Demonstrating the economic value of investments in employee health and well-being

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DEMONSTRATING THE ECONOMIC VALUE OF
INVESTMENTS IN
EMPLOYEE HEALTH AND WELL-BEING

BY

PAUL S.J MILLER BA (HONS), MSc

DOCTORAL THESIS

SUBMITTED IN PARTIAL FULFILMENT OF THE REQUIREMENTS
FOR THE AWARD OF DOCTOR OF PHILOSOPHY OF LOUGHBOROUGH
UNIVERSITY

SEPTEMBER 2009

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"...we are like dwarfs on the shoulders of giants, so that we can see more than they, and things at a greater distance, not by virtue of any sharpness of sight on our part, or physical distinction, but because we are carried high and raised up by their giant size."

John Salisbury, 1159
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ABSTRACT

The extent to which any organisation dedicates its finite resources towards employee health and well-being issues is driven by some combination of ethical, legal and economic factors. This thesis is concerned with demonstrating the economic value of investments in employee health and well-being, focusing on how economic information is and could be generated and how organisations process this information in their decision-making regarding employee health and well-being issues. The thesis explores the notion that better, more appropriate economic information and more rigorous economic evaluation methodologies are important in creating incentives for organisations to invest in and better manage the health and well-being of their employees.

A series of studies are presented: a review of the existing literature reporting cost-of-illness and cost-effectiveness type studies; a study exploring current practice using a focus group followed by a series of individual interviews with key occupational health professionals in the UK; a study reporting a survey of specialist and generalist managers’ attitudes, perceptions, information needs and experience of employee health and well-being ‘business cases’; economic evaluation methods and their application to the occupational health setting are reviewed. These studies served to directly inform the design and development of an economic framework approach using employee self-report data to construct empirical case studies to demonstrate the correlation between employer costs and employee health and well-being metrics. These studies provide new information on the relative marginal effects of cost to an organisation of changes in different employee health and well-being measures.

This knowledge could aid resource allocation decisions by providing estimates of the value to an organisation of effects that could be delivered by a diverse range of employee health and well-being interventions or policies. The separation of this economic information about the costs of employee health and well-being issues from economic information about specific interventions is likely to be key in creating incentives for organisations to invest in employee health and well-being.
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Parts of this thesis have been published, or are in the process of being published, in peer-reviewed journals:


1 Introduction

1.1 Background

Occupational health has traditionally been based on humanitarian concerns. External
pressure on firms to provide occupational health services has historically come from the
public health profession seeking improved health status per se and from trade unions
seeking social justice. Economics too, has always played an important role in
occupational health. Governments seeking to regulate markets that may otherwise be
able to transfer certain costs to third parties external to the firm; impose minimum
standards, regulation, litigation, audits, mandatory insurance schemes and the like; all of
which compel employers to invest their resources in employee health, safety and well-
being to some level.

Three key factors appear to have increased the focus on demonstrating the economic
value of investments in employee health and well-being. First, a significant factor has
been both the government and corporate response to spiralling healthcare cost inflation in
developed countries.

As most U.S. employers pay for health (and workers compensation) insurance that covers
their employees, their dependents and retirees, there has been considerable attention to
the fact that higher costs of healthcare in the U.S. translates into a competitive
disadvantage for American goods and services in a global competitive marketplace.
Indeed, health insurance premiums have been estimated to cost American businesses as
much as 38% of pre-tax profits (Fielding, 1989). Driven by the threat of financial crisis
during the 1980’s the corporate response to managing healthcare costs in the U.S. was
generally somewhat short-term and focussed on cutting the insurance bills by
withdrawing benefits, increasing coinsurance and deductibles and reviewing
administrative processes. More recently, there has been renewed recognition that
employers have great scope to influence the health and well-being of their employees by
taking a somewhat longer-term perspective and tackling some of the underlying causes
driving their healthcare costs, indeed health management and promotion may be a more (cost)-effective way of controlling all health-related costs to corporations (Aldana, 2001).

In the UK, there have been a number of government-backed initiatives including recently, for example, “The Black Report” (Black, 2008); “The Boorman Review” (Hassan et al, 2009); and the Foresight Mental Capital and Well-being Project (Dewe and Kompier, 2008); highlighting the need for a more truly societal approach to public health and well-being, where the employer must play their part. Work, the workplace and the role of the employer are clearly recognised as both potentially negative and positive drivers of an individual’s health and well-being.

The second key factor that has increased the focus on demonstrating the economic value of investments in employee health and well-being is the increased pressure for organisations to rationalise all expenditures, whether due to pressures such as global market forces, downsizing and mergers or downturns in the economic environment. Specifically for employee health and well-being related expenditures this has often been presented in terms of the ‘in-house’ versus ‘contracted out’ debate in large multinational organisations (Fitko et al., 1994; McGrail et al., 1995; Packman et al., 1996) but also the fundamental challenge to using resources apparently not core to the business purpose.

