affect – for example, happy, achievement, enthusiastic, satisfied, interested, content, positive and pride; low positive affect - for example, bored, sluggish, tired and depressed. However, since relatively few people mentioned low negative affect – this was collapsed with high positive affect into a euphoric category, since both low negative and high positive affect are indicative of affective well-being (Warr, 1990).

Stage 2: Primary job conditions

These were initially classified according to a modified version of Warr's principal environmental influences framework described in the 'Vitamin Model' (1987). As analysis advanced, concepts emerged that could not be easily categorised using this framework and new categories were developed. Warr's categories of opportunity for control, opportunity for skill use, externally generated goals (demands), variety, environmental clarity and physical security were used to classify the primary job conditions. Reward and recognition were included as a single category, which subsumed availability of money in Warr's framework, because people appeared to conflate the two concepts. Support was added to the 'contact' category because support was mentioned in the maps (e.g. 'not enough back up from management'), as well as contact from Warr's framework (e.g. 'isolating breaks') In addition to the environmental features in Warr's framework, the following categories were also added: opportunity for career development (e.g. 'started new job'), extrinsic factors (e.g. 'redundancies') and factors intrinsic to self (e.g. 'only female').

Stage 3: Secondary job conditions

These were loosely classified according to Cooper & Marshall's model of occupational stressors (1976). The categories derived from this model were found to be more appropriate for classifying secondary job conditions than Warr's model. For example, statements such as 'it's the nature of the job' could more easily be classified using Cooper & Marshall's category

'factors intrinsic to the job' than any of the primary job characteristics described by Warr. Similarly, statements referring to managerial communication could be more easily classified using Cooper & Marshall's organisational structure category. The categories were: factors intrinsic to the job; role in the organisation; relationships at work; career development; organisational structure and climate; and home/work interface. Extrinsic/economic factors and factors attributed to self were added as people mentioned the economic or institutional environment or themselves in relation to this question (e.g. 'recession', 'my positive attitude').

Stage 4: Risk reduction.

A set of categories were derived for each line of questioning for risk reduction. Categories were developed for what individuals thought they themselves could do ('personal coping'), what they thought their managers could do ('managerial support') and what they thought organisations could do ('work process change').

For individual's own coping attempts, data were categorised according to Latack & Havlovic's typology (1992). The coping literature suggests that in addition to examining coping behaviour, motivations behind the behaviours also need to be assessed. Coping behaviour can be categorised as problem focused (behaviours to alter the environmental transaction), emotion focused (regulating emotions) and appraisal focused (modifying the meaning or cognition of the situation). The motivations behind these behaviours can either involve approach or avoidance. Therefore, the personal coping strategies were classified as behavioural approach, behavioural avoidance, cognitive approach, cognitive avoidance, emotional approach and emotional avoidance.

For managerial support, data were categorised according to House's typology of social support (1981). The categories were: emotional support, defined as information that the individual feels cared for and appreciated, which includes esteem support; instrumental support, defined as managerial behaviour to provide tangible resources to help the person in need; informational support, defined as provision of information that the focal person can use to enable more effective coping; and appraisal support, defined as appraisal of individual behaviour in an unemotional way. Feedback on performance was classified as appraisal support.

For work process changes, we again used Cooper & Marshall's framework (1976): Changes mentioned by participants were those that involved changing the nature of the job; changing relationships; changing or clarifying roles; changing wider organisational processes and communication; and changing career management processes. For example statements such as 'better processes' could be classified as organisational process change, 'more time from manager' could be classified as relationship changes. None of the sample mentioned changes to the home/work interface as an organisational risk reduction strategy, and so it was excluded from the coding scheme. However, an additional category was added – extrinsic factors. Similarly to secondary job conditions, people mentioned changes to economic or institutional environments in relation to this question.

Stage 5: Consequences.

The literature suggests that affect and job conditions at work are associated with a range of performance outcomes (Weiss & Cropanzano, 1996), physical health outcomes (Cooper & Marshall, 1976), psychological well being (Warr, 1987) and spillover into non-work life (Cooper, Sloan & Williams, 1988). Accordingly, the long term and short-term outcomes of the feelings were classified as being related to well-being, performance, work-non-work spillover and major and minor physical symptoms or illnesses.

In addition, primary job conditions were coded as positive or negative. Here, a positive sign indicates presence of a job feature (e.g. high demands would be coded as positive). A negative indicates absence of a job feature (e.g. lack of autonomy would be coded as negative). Outcomes too were coded as positive and negative. Here, positive indicates well-being and negative indicates ill-being. After this additional coding, it was found that of the primary job conditions, no concepts were coded as lack of career opportunities, poor extrinsic conditions or poor physical conditions. Similarly, of the outcomes, none were coded as positive minor physical health. All of these categories were therefore excluded from the final coding scheme.

The qualitative map data were coded according to the coding protocol by the second author. The maps were then coded by the first author and analysed for consistency. Percentage agreement was determined for data elicited from each set of questions in the interview schedule. Percentage agreement between coders was: 92% for affect; 78% for primary job conditions; 70% for secondary job conditions; 71% for personal coping; 79% for managerial support; 67% for work process changes; and 90% for outcomes. Overall percentage agreement between coders was 78% across all the categories. In the context of the large number of categories used in the coding scheme, this indicates reliability between coders.

Table 4.1. shows the coding scheme with examples for each category. For each participant's map, the number of concepts in each category was counted. This enabled us to calculate the average number of concepts within a particular category for defined groups of participants. We examined the number of concepts in each category for workers and managers in isolation, as well as for the whole sample combined. We also examined the number of concepts mentioned in maps by groups of participants defined by the affect mentioned at the beginning of the interview. That is, we examined the number of concepts for participants that reported experiencing high negative affect, low positive affect and euphoric affect respectively.

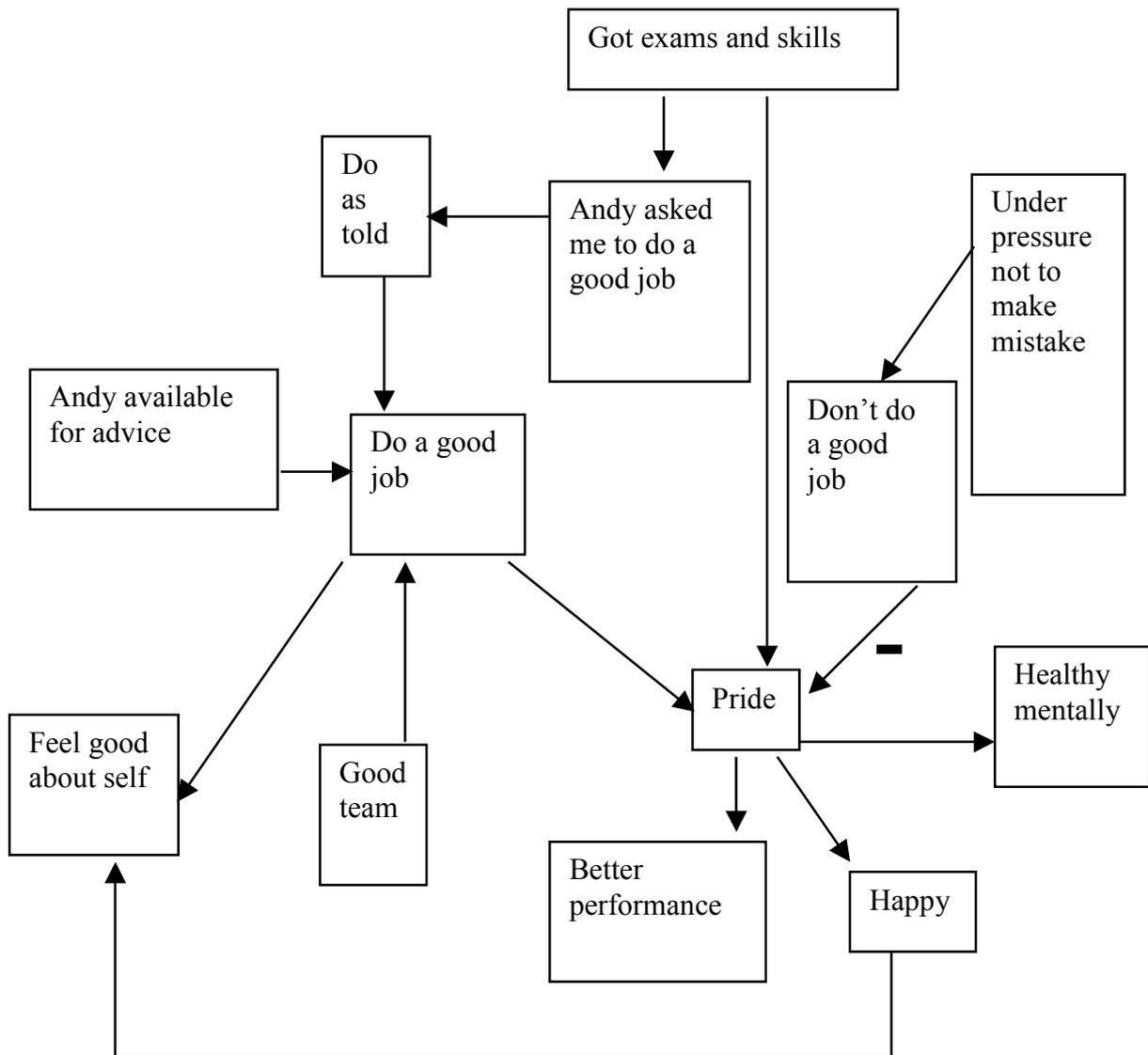
Table 4.1. Categorisation Scheme³

<i>Primary job conditions</i>	<i>Example</i>
Lack of control	'waiting for things to happen'
Have control	'have own meetings'
Lack of skill use	'can only deal with certain queries'
Have skill use	'own skill'
Lack of demand	'quiet work wise'
Have demands	'juggling tasks'
Lack variety	'repetitive'
Have variety	'stimulating work'
Lack support	'lack of support'
Have support	'get on with people I work with'
Lack reward or recognition	'lack of acknowledgement'
Have reward or recognition	'reasonable pay'
Lack security	'past redundancies'
Have security	'work picking up'
Have career opportunities	'possibility of promotion'
Lack clarity	'change boundaries'
Have clarity	'stability/continuity'
Negative factors intrinsic to self	'things take me longer'
Positive factors intrinsic to self	'reached a happy level'
Negative extrinsic factors	'new year'
Good physical conditions	'clean kitchen'
<i>Secondary job conditions</i>	
Job	'large task'
Role	'don't know who to feedback to'
Relationships	'get no help from management'
Career	'natural career progression'
Organisation	'set guidelines'
Self	'don't have background knowledge'
Extrinsic	'transition period'

³ Categories that were excluded from the coding scheme or categories for which there were no responses were excluded from the final coding scheme shown here.

Table 4.1. Categorisation Scheme continued.

<i>Personal coping</i>	<i>Examples</i>
Affective Approach	'patience'
Affective Avoidance	'ignore'
Cognitive Approach	'get positive attitude'
Cognitive Avoidance	'I will feel established over time'
Behavioural Approach	'finish calls from start to finish'
Behavioural Avoidance	'become outbound caller'
<i>Managerial support</i>	
Informational support	'reiterate to staff that they are not under pressure'
Instrumental support	'do job for day'
Emotional support	'listen'
Appraisal support	'feedback'
<i>Work process change</i>	
Job	'new repair work'
Role	'more democracy on who does what'
Career	'skills that could help come to forefront'
Relationships	'look after individual needs'
Organisation	'change processes'
Extrinsic	'city learning centre'
<i>Outcomes</i>	
Well-being +	'happiness in work environment'
Well-being -	'tired'
Performance +	'keep motivated'
Performance -	'not dealing with calls'
Minor Physical -	'headache'
Major Physical +	'good heath'
Major Physical -	'heart attack'
Spillover +	'good mood at home'
Spillover -	'lose out on social life'



NB: -ve signs indicate an inverse relationship.

Figure 4.2. Example of a cognitive map

Tables 4.2 through 4.7. summarise the primary job conditions, secondary job conditions, personal coping strategies, managerial support strategies, work process changes and outcomes mentioned by the workers and managers interviewed in this study. A description of some of the more notable features of these results is given after table 4.7.

Table 4.2. Primary job conditions mentioned in the maps

(N=35 workers, N=11 managers)

	<i>Worker mean</i>	<i>Manager mean</i>	<i>Combined mean</i>	<i>Examples</i>
Lack of control	0.143	0.181	0.152	'over monitoring'
Have control	0.171	0.181	0.173	'persuading others'
Lack of skill use	0.000	0.091	0.022	'can only deal with certain queries'
Have skill use	0.171	0.000	0.130	'rely on own skill'
Lack of demand	0.029	0.181	0.065	'lack of work'
Have demands	1.029	1.454	1.130	'being rushed on the job'
Lack variety	0.171	0.000	0.130	'repetitive'
Have variety	0.171	0.000	0.130	'everyday different'
Lack support	0.329	0.181	0.304	'lack of backup'
Have support	0.457	0.636	0.500	'get help from team'
Lack reward or recognition	0.086	0.181	0.108	'lack of acknowledgement'
Have reward or recognition	0.143	0.272	0.174	'money'
Lack security	0.143	0.181	0.152	'fear lose house'
Have security	0.000	0.181	0.000	'work picking up'
Have career opportunities	0.114	0.000	0.000	'new job'
Lack clarity	0.685	0.545	0.652	'no rules'
Have clarity	0.000	0.181	0.000	'know what I am doing'
Negative factors intrinsic to self	0.314	0.181	0.282	'getting back into work'
Positive factors intrinsic to self	0.371	0.000	0.282	'don't dread coming to work'
Negative extrinsic factors	0.000	0.181	0.000	'time of year'
Good physical conditions	0.000	0.181	0.000	'good physical conditions'

Table 4.3. Secondary job conditions mentioned in the maps

(N=35 workers, N=11 managers)

	<i>Worker mean</i>	<i>Manager mean</i>	<i>Combined mean</i>	<i>Examples</i>
Job	0.600	1.000	0.695	'too many calls'
Role	0.257	0.272	0.260	'deal with other peoples problems'
Relationships	0.943	1.363	1.043	'good team'
Career	0.171	0.636	0.173	'natural career progression'
Organisation	1.342	0.727	1.195	'good organisational systems'
Home/Work	0.000	0.091	0.022	'childcare/family'
Self	0.571	0.454	0.543	'state of mind'
Extrinsic	0.371	1.272	0.587	'competitive nature of industry'

Table 4.4. Personal coping strategies mentioned in the maps

(N=35 workers, N=11 managers)

	<i>Worker mean</i>	<i>Manager mean</i>	<i>Combined mean</i>	<i>Examples</i>
Affective Approach	0.029	0.000	0.022	'air feelings'
Affective Avoidance	0.114	0.000	0.108	'patience'
Cognitive Approach	0.542	0.272	0.478	'don't be too self critical'
Cognitive Avoidance	0.228	0.181	0.217	'switch off'
Behavioural Approach	1.228	1.454	1.282	'develop own rota system'
Behavioural Avoidance	0.200	0.000	0.152	'have a pint'

Table 4.5. Managerial support strategies mentioned in the maps

(N=35 workers, N=11 managers)

	<i>Worker mean</i>	<i>Manager mean</i>	<i>Combined mean</i>	<i>Examples</i>
Informational support	0.200	0.727	0.326	'better communication'
Instrumental support	0.857	0.818	0.847	'utilise skills - help people succeed'
Emotional support	0.342	0.909	0.478	'listen to staff'
Appraisal support	0.200	0.181	0.196	'management feedback'

Table 4.6. Work process changes mentioned in the maps

(N=35 workers, N=11 managers)

	<i>Worker mean</i>	<i>Manager mean</i>	<i>Combined mean</i>	<i>Examples</i>
Changes to job	0.171	0.363	0.217	'automatic assembly'
Changes to role	0.114	0.000	0.108	'more democracy on who does what'
Better career development	0.029	0.000	0.022	'clarification who does what'
Interpersonal relationships at work	0.057	0.272	0.108	'better communication with other departments'
Changes to organisational processes	0.743	1.181	0.847	'admin support'
Changes to extrinsic environment	0.114	0.091	0.108	'LEA (local education authority)'

Table 4.7. Outcomes mentioned in the maps

(N=35 workers, N=11 managers)

	<i>Worker mean</i>	<i>Manager mean</i>	<i>Combined mean</i>	<i>Examples</i>
Good well-being	0.828	0.727	0.804	'feel good about self'
Poor well-being	1.371	1.901	1.619	'depressed'
High performance	0.457	1.363	0.673	'quality of work good'
Low performance	0.771	1.636	0.978	'slow time'
Poor minor physical health	0.542	0.363	0.500	'back trouble'
Good major physical health	0.142	0.091	0.130	'less likely to have heart attack'
Poor major physical health	0.457	0.636	0.500	'ill health'
Positive spillover	0.086	0.000	0.065	'nice home life'
Negative spillover	0.400	0.181	0.347	'reduced home time'

Table 4.2. shows that a variety of job conditions were mentioned in relation to affective experience at work, the most frequent being high demands, followed by lack of clarity. Table 4.3. indicates that several factors were considered to be more distal causes of affective experience at work. Factors associated with the organisation and relationships at work were the most frequently mentioned of these more distal factors. Of the coping strategies thought most useful for dealing with affective experiences at work, table 4.4. shows that the most frequently mentioned were coping strategies that could be characterised as indicating 'behavioural approach'. Members of the sample also indicated a variety of managerial support strategies might be useful for dealing with affective experience at work, of which those strategies characterised as comprising instrumental support were the most frequently mentioned (table 4.5). Table 4.6. shows that changes to organisational processes were the most frequently mentioned strategies concerning work processes that the sample thought would be useful for managing affective experience at work. Finally, table 4.7. shows that although members of the sample mentioned a variety of outcomes associated with affective experience at work, the most frequently mentioned consequence was poor well-being.

Tables 4.8, 4.9. and 4.10. show the primary job conditions for people reporting high negative affect, low positive affect and euphoria respectively. Some of the more salient features of these results are described after table 4.10.

Table 4.8. Primary job conditions reported by people with negative affect

Negative affect (N= 12 workers, N=7 managers)

	<i>Worker mean</i>	<i>Manager mean</i>	<i>Combined mean</i>	<i>Example</i>
Lack of control	0.418	0.286	0.236	‘people calling on grey phone’
Have control	0.000	0.000	0.000	
Lack of skill use	0.000	0.143	0.105	‘pressure to be multi-skilled’
Have skill use	0.000	0.000	0.000	
Lack of demand	0.000	0.000	0.000	
Have demands	1.750	2.286	1.947	‘time pressure’
Lack variety	0.167	0.000	0.105	‘monotony’
Have variety	0.000	0.000	0.000	
Lack support	0.500	0.286	0.421	‘not enough staff’
Have support	0.000	0.000	0.000	
Lack reward or recognition	0.250	0.286	0.263	‘not all managers appreciate work’
Have reward or recognition	0.000	0.000	0.000	
Lack security	0.333	0.286	0.315	‘rumour about lateness’
Have security	0.000	0.000	0.000	
Have career opportunities	0.000	0.000	0.000	
Lack clarity	1.500	0.857	1.263	‘not knowing what’s expected’
Have clarity	0.000	0.000	0.000	
Negative factors intrinsic to self	0.167	0.143	0.157	‘being a woman’
Positive factors intrinsic to self	0.000	0.000	0.000	
Negative extrinsic factors	0.000	0.286	0.105	‘redundancies’
Good physical conditions	0.000	0.000	0.000	

Table 4.9. Primary job conditions reported by people with low positive affect

Low positive affect (N=8 workers, N=0 managers)

	<i>Worker mean</i>	<i>Manager mean</i>	<i>Combined mean</i>	<i>Examples</i>
Lack of control	0.000	0.000	0.000	
Have control	0.000	0.000	0.000	
Lack of skill use	0.000	0.000	0.000	
Have skill use	0.000	0.000	0.000	
Lack of demand	0.125	0.000	0.125	'quiet work wise'
Have demands	1.625	0.000	1.625	'need to cram everything into one day'
Lack variety	0.500	0.000	0.500	'call after call no time to speak to customers'
Have variety	0.000	0.000	0.000	
Lack support	0.500	0.000	0.500	'little support from other departments'
Have support	0.000	0.000	0.000	
Lack reward or recognition	0.000	0.000	0.000	
Have reward or recognition	0.000	0.000	0.000	
Lack security	0.000	0.000	0.000	
Have security	0.000	0.000	0.000	
Have career opportunities	0.000	0.000	0.000	
Lack clarity	0.500	0.000	0.500	'constant promises'
Have clarity	0.000	0.000	0.000	
Negative factors intrinsic to self	0.750	0.000	0.750	'getting back into work'
Positive factors intrinsic to self	0.000	0.000	0.000	
Negative extrinsic factors	0.000	0.000	0.000	
Good physical conditions	0.000	0.000	0.000	

Table 4.10. Primary job conditions reported by people with euphoric affect

Euphoria (N=15 workers, N=4 managers)

	<i>Worker mean</i>	<i>Manager mean</i>	<i>Combined mean</i>	<i>Examples</i>
Lack of control	0.000	0.000	0.000	
Have control	0.400	0.500	0.421	'supervision of others'
Lack of skill use	0.000	0.000	0.000	
Have skill use	0.400	0.000	0.315	'own skill'
Lack of demand	0.000	0.500	0.157	'level of work'
Have demands	0.133	0.000	0.105	'fast pace'
Lack variety	0.000	0.000	0.000	
Have variety	0.400	0.000	0.315	'varied job'
Lack support	0.133	0.000	0.105	'lack of interest from supervisor'
Have support	1.000	1.750	1.157	'manager-get on with him'
Lack reward or recognition	0.000	0.000	0.000	
Have reward or recognition	0.333	0.750	0.421	'reasonable pay'
Lack security	0.000	0.000	0.000	
Have security	0.000	0.500	0.105	'work picking up'
Have career opportunities	0.266	0.000	0.210	'possibility of promotion'
Lack clarity	0.133	0.000	0.105	'managers not keeping promises'
Have clarity	0.000	0.500	0.157	'stability-continuity'
Negative factors intrinsic to self	0.200	0.250	0.210	'things take me longer'
Positive factors intrinsic to self	0.866	0.000	0.684	'I do a good job'
Negative extrinsic factors	0.000	0.000	0.000	
Good physical conditions	0.000	0.500	0.157	'clean kitchen'

Table 4.8. shows that ten out of the twelve categories of job conditions were linked with high negative affect, although the most frequently mentioned was high demands, followed by lack of clarity. Demand was also the most frequently linked job condition to low positive affect (table 4.9.). However, in contrast to high negative affect, only five out of the twelve job conditions were associated with low positive affect. Of the job conditions linked to euphoric affect at work, table 4.10. shows that the most frequently mentioned were good support and positive factors intrinsic to self. This suggests that reducing high dysphoria through reducing high

demand and lack of clarity will not necessarily be believed to promote euphoric affect. Eleven out of the twelve job conditions were linked to euphoric affect.