If private companies exist for profit maximization then subject to various constraints all activities that the company engages in must strive to maximize shareholder value. Large corporations obviously engage in activities that contribute to this objective in both direct and indirect ways. Resources are invested in business support services, such as information technology, security and occupational health, in the belief that the company is better off: that they have some form of positive impact for the company. Supporters, advocates and providers of these business support-type services have engaged in somewhat defensive activities to demonstrate the often hidden economic value of these activities when faced with a cost-minimizing environment. Similarly, when faced with the need to cut-costs, rational organisations want to be able to select the areas where this is likely to have least impact on their organisation and its’ objectives.
The third key factor that has increased the focus on demonstrating the economic value of investments in employee health and well-being is the emergence and rapid development of the health and productivity literature. Work in this area over the past 20 years, has essentially attempted to broaden the cost perspective for employers, beyond healthcare costs (particularly in U.S.), beyond absence management and to embrace a more total economic impact approach. Key to this is the identification and measurement of a ‘new’ but highly relevant type of cost, that of presenteeism: employee performance and productivity whilst at work that may be impaired by health and well-being related issues. Two factors about presenteeism have potential to truly attract the attention of employers. First, presenteeism costs are invisible in most organisations (Hemp, 2004). Second, presenteeism costs may be very substantial indeed and greatly exceed the combined costs of absenteeism and medical treatment costs (Collins et al., 2005).

1.2 The problem

The extent to which any organisation dedicates its finite resources towards employee health and well-being issues is driven by some combination of ethical, legal and economic factors depending on the extent of government intervention and market forces (Downey and Sharp, 2007; Toren and Sterner, 2003). Motivation to engage in employee health and well-being management can be viewed as voluntary, coercive or incentive (Brody et al., 1990).

Clearly there is considerable international macro-level evidence from a range of indicators measuring mortality (Schulte, 2005; Nurminen and Karjalainen, 2001; Steenland et al., 2003); and morbidity (Courtney and Webster, 1999; Murray and Lopez, 1996, Driscoll et al., 2005; Marmot and Feeney, 1996; Frank and Maetzel, 2000); as well as macro financial impacts (Beatson and Coleman, 1997; Leigh et al., 1996; De Greef and Van den Broeck, 2004) to suggest that much more can, and needs to be, done to reduce the burden of occupational injury, disease and impairment.
One approach to address this has been to reconsider the balance of ethical, legal and economic factors that may induce organisations to allocate their resources in different ways and an acknowledgement that the current combinations of ‘pull’ and ‘push’ factors to encourage organisations to invest in employee health and well-being may be suboptimal. Specifically, there may be some opportunities to improve this situation by efforts to increase ‘pull’ factors that generate economic incentives for organisations (Hyatt and Thomason, 1998).

Internationally at a system-level, attempts have been made to introduce more economic forces by means of variable insurance-based mechanisms. Insurance premiums that are designed to penalise employers with poor employee health, safety and well-being records and reward those with good records, should create incentives for employers to improve employee health, safety and well-being. The notion being that employee illness and injury can be reduced by ensuring the cost is more directly imposed onto employers.

Results from these system-level incentive schemes are somewhat mixed. There is some evidence from the Canadian Workers’ Compensation scheme that the creation of economic incentives has been somewhat effective in influencing the behaviour of firms in British Columbia (Hyatt and Thomason, 1998). However, other evidence from U.S., Australia and UK suggests that variable premiums for workers’ compensation (LaDou, 2006; Hopkins, 1994), and employee liability (Wright, 1998), do not appear to have always had the desired effect.

Considerably more focus has been on efforts to introduce economic incentives at the level of the individual organisation. It has been proposed (Kessler and Stang, 2006) that for employers to make rational economic investment decisions about employee health and well-being they need to be able to answer five key questions:

1. What are the most commonly occurring health problems in my company?
2. What are the effects of these health problems on work performance, sickness absence, industrial accidents, and disability?
3. What is the monetary value of these workplace effects on the company’s bottom line?

4. How effective are available interventions in reducing these effects in my company?

5. What is the return-on-investment (ROI) of these proposed interventions?

Many authors have described a lack of progress with issues related to this agenda (Cartwright and Cooper, 2009; Dewe and Kompier, 2008; Cooper and Dewe, 2008, Tompa et al., 2008). There is general agreement that many organisations are still attempting to address the first issue on this list, and very few have made progress beyond this into issues around the real economics of occupational health. The reasons for this lack of progress are not exactly clear.

One hypothesis is that there is information deficiency in this system. Employers typically substantially underestimate the true cost impact of employee health and well-being issues because traditional accounting systems do not capture these costs or fail to attribute them to this source. Hence economic incentives can be created by better quantification of these hidden costs and motivate rational (cost-minimising, profit-maximising) employers to invest in employee health and well-being.

Loeppke et al. (2007), for example, have strongly advocated the role of better information and that better employee health and well-being management needs to be built on a foundation of better health and productivity measurement. It is asserted that employers would “reveal a blueprint for action” for their employee health and well-being strategies if they were to measure the full health and productivity costs related to the burden of illness and health risk in their population.

Other evidence suggests that whilst employers may have clear awareness of occupational health economics, achieving organisational change may be challenging. In a U.S national survey Bondi et al. (2006), for example, found that employers do state that they seek financial return from their offerings of clinical preventive services to employees; with
some 90% stating that increased productivity and decreased healthcare costs are among the most important reasons for investing in these services; however a review of service provision found that these employers are least likely to offer the services most likely to provide this return on investment. In addition to better information per se, it is likely that a better understanding of the decision-making process itself is also required. Better understanding about how employee health and well-being decisions are made within organisations will inform the role and type of economic information in this process.

Finally, there is also some evidence to suggest that the scope of employee health and well-being may need to be wider and more multifaceted than sometimes a more traditional occupational health approach may have been. For example, a meta-analysis of Gallup studies examined the links between core aspects of employees' satisfaction, engagement and performance across organisations and found that the presence of positive workplace perceptions and feelings are associated with higher business unit customer loyalty, higher profitability, higher productivity and lower rates of turnover (Harter, Schmidt and Keyes, 1999). A recent large-scale IOSH-sponsored study also identified some trends for correlation between the level of health and safety management and organisational outcomes such as profit margins, absence and injury rates and employee job attitudes and perceptions (Ward et al., 2008).