Tables 4.11., 4.12. and 4.13. show the secondary job conditions for people reporting high negative affect, low positive affect and euphoria respectively. A summary of these results is given after table 4.13.

Table 4.11. Secondary job conditions reported by people with negative affect

Negative affect (N=12 workers, N=7 managers)

	<i>Worker mean</i>	<i>Manager mean</i>	<i>Combined mean</i>	<i>Examples</i>
Job	0.583	1.000	0.736	'too many calls'
Role	0.417	0.143	0.316	'not sure of role'
Relationships	0.500	1.429	0.842	'customer nasty'
Career	0.000	0.857	0.105	'need for flexible people'
Organisation	1.750	1.000	1.473	'work processes'
Home/Work	0.000	0.143	0.021	'childcare/family'
Self	0.333	0.286	0.315	'easier to say yes'
Extrinsic	0.750	1.714	1.105	'influence from parent company profit margins'

Table 4.12. Secondary job conditions reported by people with low positive affect

Low positive affect (N=8 workers, N=0 managers)

	<i>Worker mean</i>	<i>Manager mean</i>	<i>Combined mean</i>	<i>Examples</i>
Job	1.000	0.000	1.000	'demand of the job'
Role	0.000	0.000	0.000	
Relationships	0.500	0.000	0.500	'atmosphere on section crap'
Career	0.125	0.000	0.125	'not much work on/job security'
Organisation	1.625	0.000	1.625	'set guidelines'
Home/Work	0.000	0.000	0.000	
Self	0.375	0.000	0.375	'personal things'
Extrinsic	0.250	0.000	0.250	'X contract'

Table 4.13. Secondary job conditions reported by people with euphoric affect

Euphoria (N=15 workers, N=4 managers)

	<i>Worker mean</i>	<i>Manager mean</i>	<i>Combined mean</i>	<i>Examples</i>
Job	0.400	1.000	0.526	'large task'
Role	0.266	0.500	0.315	'new mentor scheme'
Relationships	1.533	1.250	1.473	'can rely on team for help'
Career	0.266	0.250	0.263	'continual appraisal'
Organisation	0.866	0.250	0.736	'clear objectives'
Home/Work	0.000	0.000	0.000	
Self	0.866	0.750	0.842	'got exams & skills'
Extrinsic	0.133	0.500	0.210	'changes in law'

A variety of secondary job conditions were linked to high negative affect, low positive affect and euphoric affect. For negative affect, table 4.11. shows that the most frequently mentioned were factors associated with the organisation and extrinsic factors. Table 4.12. shows that for low positive affect, the most frequently mentioned were factors associated with the organisation. Finally, for euphoria, table 4.13. shows the most frequently mentioned secondary job conditions were factors associated with relationships at work.

Tables 4.14., 4.15. and 4.16. show the personal coping strategies mentioned by members of the sample reporting high negative affect, low positive affect and euphoria respectively. We summarise the more notable features of the results after table 4.16.

Table 4.14. Personal coping strategies reported by people with negative affect

Negative affect (N=12 workers, N=7 managers)

	<i>Worker mean</i>	<i>Manager mean</i>	<i>Combined mean</i>	<i>Examples</i>
Affective Approach	0.000	0.000	0.000	
Affective Avoidance	0.250	0.000	0.157	'stay calm'
Cognitive Approach	0.750	0.286	0.578	'think calm thoughts'
Cognitive Avoidance	0.416	0.143	0.315	'ignore'
Behavioural Approach	1.667	1.571	1.163	'do job quicker'
Behavioural Avoidance	0.333	0.000	0.215	'leave'

Table 4.15. Personal coping strategies reported by people with low positive affect

Low positive affect (N=8 workers, N=0 managers)

	<i>Worker mean</i>	<i>Manager mean</i>	<i>Combined mean</i>	<i>Examples</i>
Affective Approach	0.125	0.000	0.125	'air feelings'
Affective Avoidance	0.125	0.000	0.125	'keep calm'
Cognitive Approach	0.125	0.000	0.125	'discuss with manager'
Cognitive Avoidance	0.125	0.000	0.125	'go talk to people in other department'
Behavioural Approach	1.000	0.000	1.000	'work harder'
Behavioural Avoidance	0.375	0.000	0.375	'go to gym'

Table 4.16. Personal coping strategies reported by people with euphoric affect

Euphoria (N=15 workers, N=4 managers)

	<i>Worker mean</i>	<i>Manager mean</i>	<i>Combined mean</i>	<i>Examples</i>
Affective Approach	0.000	0.000	0.000	
Affective Avoidance	0.000	0.000	0.000	
Cognitive Approach	0.600	0.250	0.526	'get positive attitude'
Cognitive Avoidance	0.133	0.250	0.157	'forget about it'
Behavioural Approach	1.000	1.250	1.052	'do as told'
Behavioural Avoidance	0.000	0.000	0.000	

Table 4.14. shows that from the five out of six categories of coping strategies mentioned as effective for dealing with high negative affect at work, the most frequently mentioned were strategies that could be characterised as behavioural approach and cognitive approach. Table 4.15. shows that all six of the coping categories were mentioned as effective ways to reduce the low positive affect at work. Of these, the most frequently mentioned were coping strategies that could be characterised as indicating behavioural approach. Table 4.16. shows that only three out of the six broad coping strategies were mentioned as useful for enhancing euphoric affect at work. The most frequently mentioned strategies with respect to euphoric affect were strategies that could be characterised as indicating behavioural approach and cognitive approach.

Tables 4.17., 4.18. and 4.19. show the managerial support strategies mentioned by members of the sample reporting high negative affect, low positive affect and euphoria respectively. The main features of these results are summarised after table 4.19.

Table 4.17. Managerial support strategies reported by people with negative affect

Negative affect (N=12 workers, N=7 managers)

	<i>Worker mean</i>	<i>Manager mean</i>	<i>Combined mean</i>	<i>Examples</i>
Informational support	0.333	0.571	0.421	'managers share information'
Instrumental support	0.916	1.000	0.947	'set up advisory council'
Emotional support	0.416	0.714	0.526	'senior managers understand'
Appraisal support	0.250	0.287	0.263	'feedback from management'

Table 4.18. Managerial support strategies reported by people with low positive affect

Low positive affect (N=8 worker, N=0 managers)

	<i>Worker mean</i>	<i>Manager mean</i>	<i>Combined mean</i>	<i>Examples</i>
Informational support	0.000	0.000	0.000	
Instrumental support	0.875	0.000	0.875	'tougher management'
Emotional support	0.250	0.000	0.250	'manager listen'
Appraisal support	0.250	0.000	0.250	'more positive feedback'

Table 4.19. Managerial support strategies reported by people with euphoric affect

Euphoria (N=15 workers, N=4 managers)

	<i>Worker mean</i>	<i>Manager mean</i>	<i>Combined mean</i>	<i>Examples</i>
Informational support	0.200	1.000	0.368	'manager always available for advice'
Instrumental support	0.800	0.500	0.736	'greater delegation'
Emotional support	0.333	1.250	0.526	'support'
Appraisal support	0.133	0.000	0.105	'service quality better if feedback'

Tables 4.17. and 4.19. show that all four managerial support strategies were mentioned as effective ways of reducing high negative affect or enhancing euphoric affect respectively. Table 4.18. shows that three out of the four managerial support strategies were mentioned as effective ways of dealing with low positive affect. In all cases, instrumental support from managers was mentioned as the most effective type of support.

Tables 4.20., 4.21. and 4.22. show the work process changes mentioned by members of the sample reporting high negative affect, low positive affect and euphoria respectively. The most notable features of these results are described after table 4.22.

Table 4.20. Work process changes reported by people with negative affect

Negative affect (N=12 workers, N=7 managers)

	<i>Worker mean</i>	<i>Manager mean</i>	<i>Combined mean</i>	<i>Examples</i>
Changes to job	0.250	0.428	0.315	‘allow advisor to do more’
Changes to role	0.000	0.000	0.000	
Better career development	0.000	0.000	0.000	
Interpersonal relationships at work	0.000	0.143	0.105	‘get teams together’
Changes to organisational processes	0.917	1.000	0.947	‘change processes’
Changes to extrinsic environment	0.250	0.143	0.210	‘city learning centre’

Table 4.21. Work process changes reported by people with low positive affect

Low positive affect (N=8 worker, N=0 managers)

	<i>Worker mean</i>	<i>Manager mean</i>	<i>Combined mean</i>	<i>Examples</i>
Changes to job	0.000	0.000	0.000	
Changes to role	0.250	0.000	0.250	‘more democracy who does what’
Better career development	0.125	0.000	0.125	‘clarification who does what’
Interpersonal relationships at work	0.000	0.000	0.000	
Changes to organisational processes	1.125	0.000	1.125	‘remove stupid rules’
Changes to extrinsic environment	0.125	0.000	0.125	‘Local Education Authority’

Table 4.22. Work process changes reported by people with euphoric affect

Euphoria (N=15 workers, N=4 managers)

	<i>Worker mean</i>	<i>Manager mean</i>	<i>Combined mean</i>	<i>Examples</i>
Changes to job	0.200	0.250	0.210	‘less repetitiveness in job’
Changes to role	0.133	0.000	0.105	‘let me do other people’s work’
Better career development	0.000	0.000	0.000	
Interpersonal relationships at work	0.133	0.500	0.210	‘look after individual needs’
Changes to organisational processes	0.400	1.500	0.631	‘roster teams so can have same lunch break’
Changes to extrinsic environment	0.000	0.000	0.000	

Tables 4.20., 4.21. and 4.22 show that for each major category of affective experience, members of the sample mentioned four out of seven work process change strategies as effective ways to manage affective experience. However, for each category of affective experience, the four strategies mentioned differed. Only one strategy - changes to organisational processes - was mentioned in respect to all three of high negative affect, low positive affect and euphoric affect. In each case, this strategy was also the most frequently mentioned work process change strategy.

Tables 4.23., 4.24. and 4.25. show the outcomes mentioned by members of the sample reporting high negative affect, low positive affect and euphoria respectively. The most salient features of these results are summarised after table 4.25.

Table 4.23. Outcomes reported by people with negative affect

Negative affect (N=12 workers, N=7 managers)

	<i>Worker mean</i>	<i>Manager mean</i>	<i>Combined mean</i>	<i>Examples</i>
Good well-being	0.167	0.142	0.157	'proud'
Poor well-being	2.033	2.426	2.368	'stressed'
High performance	0.167	0.000	0.105	'good performance'
Low performance	1.000	2.426	1.568	'mistakes'
Poor minor physical health	0.750	0.428	0.631	'smoke more'
Good major physical health	0.000	0.000	0.000	
Poor major physical health	0.667	0.428	0.578	'heart attack'
Positive spillover	0.000	0.000	0.000	
Negative spillover	0.833	0.286	0.631	'home life suffers'

Table 4.24. Outcomes reported by people with low positive affect

Low positive affect (N=8 workers, N=0 managers)

	<i>Worker mean</i>	<i>Manager mean</i>	<i>Combined mean</i>	<i>Examples</i>
Good well-being	0.625	0.000	0.625	'happy'
Poor well-being	1.375	0.000	1.375	'unhappy'
High performance	0.250	0.000	0.250	'provide people with skills to move on'
Low performance	1.750	0.000	1.750	'reduced performance'
Poor minor physical health	0.750	0.000	0.750	'headache'
Good major physical health	0.000	0.000	0.000	
Poor major physical health	0.875	0.000	0.875	'death'
Positive spillover	0.000	0.000	0.000	
Negative spillover	0.250	0.000	0.250	'social life affected'

Table 4.25. Outcomes reported by people with euphoric affect

Euphoric affect (N=15 workers, N=4 managers)

	<i>Worker mean</i>	<i>Manager mean</i>	<i>Combined mean</i>	<i>Examples</i>
Good well-being	1.466	1.750	1.526	'feel good'
Poor well-being	0.800	1.000	0.947	'feel bored'
High performance	0.800	3.750	1.421	'better performance'
Low performance	0.000	0.250	0.105	'don't deal with calls'
Poor minor physical health	0.266	0.250	0.263	'tired'
Good major physical health	0.333	0.250	0.315	'live longer'
Poor major physical health	0.000	1.000	0.263	'repetitive strain'
Positive spillover	0.200	0.000	0.157	'nice home life'
Negative spillover	0.133	0.000	0.105	'loose out on social life'

Tables 4.23 and 4.24. show that all five categories of negative outcomes were linked to high negative affect and low positive affect at work. The most frequently mentioned negative outcomes with respect to both high negative affect and low positive affect were poor well-being and poor performance. Table 4.25. shows that four out of five positive outcomes were mentioned as resulting from high euphoria at work. Of these, the most frequently mentioned were good well-being and high performance. Interestingly, tables 4.23. and 4.24. show that high negative affect and low positive affect are not always linked to negative outcomes. Conversely, table 4.25. shows that euphoric affect is not always linked to high positive outcomes.

4.4. Conclusion

The qualitative phase of research set out to explore these questions: i) do people hold mental models of psychosocial hazards at work? ii) can mental models be represented? and iii) what are mental models of affective experience comprised of? We will deal with each of these questions in turn below.

i) Do people hold mental models of psychosocial hazards at work?

Working from a methodology that required participants to explain perceived causes and consequences of affective experience at work, participants were able to explain the primary causes (immediate psychosocial hazards), more distal causes (higher level psychosocial hazards) and consequences of the affective experience, as well as possible risk reduction strategies. Further, managers were also able to articulate what they believed to be the primary causes, more distal causes, consequences and possible risk reduction strategies in relation to affective experience within the teams that they manage. We can then conclude that both workers and managers have elaborate mental models of psychosocial hazards at work.

There were some similarities between the managers' and workers' mental models. Overall the most frequently mentioned job condition by both managers and workers was high demand. However, managers linked job conditions more frequently to extrinsic factors and relationship factors, whilst the workers linked job conditions to the organisation. Both managers and workers favoured behavioural strategies for personal risk reduction, although the workers

mentioned instrumental managerial support more frequently, whilst the managers mentioned that they could offer more informational and emotional support, as well as instrumental support. Changes to the organisational processes were by far the most frequently mentioned risk reduction strategies by both groups, with poor well-being mentioned most frequently as an outcome of affective experiences and psychosocial hazards at work.

ii) Can mental models be represented?

Mental models of psychosocial hazards at work could be represented by the visual card sort method, as used in this research.

During the mapping interview, concepts were mapped in the participant's own words and the maps were presented to the participant to ensure that the map was a valid representation of what the participant had told the interviewer. Further, an examination and comparison of the job conditions associated with dysphoria and euphoria indicates a number of findings that can be taken to support the validity of the mapping procedure. Attributions of causes and consequences of affect at work vary according to the specific form of affect that has been identified. The concepts elicited in relation to both classes of dysphoric affect were not, for the most part, associated with the obverse of the concepts associated with euphoric affect. This provides some evidence for the validity of the mapping procedure, since it has long been thought that euphoric and dysphoric affect at work may have different causes (Herzberg, 1966).

iii) What are mental models of affective experience comprised of?

Mental models included information concerning job conditions at work: they also included information concerning affect; consequences (goals); outcomes such as performance; ways of coping with the job conditions; and other risk reduction strategies to deal with problems. Both managers and workers reported perceived links between their affective experiences and a number of job conditions. The most frequently mentioned job condition was high demand, such as 'being rushed on the job'. Several factors were considered to be more distal causes of affective experience at work, the most frequently mentioned were factors associated with organisational processes such as 'set guidelines'. A variety of coping strategies were mentioned to deal with affective experience at work the most frequent being behavioural approach, such as 'do as told'. Managerial support was also mentioned by participants, the most frequent mentioned being instrumental support such as 'employ more staff'. A variety of work process changes were also mentioned in the maps, the most frequent being changes to organisational processes such as 'start job earlier'. The outcomes mentioned by participants included poor well-being such as 'stress', good well-being such as 'happy in work environment', poor performance such as 'decreased performance', good performance such as 'more motivated', poor physical health such as 'headaches', good physical health such as 'more healthy' and spillover such as 'take work home with me'.

The affective experiences reported by the workers and managers could be classified as high negative affect, low positive affect and euphoric affect. The most frequently mentioned job condition linked to negative affect at work was high demand followed by lack of clarity for the workers. The managers linked negative affect in their teams to high demand. Although the managers linked lack of clarity to negative affect more frequently than any job condition excepting high demand, they did not do so to the same extent as the workers. The workers and the managers linked the job conditions to organisational factors. The workers mentioned behavioural coping strategies as ways to reduce their affective experience or deal with the job conditions. The managers also mentioned that their workers could use behavioural coping strategies to deal with their affective experiences. When asked if the managers could support them in any way to deal with their high negative affect, the workers mentioned instrumental

support most frequently, and the managers also mentioned that they could offer instrumental support to their workers. The most frequently mentioned work process changes to deal with the negative affect or the job conditions that were linked to the negative affect were changes to the organisational processes. Changes to organisational processes were the most mentioned work process changes by the managers also. The workers mentioned poor well-being as resulting from their affective experience at work, although the managers also felt that their workers performance suffered as a result of high negative affect in addition to reduced well-being.

Only the workers mentioned low positive affect as a frequently experienced affect at work. The most frequently mentioned job condition linked to low positive affect was high demand. Organisational processes were associated with high demand at work. Behavioural coping strategies were mentioned as ways to accentuate the experience of low positive affect or to deal with the job conditions. When asked if the managers could support them in any way to accentuate the experience of low positive affect, the workers mentioned instrumental support most frequently. The most frequently mentioned (by workers) work process change to accentuate the experience of low positive affect or the job conditions that were linked to that class of affect were changes to organisational processes. The workers mentioned poor performance as resulting from low positive affect at work.

For the workers, the most frequently mentioned job condition linked to euphoric affect at work was support. The managers linked high euphoria in their workers to high support and reward. The workers linked the job conditions to interpersonal relationships at work, as did the managers. The workers mentioned behavioural coping strategies as ways to enhance their affective experience or deal with the job conditions. The managers also mentioned that their workers could use behavioural coping strategies to deal with their affective experiences. When asked if the managers could support them in any way to enhance their high euphoria the workers mentioned instrumental support most frequently, and the managers mentioned that they could offer emotional support to their workers. The most frequently mentioned work process changes to enhance high euphoria or the job conditions that were linked to the high euphoria were changes to organisational processes. Changes to organisational processes were the most frequently mentioned work process changes by the managers also. The workers mentioned good well-being as resulting from their affective experience at work, although the managers felt that their workers' performance would be enhanced as a result of euphoric affect at work.

In answering the three questions addressed in this study, it is clear that people can articulate elaborate mental models of psychosocial hazards, in which distinct affective experiences are linked to a variety of proximal and distal psychosocial hazards; harmful and organisationally important outcomes; and personal, managerial and organisational risk reduction strategies. In the next phase of the research, in a series of diary studies, we explore whether mental models of psychosocial hazards can have real consequences for important personal and organisational outcomes.

5. Diary studies

One major purpose of the three diary studies reported here is to determine whether mental models of psychosocial hazards have any effects on important personal and organisational outcomes – such as affective psychological well-being, physical symptoms and work performance. Another major purpose is to examine whether mental models of psychosocial hazards influence the enactment of those psychosocial hazards – either individually or collectively. If such effects exist, then there is evidence that a cognitive approach to understanding psychosocial hazards may realise important practical benefits to help complement and enhance existing approaches to psychosocial risk assessment and management. Before we describe the three diary studies, we outline why we used a diary methodology for this phase of the research and some of the specialised analytical methods used to analyse quantitative diary data.

5.1. Diary study methodology

The aim of this section of the report is to provide an overview of the daily diary approach. By diary studies, in the context of this research, we mean methods that adopt frequently repeated *quantitative* measures of variables such as work events, affect, performance and physical symptoms.

The use of cross-sectional, between persons designs to answer questions about day to day associations among events, moods and behaviour has come under increasing criticism in the stress and coping literature (Stone & Shiffman, 1992; Affleck & Tennen, 1996). Within the fields of social and applied psychology, there appears to be an emerging interest in research methods that involve the study of patterns of change within individuals over time, in which many variables may be measured on many occasions for each individual (Larsen, 1987). This is partly motivated by the recognition that psychologists know relatively little of the processes by which individuals change over time – and in particular, of how the changes in mental states and performance are affected by the individual's experience at work.

Methods which involve the repeated collection of data over more than one occasion are longitudinal. Longitudinal research enables the investigation of differences between people, between situations and differences between the ways in which different people react to the same situations. However the main limitation of most longitudinal studies is that they tend to rely on simple before and after comparisons, rather than focusing on developing processes. Diary studies can capture the ways that people react to many different situations on a number of occasions over a period of time.

The idea that we need to turn our attention to developing processes can be traced back to Allport (1940), who called for greater attention to how psychological content and processes differ among individuals. Allport distinguished idiographic research (within person), which is sensitive to the particulars of individuals, from nomothetic research, (between person) which strives toward broad generalisations about people. Typically the nomothetic approach seeks to examine the extent to which one person's score on one variable is associated with his or her score on another variable. Typically between person studies focus on dispositions, providing insights into relatively stable differences among people. The idiographic approach typically seeks to examine the association between one person's score on one variable and their score on another variable over several occasions. Studies that focus on within person variability highlight fluctuations that are salient from a person's own perspective. Although within person processes are generally recognised to be statistically independent of between –person processes,

the conceptual difference between these levels of analysis is sometimes overlooked (Gable & Reis, 1999). By combining both approaches - from all occasions and from all people we can determine whether two variables are associated in the same way for all people. Diary studies can thus be used to examine psychological processes idiographically and nomothetically.

5.1.1. Diary studies in the current research

There are several advantages of using diary studies in the type of research reported here.

First, recent research has indicated that work events exert a significant role on psychological and physiological well-being (e.g. Barling & MacIntyre, 1993). Affective well-being is likely to vary daily according to events and situations at work. The diary methodology can capture fluctuations in work events, affect, performance and physical symptoms on a daily basis (repeated measurement of data within persons) over a number of people with different mental models (between persons).

Second, diary studies have a number of methodological advantages for demonstrating causality. They can be used to explore lagged effects, for example in the current research we wanted to control for mood before work. They also allow us to measure mental models before outcomes. Therefore diary studies enable us to conclude with greater certainty that variables are causally related to one another. Diaries can also be used to examine moderator effects in addition to simple linear relationships. For example it is possible in the current research to examine whether trait variables moderate the association between variables collected on a daily basis.

Third, a problem with the use of cross-sectional designs is that individuals report events and outcomes long after their occurrence. Individuals may distort or underestimate recollection of stressful events (Turner & Wheaton, 1995). To address the problems of cross-sectional designs, researchers have turned to daily process designs because they minimise retrospective bias and better capture temporal contingencies predicted by theoretical models of stress. Diary studies result in more accurate data because data are recorded closer to when things happen. If data are collected closer to the time when events occur (such as before and after work), the data are less likely to suffer from problems with retrospective recall, distortions of memory and exaggeration of mood states (Parkinson, Briner, Reynolds & Totterdell, 1995). In this way diary methods can help us to identify more accurately whether mental models really do influence important outcomes.

The current research adopted an interval contingent diary methodology - with recording twice daily before and after work. We also collected questionnaire measures before the diary to examine the extent to which mental models and a number of trait variables influenced daily variation in affect, performance, goal achievement, physical symptoms and psychosocial hazards.

5.2. Hierarchical data

Hierarchical data structures are common throughout many areas of research. For example people exist in organisations, within functional units and within discrete work teams. Data gathered repeatedly from the same set of people are also hierarchical, as observations are nested within individuals. Despite the prevalence of hierarchical structures in everyday research, past studies have failed to address them adequately in data analysis (Bryk & Raudenbush, 1992). This has resulted from inadequate statistical techniques for modelling hierarchy.

5.2.1. Why are hierarchical data an issue?

Hierarchical data present several problems for analysis.

First, people that exist in hierarchies tend to be more similar to each other than people randomly sampled from the population. Similarly, repeated measures data tends to be more similar within people than between people. For example ratings of mood and hazards over a period of 1 week will be more highly correlated within each person than between people. This is because daily mood and hazard ratings are not independent of demographic factors, personality and other variables such as mental models. Therefore, individual within person observations are not fully independent. However most analytical procedures require independence of observations. This basic assumption is violated in the presence of hierarchical data, and hence ordinary least squares (OLS) regression produces standard errors that are too small. This in turn leads to higher probability of finding spurious significant effects than if more appropriate statistical analysis was used or if the data were comprised of independent observations.

Second, when the outcomes are gathered at one level of analysis and the predictors are gathered at another level, the question arises as to what level the analysis should be and how to deal with the cross-level data. One strategy would be to bring the trait level variables down to the daily level variables, but again there is a problem with the non-independence of observations. Another strategy may be to aggregate up to the trait level, however we then lose daily variability in the outcome, and the outcome changes from a daily variable to an average variable.

5.2.2. Hierarchical linear modelling

Hierarchical linear modelling (HLM) is an analytical technique that enables the researcher to hypothesise about relations at different levels of analysis and across different levels of analysis (Raudenbush, Bryk, Cheong & Congdon, 2000).

Hierarchical linear models address a problem that has existed for decades for research with hierarchical data. The nested structure of daily outcomes within persons for example produces a different variance at each level for the factors measured at that level. At the daily level, there is variance between and within people on predictor - outcome associations. Because the characteristics are measured at different levels, they should not be put into an equation that predicts daily level outcomes at only one level.

The basic concept behind HLM is similar to OLS regression. On the base level (the level 1 or, in the case of this study, daily level), the analysis is similar to that of OLS regression: an outcome variable is predicted as a function of a linear combination of one or more level 1 variables plus an intercept, so:

$$Y_{ij} = \beta_{0j} + \beta_{1j}X_1 + \dots + \beta_{kj}X_k + r_{ij}$$

Where Y_{ij} is the outcome variable for person j and day i . β_{0j} represents the intercept for person j . β_{1j} represents the slope of variable X_1 (e.g. daily hazards) of person j , and r_{ij} represents the residual for daily effects within person j . On subsequent levels, the level 1 slopes and the intercept become dependent variables that can vary between people and hence can be predicted from level 2 – or personal level - variables:

$$\beta_{0j} = \gamma_{00} + \gamma_{01}W_1 + \dots + \gamma_{0k}W_k + U_{0j}$$

$$\beta_{1j} = \gamma_{10} + \gamma_{11}W_1 + \dots + \gamma_{1k}W_k + U_{1j}$$

Where γ_{00} and γ_{10} are the intercepts and γ_{01} and γ_{11} represent the slopes predicting β_{0j} and β_{1j} respectively from variable W_1 (e.g. mental model). Through this process we accurately model the effects of level 1 variables on the outcome, and the effects of level 2 (or in this study, person level) variables on the outcome. In addition as we can predict slopes as well as means (intercepts), we can also model cross-level interactions (e.g. does mental model moderate the hazards-well-being slope), so that we can attempt to explain individual differences in the relationship between level 1 variables and the outcome. It is also possible to have third level (in this research, group level), in which level 2 and level 1 intercepts and slopes are predicted from variables measured at this third level.

HLM has several advantages for the current research. First, it can model the between and within person variance at the same time, and thus produce more accurate estimates of daily outcomes. Second, and following from the first advantage, HLM can explain daily outcomes such as affect, physical symptoms, goal achievement or performance as a function of person or trait-level characteristics while taking into account the variance of daily outcomes within people. Third, HLM can model collective group effects. Finally, it can produce better estimates of the predictors of daily outcomes within people, by bringing this information together with information from other people in the sample (Bryk & Raudenbush, 1992).

5.2.3. Some other issues

There are several choices to be made when using HLM to model diary data (see e.g. Bryk & Raudenbush, 1992; Gavin & Hofmann, 1998). We explain these choices in this section.

Location of level 1 independent variables

It is essential that the variables under study have meaning, so that the statistical results can be related to the theoretical concerns of the research. In the case of hierarchical linear models, the intercept and the slopes in the level 1 model become outcome variables at level 2. It is vital that the meanings of these level 1 variables can be fully understood.

The meaning of the intercept in the level 1 model depends on the location of the level 1 independent variables. Similarly the interpretations regarding the intercepts of the level 2 variables depend on the location of the level 2 independent variables. There are four possibilities for the location of the level 1 independent variables; the natural metric (uncentred), centring around the grand mean, centring around the mean for each individual and other locations.

The uncentred option uses variables in their natural metric. This method is appropriate in situations in which the independent variable has restricted range. However if the independent variables have variability around their mean and their mean is greater than zero then this option should not be used. This option can be used when the independent variable is dummy coded (e.g. 0,1), as the mean of the dummy variable is not always meaningful.

Centring around the grand mean implies that the independent variables are centred around the grand mean by subtracting each participant's value on the independent variable from the mean of all participants' scores. For example, if the grand mean well-being score of the sample was 44, a person with a well-being score of 44 would have a grand-mean centred value of 0, which is equal to the intercept.

Centring around the individual mean implies that each person's mean for the independent variable is subtracted from person's individual mean score on the independent variable – that is,

that person's average score over the period of the study. When the independent variables are centred in this way, the intercept therefore represents the average for the person. For example, if a person had a mean well-being score of 44 and another person had a mean well-being score of 54, each individual would have a different mean for the same outcome variable. A daily well-being score of 46 for the first person would result in an individual mean-centred value of 2 for the independent variable as the score is above the average for that person in general. If the second person's daily well-being score was 54, the individual mean centred value for the independent variable would be 0 as the score is at the average for that person in general. Other locations can be used for the current research, although we consider them inappropriate (see Bryk & Raudenbush, 1992 for a full discussion).

The current research used centring around the individual mean to build the HLM equation in order to be able to interpret the intercepts of the within-unit equations in the following way. The intercept is the level of average outcome (e.g. affective well-being after work) for each person at their 'average' level of independent variable (e.g. daily exposure to hazards). In this way, it is possible to control for differences between people in the level 1 independent - outcome relationship. However, as we explain below, there were some instances during the modelling in which after an initial examination of the results, we decided to use grand mean centring. We explain the reasoning for this below.

Although there is no real 'average' level of predictor or control variables (e.g. daily exposure to hazards, affective well-being before work), the outcome (e.g. affective well-being after work) can be seen as the average outcome before the effects of the predictor and control variables have been taken into account. Since the intercept becomes the dependent variable in the first between-person equation, this equation can be interpreted as predicting the average outcome in each person overall. This provides a baseline level of average outcome (affective well-being after work) that the independent variables (hazards and affective well-being before work) can then alter.

Location of level 2 predictors

The choice of location of the level 2 predictors is not as critical as for the level 1 predictors, so they can be centred around their grand means (Bryk & Raudenbush, 1992).

Fixed or random slopes for level 1 predictors

A major class of applications in HLM involves studies in which level 1 slopes of the independent variables are conceived as varying randomly over the level 2 units. A random coefficient model allows the researcher to estimate the variability in the intercept and slope of the independent variables across level 2 units. In contrast, a fixed model assumes that the slope of the independent variable on the dependent variable (or in rare cases the intercept) is the same for all level 2 units. In the current research the level 1 independent variables were centred around the individual mean and allowed to vary randomly. For example, the association between the independent variable (daily exposure to hazards) and the outcome (affective well-being after work) was assumed to vary according to some level 2 independent variable. If the level 1 independent variables exhibited non-random effects on the slope of the outcome variable, they were grand centred and fixed. The reason why they were fixed is because we could assume that they did not vary according to some level 2 independent variable and the impact that the level 1 independent variable had on the outcome was uniform across the sample. The reason why the independent was grand-mean centred was because the analysis of the random slope revealed that there were no significant differences in the individual means of the independent variable. In other words there is no variability in the independent variable due to individual differences

between people, and thus the independent variable could be centred around the grand mean of the sample.

5.3. Diary study 1

In this first quantitative study, the aim was to examine whether mental models of work conditions influence well-being before work, well-being after work, achievement of work goals and behaviours related to performance. We expected that people who believed that work conditions adversely influenced well-being or goal achievement would have lower well-being, report less achievement of their goals and have lower performance. We also investigated whether the nature of the relationship between mental models and these variables was dependent upon well-being before work and the personal importance of work goals.

5.3.1. Method

Participants

Participants were 22 workers at a call centre who volunteered for the study. The call centre was part of a larger telecommunications company. Participants' work required them to take telephone calls from customers concerning questions and problems with the company's products. Eleven of the sample were male, and two declined to give their gender on a questionnaire to elicit biographic information. On average, participants were 33.5 years of age (SD=11.3 years), had been working for the company in the same role for 2.6 years (SD=2.4 years). Participants worked different shifts. The first shift began at 8am. The last shift began at 3pm. Shifts lasted between 4 and 8 hours. The majority began work between 8am and 10am during the period of the study. Most of the participants worked shifts between Monday and Friday, although half the sample worked shifts on a Saturday, and eight worked shifts on a Sunday.

Procedure

Each participant completed a questionnaire a few days before they started to complete daily diaries. This questionnaire included information on mental models of work events in call centres, measures of trait well-being and demographic information. Participants were also given a diary booklet containing measures of well-being, goal achievement and goal importance. Participants were instructed to commence completing the diary on Monday at the beginning of data collection and then every working day for a period of 12 days (Monday to Friday the following week). Participants were emailed in work every day to remind them to complete the diary that day.

On every day, the diary consisted of two parts, for completion just before work and just after work respectively. Participants were required to complete the first part of the diary on every day of the study, whether in work or not. The participants responded 228 times in total, out of a maximum of 264 opportunities. This gave a compliance rate of 86.4% for this part of the diary. The participants completed the second part of the diary after work on 137 occasions, out of 192 opportunities (after taking into account absence and scheduled days off work). This gave a compliance rate of 71.3% for this part of the diary. Missing data of this amount is not unusual for daily diary studies (Totterdell, Kellert, Teuchmann & Briner, 1998). A participant's daily data were excluded from analysis if a participant was not at work, for whatever reason, on that day.

Measures

The Questionnaire

Mental models of work conditions. Participants were required to rate two commonly occurring conditions in call centre environments on a number of scales. The conditions were low variety in work tasks and high level of demands. Research indicates that these conditions are related to poor well-being (Warr, 1987). These situations were identified as common sources of poor well-being in call centre staff during the qualitative phase of this research programme. For each work condition, participants rated the extent to which that condition was perceived to decrease the chances of achieving common work goals and the extent to which that condition was perceived to decrease affective well-being. For goals, participants were asked to rate the extent to which each work situation decreased job satisfaction; made it more difficult to get on with people at work; decreased the participant's influence on work; prevented the participant from doing their job well; reduced the participant's status at work; and made it more difficult for the participant to feel a sense of purpose at work. For well-being, participants were asked to rate the extent to which each situation made participants feel anxious, angry, bored, unhappy, depressed, less relaxed and less enthusiastic. Ratings were made on a five point scale (1=never true, 5=always true). The goals were chosen to represent some of the major goals people pursue at work and the affects to represent some of the major dysphoric reactions to work (Daniels *et al.*, 2001).

Since perceived impact on goal achievement and well-being were rated for two work situations, then measures were taken of a total of four mental models: demands on goal achievement (mean=23.8, SD=7.2, $\alpha=0.66$); low variety on goal achievement (mean=29.0, SD=7.5, $\alpha=0.64$); demands on well-being (mean=18.9, SD=7.2, $\alpha=0.85$); and low variety on well-being (mean=23.1, SD=5.6, $\alpha=0.75$). High scores on all scales indicate the situation is perceived to reduce goal achievement or well-being.

Trait affective well-being at work. Participants were asked to indicate how they normally felt at work for 20 mood adjectives (active, alert, angry, annoyed, anxious, at ease, bored, calm, cheerful, depressed, enthusiastic, gloomy, happy, motivated, patient, relaxed, sleepy, sluggish, tired and worried). These 20 adjectives were selected from 30 mood adjectives found to be valid indicators of the major elements of affective well-being in the workplace (Daniels, 2000). Each adjective was rated on a 6 point scale (1=Never to 6=All of the time). Items were coded such that high scores indicated good affective well-being. Items were summed to given an overall well-being score (mean=83.3, SD=10.9, $\alpha=0.86$).

The Diary. The diary was divided into two parts, before work and after work.

Part one was completed before work. Measures were taken of affective well-being before work and goal importance.

Affective well-being before work was measured by asking participants to rate how they felt on 20 mood adjectives. These were the same adjectives used in the questionnaire to assess trait affective well-being. Participants were asked to rate how they felt at the time of completing the diary on a 5 point scale (1=Not at all, 5=Very much). Items were again coded such that high scores indicated good well-being. Items were summed to give an overall well-being before work score (mean=73.9, SD=12.3, $\alpha=0.91$).

Goal importance was measured by asking participants to rate each of six goals. These were the same six goals used to assess mental models of goal achievement for variety and demands (i.e.

job satisfaction, getting on with people at work, being able to influence work, good performance, high status and having a sense of purpose at work). These goals were rated on a 9 point scale (1=not at all important, 9=essential). The items were summed to give an overall importance scale and divided by the number of items in the scale. High scores indicate greater importance in achieving work related goals (mean=8.7, SD=6.5, α =0.86).

Part two

Affective well-being after work was measured by asking participants to rate how they felt on 20 mood adjectives. These were the same adjectives used to assess trait affective well-being and well-being before work. Participants were asked to rate how work has made them feel that day on a 5 point scale (1=Not at all, 5=Very much). Items were again coded such that high scores indicated good well-being. Items were summed to give an overall well-being after work score (mean=63.2, SD=14.0, α =0.91).

Goal achievement was measured by asking participants to rate the extent each of six goals had been achieved on that day. These were the same six goals used to assess goal importance and mental models of goal achievement for variety and demands. Participants were given four options to rate each goal (1=not at all, 2=some of the day, 3=most of the day, 4=all day). The items were summed to give an overall goal achievement scale and divided by the number of items in the scale. High scores indicate greater goal achievement (mean=2.5, SD=1.4, α =0.77).

Performance measurement. For 11 participants, data were available on the average number of calls handled per hour during the participant's shift. More extensive data were not available due to some participants performing other tasks other than handling calls on some days and technical difficulties experienced logging this information. Nevertheless, average calls per hour was taken as a key performance indicator by the organisation. There were explicit targets for average calls per hour. For our purposes it is an objective, behavioural measure of performance.

Analytic procedure

Data were analysed using hierarchical linear modelling. The following variables were chosen as dependent variables in the analyses: well-being before work, well-being after work, daily goal achievement and average calls per hour. One tailed significance tests were used where a relationship was expected in a given direction, as noted in the overview to this investigation. The following procedures were used.

First, the effects of person level variables from the questionnaire on each dependent variable were modelled. These were trait affective well-being and the measures of four mental models – demands on goals, low variety on goals, demands on well-being and low variety on well-being. Initially, each variable was regressed separately onto each dependent variable. Each variable that had a significant effect ($p < .05$) when regressed separately was then entered with all other significant effects. Non-significant effects were dropped from this composite equation: significant ($p < .05$) and marginally significant effects ($p < .10$) were retained. The combined effects of significant and marginally significant effects were then examined: effects that were no longer significant or marginally significant were dropped ($p > .05$). A final composite person level equation then included only variables with a significant effect on the dependent variable.

Second, the impact of daily variables was examined on well-being after work, goal achievement and average calls per hour. There were no relevant daily variables for well-being before work. For well-being after work, the effects of goal achievement, goal importance and well-being before work were examined. For goal achievement, the effects of goal importance and well-

being before work were examined. For average calls per hour, the effects of goal importance and well-being before work were examined. Each independent variable was regressed separately onto the dependent variable. Initially, slopes were allowed to vary between individuals. If analyses indicated that the slope of the independent variable onto the dependent variable was not random ($p > .20$)⁴, it was fixed. The fixed dependent variable was then regressed again onto the dependent variable. If the regression coefficient was not significant ($p > .05$), the independent variable was eliminated from further consideration. Independent variables with significant regression coefficients ($p < .05$) or with significant variation in slopes between people ($p < .20$) were retained for further analysis.

Where slopes were judged to be random, person level variables from the questionnaire were used to model variation in slopes between participants. Each person level variable was entered alone. Person level variables that were not significant were eliminated from further consideration ($p > .05$). All effects that were significant were entered together. Non-significant effects ($p > .10$) were eliminated from this composite. Significant ($p < .05$) and marginally significant effects ($p < .10$) were retained, and this reduced composite re-examined. Effects that failed to reach significance ($p < .05$) were eliminated.

Once the slopes of daily independent variables on each daily dependent variable had been modelled in isolation, all variables with significant regression coefficients or variation were entered into a final model that included both daily and person level relationships. Non-significant effects ($p > .10$) were eliminated from this equation. Marginally significant ($p < .10$) and significant effects ($p < .05$) were retained, and these effects were examined again in conjunction. These effects formed the final equations, and it is these final equations that we show below.

5.3.2. Results and discussion

For well-being before work, no person variables had any significant effect. This indicates that mental models of work conditions do not influence well-being before work in this sample. However, there were a number of significant results for well-being after work. Table 5.1 shows the final equation for well-being after work. Table 5.1 indicates that well-being after work is less for people who believe more strongly that work demands influence their well-being and when, on average, there is less achievement of personal work goals. However, the results also show that the influence of goal achievement is stronger for some people than others - since the slope is random. The results also show that although well-being before work does not, on average, predict well-being after work, for some people it can. Parenthetically, trait affective well-being did not influence well-being in this sample. For the purposes of this research, the most important finding is that mental models of demands on well-being influence daily well-being after work.

⁴ *The conventional significance level of $p < .05$ is not used to assess random variation in slopes. More liberal cut-offs such as $p > .20$ are used (Bryk and Raudenbush, 1992). In this special case, very high probabilities indicate very little variation in slopes between people. Very low probabilities indicate a great deal of variation in slopes between people. Moderate probabilities indicate that there is some variation in slopes between people. In these analyses, where slopes were random, then variables were centred at the average score on that variable for that person. Where slopes were fixed, variables were centred at the mean for the whole sample (see Hofmann & Gavin, 1998).*

Table 5.1. Final equation to predict well-being after work

	<i>Coefficient</i>	<i>Standard error</i>	<i>T-ratio</i>	<i>df</i>	<i>p <</i>
Fixed effects					
Intercept well-being after work					
Intercept (variability)	64.32	2.05	31.34	18	0.01
Mental model of demands on well-being	-0.78	0.28	-2.82	18	0.05*
Goal achievement slope					
Intercept (variability)	12.06	2.51	4.81	19	0.01
Well-being before work slope					
Intercept (variability)	0.09	0.14	0.70	19	ns
* Since we expected high scores on the mental models scales to reduce well-being, these tests are one-tailed. Other tests are two-tailed.					
Random Effect					
	<i>Standard Deviation</i>	<i>Variance Component</i>	<i>df</i>	<i>Chi-square</i>	<i>p <</i>
Intercept (variability)	8.65	74.77	16	182.94	0.01
Goal achievement slope	6.73	45.34	17	25.03	0.10
Well-being before work	0.40	0.16	17	41.44	0.01
Level-1 (variability)	6.96	48.46			

Another interesting finding is that mental models did not influence well-being before work only well-being after work. This divergence indicates that the experience of work may trigger the influence of the mental models. In the context of a call centre – where there can be many demands – the experience of demands acts as a cognitive cue to activate a mental model of the influence of demands on well-being – which in turn activates the experience of poor affective well-being.

Table 5.2 shows the final equation for daily goal achievement. The results indicate that those people who believe more strongly that demands reduce their well-being subsequently achieve fewer daily personal work goals. This result is similar to that for affective well-being after work. Indeed, mental models that demands lead to greater reductions in well-being have a double effect in this sample. Such mental models reduce well-being after work – even after controlling for goal achievement, and they also reduce goal achievement. Reduced goal achievement in turn predicts lower well-being after work.

Table 5.2. also shows that mental models of low variety reducing goal progress also influence the impact of well-being before work on goal achievement. To explain the nature of this relationship, we shall begin with those people who believe low variety is less likely to impede progress toward personal work goals. For such people, there is a slight negative relationship between well-being before work and goal achievement after work. This means, that for such a person, well-being before work that is worse than usual for that person is associated with more goal achievement. Where well-being before work is better than usual for that person, then well-being before work is associated with less goal achievement. For people who do believe low variety at work is more likely to impede goal achievement, the converse is true: well-being before work has a slight positive relationship with goal achievement after work. This means that for such a person, well-being before work that is better than usual for that person is associated with more goal achievement. Where well-being before work is worse than usual for that person, then there is less goal achievement.