1.3 The aims of this research

The broad aim of this research is to gain insight into the extent that the level of information demonstrating the value (costs and benefits) of investments in health and well-being specifically in the workplace could be used to provide further incentives for private firms (or indeed budget optimising publicly funded organisations) to devote resources towards employee health and well-being.

There are several fundamental research questions to be addressed:

1. What are the objectives of employee health and well-being investment?
2. What is the demand for economic value information about employee health investments?

3. Why do some firms choose to invest in employee health, to a greater extent than others and to that required by regulation?

4. What outcomes measures should health investments at work be assessed by?

5. How sensitive are these outcome measures to changes in employee health and well-being status?

1.4 Research objectives

The objective of this research is to explore the extent to which economic information can be used to provide incentive for organisations to make rational investments in employee health and well-being.

It will aim to:

- Summarise how economic information about employee health and well-being is reported in both general employee cost-of-illness and intervention-specific cost-effectiveness literature

- Better understand the information needs of key stakeholders within organisations when involved in decision-making on employee health and well-being investment

- Examine the extent to which correlation between employee health and well-being metrics and employer costs can be described and used to inform efficient allocation of resources towards employee health and well-being interventions

- Provide guidance for demonstrating the economic value of employee health and well-being
1.5 Structure of the thesis

An overview of the way this thesis is structured is presented graphically in Figure 1-1 and as a flowchart before each chapter to aid navigation through the thesis. Reviews of the literature demonstrating the burden or cost of illness, injury or impairment at work as well as the literature reporting on the cost-effectiveness of interventions to mitigate this are presented in chapter 2. The thesis method of combining qualitative and quantitative research approaches is presented in chapter 3. Three substantial primary research activities were undertaken for this thesis. The first primary research activity is presented in chapter 4, which is an exploration of current practice using a focus group method as well as a series of individual interviews. Chapter 5 details the second primary research activity, a survey of managers' attitudes and knowledge of employee health and well-being and the role of the business case within their organisations. Chapter 6 is a review of some key economic evaluation methodologies arising from the literature. The third primary research activity is presented in chapter 7, this reports on a survey of employees that used multiple measures of employee health and well-being status alongside estimates of cost to the employer in order to explore correlations. Chapter 8 is a discussion of the findings from this research, as well as implications and recommendations.

Figure 1-1: Overview of thesis structure

- Focus group / 1:1 interviews
- Manager Survey
- Employee Survey
- Cost-of-Illness literature review
- Cost-effectiveness literature review
- Economic evaluation methods review
- Guidance for demonstrating the economic value of employee health & well-being
Overview of the thesis

Chapter 1
Introduction

Chapter 2
Literature review

Chapter 3
Thesis method

Chapter 4
Exploration of current practice: qualitative methods

Chapter 5
Managers' survey (n=986)

Chapter 6
Economic evaluation: methodological review

Chapter 7
Empirical case studies: Employee surveys (n=1,504)

Chapter 8
Discussion, implications and recommendations
2 Creating incentives for employers to invest in employee health and well-being

2.1 Introduction

"The connection between health and productivity at work is intuitively obvious but has not been demonstrated to the satisfaction of either researchers or corporate financial officers." Sean Sullivan, CEO Institute for Health and Productivity Management (Kessler and Stang, 2006, cover review comment)

Lesson one of economics often starts with the factors of production for all goods and services are land, capital, labour and enterprise. People are clearly, a key input factor (labour), but they are also responsible for managing all the production factors (enterprise) and hence fundamentally drive output. Human capital holds the key to a firm’s success or failure and has been described as the ‘profit lever’, especially in a knowledge-based economy (Fritenz, 2000). In any context, managing these factors of production and the risks around them is very likely to be important to the performance of an organisation. Since an individual’s health stock will affect their supply (quantity, quality and price) of labour (Grossman, 1972), it is clear that there is some kind of link between employee health, the efficiency (costs and benefits) of human capital and thus business performance (however measured).

The existence of this somewhat intuitive link between employee health and well-being, their labour and enterprise and the success of an organisation employing the labour is rarely disputed. Moreover, employers need to know just how important these links are for different issues under different circumstances. Employers need to understand the nature of the relationship between each component: how much changes in health and well-being contribute to labour and enterprise; and how much changes in labour and enterprise contribute to an organisation’s success. Specifically, what is the cost to an organisation of marginal decreases in different aspects of employee health and well-being, what strategies exist to mitigate these decrements in employee health and well-being and their organisational costs, and whether these strategies themselves are likely to
cost more or less to implement than the savings they might deliver through improved employee health and well-being.

Work outcome measures, such as absenteeism and staff turnover rates as well as various measures of productivity, may be impacted to varying degrees by different employee health and well-being issues and indeed by the interventions to mitigate these issues. However, these work outcomes are intermediate endpoints in the sense that they do not by themselves reveal the full impact on an organisation.

The organisational costs of employee health and well-being issues can potentially present in several forms (Miller et al., 2002) including the cost of accidents or mental or physical illnesses at work, in the form of: sickness benefits paid to employees; loss of production from absenteeism; sub-optimal staff performance and the resultant loss in productivity that may present in terms of reduced output, product quality or customer service; litigation and claims for work-related health problems or insurance premia against such claims. If management is successful and interventions selected are effective, they will reduce the probability, frequency and hence costs of negative employee health and well-being related events. Enhanced employee health and well-being management itself may also generate morale-type benefits; it may contribute to a perceived culture of partnership, whereby the company is seen to accept responsibility for the welfare of staff. Higher morale may itself generate benefits for the company as more engaged, satisfied and committed employees increase productivity in various ways. It may also influence staff retention and recruitment, and enhance the general reputation of the company. It could also be argued that this environment could reduce industrial disputes and litigation against the company (Ward et al., 2008).