Table 5.2. Final equation to predict daily goal achievement

	<i>Coefficient</i>	<i>Standard error</i>	<i>T-ratio</i>	<i>df</i>	<i>p <</i>
Fixed effects					
Intercept daily goal achievement					
Intercept (variability)	1.41	0.07	20.71	18	0.01
Mental model of demands on well-being	-0.02	0.01	-1.77	18	0.05*
Well-being before work slope					
Intercept (variability)	0.00	0.00	0.88	117	ns
Mental model of low variety on goals	$1.6 \cdot 10^{-2}$	$6.3 \cdot 10^{-3}$	2.53	117	0.05
Goal importance slope					
Intercept (variability)	0.08	0.04	1.87	117	0.10
* Since we expected high scores on the mental models scales to reduce well-being, these tests are one-tailed. Other tests are two-tailed.					
Random Effect†					
	<i>Standard Deviation</i>	<i>Variance Component</i>	<i>df</i>	<i>Chi-square</i>	<i>p <</i>
Intercept (variability)	0.25	0.06	18	63.84	0.01
Level-1 (variability)	0.40	0.16			
† After the inclusion of mental models of variety on goals, the residual intra-class correlation of well-being before work was lower than the 0.05 cut-off recommended (Bryk & Raudenbush, 1992). The error term for well-being before work was then set to zero in the equation shown here. There was no significant difference in variance explained between these two equations (Test of difference between deviance statistics, chi-square = 0.005, df = 2, p > .50).					

The well-being dependent link between reduced goal achievement and beliefs that low variety impedes goal progress can be explained by reference to work on the cognitive psychology of emotions (see Williams *et al*, 1996; Daniels *et al*, 2001). When a person is in a good mood (well-being better than usual), then mental models with negative connotations are suppressed from recall and attention is directed toward positive information in the environment. In these circumstances then, a person will direct information processing toward information consistent with the achievement of goals. When a person is in a poor mood (well-being worse than usual), mental models with negative connotations are recalled involuntarily and information processing is directed toward negative information in the environment. In the case of mental models of low variety impeding goal achievement then, people are more likely to notice how low variety in the environment impedes achievement of their goals. The same principles apply for people who believe low variety is less likely to reduce goal achievement. In this case, we expect that such people might believe high variety leads to reduced goal achievement – such that high variety is interpreted as a negative feature of the environment.

Table 5.3. Final equation to predict daily average calls per hour

	<i>Coefficient</i>	<i>Standard error</i>	<i>T-ratio</i>	<i>df</i>	<i>p <</i>
<i>Fixed effects</i>					
Intercept daily goal achievement					
Intercept (variability)	11.15	0.58	19.20	9	0.01
Mental model of low variety on well-being	-0.30	0.12	-2.51	9	0.05*
Well-being before work slope					
Intercept (variability)	0.01	0.03	0.32	9	ns
Mental model of low variety on goals	0.01	0.00	3.42	9	0.01
* Since we expected high scores on the mental models scales to reduce well-being, these tests are one-tailed. Other tests are two-tailed.					
<i>Random Effect</i>					
	<i>Standard Deviation</i>	<i>Variance Component</i>	<i>df</i>	<i>Chi-square</i>	<i>p <</i>
Intercept (variability)	1.73	2.99	8	48.33	0.01
Well-being before work	0.03	0.00	8	6.46	ns
Level-1 (variability)	1.79	3.21			

Table 5.3. shows the final equation for daily average calls per hour. These results indicate that average calls per hour – an index of performance – is lower for people who believe low variety is more likely to reduce well-being. The results also indicate that the influence of well-being before work on performance is dependent upon mental models of low variety on goals. As with goal achievement, for those who believe low variety is more strongly associated with reduced goal achievement, then there is a positive relationship between well-being before work and average calls per hour. This relationship indicates for such people, being in a mood better than usual is associated with handling more calls per hour, but being in a worse mood than usual is associated with handling fewer calls per hour. The converse is true for people who believe low variety is less likely to impede goal achievement. As with goal achievement, mood may act as an internal cognitive cue that low variety impedes goal progress for some people. In the case of calls handled per hour, the aim may be to increase variety (and hence progress toward goals) by simply engaging in other, less repetitious, tasks. For other people, mood may act as a cue that low variety increases goal progress, and so such people engage in handling more calls per hour.

The main conclusion to take from this first diary study is that mental models of work events do influence important personal and organisational outcomes: affective well-being, achievement of personal goals at work and performance. Mental models of effects of demands and low variety on well-being had direct effects on well-being after work, goal achievement and calls handled per hour. Beliefs that such work conditions are more likely to reduce well-being were associated subsequently with reduced well-being after work, reduced goal achievement and reduced performance. The influence of mental models of goal achievement was dependent on well-being before work. Here, poor mood was interpreted as a cognitive cue that activates the mental model and subsequent negative interpretations of the work environment. Where low variety is more strongly believed to reduce goal achievement, then poor mood is associated with subsequent reductions in goal achievement and performance. Further, in order to interpret the pattern of our findings, we suggested that people who do not believe low variety influences goal achievement may believe instead that high variety impedes goal achievement. Indeed this interpretation is convergent with models that indicate both high and low variety can be deleterious to well-being (Warr, 1987).

That we did however uncover individual differences in cognitive representations of the influence of aspects of work environments on well-being and goals indicates potential for a cognitive approach to explain individual differences in the stress process more fully (Daniels *et al*, 2001). For performance in particular, the results indicate that the influence of well-being on performance is dependent on differences in cognitive representations between people. This in itself is an important conclusion, that may go some way to explaining inconsistent evidence concerning occupational stressors and poor well-being as causes of poor performance in the workplace (Jex, 1998; Daniels & Harris, 2000).

The evidence that the effects found in this study are causal is persuasive. Even after a variety of controls, the influence was demonstrated of mental models of demands and low variety measured before assessment of daily well-being after work, daily goal achievement and average calls per hour. For the results with well-being, the influence of mental models was found even controlling for well-being before work and goal achievement; and trait affective well-being did not have any significant effects. Further, the use of an objective, behavioural measure of performance in the context of the design of this study strengthens claims that mental models of psychosocial hazards are important influences on work performance.

That mental models did not have an influence on well-being before work indicates aspects of the work environment may act as cues to activate mental models, which in turn influence interpretation of the work environment. That is, the influence of mental models on important outcomes is conditioned by the experience of work conditions to some extent. In this study, we did not measure the incidence of low variety or high demands in the work environment. Rather these conditions were inferred from the earlier qualitative study. That we did not measure these conditions directly may explain why mental models of demands and variety did not have consistent effects. Therefore, in subsequent diary studies, we will measure relevant aspects of the work environment directly and match these with mental models of those aspects.

5.4. Diary Study 2

In this study, we examined whether mental models of a psychosocial hazard's impact on affect and performance influenced affective well-being and work performance. Specifically, we examined mental models of work demands' influence on affect and performance. Subsequently, these are referred to as mental models of affect and mental models of performance respectively.

We examined whether mental models of affect predicted affective well-being after work and whether mental models of affect moderated the association between daily demands and affective well-being after work. We conjectured that mental models of affect would predict affective well-being after work. We also conjectured that mental models of affect would moderate the impact of demands upon affective well-being after work.

We then examined whether mental models of demands' influence on performance predicted performance and moderated the impact of daily demands on performance. We conjectured that mental models of performance predict performance and moderate the impact of daily demands on performance.

Finally, we examined whether – individually or collectively – mental models influenced the enactment of work demands. We conjectured that mental models of adverse impacts of work demands would predict fewer demands. To examine collective effects, we examined differences in levels of demands across work groups to explore whether any differences could be attributable to average levels of mental models within each work group.

5.4.1. Method

Participants

Participants were 36 employees from a Human Resource Directorate within a large Public Health Authority. Thirty one of the employees were female. The participants' ages ranged from 16 to 55 years; the mean age was 34.0 years (SD=9.0). The participants worked in 13 teams, which ranged in size from 1 to 4 employees. Ten of the employees classified themselves as secretaries, six as Human Resource Assistants, 11 as Human Resource Managers (plus one Health & Safety manager) and eight of the participants could be classified as occupational health nurses, officers or advisors. The participants' duration of service in their current role ranged from eight months to eight years; the mean tenure was 1.7 years (SD=1.9). On average, participants had been working for the organisation for 3.6 years (SD=3.8). The employees worked for 5 days per week, Monday to Friday.

Procedure

Each participant was asked to complete a short questionnaire, which asked him or her to name the three worst aspects of their job in order to establish the main hazard. The questionnaires were collected from the participants and used to tailor the questionnaire and diary questions to reflect the most mentioned hazard. The reason why the questionnaire and diary were tailored to reflect one hazard was to reduce the amount of time necessary to complete the diary and to ensure enough data points would be collected from the participants to enable statistical analysis. Analysis of the worst three worst aspects of work indicated that demands were the most prominent psychosocial hazard.

One week prior to the start of the diary study, the participants were asked to complete a second questionnaire. The questionnaire collected background information in order to gain several indicators of trait well-being, trait performance, trait demands, mental model of performance and mental model of affect.

The participants were given a 2 week diary booklet in which to record their responses twice daily, before work and after work. The diary was given to the participants after they had completed the background questionnaire. Participants were asked to start completing their diary on a specified date. The participants were required to respond to questions concerning their mood, daily demands and performance. The participants responded 257 times in total, which assuming an average of 10 working days for the 36 participants, represent a compliance rate of 71%. This amount of missing data is not unusual for daily experience studies (Totterdell *et al*, 1998).

At the end of the 2 working weeks, the diaries were collected from the participants.

Measures

The Questionnaire

Demands at Work. Participants were required to rate on two six-point scales, how often they experienced high demands at work (every minute - once a week) and for how long high demands at work lasted (always - for a few minutes or less at a time). We used scales that assess frequency and duration as indices of exposure to the psychosocial hazard of work demands. The two items were combined to give an overall rating of demands, with higher ratings indicating more demands (mean=8.37, SD=2.13, $\alpha=0.65$).

Mental Model of Affect. Participants were then required to consider four statements about high demands at work and rate them on a scale of 1-5 (1 = not at all true - 5 = very true). The four statements were: 'high demands at work; 1) make me feel anxious; 2) make me feel angry; 3) make me feel bored; 4) make me feel unhappy'. These items were chosen to represent the major elements of dysphoric reactions to work (Daniels *et al*, 2001). The four items were combined to give an overall rating of mental models of affect, with higher ratings indicating that high demands at work reduce affective well-being (mean=9.11, SD=2.48, $\alpha=0.59$).

Mental Model of Performance. Participants were then required to consider four statements about high demands at work and rate them on a scale of 1-5 (1 = not at all true - 5 = very true). The four statements were: 'high demands at work; 1) prevent me from doing my job well; 2) prevent me working to the best of my ability; 3) increase my chances of letting people down with my performance; 4) increase my chances of making mistakes at work. The four items were combined to give an overall rating of mental models of performance, with higher ratings indicating that high demands at work reduce performance (mean=12.77, SD=4.04, $\alpha=0.86$).

Affective Well-being At Work. Participants indicated how they normally felt at work on a scale of 1-6 (1 = never - 6 = all of the time). The same twenty items as used in the first study were used. The twenty items were combined to give an overall rating of well-being, with high scores representing higher well-being (mean=83.81, SD=12.06, $\alpha=0.90$).

Trait Performance. Participants were required to indicate by circling one of four responses (not at all, some of the day, most of the day and all day) the extent to which they achieved four performance goals at work in general. Specifically the participants were asked to indicate the extent that they perform their job well, work to the best of their ability, let people down with their performance and make mistakes. The items were not combined to form a scale due to low reliability ($\alpha<0.50$), and analysis proceeded with single items.

The Diary

The diary was divided into two parts, before work and after work.

Part one was completed before work and affective well-being before work was assessed.

Affective well-being was measured using ten items rated on a scale of 1-6 (1 = not at all and 6 = very much). The items were; happy, at ease, anxious, annoyed, motivated, calm, tired, bored, gloomy and active. These ten items represent each of the poles in Daniels' five-dimensional model of work-related affective well-being (2000). Participants were asked how they felt at that moment in time. A combined index was used to indicate overall well-being with high scores associated with better well-being (mean=44.84, SD=7.88, $\alpha=0.87$).

Part two was completed after work and included three sections.

Demands at work. Again, exposure to demands was assessed by asking to rate on two six-point scales, how often they experienced high demands at work (every minute - not at all) and for how long high demands at work lasted (all of the day - not at all). The two items were combined to give an overall rating of demands, with higher ratings indicating more demands (mean=4.93, SD=2.76, $\alpha=0.95$).

Performance. Participants were required to indicate by circling one of four responses (not at all, some of the day, most of the day and all day) the extent to which four performance goals had been achieved at work that day. Specifically the participants were asked to indicate the extent that they had performed their job well, worked to the best of their ability, let people down with

their performance and made mistakes. The four items were combined to give an overall rating of achievement of good performance with higher scores indicating higher performance achievement (mean=9.73, SD=1.84, $\alpha=0.73$).

Affective well-being after work. Well-being after work measured using the same 10 items as before work on a 6 point scale (1 = not at all - 6 = very much). Participants were asked to rate how they had felt at work that day. A combined index was used to indicate overall well-being with high scores associated with better well-being (mean=43.79, SD=8.88, $\alpha=0.89$).

Analytic procedure

The following variables were used as level 2 independent variables in hierarchical linear modelling analyses: mental model of affect and mental model of performance. The following variables were used as level 2 control variables: trait well-being, trait performance and trait demands. The measure of daily demands was used as the level 1 independent variable to predict affective well-being after work and performance. Affective well-being before work was used as the level 1 control variable. The following variables were used as level 1 dependent variables: affective well-being after work, performance and daily demands at work. In addition, differences in levels of daily demands were examined amongst work groups. Data from managers were excluded from these analyses to help determine whether differences amongst groups could be attributed to group level differences in average levels of mental models or characteristics of groups' managers. The analyses proceeded as follows.

Level 2 control variables were entered to predict the level 1 dependent variables. For example trait well-being was used to predict affective well-being after work, trait performance indicators to predict performance and trait demands to predict daily demands at work. For performance, each trait indicator was entered separately and non-significant effects discarded ($p>.10$). Then all of the significant performance indicators were entered together. Non-significant effects were eliminated ($p>.10$).

Measures of level 2 mental models were entered to predict the level 1 dependent variables. Mental model of affect was entered to predict affective well-being after work and mental model of performance was entered to predict performance. Both mental model of performance and mental model of affect were used to predict daily demands at work. Non-significant effects were eliminated ($p>.10$).

All level 2 variables that were significant ($p<.10$) were entered together to predict the level 1 dependent variable. Non-significant effects were eliminated ($p>.10$).

The level 1 control variable - affective well-being before work - was centred at its level 1 mean and entered to predict the dependent variables and to assess whether or not affective well-being before work had a random or variable slope. If the slope was not random, affective well-being before work was centred at the grand mean. The slope was then fixed and affective well-being before work eliminated from the analysis if not significant ($p>.10$). If the slope was random ($p<.20$), it was modelled using the level 2 independent variables also used to model the intercept. Again each level 2 variable was entered alone, significant effects kept and non-significant effects eliminated ($p>.10$). All significant effects were then entered together.

The level 1 independent variable - daily demands - was centred at its level 1 mean and entered to predict the dependent variables and to assess whether or not daily demands had a random or variable slope. If the slope was not random ($p>.20$), demands were grand centred, the slope fixed and demands eliminated from the analysis if not significant ($p>.10$). If the slope was

random ($p < .20$), it was modelled using the level 2 independent variables also used to model the intercept. Again each level 2 variable was entered alone, significant effects kept and non-significant effects eliminated ($p > .10$). All significant effects were then entered together.

Once the effects of daily demands and daily well-being before work had been modelled separately, the full predictive model was made by combining the influences of the dependent variable and the slopes of well-being before work and daily demands.

5.4.2. Results and discussion

Tables 5.4. through 5.6. show the final equations. Two-tailed tests of significance were used, except when a relationship was expected, in this case, a one-tailed test was used.

Table 5.4. Final equation to predict well-being after work

	<i>Coefficient</i>	<i>Error</i>	<i>T-ratio</i>	<i>df</i>	<i>p</i> <
Fixed Effects					
Intercept well-being after work					
Intercept (variability)	43.696	0.670	65.142	33	0.01
Mental Model of Affect	-1.101	0.283	-3.892	33	0.01*
Trait Well-Being	0.212	0.062	3.371	33	0.01
Demands slope					
Intercept (variability)	-0.896	0.320	-2.796	34	0.01
Mental Model of Affect	-0.304	0.131	-2.315	34	0.05*
Well-Being before work slope					
Intercept (variability)	0.324	0.073	4.405	34	0.01
Trait Well-Being	-0.016	0.005	-2.867	34	0.01
* Since we expected high scores on the mental models scales to reduce well-being, these tests are one-tailed. Other tests are two-tailed.					
Random Effects					
	<i>Standard Deviation</i>	<i>Variance Component</i>	<i>df</i>	<i>Chi-square</i>	<i>p</i> <
Intercept (variability)	3.463	11.99	31	126.522	0.01
Demands slope	1.336	1.787	32	64.720	0.01
Well-Being before work	0.214	0.045	32	46.969	0.05
Level 1 (variability)	5.302	28.121			

The negative association between mental model of affect and affective well-being after work indicates that those people who hold mental models that high demands are more likely to reduce their well-being also report lower affective well-being after work. This affect occurs even after controlling for affective well-being before work and trait well-being.

The negative association between daily demands and affective well-being after work indicates that those people who report high daily demands at work also report lower affective well-being after work. The association between demands and affective well-being was moderated by mental model of affect. The nature of this relationship indicates a stronger negative relationship between daily demands and affective well-being after work for those people who hold mental models that demands are more likely to reduce well-being. These results are as expected – that is there is a stronger impact of daily demands on daily affective well-being for those people who

believe demands are more likely to reduce their affective well-being. That there was also a main effect for mental models on well-being is also consistent with the first diary study.

The positive association between trait well-being and affective well-being after work indicates that those people who report high affective well-being in general also report high affective well-being after work.

The positive association between affective well-being before work and affective well-being after work indicates that those people who report high well-being before work also report high well-being after work. Trait well-being moderated the association between affective well-being before and affective well-being after work. The direction of this relationship indicated a weaker effect for well-being before work on well-being after work for people with generally better affective well-being. There is a stronger relationship for people with poorer well-being. These results may indicate that people with generally better well-being return to their generally more positive baseline mood more quickly than people with generally poor well-being who take longer to return to generally negative baseline mood.

Table 5.5. Final equation to predict daily performance

	<i>Coefficient</i>	<i>Error</i>	<i>T-ratio</i>	<i>df</i>	<i>p</i> <
<i>Fixed Effects</i>					
Intercept Performance					
Intercept (variability)	9.818	0.164	59.801	33	0.01
Mental Model Performance	-0.078	0.041	-1.887	33	0.05*
Trait Performance†	0.771	0.217	3.545	33	0.001
Demands slope					
Intercept (variability)	-0.157	0.050	-3.099	34	0.01
Trait performance†	-0.129	0.061	-2.118	34	0.05
Well-Being before work slope					
Intercept (variability)	0.023	0.012	1.806	262	0.10
* Since we expected high scores on the mental models scales to reduce well-being, these tests are one-tailed. Other tests are two-tailed.					
† Trait performance was analysed as separate items. The only trait performance item found to be significant was the item assessing whether participants felt they usually worked to the best of their ability.					
<i>Random Effects</i>					
	<i>Standard Deviation</i>	<i>Variance Component</i>	<i>df</i>	<i>Chi-square</i>	<i>p</i> <
Intercept (variability)	0.864	0.747	31	154.885	0.01
Demands slope	0.135	0.018	32	35.978	0.287
Level 1 (variability)	1.217	1.483			

There was a positive association between mental model of performance and performance, albeit weaker than the impact that mental models of affect had on affective well-being after work. The negative association between mental model of performance and daily performance indicates that those people who hold mental models that demands are more likely to reduce their performance also report worse performance on a daily basis. This is consistent with the first diary study in which mental models of adverse effects of psychosocial hazards had a detrimental influence on performance.

The positive association between daily performance and one of the trait performance items indicates that those people who generally think they work to the best of their ability report better

daily performance. The negative association between daily demands and performance indicates that people who report high demands on a daily basis also report lower performance on a daily basis. One of the trait performance items moderated the association between daily performance and daily demand. The nature of this relationship indicates a stronger negative relationship between demands and performance for those people who report generally working to the best of their ability. However, mental models of performance did not influence the relationship between demands and daily performance.

Affective well-being before work was also entered into the equation. Affective well-being before work had a positive fixed effect on performance indicating that well-being before work can influence performance, albeit self-reported performance.

Table 5.6. Final equation predicting daily demands from individual level data

	<i>Coefficient</i>	<i>Error</i>	<i>T-ratio</i>	<i>df</i>	<i>p</i> <
<i>Fixed Effects</i>					
Intercept Demands					
Intercept (variability)	5.019	0.321	15.634	33	0.01
Trait Demands	0.545	0.154	3.550	33	0.01*
Well-Being before work slope					
Intercept (variability)	-0.039	0.019	-2.030	257	0.05
* Since we expected high scores on the mental models scales to reduce well-being, these tests are one-tailed. Other tests are two-tailed.					
<i>Random Effects</i>					
	<i>Standard Deviation</i>	<i>Variance Component</i>	<i>df</i>	<i>Chi-square</i>	<i>p</i> <
Intercept (variability)	1.751	3.066	33	246.516	0.01
Level 1 (variability)	1.873	3.508			

There was a positive association between trait demands and daily demands, indicating that those people who report high demands at work in general also report high demands at work on a daily basis. On a daily basis well-being before work had a fixed negative impact on demands with lower well-being associated with higher demands ratings. Mental models were not significant predictors of demands. A test of differences amongst groups revealed no significant results, indicating no collective influences on the enactment of daily demands.

The results revealed that mental models of the influence of work demands on affect influence daily affective well-being. Mental models moderated the impact of daily demands on affective well-being at work, indicating that the impact that daily demands has on affective well-being after work depends on mental models of the influence of psychosocial hazards on affect at work.

We also found that mental models of the influence of work demands on performance influence self-reports of performance. This is consistent with the first diary study, which found mental models influence objective performance. Although mental models did not moderate the impact of work demands on performance, we can conclude overall that mental models of the impact of psychosocial hazards can influence performance.

Mental models of the influence of work demands on performance and affect – individually or collectively - had no influence on reports of daily demands. Therefore we can conclude that whilst mental models of work conditions can affect performance and affective well-being at work, they do not influence reports of daily demands.

Overall, this second diary study has also indicated the importance of mental models of psychosocial hazards, even when controlling for the daily occurrence of psychosocial hazards. Indeed, we have found evidence that mental models may even moderate the impact of hazards on daily affective well-being. Nevertheless, this study has focused on just affective well-being and performance. To extend the range of the investigation we examine another potential outcome in the third diary study.

5.5. Diary study 3

This third diary study investigated the impact of mental models on the influence of psychosocial hazards on affect and physical symptoms over a 2 week period. Again, the psychosocial hazard we examined was daily work demands. Hence, we examined mental models of the impact of work demands on affect and physical health. Subsequently, these are referred to as mental models of affect and mental models of physical health respectively.

We examined whether mental models of affect predicted affective well-being after work and whether mental models of affect moderated the association between daily demands and affective well-being after work. We then examined whether mental models of physical health predicted daily physical symptoms. Mental models of physical health and affect were also used to predict daily demands at work.

We conjectured that mental models of affect would predict affective well-being after work. We also conjectured that mental models of affect would moderate the impact that daily demands had upon affective well-being after work. Similarly, we conjectured that mental models of physical health would predict daily physical symptoms and moderate the influence of daily demands on physical symptoms.

5.5.1. Method

Participants

Participants were 34 employees from a Pharmacy Directorate within a large Public Health Authority. Twenty seven of the employees were female. The participants' ages ranged from 19 to 59 years; the mean age was 38.2 years (SD=9.6). The participants worked in six teams, which ranged in size from three to nine employees. Three of the employees classified themselves as Assistants, nine as Technicians, 10 as Senior Pharmacists, five as Principal Pharmacists, three as Managers and four as Secretaries. The participants' duration of service in their current role ranged from three months to 18 years; the mean tenure was 4.3 years (SD=4.0). On average, members of the sample had been working for the trust for 8.6 years (SD=7.9). The employees worked on average five days per week, Monday to Friday (although some of the participants were on call over the weekend).

Procedure

Each participant was asked to complete a short questionnaire, which asked him or her to name the three worst aspects of their job in order to establish the main hazard. The questionnaires were collected from the participants and used to tailor the questionnaire and diary questions to reflect the most mentioned hazard. The reason why the questionnaire and diary were tailored to reflect one hazard was to reduce the amount of time necessary to complete the diary and to ensure enough data points would be collected from the participants to enable statistical analysis. Analysis of the worst three worst aspects of work indicated that demands were the most prominent psychosocial hazard.

One week prior to the start of the diary study, the participants were asked to complete a questionnaire. The questionnaire collected background information in order to gain several general indicators of trait well-being, trait physical symptoms, trait demands, mental model of physical health and mental model of affect.

The participants were given a 2 week diary booklet in which to record their responses twice daily, before work and after work. The diary was given to the participants after they had completed the background questionnaire. Participants were asked to start completing their diary on a specified date. The participants were required to respond to questions concerning their mood, daily demands and physical symptoms. The participants responded 244 times in total, which represents a compliance rate of 72%. This amount of missing data is not unusual for daily experience studies (Totterdell *et al*, 1998).

At the end of the 2 working weeks, the diaries were collected from the participants.

Measures

The Questionnaire

Demands at work. In order to assess general exposure to demands, participants were required first to rate on two six-point scales how often they experienced high demands at work (every minute - once a week) and for how long high demands at work lasted (always - for a few minutes or less at a time). The two items were combined to give an overall rating of demands, with higher ratings indicating more demands (mean=7.47, SD=2.93, $\alpha=0.82$).

Mental model of affect. Participants were required to rate four statements about high demands at work and rate them on a scale of 1-5 (1 = not at all true - 5 = very true). The four statements were 'high demands at work: 1) make me feel anxious; 2) make me feel angry; 3) make me feel bored; 4) make me feel unhappy'. The four items were combined to give an overall rating of mental models of affect, with higher ratings indicating that high demands at work reduce affective well-being (mean=10.76, SD=3.16, $\alpha=0.75$).

Mental model of physical health. Participants were then required to rate two statements about high demands at work on a scale of 1-5 (1 = not at all true - 5 = very true). The two statements were 'high demands at work: 1) increase my chances of suffering from minor aches and pains (e.g. backache, headache, stomach upset); 2) increase my chances of suffering from serious health problems (e.g. heart disease, cancer)'. The two items were combined to give an overall rating of mental model of physical health, with higher ratings indicating that high demands at work increase chances of suffering from physical health problems (mean=5.41, SD=2.32, $\alpha=0.78$).

Physical symptoms. Participants were required to indicate by ticking the appropriate box (yes, no) whether or not they generally suffered from the following; heartburn, wind or indigestion; backache or pains in the back; headache; shortness of breath; dizziness or giddiness; pains in the chest; wheeziness; stomach problems. These items were derived from physical symptoms more closely associated with self-reports of 'stress at work' (Smith *et al*, 2000). The eight items were combined to give an overall rating of trait physical symptoms, with higher ratings indicating more health complaints (mean=1.76, SD=1.37, $\alpha=0.52$). Although the alpha was low, this was expected since it is not necessarily the case that people will suffer from a host of physical problems at one time.

Affective well-being at work. Participants indicated how they normally feel at work (psychological well-being) on a scale of 1-6 (1 = never - 6 = all of the time). The same twenty items were rated as in the previous two diary studies. The twenty items were combined to give an overall rating of well-being, with high scores representing higher well-being (mean=85.06, SD=12.95, $\alpha=0.91$).

The Diary

The diary was divided into two parts, before work and after work.

Part one was completed before work and affective well-being before work was assessed.

Affective well-being was measured using ten items on a scale of 1-6 (1 = not at all and 6 = very much). The items were the same as used in the second diary study. Participants were asked how they felt at that moment in time. A combined index was used to indicate overall well-being with high scores associated with better well-being (mean=43.48, SD=8.30, $\alpha=0.88$).

Part two was completed after work and included three sections.

Demands at work. To assess daily exposure to demands, participants were required to first rate on two six-point scales, how often they experienced high demands at work (every minute - not at all) and for how long high demands at work lasted (all of the day - not at all). The two items were combined to give an overall rating of demands, with higher ratings indicating more demands (mean=4.75, SD=2.55, $\alpha=0.93$).

Physical symptoms. Participants were required to indicate by ticking the appropriate box (yes, no) whether or not they had suffered from the following during that day; heartburn, wind or indigestion; backache or pains in the back; headache; shortness of breath; dizziness or giddiness; pains in the chest; wheeziness; and stomach problems. These were the same eight items as used to assess trait physical symptoms in the questionnaire. The eight items were combined to give an overall rating of physical symptoms, with higher ratings indicating more health complaints (mean=0.81, SD=0.83, $\alpha=0.20$). Again the alpha was low, but this was expected given that physical symptoms do not usually co-occur on a daily basis.

Affective well-being after work was measured using the same 10 items as before work on a 6 point scale (1 = not at all - 6 = very much). Participants were asked to rate how they had felt at work that day. A combined index was used to indicate overall well-being with high scores associated with better well-being (mean=44.35, SD=8.64 $\alpha=0.89$).

Analytic procedure

Hierarchical linear modelling was used to test whether mental models predicted affective well-being after work, physical symptoms and demands at work. The following variables were used as level 2 independent variables: mental model of affect and mental model of physical health. The following variables were used as level 2 control variables: trait well-being, trait physical symptoms and trait demands. Demands was used as the level 1 independent variable to predict affective well-being after work and physical symptoms. Affective well-being before work was used as the level 1 control variable. Differences in the levels of daily demands were examined amongst work groups. Data from managers were excluded from these analyses to help determine whether differences amongst groups could be attributed to group level differences in average levels of mental models or characteristics of groups' managers. Analyses proceeded as follows.

Level 2 control variables were entered to predict the level 1 dependent variables. Trait well-being was used to predict affective well-being after work, trait physical symptoms to predict physical symptoms and trait demands to predict daily demands at work. Non-significant effects were eliminated ($p > .10$).

Measures of level 2 mental models were entered to predict the level 1 dependent variables. Mental model of affect was entered to predict affective well-being after work and mental model of physical health was entered to predict daily physical symptoms. Both mental model of physical health and mental model of affect were used to predict daily demands at work. Non-significant effects were eliminated ($p > .10$).

All level 2 variables that were significant ($p < .10$) were entered together to predict the level 1 dependent variable. Non-significant effects were eliminated ($p > .10$).

The level 1 control variable - affective well-being before work - was centred at its level 1 mean and was entered to predict the dependent variables and to assess whether or not affective well-being before work had a random or variable slope. If the slope was not random, affective well-being before work was centred at the grand mean. The slope was then fixed and affective well-being before work eliminated from the analysis if not significant ($p > .10$). If the slope was random ($p < .20$), it was modelled using the level 2 independent variables also used to model the intercept. Again each level 2 variable was entered alone, significant effects kept ($p < .10$) and non-significant effects eliminated. All significant effects were then entered together.

The level 1 independent variable - daily demands - was centred at its level 1 mean and was entered to predict the dependent variables and to assess whether or not daily demands had random or variable slope. If the slope was not random, demands were centred at the grand mean. The slope was then fixed and demands eliminated from the analysis if not significant. If the slope was random ($p < .20$), it was modelled using the level 2 independent variables also used to model the intercept. Again each level 2 variable was entered alone, significant effects kept ($p < .10$) and non-significant effects eliminated. All significant effects were then entered together.

Once the effects of daily demands and daily well-being before work had been modelled separately the full predictive model was made by combining the influences of the dependent variable and the slopes of well-being before work and daily demands.

5.5.2. Results and discussion

Tables 5.7., 5.8. and 5.9. show the final equations. Two-tailed tests of significance were used, except when a relationship was expected, in this case, a one-tailed test was used.

Table 5.7. Final equation to predict well-being after work

	<i>Coefficient</i>	<i>Error</i>	<i>T-ratio</i>	<i>df</i>	<i>p</i> <
<i>Fixed Effects</i>					
Intercept well-being after work					
Intercept (variability)	43.583	1.025	42.499	31	0.01
Mental Model of Affect	-0.673	0.392	-1.718	31	0.05*
Trait Well-Being	0.218	0.097	2.253	31	0.05
Demands slope					
Intercept (variability)	-1.000	0.157	-6.368	238	0.01
Well-Being before work slope					
Intercept (variability)	0.258	0.056	4.559	32	0.01
Trait Well-Being	-0.010	0.004	-2.351	32	0.05
* Since we expected high scores on the mental models scales to reduce well-being, these tests are one-tailed. Other tests are two-tailed.					
<i>Random Effects</i>					
	<i>Standard Deviation</i>	<i>Variance Component</i>	<i>df</i>	<i>Chi-square</i>	<i>p</i> <
Intercept (variability)	5.756	33.141	31	562.307	0.000
Well-Being before work	0.050	0.003	32	37.117	0.245
Level 1 (variability)	4.089	16.719			

Mental model of affect was a significant negative predictor of affective well-being. The negative association between mental model of affect and affective well-being after work indicates that those people who hold mental models that high demands are more likely to reduce their well-being also report lower affective well-being after work on a daily basis, even after controlling for affective well-being before work. This is consistent with the previous two diary studies.

The negative association between daily demands and affective well-being after work indicates that those people who report high daily demands at work also report lower affective well-being after work. Daily demands had a fixed effect on daily affective well-being after work and therefore the slope was not influenced by mental models of affect in this sample, thus not replicating the effect found in the second diary study.

The positive association between affective well-being before work and affective well-being after work indicates that those people who report high affective well-being before work also report high affective well-being after work. Trait well-being again moderated the association between affective well-being before work and affective well-being after work. This form of this relationship is similar to that observed in the second diary study.

Table 5.8. Final equation to predict physical symptoms

	<i>Coefficient</i>	<i>Error</i>	<i>T-ratio</i>	<i>df</i>	<i>p</i> <
<i>Fixed Effect</i>					
Intercept Physical Symptoms					
Intercept (variability)	0.715	0.087	8.187	32	0.01
Trait Physical Symptoms	0.180	0.065	2.737	32	0.01
Demands slope					
Intercept (variability)	0.059	0.022	2.658	244	0.01
Well-Being before work slope					
Intercept (variability)	-0.019	0.007	-2.737	244	0.01
<i>Random Effects</i>					
	<i>Standard Deviation</i>	<i>Variance Component</i>	<i>df</i>	<i>Chi-square</i>	<i>p</i><
Intercept (variability)	0.442	0.195	32	137.197	0.00
Level 1 (variability)	0.654	0.428			

The positive association between trait physical symptoms and daily physical symptoms indicates that those people who report more health symptoms in general also report more physical symptoms on a daily basis. The negative association between daily physical symptoms and affective well-being before work indicates that those people who report high affective well-being before work report fewer physical symptoms after work. Affective well-being before work had a fixed effect on daily physical symptoms after work.

The positive association between daily demands and daily physical symptoms indicates that those people who report high daily demands at work also report more daily physical symptoms after work. Daily demands had a fixed effect on daily physical symptoms after work. Mental models of physical health did not influence daily physical health symptoms, nor the relationship between demands and physical symptoms.

Table 5.9. Final equation to predict daily demands

	<i>Coefficient</i>	<i>Error</i>	<i>T-ratio</i>	<i>df</i>	<i>p</i> <
<i>Fixed Effect</i>					
Intercept Demands					
Intercept (variability)	4.688	0.289	16.180	31	0.00
Trait Demands	0.341	0.098	3.456	31	0.01
Well-being before work slope					
Intercept (variability)	0.040	0.028	1.431	32	ns
<i>Random Effects</i>					
	<i>Standard Deviation</i>	<i>Variance Component</i>	<i>df</i>	<i>Chi-square</i>	<i>p</i><
Intercept (variability)	1.530	2.341	31	215.887	0.00
Well-Being before work	0.077	0.005	32	46.373	0.05
Level 1 (variability)	1.703	2.902			

There was a positive association between trait demands and daily demands, indicating that those people who report high demands at work in general also report high demands at work on a daily basis. Neither mental models of affect nor physical symptoms had any influence on daily demands. Further, in an analysis of variation in demands amongst work groups, we did not find

any significant variation amongst groups indicating that there are no collective influences on the enactment of daily work demands.

The results of this study revealed that mental models of the influence of work demands on affect influence daily affective well-being. This effect occurs independently of daily work demands and well-being before work in this study. However, unlike the second study, mental models did not moderate the impact of daily work demands on affective well-being in this study. Nevertheless, we can conclude overall that mental models of the impact of psychosocial hazards can influence affective well-being at work.

Mental models of the influence of work demands on physical health had no influence on reports of daily physical symptoms.

Mental models of the influence of work demands on physical health and affect had no influence on reports of daily demands: this finding is consistent with the second diary study.

5.6. Conclusion

Overall, mental models of psychosocial hazards do have significant predictive relationships with affective well-being in all three studies. In the two studies where performance was measured, the results also indicate an influence of mental models on performance. In the first diary study, we also found an influence on daily goal achievement. The form of the relationships between mental models and well-being, performance and goal achievement varies between the three diary studies and the outcome measures used. These relationships can be direct, linear relationships or mental models can alter the influence of other variables – such as affect prior to work and daily demands - on well-being and performance. We were unable to find any evidence that mental models influence the enactment of psychosocial hazards or that mental models are related to physical symptoms.

Those significant relationships we did find offer strong support for causal relationships between mental models and outcomes. Not only were measures of mental models taken before measures of outcomes, measures of outcomes were taken close to the experience of those outcomes and statistical relationships were investigated using a variety of controls. Further, an objective behavioural measure of performance was used in one of these studies.

The main purpose of these diary studies was to investigate – using rigorous field methods that allow strong causal inferences to be made – whether mental models of psychosocial hazards had any influence on important organisational and personal outcomes. The results of the diary studies indicate that this is so. Consequently, there might be practical utility in incorporating measures of mental models of psychosocial hazards into psychosocial risk management processes. To do so first requires developing an instrument that can be used with relative ease across large samples of people. In the next chapter, we report the development of such an instrument.

6. Developing an instrument

The three diary studies demonstrate the usefulness of a cognitive approach to psychosocial hazards. In each of the three studies, measures of mental models of psychosocial hazards predicted subsequent daily well-being, progress toward goals and performance. To facilitate practical interventions, the purpose of this part of the research is to develop and validate a normative instrument to measure mental models of psychosocial hazards using a survey methodology. Whilst surveys do not permit the same power to draw causal inferences as do diary studies, surveys do allow coverage of a wider number of people with greater ease than diary studies. Hence surveys can provide greater generalisability of results – which is especially important when trying to discover the underlying structure of a measurement instrument. Also, for the purposes of practical use, the statistical methods commonly used to analyse survey data are more widely known than the specialised methods used to analyse diary data.

To show that the instrument can be used to inform interventions, we examine the measurement properties of the instrument. We assess the underlying structure of the instrument to identify the major dimensions of cognitive interpretation of psychosocial hazards. In so doing, we are able to identify the basic dimensions by which people judge the impact of psychosocial hazards on their goals, health and psychological well-being. If the instrument is valid, these dimensions should be readily interpretable by examining the pattern of items that show high correlations with the dimensions. Further, the same dimensions should be evident across different samples. This procedure also allows us to develop sub-scales of the instrument. We also examine the reliability of the instrument. That is, we examine whether the sub-scales produce consistent answers. Further, we examine relationships between sub-scales of the instrument and other variables. The validity of the instrument is supported if such relationships exist and they are interpretable by reference to previous research and theory. Further, in examining such relationships, we may be able to find further evidence to support claims made in the last chapter concerning the influence of mental models of psychosocial hazards on important outcomes. We may also be able to find evidence that may indicate how mental models of psychosocial hazards develop – for instance whether they are more closely related to the nature of hazards experienced, the characteristics of people or some combination of both.

On the basis of the diary studies and material reviewed in chapter 3, we expect that sub-scales should be associated with affective psychological well-being and reduced work performance, amongst other things. Therefore, data on well-being and work performance were gathered as part of the survey research. We also assessed participants' intentions to leave their job, given that intention to leave has been reported as a correlate of distressing events in the work place (Daniels, 1996b). We assume that well-being, performance and intention to quit are consequences of mental models of psychosocial hazards. From material reviewed in the third chapter, we also expect that mental models of psychosocial hazards will be associated with: cultural attitudes; organisational membership or job role; different biographic factors; the psychosocial hazard itself; and trait well-being. We assume that these variables are influences on the formation of mental models of psychosocial hazards. Additionally, as noted in the third chapter, we expect that the sub-scales should be associated with the perceived effectiveness of different forms of stress management interventions.

In the next section of this chapter, we explain how we developed the items to include in the instrument. We then report the methods used for data collection, the results and a discussion of those results.

6.1. Development of the instrument

The tool was developed from two sources. First, from a review of the relevant literature. Second, from the responses of participants in the qualitative phase of this research reported in chapter 4. We drew upon both published research and primary data collection in order to attempt to maximise both content and face validity respectively. Content validity refers to whether an instrument covers the range of relevant issues. Face validity refers to whether an instrument looks like it measures what it should to a non-expert (see appendix A of Rick, Briner, Daniels, Perryman & Guppy, 2001 for a discussion of validity and other psychometric criteria in the context of measures of psychosocial hazards). In addition, once the initial items for the instrument had been developed, they were subject to a number of pre-tests to ensure that the items were understandable to a range of people and that the items would produce a range of responses. These pre-tests included obtaining responses on the items from over 40 people, including non-academic members of University staff and members of the general public.

For purposes of validation, we decided to allow participants to nominate their own psychosocial hazard. This allowed us to compare responses on the instrument across different psychosocial hazards.

The main part of the instrument is split into two sections. In the first section, participants are asked to indicate the impact of a nominated psychosocial hazard on a number of goals and affective well-being. Both goals and affective well-being were chosen, since Power & Dalgleish (1997) indicate affective reactions are generated by the perceived consequences of events or situations for goals or direct cognitive associations between an event or situation and affect (see chapter 2). Indeed in the qualitative phase of the study, we found that people do link the incidence of psychosocial hazards to specific affects and work performance, physical health and pursuit of non-work activities. Good work performance, preservation of health and pursuit of non-work activities reasonably can be thought of as work goals for most people. Ratings were made on a five-point Likert type scale anchored at the extremes (1=not at all true, 5 = very true).

The goals included in the instrument were identified through a review of the literature (Daniels *et al*, 2001). Many of the goals identified in this way were also mentioned in the qualitative phase of the study. The goals included in the instrument are:

- a) pursuit of pleasure (Freud, 1959; Epstein, 1994), operationalised as job satisfaction and work not interfering with pursuit of non-work goals;
- b) relatedness (Bowlby, 1988; Epstein, 1994; Ryan, 1995; Ryff & Keyes, 1995) operationalised as good social relationships at work;
- c) autonomy (Adler, 1954; Ryan, 1995; Ryff & Keyes, 1995) operationalised as influence over work processes;
- d) competence (Adler, 1954; Allport, 1961; Bandura, 1977; Epstein, 1994; Ryan, 1995; Ryff & Keyes, 1995) operationalised as good job performance;
- e) aspiration and personal growth (Maslow, 1954; Hackman & Oldham, 1980; Warr, 1987; Ryff & Keyes, 1995) operationalised as developing skills.
- f) sense of meaning in life (Rogers, 1959; Antonovsky, 1987; Ryff & Keyes, 1995) operationalised as sense of purpose at work;
- g) stability (Maslow, 1954; Warr, 1987; Nicholson, 1997) operationalised as job security;
- h) status (Maslow, 1954; Nicholson, 1997) operationalised as gaining a promotion or pay rise.
- i) life instinct (Freud, 1959) operationalised as no minor or major physical health risks from work.

We included four affective reactions in the instrument. These were anxiety, anger, depression and boredom. These affective reactions have been identified as key indicators of poor affective

well-being at work (Warr, 1990; Daniels, Brough, Guppy, Peter-Beans & Weatherstone, 1997; Daniels, 2000; Daniels *et al*, 2001). A fifth item, related to poor well-being in general was also included (Russell & Carroll, 1999). This was unhappiness.

In the second section of the instrument, we included strategies for reducing exposure to the nominated hazard and or strategies for reducing the impact of that hazard. Participants were asked to rate each strategy on its effectiveness for dealing with their nominated hazard on a five-point Likert-type scale, anchored at the extremes (1=not at all useful, 5=very useful). The items were developed from the qualitative interviews and the coding scheme used to categorise concepts mentioned in the interviews. Insofar that the coding scheme was informed by existing literature (see chapter 4), then this instrument is also informed by the research literature. There were three major classes of items – organisational strategies, personal coping strategies and managerial support. Ten items were used to assess organisational strategies in five major areas identified in chapter 4. These are:

- a) Work process change, operationalised as ‘changing the way in which work tasks are performed’ and ‘improving work processes’;
- b) Changes to roles, operationalised as ‘ensuring that everyone knows what they are supposed to be doing’ and ‘making peoples’ roles at work more clear’;
- c) Changes to relationships at work, operationalised as ‘changing the way people at work behave toward each other’ and ‘improving the overall atmosphere at work’;
- d) Changes to career and reward management practices, operationalised as ‘changing the way careers are managed’ and ‘improving the way people are rewarded’;
- e) Changes to organisational process, operationalised as ‘changing the way the whole organisation works’ and ‘improving the way departments work together’.