Furthermore, for some time, Occupational Health professionals have of course argued that employers are actually well-placed to impact the health of their employees since in many respects the workforce represents a captive audience for health strategies (Okie, 2007). In a U.S healthcare context, Pelletier (1993) highlights that employee health is of mutual interest to both employee and employer and states:
"Work environments are a mainstay in the generation of a true health care system because the workplace provides a site where it is possible to reach the largest number of people and their dependants, for the most years of their adult life, where both the individual and the employer has a vested interest in a person's health and well-being."

Hennrikus and Jeffery (1996) point out that at low cost, occupational measures can reach a great number of people, amongst these in particular being those persons, who would not seek professional help of their own accord. In addition, companies offer easy access to persons on account of the given geographical concentration and because available communication channels can be utilised.

Warner et al. (1988) also highlights several reasons why the occupational setting can be beneficial for the effective promotion and management of health (Table 2-1).

Table 2-1: Advantages of the occupational setting for health promotion and management
(Warner, 1988)

- Ease of access to a sizeable group of people (many at risk)
- Reduction of time and travel barriers to employee's participation
- Cohesiveness of the community (peer-support/pressure)
- Existence of well-established communication channels
- Availability of relevant existing physical facilities (e.g. employee health department)
- Efficiency of administration
- Process and feedback
- Availability of an existing health staff on site
- Stability of the target population

Individual organisations may be able to conduct health risk assessments and employee surveys to better understand the prevalence and pattern of employee health and well-being issues within their organisation. However, in the absence of their own research projects these organisations may look to the existing research evidence base to help:
i) understand and quantify the possible impact that these employee health and well-being issues may have on work outcomes and organisational cost;

ii) determine the effectiveness of various available strategies to mitigate employee health and well-being issues and so reduce impact on work outcomes and organisational cost;

iii) estimate the cost-effectiveness of implementing these strategies.

For issues where the impact on work outcomes and organisational cost is deemed material and effective strategies are available that deliver more benefits than their implementation costs there is true potential to create an economic incentive for rational employers to invest in employee health and well-being.

2.1.1 Objectives of the chapter

The specific objectives of this chapter are to conduct a review of the literature in order to:

- Explore the current evidence base documenting the impact of employee health and well-being issues on work outcomes and organisational costs

- Review the available evidence documenting the effectiveness and cost-effectiveness of interventions to mitigate the impact of employee health and well-being issues on work outcomes and organisational costs

- To review issues affecting the utility and accessibility of this evidence base to employers
2.2 Literature review method

Based on Egger et al. (2003) and Centre for Review and Dissemination (CRD) (2009), the method for reviewing literature in this area consisted of the following six steps:

- Formulation of review questions
- Comprehensive search for studies
- A priori definition of eligibility
- Standardised assessment of methodological quality
- Data extraction
- Analysis and presentation of results

2.2.1 Review questions

The review questions are aligned with the objectives of this chapter as outlined above. The literature review conducted in this chapter is intended to identify the available evidence to address two key issues:

1. What is the effect of (a range of) employee health and well-being issues on work outcomes and organisational costs?
2. What effect on work outcomes and organisational costs do interventions to mitigate employee health and well-being issues have?

2.2.2 Search strategy

Preliminary searches were conducted using online review collections, including the Database of Abstracts of Reviews of Effects (DARE); the Cochrane Database of Systematic Reviews (CDSR) as well as simple MEDLINE searches. This initial search suggested there were numerous literature reviews, including some high quality recent systematic reviews, reporting on the effectiveness of interventions to mitigate employee health and well-being issues (intervention studies). Fewer reviews were identified at this
stage considering the effect of employee health and well-being issues on work outcomes and organisational costs (observational studies), reviews identified were presented as meta-analyses of epidemiological prospective cohort studies.

The approach of the subsequent comprehensive search strategy was to focus the review on observational (rather than interventional) studies empirically reporting the impact of employee health and well-being issues on work outcomes and organisational costs. Intervention studies reporting the effectiveness of interventions are also summarised.

Several strategies for search terms were piloted and the strategy detailed in appendix 2-1 for searches of the MEDLINE and EMBASE publication databases searched using the Ovid interface was used. The list of search terms was adapted from a recent systematic review of intervention studies (Tompa et al., 2007) and developed in four main sections to identify:

i) Occupational perspectives
ii) Cost, financial or economic analyses
iii) Workplace settings
iv) Common employee specific health and well-being issues

Additional searches used the PsycINFO database based on search terms outlined in appendix 2-2, and the grey literature (specialist reports).

2.2.3 Inclusion criteria and study selection

A flowchart of the study selection process is presented in Figure 2-1 (page 20), with the yellow box showing the focus of this literature review. The search strategy above provided an initial list of 6,047 references. By reviewing titles and abstracts manually studies not presenting primary or secondary (i.e. reviews) empirical data were excluded at this stage. Remaining studies were then coded as observational or intervention studies. Of the 576 observational studies identified, 166 studies were selected for data extraction.
by means of a second filter for inclusion/exclusion criterion as outlined in Table 2-2. At this stage these observational studies were also categorised as primarily either 'impact' or 'correlation' studies. Impact studies are defined as those primarily presenting observed data on absolute risk to work outcomes (e.g. absolute number of sickness absence days) and organisational costs (e.g. absolute workloss costs) from employee health and well-being issues. Correlation studies are defined as those primarily presenting observed data on relative risks, reporting the impact of an employee health and well-being issue primarily in terms of a statistical relationship with a work outcome measure. These relationships are typically presented in terms of relative risks (hazards or odds ratios) or in terms of an estimated correlation coefficient within a regression model.