We excluded items relating to the other category identified in the qualitative phase of the research, namely changes to the institutional or economic environment – since these are usually beyond the control of organisations.

Six items were used to assess personal coping across six categories of personal coping. These are:

- a) Behavioural approach coping operationalised as ‘focusing your efforts on changing it’;
- b) Cognitive approach coping operationalised as ‘changing your expectations’;
- c) Emotional approach coping operationalised as ‘getting things off your chest’;
- d) Behavioural avoidance coping operationalised as ‘staying away from it’;
- e) Cognitive avoidance coping operationalised as ‘not thinking about it’;
- f) Emotional avoidance coping operationalised as ‘controlling your feelings’.

Four items were used to assess managerial support across four major categories. These are:

- a) Informational support, operationalised as ‘your manager giving you information on how to deal with it’;
- b) Instrumental support, operationalised as ‘your manager helping you to get the things or time you need to deal with it’;
- c) Emotional support, operationalised as ‘your manager telling you that he or she has confidence in you’;
- d) Appraisal support, operationalised as ‘your manager being available just to talk about it’.

As noted, before completing all of these items, in this research, participants were asked to nominate their own psychosocial hazard. This was operationalised by asking participants to identify the ‘worst aspect of their job’. In two of the samples used in this survey phase of the research, we then asked participants to rate the frequency with which they had experienced this hazard over the past week and the duration of that experience on two fully anchored scales.

Duration and frequency were combined into an overall index of recent hazard exposure. The final instrument, including the measure of hazard exposure, with instructions for completion is shown over the next few pages.

In this first section of the survey, we would like you to name the one worst thing about your job. This might be the physical conditions at work, your relationships with other people at work, your work load, the nature of your work or something else. Please write down the one worst thing about your job in the space provided below:

.....

.....

.....

.....

1. **Over the past week**, how often have you experienced the worst aspect of your job ?
 (please circle the most appropriate answer)

Every minute	Several times every hour	Several times every day	A few times every day	Several times this week	A few times this week	Once this week	Not at all this week
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2. **Over the past week**, how long has the worst aspect of your job lasted ?

All of this week	Most of this week	A few days at a time	A whole day at a time	Several hours at a time	An hour or less at a time	A few minutes or less at a time	Not at all this week
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The rest of this section consists of a number of statements about the *worst aspect* of your job. Please circle the number that best represents your assessment of each statement, as it applies to the one *worst aspect* of your job, where *1 = Not At All True* and *5 = Very True*:

The worst aspect of my job:	Not At					Very True
	All True					
1. decreases my job satisfaction	1	2	3	4	5	
2. makes it more difficult to get on with people at work	1	2	3	4	5	
3. decreases the influence I have on my work	1	2	3	4	5	
4. prevents me from doing my job well	1	2	3	4	5	
5. decreases my chances of promotion or a pay rise	1	2	3	4	5	
6. reduces my status at work	1	2	3	4	5	
7. makes it more difficult to develop my skills	1	2	3	4	5	
8. makes it more difficult to feel a sense of purpose at work	1	2	3	4	5	
9. reduces my job security	1	2	3	4	5	
10. increases my chances of suffering from aches and pains (e.g. backache, headache, stomach upset)	1	2	3	4	5	
11. increases my chances of suffering from major health problems (e.g. heart disease, cancer)	1	2	3	4	5	
12. makes work interfere with my home life	1	2	3	4	5	
13. makes me feel anxious	1	2	3	4	5	
14. makes me feel angry	1	2	3	4	5	
15. makes me feel bored	1	2	3	4	5	
16. makes me feel unhappy	1	2	3	4	5	
17. makes me feel depressed	1	2	3	4	5	

In this next section, please rate how much each statement reflects a useful way of dealing with the *worst aspect* of your job, where *1 = not at all useful* and *5 = very useful*.

To what extent would the following be useful for dealing with the <i>worst aspect</i> of your job?	Not At All Useful	1	2	3	4	5	Very Useful
1. Changing the way in which work tasks are performed	1	2	3	4	5		
2. Ensuring that everyone knows what they are supposed to be doing	1	2	3	4	5		
3. Changing the way people at work behave toward each other	1	2	3	4	5		
4. Improving work processes	1	2	3	4	5		
5. Changing the way the whole organisation works	1	2	3	4	5		
6. Changing the way careers are managed	1	2	3	4	5		
7. Improving the overall atmosphere at work	1	2	3	4	5		
8. Improving the way people are rewarded	1	2	3	4	5		
9. Improving the way departments work together	1	2	3	4	5		
10. Making people's roles at work more clear	1	2	3	4	5		
11. Changing your expectations	1	2	3	4	5		
12. Controlling your feelings	1	2	3	4	5		
13. Not thinking about it	1	2	3	4	5		
14. Staying away from it	1	2	3	4	5		
15. Focusing your efforts on changing it	1	2	3	4	5		
16. Getting things off your chest	1	2	3	4	5		
17. Your manager helping you to get the things or time you need to deal with it	1	2	3	4	5		
18. Your manager telling you that he or she has confidence in you	1	2	3	4	5		
19. Your manager giving you information on how to deal with it	1	2	3	4	5		
20. Your manager being available just to talk about it	1	2	3	4	5		

6.2. Methods

Samples

Three samples were used in this phase of the research. All three samples were used to examine the basic dimensions underlying responses to the new instrument, and also to examine the reliability of sub-scales developed from the new instrument. Two of the samples were also used to examine correlates of the new instrument's sub-scales, and to discern further possible consequences and influences of mental models of psychosocial hazards. The three samples were taken from a telecommunications company, a manufacturing company and a local government organisation. The manufacturing and local government samples were used to examine the correlates of the new instrument, and additional data were gathered from participants in these samples.

Telecommunications company. The sample from the telecommunications company consisted of 257 participants that responded to 500 questionnaires distributed at one site of a multinational company (response rate = 51.4%). The new instrument was included along with several other measures in a self-completion questionnaire. These other measures were collected for a research project conducted by Dr Andy Liefoghe and Dr Neil Conway, at Birkbeck College, University of London. Questionnaires were distributed through the internal mailing system of the organisation and returned directly to Birkbeck College in pre-paid envelopes.

Most of the sample was female (53.8%) and most described their ethnicity as white (82.1%). Most of the sample was under 30 years of age (57.1%), and only one member of the sample was over 50. Some 7.3% of the sample described their jobs as senior management, 18.7% described their jobs as middle management, 16.5% described their jobs as line management and 48.7% described their jobs as non-management. On average, members of the sample had been working for the company for 1.84 years (SD=1.46).

Given differences in data collection methods, especially since only measures of mental models of psychosocial hazards were available for analysis and questions relating to demographic variables differed from those used in the other samples, data from this sample were used only to examine the dimensions underlying responses to the instrument and the reliability of sub-scales developed from the new instrument.

Manufacturing company. One hundred and sixty questionnaires were distributed to all staff members at a single site organisation, wholly owned by a multinational company. Ninety completed responses were received (response rate = 56.3%). Questionnaires were distributed by hand by a member of the research team, but were completed in the participants' own time. Anonymous responses were returned in a sealed pre-paid envelope to members of the research team.

Most of the sample were male (91.1%) and described their ethnicity as white British (94.4%). On average, members of the sample were 41.88 years old (SD=9.31). Most of the sample worked in production on the shop floor (53.3%), but 7.8% of the sample were clerical staff, 26.7% were in middle management and 3.3% senior management. Some 47.8% of the sample worked shifts. Members of the sample had been in their current job for an average 8.30 years (SD=8.27) and working at this site for 13.87 years (SD=10.53).

Local government sample. The central administrative departments of a shire county council agreed to facilitate the research. Questionnaires were distributed via the internal mailing system on two separate occasions. The envelope containing the questionnaire also included a letter from the research team explaining the nature of the research and that confidentiality of

responses was guaranteed. A letter was included from the Director of Personnel, which informed participants that the study had the backing of the Council and the Trade Unions that represented staff at the Council offices. Anonymous responses were returned directly to the research team in pre-paid envelopes. A total of 550 questionnaires were distributed to a random sample, and 184 returned (response rate 33.5%). Responses from both administrations of the questionnaire were compared with a series of t-tests and χ^2 -tests. Analyses were conducted on all the biographic variables, scores on all the scales used to validate the new instrument and scores on sub-scales of the new instrument. Out of 20 tests conducted, only one test was significant ($p < .05$). From the binomial distribution, the probability of one test from 17 being significant at $p < .05$ is 0.38. Therefore, it is very likely that this result reflects sampling variability, rather than true differences between questionnaire administrations. It was therefore decided to treat data from both questionnaire administrations together.

Most of the sample (62.5%) was female. The average age of the sample was 42.01 years ($SD=10.92$). On average, members of the sample had been working for the Council for 7.19 years ($SD=6.34$) and had been in their current job for an average of 11.60 years ($SD=9.21$). Most of the sample classed themselves as white British (97.3%). Most of the sample belonged to the clerical and manual grades (45.7%). Professionals and middle managers comprised 41.3% of the sample and senior managers 8.2% of the sample.

Given a very low ethnic mix in both the manufacturing and local government sample (typical of the areas where both are situated), it was not possible to examine differences in mental models of psychosocial hazards amongst ethnic groups reliably using statistical inference in these samples. However, it was possible to examine differences across other demographic variables, and differences between these two organisations.

Measures

As noted, the additional measures described below were taken only in the manufacturing and local government samples. The means, standard deviations, scale ranges, alpha coefficients of reliability and other descriptive statistics are shown for both samples combined.

Psychosocial hazard. As noted above, participants were asked to nominate a psychosocial hazard. A small minority (2.6%) noted that they liked their job and did not experience any psychosocial hazards. Another small minority declined to nominate a hazard (4.0%). Both these groups were excluded from analyses involving measures of mental models of psychosocial hazards. Working from Karasek & Theorell's (1990) job-demands-control-support model, we developed a five-fold classification of hazards mentioned by the sample. Following Karasek & Theorell, three categories were:

- a) low decision latitude, which included low job autonomy, low participation in decisions, lack of variety in tasks, lack of skill use and underload;
- b) demands, which included quantitative and qualitative overload, role conflict and other factors intrinsic to the job, such as shiftwork and dealing with customers;
- c) interpersonal relationships and communication, which included interpersonal conflict, lack of support, role ambiguity and poor communication.

Whilst these three categories accounted for the vast majority of responses, we added two categories to cover the other responses. These were:

- d) physical conditions, such as noise, heat and cramped conditions;
- e) careers and job security, including impeded career progression, lack of job security and low pay.

Interestingly, these two additional categories are included along with scales to assess demands, decision latitude and support in Karasek's Job Content Questionnaire (1985), which is popularly used in research on work-related stress (Rick *et al*, 2001). Two members of the research team coded the hazards nominated by members of the sample. There was 92.2% agreement between coders.

Some 9.1% reported low decision latitude as the worst aspect of their job, 48.5% reported demands as the worst aspect, 24.8% interpersonal relationships and communication, 6.2% physical conditions and 4.7% reported careers and job security as the worst aspect of their job.

Participants rated exposure to the hazard on the two eight-point scales shown above. Responses to each scale were coded as ranging between 0 and 7. Scores on the two scales were combined to form an overall hazard exposure scale, where higher scores indicate greater exposure (mean = 7.08, SD = 3.91, range 0-14, $\alpha=0.87$).

Participants were then asked to complete each of the two sets of questions relating to their mental models of the psychosocial hazard nominated.

Cultural attitudes. As noted in chapter 3, the cultural approach to risk perception is based mainly upon the grid/group model of culture (Thompson *et al*, 1990). In this model, four cultural archetypes are defined by two dimensions of cultural attitudes; group and grid. The group dimension is defined as 'the extent to which an individual is incorporated into bounded units' (Thompson *et al*, 1990, p. 5). The grid dimension refers to the 'degree to which an individual's life is circumscribed by externally imposed prescriptions' (Thompson *et al*, 1990, p. 5). The archetypes are 'fatalist', 'hierarchist', 'egalitarian' and 'individualist'. There have been attempts to develop measures of grid and group and the four cultural archetypes, although none have proved to be satisfactory (Smallman, personal communication). Similarly, other measures of cultural attitudes developed for work contexts are very problematic (see Nyambegera, 2000; McSweeney, in press). In this study then, we decided to develop our own measures of cultural attitudes. We examined existing measures of cultural attitudes and related constructs with items in the public domain (Hampton, 1982; Spector, 1988; Dake, 1992; Maznevski & DiSteffano, 1995), and included 24 items that we considered represented the dimensions of grid and group or the archetypes of fatalism, individualism, egalitarianism and hierarchy. These items were rated on a five-point Likert type scale (1=disagree strongly, 5 = agree strongly).

To determine the structure of the items, responses were subjected to principal components analysis (PCA). Since there was significant and considerable skew in the data, steps were taken to reduce the skew prior to examining the underlying structure of these cultural attitudes. The natural log was taken of items with significant positive skew ($p<.05$) and items with significant negative skew ($p<.05$) were squared. These transformed data were suitable for PCA (Kaiser-Meyer-Olkin index of sampling adequacy = 0.68). Principal components analysis indicated two large components with eigenvalues greater than 2.80, accounting for 24.60% of the variance. The next component had an eigenvalue of just 1.60. Two components were therefore extracted using varimax rotation. Items loading on these two largest components ($r>|.30|$) were interpretable. To form cultural attitude scales, items were attributed to the component where it had the highest loading, providing that loading exceeded $|.30|$. Two items did not load to criteria on either component and were therefore dropped from further consideration. All other primary loadings were positive. Scale scores were then calculated by summing the items and then dividing by the number of items in the scale.

The first scale comprised of items such as 'people should put their own interests at work ahead of others', 'one's success at work is mostly a matter of good fortune', 'we have little influence

over events at work' and 'at work, it's better to be lucky than smart'. This scale comprised of 9 items and was labelled 'chance'. High scores on this scale indicate an individual believes matters are determined mostly by chance and that they should protect their own interests first (mean = 2.29, SD = 0.62, range = 1-4.33, $\alpha=0.68$).

The second scale included items such as 'the best form of organisation has clear lines of reporting', 'everybody should be treated equally at work', 'it is important to carry out organisational procedures properly' and 'the highest ranking manager in a team should take the lead'. This scale comprised of 13 items and was labelled 'group rules'. High scores on this scale indicate an individual values clear and hierarchical group processes (mean = 3.66, SD = 0.47, range 2.38-5, $\alpha=0.65$).

State well-being. State well-being was measured by 10 items representing the positive and negative poles of the 5 dimensions of affective well-being identified by Daniels (2000). The items were taken from Daniels' 30 item measure of affective well-being at work, which in turn had been developed from Warr's measures of affective well-being (1990). Items included 'at ease', 'anxious', 'motivated' and 'gloomy'. Participants were asked to indicate how they had felt about work in the previous week for each item. Responses were made on a six-point Likert-type scale (1=never, 6= all the time). The 10 items were summed to form an overall scale, where high scores indicated good well-being over the previous week (mean= 40.35, SD = 8.83, range 6-60, $\alpha=0.84$).

Trait well-being. This was assessed using the same 10 items as for state well-being. In this case however, participants were asked to rate how they usually felt about work. Again, the items were summed with high scores indicating good well-being (mean= 42.67, SD = 8.26, range 6-60, $\alpha=0.86$).

Performance. Performance was measured by self-report. Eight items were adapted from Guppy & Marsden's self-report measure of performance (1997) and Van Dyne & LePine's measure of organisational citizenship behaviour (1998). Example items are 'I work to the best of my ability', 'I take on extra duties at work', 'I am absent from work' and 'I waste time at work'. Participants were asked to rate the extent to which each statement applied to them on a six-point Likert-type scale (1=never, 6=always).

To determine the structure of the items, responses were subjected to PCA. The data were suitable for PCA (Kaiser-Meyer-Olkin index of sampling adequacy = 0.80). PCA indicated one large component accounting for 42.64% of the variance (eigenvalue = 3.41). The next largest component accounted for just 13.57% of the variance (eigenvalue = 1.09). Prior to rotation, all items' loadings on this first component exceeded |0.40|. All items' loadings were in the direction that indicated better performance. Accordingly, items were summed to form a scale, where high scores indicated better performance (mean= 38.34, SD = 4.71, range 20-46, $\alpha=0.74$).

Intention to quit was measured by a single item – 'I feel like leaving this job for another'. Participants were asked to rate the extent to which this statement applied to them on a six-point Likert-type scale (1=never, 6=always, mean= 2.92, SD = 1.68, range 1-6).

Perceived effectiveness of stress management interventions. Participants were asked to rate whether they thought each of nine forms of stress management would be effective for managing stress at work. Participants were given three response options 'yes' (i.e. the technique would be effective), 'no' or 'unsure'. Participants who indicated they were unsure were dropped from analyses using that item.

The forms of stress management considered were: a) change in personnel policy (proportion of 'yes' responses = 36.3%); b) change the way jobs are done (yes = 67.2%); c) time management training (yes = 49.2%); d) lifestyle advice (yes = 33.6%); e) providing a counselling service (yes = 46.9%); f) coping skills training (yes = 55.5%); g) relaxation skills training (yes = 56.3%); h) assertiveness training (yes = 48.0%); and i) health promotion, such as on-site medical checks (yes = 63.7%).

6.3. Results and discussion

6.3.1. Assessing the psychometric properties of the instrument

The first step in assessing the psychometric properties of an instrument is to determine its structure. If the instrument is valid, then the underlying structure of the instrument should be interpretable and consistent across samples. To determine the structure of the instrument, we used principal components analysis (PCA). PCA is an exploratory technique, which we felt was more suitable than confirmatory factor analysis (CFA) for four reasons (see e.g. Hurley, Scandura, Schriesheim, Brannick, Seers, Vandenberg & Williams, 1997). First, we had no *a priori* structure for the instrument. Second, PCA and other forms of exploratory factor analysis can detect items that load on several factors, which CFA is unable to do. Third, PCA provides a number of diagnostics to assess the number of factors or components that explain the pattern of responses. Fourth, because of these reasons, PCA is more appropriate to examine instruments in the early stages of their construction, such as the instrument reported here.

Since the instrument was divided into two sections and asked two distinct questions, we decided to conduct separate analyses on each section. In each case, eigenvalues, amount of variance accounted by the components and Cattell's scree plot were used as indicators of the number of components underlying the data. Once the number of underlying components had been identified, interpretation of the factors was facilitated by applying oblique rotation using the OBLIMIN procedure in SPSS and examining the pattern matrix. In order to check the consistency in the structure of the instrument, two PCAs were conducted on each separate section of the instrument (four PCAs in total). The telecommunications sample was analysed separately from the manufacturing and local government samples. The manufacturing and local government samples were combined to achieve a more suitable sample size for PCA (Rick *et al*, 2001). Prior to the application of PCA, the suitability of the data for PCA were examined using Bartlett's test of sphericity and the Kaiser-Meyer-Olkin index of sampling adequacy (KMO) (see Rick *et al*, 2001).

For PCA of the 17 items assessing perceived impact of psychosocial hazards, Bartlett's test of sphericity was significant in the telecommunications sample ($\chi^2 = 2312.80$, $df = 136$, $p < .001$) and the KMO was 0.91. In the combined manufacturing and local government sample, Bartlett's test of sphericity was significant ($\chi^2 = 1879.59$, $df = 136$, $p < .001$) and the KMO was 0.87. Therefore the data from both samples were judged suitable for PCA. In both samples, PCA indicated three components with eigenvalues exceeding 1.2 prior to rotation. These three components accounted for 62.20% of the variance in the telecommunications sample and 56.57% of the variance in the combined sample. In both PCAs, there was a fourth component with an eigenvalue in excess of unity (1.01 for telecommunications and 1.10 for the combined sample), but examination of the scree plots indicated a three component solution in both samples. However, examination of the pattern matrices after rotation indicated a substantial number of cross-loadings in both PCAs – especially amongst the items assessing the impact of the hazard on affect. This is perhaps not surprising: according to Power & Dalglish (1997) experience of negative affect should be associated with impeded goal progress. Therefore, in

order to develop scales with unique interpretations (i.e. pure goal scales rather than mixed goal and affect scales), it was decided to analyse the goal items separately from the affect items.

For the PCA of the 12 goal items, Bartlett's test of sphericity was significant ($\chi^2 = 1317.34$, $df = 66$, $p < .001$) and the KMO was 0.88 for the telecommunications sample. In the combined sample, Bartlett's test of sphericity was significant ($\chi^2 = 1064.29$, $df = 66$, $p < .001$) and the KMO was 0.82. Therefore, in both cases, the data were judged suitable for PCA. In the telecommunications sample, PCA indicated two components with eigenvalues greater than 1.4, together accounting for 57.4% of the variance. No other components' eigenvalue exceeded unity in this sample. In the combined sample, PCA indicated two components with eigenvalues exceeding 1.5 prior to rotation. These three components accounted for 53.33% of the variance. A third component's eigenvalue exceeded unity (1.18), but examination of the scree plot indicated a two component solution. Together with evidence to indicate a two component solution in the telecommunications sample, it was decided to extract two components. The pattern matrix loadings for the two component solution are shown in table 6.1 for both samples. No cross-loading exceeded $|0.30|$ – although there were cross-loadings greater than $|0.30|$ in the pattern matrix of the three component solution in the combined sample. This provides further evidence that two components account for the data best in both samples.

The pattern of loadings is the same for both samples. Items loading on the first component indicate that this component assesses the hazard's perceived impact on work goals. Accordingly, a sub-scale of the instrument was produced by summing scores on the nine items loading on this component and dividing by nine. The sub-scale was labelled 'impact on work goals'. High scores on this scale indicate that the hazard is thought more likely to impede progress toward work goals. Loadings on the second component indicate this component assesses the hazard's perceived impact on health and work-life balance goals. A sub-scale – labelled 'impact on health and spillover' – was created by summing scores on the three items that load on this component and dividing by three. High scores indicate the hazard is thought more likely to impede health and increase negative spillover from work to home domains.