Table 2-2: Inclusion / exclusion criteria for studies reporting the impact of employee health and well-being issues in employers

<table>
<thead>
<tr>
<th>Question</th>
<th>Include</th>
<th>Exclude</th>
</tr>
</thead>
<tbody>
<tr>
<td>Does the title/abstract refer to (or suggest) a burden/cost-of-illness study design?</td>
<td>Studies that consider the burden/costs of employee health, safety and well-being. Outcome measures are quantified (in natural units or monetary terms)</td>
<td>Outcome measures not quantified (only described) Intervention studies Economic evaluation (cost-effectiveness, cost-benefit or cost utility design)</td>
</tr>
<tr>
<td>Does the title/abstract imply/refer to a workplace setting?</td>
<td>If setting is work environment. If perspective is wider (i.e. societal) but includes analysis of work environment. If subjects are employees. If subjects are mixed but include sub-group analysis of employees. If at least 1 employer relevant outcome is included</td>
<td>If setting is outside of work environment. If subjects are: Homemakers Volunteers Unpaid family help. If no employer relevant outcomes are included.</td>
</tr>
</tbody>
</table>

A considerable literature was identified for studies reporting on the effectiveness of interventions, for which multiple reviews have already been conducted. This study
selected 15 major reviews, supplemented by a few specific studies that illustrate different aspects of how the effectiveness of workplace interventions has been evaluated.

2.2.4 Quality assessment

The use of quality assessment tools to appraise observational studies included in systematic reviews is much less established than in systematic reviews of randomised controlled trials (Mallen et al., 2006). Two approaches used to assess quality are a) checklists of specific issues and b) quality scoring scales, which provide an overall numerical quality score. The use of scales that collapse quality into a single number to distinguish high and low quality studies has been seriously questioned and is not recommended (Juni et al., 1999; Colle et al., 2002). Several standardised quality checklists are available (Downs and Black, 1998; Stroup et al., 2000), but these are not widely used and no gold standard exists. This may be due to lack of flexibility as quality assessment tools tend to be tailored to specific study designs whereas reviews more often include mixed study designs. Also despite efforts to enhance the quality of reporting of observational studies such as the STROBE initiative (von Elm et al., 2007), in practice populating detailed quality assessment tools often remains problematic (Egger et al., 2003). With or without checklist tools, it is advised (CRD, 2009) that it is preferable to consider individual aspects of methodological quality.

For observational studies this review presents a narrative synthesis of several key aspects of methodological quality: the choice of outcome measures used and the appropriateness of the data sources to capture this; the choice of study design (as defined by Table 2-3) and measures taken to minimise selection bias and control for confounding factors. Internal validity, the extent to which an observed effect can be truly attributed to the intervention or exposure being evaluated and not due to the design or conduct of the study, is assessed. External validity or generalisability issues are included in the discussion.
For intervention studies methodological quality as described in the selected reviews is summarised.

Table 2-3: Definitions of observational study types (adapted from CRD, 2009)

<table>
<thead>
<tr>
<th>Observational studies</th>
</tr>
</thead>
<tbody>
<tr>
<td>A study in which natural variation in interventions or exposure among participants (i.e. not allocated by an investigator) is investigated to explore the effect of the intervention or exposure on health outcomes.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Cohort study</th>
</tr>
</thead>
<tbody>
<tr>
<td>A defined group of participants is followed over time and comparison is made between those who did and did not receive an intervention or exposure.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Case-control study</th>
</tr>
</thead>
<tbody>
<tr>
<td>Groups from the same population with (cases) and without (controls) a specific outcome of interest, are compared to evaluate the association between an exposure or intervention and the outcome.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Case series</th>
</tr>
</thead>
<tbody>
<tr>
<td>Description of a number of cases of an intervention or exposure and the outcome (without comparison with a control group). These are not comparative studies.</td>
</tr>
</tbody>
</table>

2.2.5 Data extraction

For each observational ‘impact’ study the following data were extracted: description of employee issue; evaluation perspective (firm(s), specific industry, system (i.e. insurance fund), societal); country of study; employer relevant outcome measures used (healthcare costs, absences (sickness workloss, disability), productivity (job performance, presenteeism), and other factors); the source of data used to measure employer relevant outcomes; whether outcomes were measured (or converted) to monetary values; the industrial sector; the number of subjects; study design; whether any controls were matched in some way; whether any adjustments were made for confounding factors; how subjects were selected for inclusion in the study; and a brief summary of findings.

2.2.6 Data analysis and presentation

Narrative synthesis of data items extracted for the observational studies identified by this review is presented.
Meaningful and systematic synthesis of this evidence is complicated by inter-study variability, not least in terms of which work outcomes are measured, presented and how they are combined and costed, added to many other differences between the studies including study design, sample size, year of analysis, industrial sector, employee characteristics, job characteristics and so on. Egger et al. (1998, 2003) have advised that statistical combination of studies should not, in general, be a prominent component of reviews of observational studies, whilst others have argued that meta-analyses of observational studies should be abandoned completely (Shapiro, 1994).

However, to illustrate the available evidence on the impact of health and well-being issues on work outcomes and how employers might potentially use this, some standardisation of information is attempted. For observational 'impact' studies crude, unadjusted absolute measures are presented in terms of minimum and maximum values identified by this review for a range of employee health issues. For observational correlation studies, statistical pooling and evidence synthesis is perhaps more appropriate. Results from several existing meta-analyses are summarised.

A summary of the available evidence presented by the numerous reviews that have been conducted for studies describing the effectiveness of interventions aiming to mitigate employee health and well-being issues is organised into three sections: systematic reviews of studies with work outcomes; reviews of specific work-based interventions; and reviews of work-based health promotion (disease management) interventions.
Figure 2-1: Flow chart of study selection process

Search terms as appendix 2-1, 2-2
(MEDLINE, EMBASE, PsychINFO)
N= 6,047

Review of titles and abstracts for empirical content

Observational study
N=576

Intervention study

Inclusion/exclusions as table 2-2

IMPACT
129 primary studies
(appendix 2-3)

CORRELATION
33 primary studies
4 reviews
(appendix 2-4)

EFFECTIVENESS
15 reviews
+ Illustrative primary studies

N=20
2.3 Creating employer incentives

2.3.1 Impact

A total of 129 studies were identified and met the inclusion/exclusion criteria for this section of the literature review, data extracted from each of these studies is presented in appendix 2-3-1 and appendix 2-3-2.

This sample is dominated by studies from the United States (83%) but also includes studies from Australia, Belgium, Canada, France, Germany, Japan, Mexico, Netherlands, Sweden, Taiwan, UK and two international studies. In terms of study perspective most (76%) studies were found to be from the employer (firm) perspective (either single organisations, industrial sector or multiple firms); 17 studies (13%) were categorised as taking a societal (sometimes labelled national) perspective which included some element of employer or work perspective; the remaining 11% of studies used a system perspective: that of an insurance/health plan. Some 70% of studies indicated that samples included employees from mixed industrial sectors; 11% of studies did not state the industrial sector; studies including employees from manufacturing, petrochemicals, clerical, financial services, hospital, electronics, telecoms and logging sectors were also identified.

2.3.1.1 Data Sources

Greenberg and Birnbaum (2006) have categorised four different sources of data in studies considering the impact of employee illness and its treatment (Table 2-4). Studies included in this section of the review all collected data retrospectively. Data sources for studies identified by this review were categorised as follows:

1. Retrospective ‘count’ studies (group 3 on Table 2-4) using archival data sources only, predominantly workers’ compensation; were found to be most common in this review. A total of 83 of 129 studies (64%) were found to use data only from archival sources.
2. Retrospective ‘ask’ studies (group I on Table 2-4) using self-reported data sources only, collecting data on productivity and workloss; were found to be less common in this review, 24 studies (19%) used only self-report data sources.

3. Retrospective hybrid studies (‘ask’+ ‘count’) were also identified, 22 studies (17%) were found to use a combination of self-report data and archival data sources.

For simplicity, studies in category 1 are referred to as ‘archival-only’ and studies in categories 2 and 3 are referred to as ‘non-archival-only’.

Table 2-4: Approaches to assessing impact of employee illness Greenberg and Birnbaum (2006)

<table>
<thead>
<tr>
<th></th>
<th>Retrospective</th>
<th>Prospective</th>
</tr>
</thead>
<tbody>
<tr>
<td>Self-report work</td>
<td>1) Both cross-sectional and longitudinal epidemiological/naturalistic surveys</td>
<td>2) Controlled and uncontrolled clinical trials, including effectiveness</td>
</tr>
<tr>
<td>measures “ASK”</td>
<td>assessing respondent’s clinical status in relation to his/her recollection of</td>
<td>trials documenting differential responses to alternative interventions in</td>
</tr>
<tr>
<td></td>
<td>work impairment level in the recent past</td>
<td>relation to patient or clinician replies to series of questions concerning</td>
</tr>
<tr>
<td>Archival work</td>
<td>3) Company-specific studies showing administrative claims data documenting</td>
<td>work performance and resource utilisation.</td>
</tr>
<tr>
<td>measures “COUNT”</td>
<td>patient clinical status and patterns of resource utilisation in relation to</td>
<td></td>
</tr>
<tr>
<td></td>
<td>actual patterns of work cutback and/or time missed and (possibly) also in</td>
<td></td>
</tr>
<tr>
<td></td>
<td>relation to lifestyle data from health risk assessments.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>4) Workplace-based clinical trials permitting analysis of disease-related</td>
</tr>
<tr>
<td></td>
<td></td>
<td>severity over time (e.g. following an intervention) in relation to well-</td>
</tr>
<tr>
<td></td>
<td></td>
<td>defined, worker-specific productivity measures.</td>
</tr>
</tbody>
</table>

To explore time trends, the number of studies identified as archival-only compared to non-archival-only were plotted over time. Figure 2-2 suggests that the number of studies of both types may have increased over time, certainly with a peak in 2006, in this analysis.
archival-only studies outnumber the other studies in almost every year over this time period.

Figure 2-2: Data sources over time for studies describing impact of employee health and well-being issues

2.3.1.2 Outcome Measures
The outcome measures used in the studies identified are presented in Figure 2-3. All 46 non-archival-only studies included some measure of productivity, whilst the 83 archival-only studies did not measure productivity.