Table 6.1. Pattern matrix loadings for a hazard's impact on goals

<i>Item</i>	<i>Loading on 'impact on work goals'</i>	<i>Loading on 'impact on health and spillover'</i>
1. decreases my job satisfaction	.57 / .55	
2. makes it more difficult to get on with people at work	.52 / .56	
3. decreases the influence I have on my work	.75 / .66	
4. prevents me from doing my job well	.62 / .64	
5. decreases my chances of promotion or a pay rise	.89 / .71	
6. reduces my status at work	.93 / .85	
7. makes it more difficult to develop my skills	.79 / .73	
8. makes it more difficult to feel a sense of purpose at work	.69 / .74	
9. reduces my job security	.56 / .63	
10. increases my chances of suffering from aches and pains (e.g. backache, headache, stomach upset)		.82 / .85
11. increases my chances of suffering from major health problems (e.g. heart disease, cancer)		.82 / .83
12. makes work interfere with my home life		.70 / .72

Loadings before slash are for the telecommunications sample, loadings after the slash for the combined manufacturing and local government sample.
NB Loadings < |.30| omitted.

For the PCA of the five items assessing impact on affect, both Bartlett's test of sphericity ($\chi^2 = 624.84$, $df = 10$, $p < .001$ for the telecommunications sample, $\chi^2 = 445.19$, $df = 10$, $p < .001$ for the combined sample) and the KMO (0.82 and 0.69 for the telecommunications and combined samples respectively) indicated that both data-sets were suitable for PCA. PCA indicated one large component in both samples (eigenvalue = 3.17 for the telecommunications samples, eigenvalue = 2.66 for the combined sample). This first component accounted for 63.36% of the variance in the telecommunications sample and 53.16% of the variance in the combined sample. Although no other components' eigenvalue exceeded unity in the telecommunications sample, the eigenvalue of a second, much smaller, component exceeded unity (1.09) in the combined sample. However, examination of the scree plot for the combined sample indicated a one component solution. In both analyses then, the data indicate that these five items are best accounted for by one factor.

In both samples, for four of the five items, loadings on this factor exceeded 0.70. In both samples, one item (makes me feel bored) had a lower loading. In the telecommunications sample, this loading was 0.58. However, in the combined sample, the loading on this factor was just 0.28. Nevertheless, even though the loading was much lower than the other loadings, it was in the expected direction. It was therefore decided to retain this item in a sub-scale assessing the impact of the hazard on affective well-being at work. Scores on the sub-scale were calculated by summing scores on each of the items and dividing by five. This sub-scale was labelled 'impact on affect at work'. High scores indicate that the hazard is thought more likely to increase dysphoria at work.

For the PCA on the 20 items assessing effectiveness of strategies for dealing with the hazard, both Bartlett's test of sphericity ($\chi^2 = 2130.85$, $df = 190$, $p < .001$) and the KMO (0.83) indicated the data were suitable for PCA in the telecommunications sample. Bartlett's test of sphericity ($\chi^2 = 2203.17$, $df = 190$, $p < .001$) and the KMO (0.88) indicated the data from the combined sample were also suitable for PCA. In the telecommunications sample, PCA indicated three components with eigenvalues greater than 1.90, accounting for 52.14% of the variance. A fourth component had an eigenvalue of 1.50. The scree plot indicated either a three or four component solution would be appropriate for these data. In the combined sample, PCA indicated three components with eigenvalues exceeding 1.6 prior to rotation. These three components accounted for 54.58% of the variance. Two other components' eigenvalues exceeded unity (1.13, 1.01), but examination of the scree plot indicated a three component solution. Taken together, the results indicate that a three component solution accounts for the data best across both analyses.

Table 6.2. shows the pattern matrix loadings for the three component solution in both samples. Examination of the pattern of loadings indicates that items loading on the first component mainly refer to organisational changes. This component was therefore labelled 'organisation process change'. Items loading on the second factor mainly refer to personal attempts to avoid the hazard or its cognitive or affective consequences. This component was therefore labelled 'personal avoidance'. Items loading on the third component refer to support from manager and attempts to change the hazard or vent feelings. Since managers may offer support to enable individuals to change hazards or vent feelings, this component was labelled 'managerial support'.

In the telecommunications sample, one item did not load to criteria on a component with which there was a strong loading in the combined sample ('changing the way careers are managed'). However, this item was only just below the 0.30 threshold (0.295) in the telecommunications sample. This item also exhibited a loading of 0.41 on the 'personal avoidance' component in the telecommunications sample, although there is no conceptual fit with other items in this component. There was no such cross-loading in the combined sample. Given the item's conceptual fit with other items loading on the 'organisation process change' component in both samples, that it loaded strongly on this component in the combined sample, it nearly reached criteria in the other sample and the cross-loading occurred in only one sample, it was decided to include this item as part of an 'organisation process change' sub-scale.

Table 6.2. Pattern matrix loadings for strategies for managing the hazard

<i>Item</i>	<i>Loading on 'organisation process change'</i>	<i>Loading on 'personal avoidance'</i>	<i>Loading on 'managerial support'</i>
1. Changing the way in which work tasks are performed	.62 / .34		-- / .37
2. Ensuring that everyone knows what they are supposed to be doing	.64 / .67		
3. Changing the way people at work behave toward each other	.50 / .75		
4. Improving work processes	.79 / .67		
5. Changing the way the whole organisation works	.53 / .77		
6. Changing the way careers are managed	.295 / .78	.41 / --	
7. Improving the overall atmosphere at work	.33 / .74		
8. Improving the way people are rewarded	.38 / .70		
9. Improving the way departments work together	.79 / .72		
10. Making people's roles at work more clear	.72 / .68		
11. Changing your expectations	-- / .32	.51 / .49	
12. Controlling your feelings		.63 / .61	
13. Not thinking about it		.86 / .87	
14. Staying away from it		.83 / .71	
15. Focusing your efforts on changing it			.52 / .48
16. Getting things off your chest			.69 / .61
17. Your manager helping you to get the things or time you need to deal with it			.80 / .76
18. Your manager telling you that he or she has confidence in you			.85 / .72
19. Your manager giving you information on how to deal with it			.83 / .81
20. Your manager being available just to talk about it			.87 / .78

*Loadings before slash are for the telecommunications sample, loadings after the slash for the combined manufacturing and local government sample.
NB Loadings < |.30| omitted.*

In the combined sample, there were two cross-loadings that exceeded |.30|. One of these was less than |0.35|, and the primary loadings exceeded 0.45. The cross-loading was not evident in the telecommunications sample ('changing your expectations'). For this item, it was decided to attribute the item to the component with the primary loading. Notwithstanding the cross-loading occurred in only one sample, the primary loading – in both samples – was on a component with which the item has greater conceptual fit: 'personal avoidance'. The item 'changing the way work tasks are performed' loaded on both the 'organisation process change'

and the ‘managerial support’ components in the combined sample. It was decided to attribute this item to the ‘organisation process change’ component, given its closer conceptual fit with this component, that the item had a large loading on this component in the telecommunications sample and the cross-loading was observed only in the combined sample.

Three sub-scale scores were calculated by summing scores on items attributed to each component and dividing by the number of items attributed to each component. Each item was attributed to only one component, and hence was featured in only one sub-scale.

Table 6.3. Means, standard deviations, alpha coefficients of reliability and Pearson product-moment correlations for scales assessing mental models of psychosocial hazards

Scale	Telecommunications sample			Local government and manufacturing			Correlations (below diagonal telecommunications, above diagonal local government and manufacturing)					
	Mean	SD	α	Mean	SD	α	1.	2.	3.	4.	5.	6.
1. Impact on work goals	2.90	0.95	.89	2.89	0.94	.86	--	.40**	.68**	.48**	.31**	.32**
2. Impact on health and spillover	2.65	1.13	.75	2.85	1.15	.74	.49**	--	.49**	.32**	.27**	.29**
3. Impact on affect at work	3.06	1.07	.84	2.91	0.94	.74	.69**	.60**	--	.42**	.42**	.31**
4. Organisation process change	3.60	0.74	.81	3.30	1.04	.90	.33**	.36**	.30**	--	.41**	.52**
5. Personal avoidance	2.52	0.90	.76	2.49	0.99	.72	.28**	.13*	.28**	.32**	--	.38**
6. Managerial support	3.66	0.89	.86	3.3	1.04	.82	.13	.20**	.16*	.52**	.27**	--

All scales range from 1-5.

** $p < .01$, * $p < .05$

In total, six PCAs in two samples indicated six dimensions that represent variation in mental models of psychosocial hazards as measured by the scales developed in this study. Six sub-scales were developed to represent these dimensions. Three sub-scales refer to perceptions of the hazard’s impact and were labelled ‘impact on work goals’; ‘impact on health and spillover’; and ‘impact on affect at work’. A further three sub-scales refer to perceptions of how best to deal with the hazard. These were labelled ‘organisational process change’; ‘personal avoidance’; and ‘managerial support’. Table 6.3. above shows the means, standard deviations, alpha coefficients of reliability and correlations amongst these six scales.

Table 6.3. shows that each of the scales has acceptable reliability as assessed by the alpha coefficients (all $> .70$). Further, since the PCAs were generally consistent across samples and that the scales derived from the PCAs were interpretable indicates some support for the

construct validity of the scales. Further evidence for the construct validity of the scales comes from analyses showing relationships with other variables. These analyses are reported next.

As noted earlier in this chapter, we expected the sub-scales to be related to a number of other variables. Correlation analysis was used to assess relationships with state well-being, trait well-being, work performance, intention to quit; the cultural attitudes of ‘group rules’ and ‘chance’; age; tenure in current job; and organisational tenure. Table 6.4. shows these correlations. The results shown in table 6.4., and in the rest of this chapter, are based on data from only the combined manufacturing and local government sample.

Table 6.4. Pearson product-moment correlations of psychosocial hazard scales with other variables

<i>Variables</i>	<i>Impact on work goals</i>	<i>Impact on health and spillover</i>	<i>Impact on affect at work</i>	<i>Organisation process change</i>	<i>Personal avoidance</i>	<i>Managerial support</i>
State well-being	-.44**	-.41**	-.65**	-.23**	-.20**	-.17**
Trait well-being	-.31**	-.29**	-.53**	-.16*	-.20**	-.09
Performance	-.16*	.04	-.17**	.04	-.01	.03
Intent to quit	.42**	.29**	.57**	.24**	.24**	.06
‘Chance’	.22**	.09	.24**	.15*	.24**	.03
‘Group rules’	-.02	.09	.03	.17*	.13*	.14*
Age	-.03	.14*	-.11	.03	-.02	.08
Tenure in job	.03	.24**	.15*	.18**	.14*	.14*
Organisation tenure	-.03	.23**	-.02	.08	.01	.06

** $p < .01$, * $p < .05$

Table 6.4. shows that each of the psychosocial hazard scales correlates significantly with several of the other scales. High scores on each of the psychosocial hazard scales are associated with lower state well-being. High scores on five out of six of the scales are associated with lower trait well-being. Performance has a negative association with greater perceived impact of the hazard on work goals and affect at work. Greater intent to quit is associated with high scores on five of the six scales. The cultural attitude of belief in ‘chance’ is associated with perceptions of the hazard impeding progress toward work goals, reducing affective well-being at work and perceptions of the usefulness of organisation process change and avoidance coping. The cultural attitude of ‘group rules’ is associated with higher scores on the ‘organisation process change’, ‘personal avoidance’ and ‘managerial support’ scales. Age, tenure in job and organisation tenure were all associated with greater perceptions that the hazard influences health and spillover. Tenure in the job was also associated with perceptions that the hazard reduces affective well-being at work and higher scores on the ‘organisation process change’, ‘personal avoidance’ and ‘managerial support’ scales.

We also expected that scores on the dimensions would be associated with gender; job grade; organisation membership; and the nature of the psychosocial hazard. One-way analyses of variance (ANOVA) were used to assess relationships amongst these variables and scores on the

psychosocial hazard scales. ANOVA indicated two significant differences between genders. One was for ‘impact on work goals’ ($F=4.22$, $df=1/245$, $p<.05$). Results indicated that men reported the hazard had a greater impact on their work goals (mean=3.00) than women (mean=2.75). The other significant effect for gender was on organisation process change ($F=6.97$, $df=1/240$, $p<.01$). Here, men perceived greater effectiveness of organisation process change (mean=3.46) than women (mean=3.11).

Table 6.5. Differences in psychosocial hazard scale scores amongst job roles

<i>Job role</i>		<i>Production</i> (<i>n=43</i>)	<i>Clerical</i> (<i>n=85</i>)	<i>Professional/middle management</i> (<i>n=95</i>)	<i>Senior management</i> (<i>n=17</i>)
<i>Scale</i>	<i>F</i>	<i>mean</i>	<i>mean</i>	<i>mean</i>	<i>mean</i>
1. Impact on work goals	3.81*	3.19	2.74	2.78	3.33
2. Impact on health and spillover	6.85**	3.24	2.43	3.07	2.92
3. Impact on affect at work	<1	3.07	2.86	2.88	3.15
4. Organisation process change	15.63**	4.14	2.88	3.35	3.26
5. Personal avoidance	3.76*	2.96	2.31	2.44	2.49
6. Managerial support	4.36**	3.69	3.07	3.34	3.59

df = 3/225 - 4/235 (variation due to missing data), ** $p<.01$, * $p<.05$.

ANOVA revealed significant differences amongst job roles for five out of six of the psychosocial hazard scales. Table 6.5. summarises these analyses. Least significant difference tests were used to compare differences between the different job roles for the scales where there was an overall significant effect. Differences that reached statistical significance at $p<.05$ are described below. For impact on work goals, senior managers and production workers rated the greatest impact of the hazard compared to professionals/middle managers and clerical workers. For impact on health and spillover, production and professionals/middle managers reported higher scores than clerical workers. For organisation process change, production workers scored higher than the other types of job roles, and clerical workers scored lower than production workers and professionals/middle managers. Production workers returned significantly higher scores on the personal avoidance scale than clerical workers and professionals/middle managers. For managerial support, the only significant difference was between production and clerical workers, with production workers scoring higher on this scale.

ANOVA revealed two significant differences between the organisations, for organisation process change ($F=33.98$, $df=1/242$, $p<.001$) and personal avoidance ($F=5.72$, $df=1/247$, $p<.05$). For both measures, the members of the manufacturing organisation reported higher scores

(mean = 3.81 for organisation process change; mean = 2.69 for personal avoidance) than the local government organisation (mean = 3.04 for organisation process change; mean = 2.38 for personal avoidance).

There were significant differences between psychosocial hazards for four of the six scales, namely impact on work goals, impact on health and spillover, impact on affect at work and organisation process change. These analyses are summarised in table 6.6. Least significant difference tests were used to examine differences amongst the hazards on the four scales where there was an overall significant effect. Physical conditions were rated as having less impact on work goals than all of the other hazards. Physical conditions were also rated as having less impact on affect at work than three of the other hazards – demands, relationships and communication and careers and job security. Demands were rated as having a greater impact on health and spillover than low decision latitude and poor relationships and communication. There was no significant difference between demands and physical conditions or careers and job security, although both of these latter hazards returned a lower score than interpersonal relationships and communication. The small cell sizes for these hazards (n=17 and n=13) may explain why there was no reliably significant difference with demands on the impact on health and spillover scale. For organisation process change, scores were higher for relationship and communication hazards compared to low decision latitude, demands and physical conditions. Demands were rated higher than physical conditions on this scale as well.

Table 6.6. Differences in psychosocial hazard scale scores amongst named psychosocial hazards

<i>Hazard</i>		<i>Low decision latitude (n=25)</i>	<i>Demands (n=133)</i>	<i>Relationships and communication (n=68)</i>	<i>Physical conditions (n=17)</i>	<i>Careers and job security (n=13)</i>
<i>Scale</i>	<i>F</i>	<i>mean</i>	<i>mean</i>	<i>mean</i>	<i>mean</i>	<i>mean</i>
1. Impact on work goals	3.07**	2.99	2.83	3.07	2.24	3.30
2. Impact on health and spillover	4.66**	2.28	3.13	2.67	2.57	2.51
3. Impact on affect at work	2.83*	2.86	2.88	3.09	2.29	3.20
4. Organisation process change	5.96**	2.96	3.24	3.72	2.58	3.28
5. Personal avoidance	<1	2.61	2.38	2.59	2.51	2.71
6. Managerial support	1.87	3.05	3.40	3.42	2.83	3.10

df = 4/239 - 4/251 (variation due to missing data), ***p*<.01, **p*<.05.

Table 6.7. Point-biserial correlations of psychosocial hazard scales and perceived effectiveness of stress management interventions

<i>Scale</i>	<i>Impact on work goals</i>	<i>Impact on health and spillover</i>	<i>Impact on affect at work</i>	<i>Organis-ation process change</i>	<i>Personal avoidance</i>	<i>Managerial support</i>
Change in personnel policy	.29**	.26**	.32**	.41**	.10	.26**
Change the way jobs are done	.18*	.05	.13	.17*	.10	.05
Time management training	.09	-.03	.02	.03	-.02	.14*
Lifestyle advice	.03	.17*	.10	.00	.05	.15*
Providing a counselling service	.07	.05	.16**	.06	.09	.22**
Coping skills training	.10	.09	.12	.13	.09	.27**
Relaxation skills training	.10	.19**	.19**	.14	.12	.29**
Assertiveness training	.02	.02	.01	.16	.05	.28**
Health promotion, such as on-site medical checks	.00	.20**	.06	.18	.15*	.32**

n = 153-206 due to exclusion of 'unsure' response from the analyses
 ***p* < .01, * *p* < .05.

Additionally, as noted in the third chapter, we expect that the sub-scales should be associated with the perceived effectiveness of different forms of stress management interventions. These correlations are shown in table 6.7. These results show that there are significant correlations between the psychosocial hazard scales and perceived effectiveness of different stress management interventions, and that there is a different pattern for each scale. There are some patterns in these results that are notable. First, impact on work goals was associated only with perceived effectiveness of changes in personnel policy and changes in the way jobs are done. Although impact on health and spillover was associated with perceived effectiveness of changes in personnel policy, people who felt the hazard they named posed greater risk to health and spillover also felt lifestyle advice, relaxation skills and health promotion would be effective. Similarly, impact of affect at work was correlated with changes in personnel policy, but people who felt the hazard they named posed a greater risk to their affective well-being at work also felt counselling and relaxation skills training would be effective. Scores on the organisational process change variable had the strongest correlation with rated effectiveness of change in personnel policy, but also to a lesser extent with scores on rated effectiveness of changes in the way jobs are done. Scores on the managerial support scale had unique associations with rated

effectiveness of assertiveness training and coping skills training. Scores on the managerial support scale also had the most extensive range of significant correlations with the perceived effectiveness of different forms of stress management, being correlated with all the interventions rated excepting changes in the way jobs are done. Finally, personal avoidance had only one significant correlation, which was with perceived effectiveness of health promotion.

The emergence of many significant correlations and associations supports the concurrent validity of the scales. That each scale had a different pattern of significant correlations and associations also indicates that the scales are not assessing some generalised perceptions of psychosocial hazard or response tendency, but rather each scale is assessing a different facet of mental models of psychosocial hazards. Together with analyses showing the emergence of interpretable dimensions that are associated with reliable sub-scales, the evidence presented from this study begins to suggest that the instrument has adequate psychometric properties.

6.3.2. Assessing possible influences on mental models of psychosocial hazards

Another aim of this study was to assess possible influences on responses to the psychosocial hazard scales. For each of the six scales, multiple regression analyses were conducted to determine possible influences. Working from variables assumed to be causes of mental models of psychosocial hazards identified earlier (i.e. cultural attitudes; organisation membership; different biographic factors; the psychosocial hazard itself; and trait well-being), we constructed a multiple regression equation for each scale from variables that had demonstrated a significant association with that scale in the univariate analyses reported above. Where a categorical variable was related to a sub-scale in the univariate analyses, a series of dummy codes were created to represent that categorical variable (see Cohen & Cohen, 1983). Independent variables were entered as groups in the following order. First, personal biographic variables not related to work (i.e. age, gender). Second, personal biographic variables related to work (i.e. tenure in current job, organisational tenure, organisation membership). Third, job role. Fourth, personal psychosocial variables (i.e. trait well-being, cultural attitudes). Fifth, a series of dummy variables representing the psychosocial hazards each participant had named as the worst aspect of his or her job. To limit the possibility of type I error, coefficients were judged as significant only if the overall step in which the variables were entered was significant too. Results from these regression analyses are shown in tables 6.8. through 6.13.

Table 6.8. Multiple regression to predict ‘impact on work goals’

<i>Variables in equation</i>	ΔR^2	<i>B</i>
Step 1: Personal biographics Gender	.02*	-.17
Step 2: Job role	.03	
Step 3: Personal psychosocial variables Trait well-being ‘Chance’ cultural attitude	.12**	-.03** .27*
Step 4: Named psychosocial hazard	.06**	

B coefficients are for final equation, $df = 10/212$, ** $p < .01$, * $p < .05$

Table 6.8. indicates that personal psychosocial variables have the strongest relationship on the perceived impact of a hazard on work goals ($\Delta R^2=0.12$). Both trait well-being and the belief in chance were related to perceived impact on work goals. The negative relationship with trait well-being supports Williams *et al*'s (1997) assertion that people with poor trait well-being have more elaborate mental models of the negative influence of aversive events on personal experience. The positive relationship with belief in chance supports the view that those with a fatalist attitude believe that external forces control their lives (Thompson *et al*, 1990), in so far that the results indicate that such people think it more likely a hazard will influence their pursuit of work goals. Psychosocial hazards too contributed significantly to the equation ($\Delta R^2=0.06$), even after controlling for personal psychosocial and other biographic variables. These results indicate people can learn that psychosocial hazards influence the experience of work, and this subsequently alters their views about work (Dollard & Winefield, 1998; Harris, Daniels & Briner, 2000). After controlling for gender, job role did not have a significant relationship with perceptions of a hazard's impact on work goals. The significant effect of gender disappeared after controlling for other variables – specifically job roles, indicating gender is not directly related to mental models of psychosocial hazards' impact on work goals.

Table 6.9. Multiple regression to predict 'impact on health and spillover'

<i>Variables in equation</i>	ΔR^2	<i>B</i>
Step 1: Personal biographics Age	.02*	.01
Step 2: Personal biographics related to work Tenure in job Organisational tenure	.06**	.02 .01
Step 3: Job role	.05**	
Step 4: Personal psychosocial variables Trait well-being	.08**	-.04**
Step 5: Named psychosocial hazard	.05**	

*B coefficients are for final equation, df = 11/215, **p<.01, *p<.05*

Table 6.9. indicates that, although initially significant, age, tenure in job and organisational tenure did not have a significant relationship with perceptions of a hazard's impact on health and spillover, after controlling for job role, trait well-being and the nature of the psychosocial hazard itself. Job role is related to the 'impact on health and spillover' scale ($\Delta R^2=0.05$), indicating collective influences on cognition within bounded functional or professional groups (cf. Bowman & Daniels, 1995). As with the analysis on hazards' influence on work goals, both trait well-being and named psychosocial hazard had statistically reliable associations with a hazard's perceived impact on health and spillover.