Of the 83 archival-only studies, 52 (63%) measured both healthcare and absence related costs, with relatively few just measuring healthcare costs. Of the 46 non-archival-only studies, some 52% measured productivity alone and 35% measured absence (self-reported or archival) and productivity together, very few of these studies measured multiple outcomes that included healthcare.
Very few studies measured other work-related outcomes, Muller-Nordhorn et al. (2008) included a measure of early retirement, Goetzel et al. (2001) included a measure of turnover, Fowler et al. (2006) included a measure of quality of life. Studies of occupational injuries (McCall and Horwitz, 2006; Zaloshnja et al., 2007) also included indemnity payments (workers compensation). Empirical evidence of impact on product or service quality, organisational reputation and image or other work-related outcome were not identified by this review.

Studies identified in this literature review measured productivity impact in several different ways. Kleinman et al. (2005, 2007) included an objective real output count to assess productivity alongside archival data sources for costs. Wang et al. (2004) used the experience sampling method in an attempt to overcome problems of recall bias in self-report productivity measures, this method contacted employees by electronic pager at time points when they were required to complete a diary to log their job effectiveness and other factors. Pransky et al. (2005) used interactive voice response (IVR), automated data capture by telephone, to collect daily diary information on productivity, job effectiveness and workloss. Kessler et al. (2001) used daily diaries to collect productivity data.

Most studies, however, collected productivity data using a self-report instrument with a recall period of 1 to 4 weeks, specified instruments included: Health and Work Productivity Questionnaire (HPQ) (Kessler et al., 2009, 2008, 2006); Migraine Background Questionnaire (MBQ) (Lambert et al., 2002; Gerth et al. 2001); Osterhaus model (Lavinge et al., 2003); Stanford Presenteeism Scale (Collins et al., 2005); Wellness Inventory (Bunn et al., 2006); Work Limitation Questionnaire (WLQ) (Burton et al., 2004, 2005, 2006; Adler et al., 2006); Work Productivity and Activity Impairment questionnaire (WPAI) (Pearce et al., 2006; Fowler et al., 2006); Worker Productivity Index (WPI) (Burton et al., 1999); Work Productivity Survey (WPS) (Erickson and Kirking, 2002); and Work Productivity Short Inventory (WPSI) (Lamb et al., 2006).
A total of 30 (23%) studies did not report the monetary consequences of the impact on employer relevant outcome measures. These studies report on the prevalence or proportions of employees, claims or absences that are due to the given employee issue. Most of these studies (25 of 30, 83%) were from the non-archival-only category, with 18 of these studies (60%) using self-report as the only source of data.

The vast majority of studies that did provide an estimate of the monetary consequences, directly reported unadjusted insurance claims data for the relevant outcome (healthcare, workloss, disability, indemnity). This may be a poor proxy for the cost impact on the employer (see discussion section on this chapter). All of the remaining studies used the human capital method to attach monetary values to work outcome measures, Boonen et al. (2002) also supplemented this with a comparison using the friction-cost method (discussed in chapter 6 of this thesis).
2.3.1.3 Sample Size
The number of subjects studied was consistently higher in archival-only studies compared to those incorporating self-report data in combination with other sources or alone. For example, studies of archival data by Goetzel et al. (1998, 2001, 2003) used datasets ranging from 46,026 to 1 million subjects. Similarly, White et al. (2005) analysed data from 600,000 subjects; Rajagopalan et al. (2006) analysed data from 230,000 subjects and Ozminkowski et al. (2007) included 138,820 subjects.

Studies only using self-report data sources typically included several hundred subjects. For example, Blanc et al. (2001) interviewed 300 subjects to collect job effectiveness data; Wang et al. (2004) used the experience sampling method (ESM), involving 286 subjects completing diaries when contacted by pager; and Fowler et al. (2006) had 507 subjects complete a work productivity instrument. The exceptions to this were major research projects such as the American Productivity Audit (Stewart et al., 2003), studies by Burton et al. (2006a, 2006b, 2005, 2004) and Kessler et al. (2003, 2009) which involved multiple thousands of subjects.

2.3.1.4 Study Design
In terms of study design, 68 (53%) studies were categorised as observational case series studies; 43 (33%) were observational case-control studies; and 7 (5%) were observational cohort studies. The remaining studies were classified as decision-analytic models or reviews, and one randomised controlled trial was included.

Studies based on self-report productivity data only were most likely to be case-series design (68% of self-report only studies), whilst case-series design made up 56% and 50% of non-archival-only and archival-only studies, respectively.

Some 53% of the case-control studies (23 of 43 studies) reported using a matched control group to attempt to reduce bias from confounding factors. 17 of these studies were based on archival data sources only and 4 were based on self-report data sources only. Matching was most commonly restricted to key demographic variables routinely
available from archival (claims) data. Ratios of cases to controls were commonly balanced (1:1), some studies oversampled controls.

Multivariate regression models are used by several studies to correct for differences between groups of employees, however, over half of studies (56%) did not make adjustments to the analysis of results to control for confounding factors. Some 43% of archival-only and 34% of self-report only studies did report adjusted analysis to control for confounding, however this was most frequent among ‘hybrid’ studies (60%).

Several methods of subject selection were observed among studies included in this review, in order of frequency these were:

- All subjects included in given data source(s) for given year(s)
- All subjects included in given data source(s) in given year(s) selected by specific diagnosis code(s) or characteristic(s); or absence thereof with or without matching variables (controls)
- Volunteer respondents to survey or offer of health risk appraisal within given organisation(s)
- Identified as patients with given condition in clinical setting
- Random selection

2.3.1.5 Findings

To review findings, studies were categorised into 7 broad groups as follows:

1. 10 studies that measured the impact of migraine headache.
2. 18 studies that measured the impact of mental health-related issues, including anxiety disorders, bipolar disorder, depression, general mental health, and schizophrenia.
3. 10 studies that measured the impact of respiratory-related issues, including allergic rhinitis, allergies, asthma, COPD, and lower respiratory tract infections.
4. 14 studies that measured the impact of musculoskeletal-related issues, including arthritis, ankylosing spondylitis, back pain, chronic pain, neck pain, and rheumatoid arthritis.