Table 6.10. indicates that personal psychosocial variables have the strongest relationship with perceptions of a hazard's impact on affect at work ($\Delta R^2=0.29$), with both trait well-being and belief in chance having significant unique relationships. These results are consonant with the results with perceptions of a hazard's impact on work goals. They again indicate that people with poor trait well-being have more elaborate mental models of the negative influence of

aversive events on personal experience (Williams *et al*, 1997) and that those with a fatalist attitude believe that external forces control their lives (Thompson *et al*, 1990). Nevertheless, the nature of psychosocial hazards themselves also had a significant relationship, again indicating that aversive work conditions can change people's perceptions of the experience of work (Dollard & Winefield, 1998). Table 6.10. shows the relationship between tenure in job and a hazard's impact on affect at work is no longer significant after controlling for psychosocial variables and the nature of the hazard.

Table 6.10. Multiple regression to predict 'impact on affect at work'

<i>Variables in equation</i>	ΔR^2	<i>B</i>
Step 1: Personal biographics related to work	.02*	
Tenure in job		.01
Step 2: Personal psychosocial variables	.29**	
Trait well-being		-.05**
'Chance' cultural attitude		.28**
Step 3: Named psychosocial hazard	.05**	

B coefficients are for final equation, *df* = 7/227, ***p*<.01, **p*<.05

Table 6.11. Multiple regression to predict 'organisational process change'

<i>Variables in equation</i>	ΔR^2	<i>B</i>
Step 1: Personal biographics Gender	.03*	.10
Step 2: Personal biographics related to work Tenure in job Organisation membership	.14**	.01 -.49*
Step 3: Job role	.04*	
Step 4: Personal psychosocial variables Trait well-being 'Group rules' cultural attitude 'Chance' cultural attitude	.04**	-.02* .11 .27*
Step 5: Named psychosocial hazard	.10**	

B coefficients are for final equation, *df* = 13/204, ***p*<.01, **p*<.05

Table 6.11. indicates that the nature of the psychosocial hazards experienced had the strongest relationship with perceived effectiveness of changes in organisational process to deal with the hazard named ($\Delta R^2=0.10$), even after controlling for a range of other variables. Trait well-being again had a negative influence – perhaps indicating that those with poor well-being believe others are best placed to influence their own levels of well-being. Three significant effects indicate that socio-cultural variables have an influence on perceived effectiveness of

organisational process change for managing hazards. These are the significant relationship with organisation membership and job role – both indicating convergence of cognition within bounded social units such as organisational and professional/functional cultures; and the significant relationship with the cultural attitude of belief in chance. The positive relationship with the chance scale again indicates that those with a fatalist attitude believe external forces control their lives: in this case, the results indicate that changes implemented by others at an organisational level are believed to have a beneficial effect.

Table 6.12. Multiple regression to predict ‘personal avoidance’

<i>Variables in equation</i>	ΔR^2	<i>B</i>
Step 1: Personal biographics related to work Tenure in job Organisation membership	.07**	.01 -.22
Step 2: Job role	.02	
Step 3: Personal psychosocial variables Trait well-being ‘Group rules’ cultural attitude ‘Chance’ cultural attitude	.06**	-.01 .07 .35**

*B coefficients are for final equation, df = 8/211, **p<.01, * p<.05*

Table 6.12. indicates that neither personal biographics nor job role had a significant relationship with perceived effectiveness of personal avoidance coping after controlling for other variables. Although personal psychosocial variables had a significant relationship after controlling for other variables ($\Delta R^2=0.06$), only belief in chance had a significant influence. This relationship may reflect the fatalist attitude that there is not much that can be done about hazards and that steps can be taken only to endure the consequences of hazards (Thompson *et al*, 1990).

Table 6.13. Multiple regression to predict ‘managerial support’

<i>Variables in equation</i>	ΔR^2	<i>B</i>
Step 1: Personal biographics related to work Tenure in job	.02*	.02
Step 2: Job role	.05*	
Step 3: Personal psychosocial variables ‘Chance’ cultural attitude	.01	.16

*B coefficients are for final equation, df = 8/211, **p<.01, * p<.05*

Table 6.13. shows that only job role had significant relationships with scores on the ‘managerial support’ scale. The relationship with job role again indicates that mental models of psychosocial risk might be influenced by membership of bounded social groups. After

controlling for other variables, neither biographic variables nor personal psychosocial variables had any relationship with this scale.

In general, these multivariate analyses indicate that different facets of mental models of psychosocial hazards are related to:

- i) individual differences – as evidenced through unique relationships between trait well-being and the ‘impact on work goals’, ‘impact on health and spillover’, ‘impact on affect at work’ and ‘organisation process change’ variables;
- ii) the nature of the work environment – as evidenced through relationships between psychosocial hazards and the ‘impact on work goals’, ‘impact on health and spillover’, ‘impact on affect at work’ and ‘organisation process change’ variables;
- iii) socio-cultural variables – as evidenced through relationships between the six scales that assess different aspects of psychosocial perception and, variously, cultural attitudes, organisational membership and job role.

6.3.3. Assessing possible consequences of mental models of psychosocial hazards

In the final set of analyses with these survey data, we examined the joint relationships of the three psychosocial hazard impact scales on assumed outcomes: state well-being, performance and intention to quit. Multiple regression analyses were constructed with two steps. In the first step, a series of control variables were entered: age, gender, tenure in job, organisational tenure, dummy variables representing job role, organisation membership, trait well-being, both cultural attitude scales, dummy variables representing each named psychosocial hazard and exposure to the hazard. In the second step, the three impact scales were entered, namely ‘impact on work goals’, ‘impact on health and spillover’ and ‘impact on affect at work’. To limit the possibility of type I error, coefficients were judged as significant only if the overall step was significant too. Table 6.14. summarises these analyses.

Table 6.14. Joint relationships of mental models of impact on state well-being, performance and intent to quit

		<i>Impact on work goals</i>	<i>Impact on health and spillover</i>	<i>Impact on affect at work</i>
<i>Dependent variable</i>	ΔR^2	<i>B</i>	<i>B</i>	<i>B</i>
State well-being	.07**	-.07	-.98**	-2.36**
Performance	.03*	-.60	.83*	.29
Intention to quit	.07**	.12	.02	.53**

** $p < .01$, * $p < .05$

Table 6.14. shows that greater perceived impact of hazards on affect is related to reduced well-being and greater intention to quit, even after controlling for biographic variables, trait well-being, cultural attitudes, psychosocial hazard type and exposure. The results with affective well-being are consonant with the findings of an influence of mental models on daily well-being in the diary studies. There was also a negative relationship between well-being and perceived impact of a hazard on health and spillover. However, the positive relationship between performance and perceived impact of a hazard on health and spillover is not consistent with two

of the diary studies. There are reasons to consider the diary evidence superior however. First, measures of performance were taken daily, and so will be less influenced by recall bias and other response tendencies found in self-report measures of performance assessed through general surveys. Second, one of the diaries included an objective, behavioural measure of performance. Third, zero-order correlations indicate that there is no association between measures of performance taken in this study and perceived impact on health and spillover (see table 6.4.), indicating that the relationship is either statistically spurious or conditioned by the presence of control variables. Fourth, measures of mental models were taken before measures of performance. Where measures of performance are taken concurrently, we cannot be sure of the direction of causation. Consequently, the results may indicate that people who perform their jobs well endure risks to their health in order to do so. Indeed, an item level analysis supports this interpretation. After the same controls as used in the regression analysis, perceived impact of a hazard on health and spillover was related to only three of the eight items comprising the performance scale ($p < .05$). The items were 'I help colleagues to do their work better', 'I put a lot of effort into my work' and 'I take on extra duties at work'. The nature of these items indicates that people may put extra effort into work even if they subsequently come to believe this additional effort may damage their health or non-work life. This perceived cost may be discounted by a perception of benefits that accrue from the additional effort. Nevertheless, in spite of some divergence from the diary studies, the results reported in this chapter do reinforce the general principle established in the diary studies. That is, mental models of psychosocial hazards have important organisational and personal consequences.

6.4. Conclusion

By developing the instrument from extant literature and the qualitative research reported in chapter 4, we have taken steps to help ensure the content and face validity of the instrument. The PCA indicated six interpretable dimensions underlying responses to the instrument. That these dimensions were interpretable lends support to the instrument's construct validity. Items' relationships to these six dimensions were generally consistent across samples, indicating some degree of cross-validation across sample. There was a unique pattern of associations amongst scales derived from the instrument and other variables, supporting both the concurrent and divergent validity of the scales. Evidence for these two more specific forms of validity lends more support to the construct validity of the instrument. The scales were also shown to have acceptable internal consistency, supporting the scales' reliability.

The cross-sectional methodology used in this stage of the research did not allow us to examine the test-retest reliability, the test-retest sensitivity and predictive validity of the instrument's scales. Nevertheless, the diary studies reported in the last chapter suggest that evidence for predictive validity may be forthcoming. Further, there were significant associations between a hazard's perceived impact on affect at work and state well-being and intent to quit, even after controlling for a range of other variables. There was also qualified evidence for a positive relationship between a hazard's perceived impact on health and self-reports of better performance. Whilst this relationship is not consistent with the results reported in the diary studies, more detailed analyses nevertheless indicated this relationship to be interpretable. There were associations between most of the scales and named psychosocial hazards after controlling for other variables. These results suggest changes in the experience of psychosocial hazards may alter mental models of their impact and best strategies for dealing with them. In this sense, we may expect to find evidence of test-retest sensitivity as people change jobs or gain experience with particular psychosocial hazards. However, socio-cultural variables and trait well-being also were related to mental models of psychosocial hazards. Since these variables are more difficult to change, we may also expect to see evidence of test-retest reliability in the measures, as socio-cultural variables and trait well-being provide cognitive inertia.

Although we can infer preliminary support for the reliability and validity of the instrument – as with all instruments of this nature – further work in more samples will be needed to clarify the statistical properties of the instrument and develop the instrument if necessary. The best way to examine this instrument further is in the context of its use in the processes of psychosocial risk management. In this way, the practical properties of the instrument will become apparent also. Building on the work reported in this chapter and elsewhere in this report, we explain in the next chapter how this instrument might be used in the processes of psychosocial risk management – with particular emphasis on using the instrument as a diagnostic for psychosocial risk assessment and risk communication.

7. Conclusions

In this report, we have described the results of a number of studies that have examined mental models of psychosocial hazards. In broad terms, we found:

- i) In the preliminary qualitative study, that people have elaborate mental models of psychosocial hazards, which may include the causes of those hazards, the affective and other consequences of those hazards and views on effective personal, managerial and organisational risk reduction strategies;
- ii) In the diary studies, that some aspects of mental models predict levels of subsequent affective well-being and performance, but not enactment of hazards (individually or collectively) or physical symptoms. The evidence for these predictive effects suggests causal processes insofar that these effects were observed where data collection was longitudinal, measures of well-being and performance were taken in close temporal proximity to changes in performance and well-being, an objective measure of performance was used in one study, and the effects were observed even after controlling for many other variables – including exposure to the hazard investigated;
- iii) In the survey research, that people appear to make judgements of the impact of psychosocial hazards across three dimensions – the impact on work goals; impact on health and spillover; and impact on affect at work. People appear to make judgements concerning effective risk reduction strategies for named hazards across three dimensions also. These are organisation process changes, personal avoidance and managerial support. Initial analyses of an instrument used to assess these dimensions indicates the reliability and validity of this instrument;
- iv) In the survey research, that some aspects of mental models are related to concurrent levels of well-being – replicating earlier longitudinal findings from the diary studies - and intention to leave employment with an organisation. These associations emerged even after statistical controls for various biographic factors, trait well-being and other attitudinal variables, the nature of the psychosocial hazard named by participants and exposure to that hazard. There was also qualified evidence that mental models are related to putting greater effort into work;
- v) In the survey research, that mental models are associated with concurrent measures of person variables – in particular trait affective well-being at work and the nature of the hazard named by participants. There was also evidence that socio-cultural variables are related to concurrent levels of some aspects of mental models.

In summary, the research indicates that mental models of psychosocial hazards may have a significant influence on important individual and organisational outcomes, that these mental models reflect, at least partly, the nature of psychosocial hazards encountered and that structured methods can be used to represent these mental models. In the following sections, we outline the implications of this research for research on psychosocial hazards and for psychosocial risk management.

7.1. Implications for research

Whilst this research indicates the potential of a cognitive perspective on psychosocial hazards for providing insights into the nature of psychosocial hazards and their consequences, a number of questions and issues emerge from the research that could be addressed by subsequent research. These issues arise partly from the necessary limitations of an initial programme in a new area of study, and partly from the findings of this programme of research.

Further investigations into psychometric properties of the normative instrument presented in the last chapter are important in order to realise more fully any practical benefits for this line of enquiry. Such research would not only help develop the knowledge base of the measurement properties of the instrument, but would suggest directions for enhancement of the instrument. We consider that the best research of this nature would be practical research in which the instrument is included with other measures of psychosocial hazards and attendant harm as a diagnostic package for psychosocial risk assessment. It would then not only be possible to investigate further the psychometric properties of the instrument, but to investigate the instrument's practical utility and whether it affords any unique insights to enable more effective intervention.

Results from the diary studies and surveys indicate that mental models have an influence on affective well-being and performance. However, in the diaries, these effects were sometimes direct and other times the effects were moderated by affective well-being before work or exposure to psychosocial hazards. Additionally, in many instances daily hazards still predicted well-being even after controlling for mental models. Further diary and longitudinal research is needed to determine whether mental models moderate or mediate impact of hazards. If they are found to moderate the impact of hazards, research then needs to identify whether any other factors – such as mood as indicated in the diary research – also condition these relationships. In the survey research, we found that mental models of a hazard's influence on physical health may be associated with greater effort at work. Although this evidence is qualified, it might indicate that people are prepared to make trade-offs between bearing psychosocial risks and other benefits. Research is then needed into the conditions under which people make trade-offs between bearing greater risk and obtaining increased benefits (e.g. to assure job security after downsizing, cf. Brockner, Grover, O'Malley, Reed & Glynn, 1993; Daniels, 1995).

We did not find any evidence that mental models of psychosocial hazards had any influence on the enactment of psychosocial hazards – either collectively or individually. It may be that the relationships between mental models and individual and collective enactment are too subtle or complex to be detected even by sophisticated methods such as structured daily diaries. Certainly, further research is needed before we can rule out any influences of mental models on the enactment of hazards. It could be argued that ethnographic type methods – that allow direct observation of behavioural phenomena - are more appropriate in this area (cf. Meyerson, 1994).

In the survey research, we found evidence for three major classes of relationship with mental models of psychosocial hazards. These were i) individual differences, assessed through trait well-being; ii) the nature of psychosocial hazards themselves; and iii) socio-cultural influences, evidenced through cultural beliefs about work or membership of particular organisational or professional groups. In order to provide more detail on these relationships, further research is needed to examine a wider range of variables in each of these major classes of potential influences on mental models of psychosocial hazards. For example, the association with trait well-being indicates that a fruitful line of research may examine associations between mental models of psychosocial hazards and individual difference variables, such as those commonly investigated in relation to occupational stress (e.g. negative affectivity, type A behaviour pattern, self-esteem, locus of control). It may be that mental models help provide an explanation for why individual differences alter the perception of work and the influence of work on well-being.

Most importantly, longitudinal research is needed to determine the extent to which these major classes of variables are causally implicated in the development of mental models of psychosocial hazards. In such research, it is important that individual differences, environmental and socio-cultural variables are examined conjointly in order to determine the relative size of their unique contributions. The importance of longitudinal research examining

several factors conjointly can be illustrated by considering the relationships between trait well-being and aspects of mental models found in this research. It is arguable that the association between trait affective well-being at work and mental models may overestimate the influence of personality variables on mental models of psychosocial hazards. Chronic exposure to a psychosocial hazard may lead to long term deterioration in affective well-being, which in turn may influence development of mental models that emphasise the harmful influences of psychosocial hazards. In this case, it is trait well-being that mediates the indirect influence of the work environment on mental models. Only longitudinal research would be able to detect such causal processes.

Given evidence that suggests such individual, environmental and socio-cultural influences on mental models, key questions for future research might include: do mental models change as exposure to hazards changes? do changes in well-being mediate the impact of changes in the work environment on mental models? can human resource management systems used for employee communication and induction (such as performance appraisal systems, socialisation programmes, training systems, career development systems) influence the development of mental models of psychosocial hazards? if so, can such human resource systems be used to impart information on effective courses of preventive action? how do individual differences influence the nature of these processes?

It is clear then that many issues need to be resolved before a complete cognitive explanation of psychosocial hazards is forthcoming. Nevertheless, the research reported here does indicate such a cognitive approach might be a fruitful area for research.

7.2. Implications for practice

Notwithstanding the questions raised in the previous section - there are practical implications of this research. It is however necessary to raise one issue with practical connotations. This concerns any presumptions concerning the locus of causality imagined in this research.

Since we focus on how individuals interpret psychosocial hazards, it might be tempting to conclude that this research indicates that it is the individual, rather than the work environment that is the 'cause' of psychosocial harm. Such a naïve interpretation of this research is untenable. Given that we have found evidence to suggest individual differences, socio-cultural variables and environmental factors influence the formation of mental models of psychosocial hazards, we believe a cognitive account of psychosocial hazards has the potential to provide a more subtle account of how differences in responses to psychosocial hazards may be linked to more deep rooted personality variables, the wider socio-cultural environment and experience with psychosocial hazards. Indeed, just because information is represented in a mental model, it does not follow that it is 'just a belief' with no grounding in social reality. From a practical perspective, as our results indicate, there is not much point in attempting merely to change peoples' mental models in isolation. If the wider social environment does not change and the same psychosocial hazards are encountered, people may well continue to draw the same - possibly accurate - inferences concerning the impact of those hazards on affective well-being and the pursuit of their goals. Therefore, we feel that the major practical applications of the research reported here are in the area of psychosocial risk management: particularly risk communication and risk assessment.

As noted in chapter 3 of this report, effective risk communication is a participatory and two-way process that allows the views of stakeholders to be incorporated into risk management decisions as much as it involves communication to those exposed to hazards (cf. National Research Council, 1989).

Risk messages are likely to be more successful where their content accords with recipients' mental models and where messages include information on what those exposed can do (rather than 'not do') to minimise exposure (see Daniels, 1996a). Information gathered from a sample of those exposed to psychosocial hazards may then be useful in developing an understanding of their mental models of psychosocial risks. Such knowledge can then be useful in developing effective risk messages that address: workers' concerns about psychosocial hazards, address 'cognitive blindspots' in the impact of psychosocial hazards on well-being and important work goals; and ensure that information on personal and organisational risk reduction is readily assimilated into existing mental models. For example, prevalent beliefs amongst a group of workers may be that excessive work demands do not influence physical health, that personal coping strategies are ineffective for dealing with demands, but that excessive demands do influence performance. In this case, risk messages focusing on the impact of demands on physical health are not likely to be attended to, since such messages are not consonant with group members' mental models. A message that starts by focusing on the influence of demands on work performance is more likely to be attended to. Information later in the message concerning personal strategies to limit exposure are consequently more likely to be acted upon – especially if it acknowledges that many personal strategies are ineffective for dealing with demands, but some strategies – of which the sample is unaware - can limit exposure and the organisation is providing resources to enable enactment of these more effective coping strategies.

As part of communication from those exposed to psychosocial hazards to those responsible for developing policies to manage the hazards, the instrument developed in this research can help identify the hazards which people are concerned about and what people think should be done about those hazards. Hazards which are rated as occurring frequently and which are rated as having a large influence on work goals, health, spillover or affect at work are likely to be viewed by the sample as the hazards requiring attention. Such information may help to prioritise hazards for intervention. It may be that in some circumstances other evidence indicates hazards rated as having a large impact are not particularly risky. Even so, knowledge that a hazard is perceived to be risky is useful for communicating information about risk reduction strategies. In this instance, special attention needs to be given in communication as to why a particular hazard is not being targeted for intervention. Knowledge of views on effective forms of risk reduction may help identify suitable courses of action that might otherwise go unnoticed. At the very least, such knowledge will indicate that risk messages should include information on why certain interventions – perceived to be effective – are not being undertaken.

In this sense, inclusion of the instrument developed here along with other psychosocial risk assessment approaches (e.g. Cox & Griffiths, 1996) may facilitate psychosocial risk communication and help prioritise hazards for intervention and identify suitable risk reduction strategies. The instrument could also be used after the implementation of psychosocial risk reduction strategies and/or communication of risk messages. In this way, the instrument could be used to assess the success of risk reduction or risk communication.

Additionally, the cognitive approach adopted in this research suggests several novel approaches that might prove useful as supplements to more traditional risk reduction strategies. One of these is focused on organisational development, in which concerted efforts are made to encourage a participatory and proactive approach to dealing with psychosocial hazards. For example, members of an organisation may believe avoiding psychosocial hazards is the most effective way of limiting exposure, although proactive strategies facilitated by support from line managers might be more effective. In this case, as well as embarking upon a training or change programme to encourage more effective proactive coping and support, managers' performance criteria could be changed to emphasise a supportive role. This change in performance criteria could then be introduced via annual performance appraisal cycles. Such change programmes

are suitable for people who have already occupied a role for some time. For new recruits, socialisation programmes provide many opportunities for communicating information on likely psychosocial hazards, their consequences and available risk reduction strategies. Such communication is likely to be more effective if it involves interaction and observation with co-workers (cf. Ostroff & Kozlowski, 1992) than highly structured health and safety briefings and leaflets.

Many of the implications outlined in this section assume that mental models of psychosocial hazards are amenable to change. As discussed earlier in this chapter, it is important that longitudinal research to establish whether such mental models are amenable to durable change, and, if so, the processes that bring about such change. Indeed, we feel some of the questions raised in relation to advancing research could be examined in the context of applied research into real organisational problems.

7.3. Final comments

Throughout this report, we have argued and presented evidence to indicate that a cognitive approach to psychosocial hazards can supplement existing approaches to psychosocial risk management. Whilst there remain many questions concerning the nature of mental models of psychosocial risk, the research does indicate the theoretical and practical importance of interpretations of the psychosocial environment. However, to ignore the impact of the psychosocial environment that influences those interpretations would not only mean ignoring an important aspect of the process of the generation of harm, but would allow organisations to ignore a legal and ethical responsibility to provide, as far as is reasonably possible, work environments free of psychosocial hazards. Since we have concentrated on peoples' interpretations of psychosocial hazards, it is worth repeating that it does not follow that these interpretations are somehow irrational and not rooted in reality: and as such workers' views on the psychosocial hazards they experience may provide valuable information on effective interventions to reduce the incidence of psychosocial hazards at work.

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