5. 12 studies that measured the impact of injuries.

6. 25 studies that measured the impact of health risk, including alcohol, smoking, general health risks, insomnia, and obesity.

7. 31 studies that measured the impact of other specific medical conditions, including ADHD, atrial fibrillation, chronic health conditions, dental diseases, diabetes, epilepsy, fibromyalgia, GERD, gout, hand dermatitis, hearing loss, heavy menstrual bleeding, hypercholesterolemia, irritable bowel syndrome, and lupus.

Brief findings for each study are included in appendix 2-3. Table 2-5, 2-6 and 2-7 present data identified in the literature review on the incremental changes attributed to each health condition in terms of excess days of absenteeism, excess equivalent days of presenteeism (diminished job effectiveness, work performance, productivity), the estimated excess cost of workloss and total (including all cost components for that study) costs per year per employee with this risk factor. For each work outcome measure a minimum and maximum value reported in the literature is presented, where available. Areas of these tables that are shaded, represent outcomes for which no evidence on the incremental change was identified in this review. Health conditions included in the summary of findings (appendix 2-3) that do not provide evidence in this format are not presented in these tables.

Table 2-5 presents evidence of the impact of 4 common occupational issues: headache, mental health, respiratory problems and musculoskeletal-related disorders (MSD); on these work outcomes. Studies suggest that the impact of headache and migraine is likely to be high. One Swedish study (Raak and Raak, 2003) provided an extrapolated cost of lost productivity due to headache at the national level as €1.4billion per year. Interestingly, one study (Michel et al., 1997) found no difference in absenteeism rates between a group with migraine and a control, although presenteeism was reported much
more. A number of studies assessing the impact of mental health issues were identified. Laxman et al. (2008) conducted a review and concluded that bipolar disorders may cost employers almost twice the costs of depression, predominantly in terms of work loss. The study of depression by Druss et al. (2000) is based on analysis of workers compensation claims for more than 15,000 subjects. Two depression studies (Berndt et al., 1998; Greenberg et al., 1993) used modelling techniques based on secondary data sources including clinical trials. Depression was also included as part of the American Productivity Audit (Stewart et al., 2003), 1127 subjects were asked about work absence and reduced work performance in the previous 2-week period. Adler et al. (2006) studied multiple dimensions of job performance using the Work Limitations Questionnaire (WLQ) in 286 subjects with depression. The productivity impact of allergies has been particularly well documented (Kessler et al., 2001; Crystal- Peters et al., 2000; Lamb et al., 2006; Burton et al., 2001) using self-report instruments. Less information on the impact of other respiratory-related issues was identified. Studies of musculoskeletal-related disorders tended to report total costs, that included health care costs and document proportions of this total estimated to be indirect or workloss costs. Studies in this area had the largest number of subjects of studies identified by this review. Rheumatoid arthritis studies included samples of 5400 (Kessler et al., 2008) and 8500 (Ozminkowski et al., 2006), a general arthritis study (Burton et al., 2006) included 16,651 subjects completing a self-report productivity instrument and studies of generic pain (White et al., 2005; Stewart et al., 2003) drew from very substantial datasets.

Evidence on the impact of injuries were found to be presented somewhat differently to other health conditions, with studies comparing injury rates by industry and job type as well as the national burden and cost impact. Leigh et al. (2004) ranked industries in the U.S. by their annual injury costs per employee, whilst Leigh et al. (2006) ranked U.S. occupations by their injury costs and concluded a very skewed distribution with highest ranking occupations for combined fatal and non-fatal costs with an average of $5,163 per employee, some 18 times higher than the lowest ranking occupations. Horwitz et al. (2006) conducted a study of workplace assault injuries and reported average costs per injury of $1,097.
Table 2-6 presents evidence of the impact of common health risks including smoking, alcohol, insomnia and obesity as well as studies looking at multiple risk factors. Some 25 studies were identified in this area, but relatively few provided data suitable to populate the standardised format of table 2-6. An Australian study (Hocking et al., 1994) estimated the national cost of lost productivity from smoking and alcohol at AUS$2 billion whereas a Japanese study (Osaki et al., 1996) concluded that medical cost for employees that smoked were not higher than those of other smoking status and concluded this did not support investment in anti-smoking measures in the workplace. In a large U.S. study (Bertera, 1991) integrating archival claims data with employee health risk assessment data it was found that employees with any of 6 behavioural risks had higher absence, leading to higher illness costs. A study by Wright et al. (2002) also integrated archival claims data with health risk assessment data and found higher time-away-from-work costs were associated with individual's lower perception of physical health, job dissatisfaction, high stress, life dissatisfaction, and physical inactivity. A study by Boles et al. (2004) found the odds of any productivity loss were highest for individuals with diabetes (absenteeism) and stress (presenteeism). There is some evidence of the work impact of poor sleep or insomnia, a Japanese study (Doi et al., 2003) found the 1-month point prevalence of poor sleep quality was 30-45% and that poor sleepers were, indeed statistically more likely to take sick leave. The health risk of obesity or elevated body mass is also shown to be associated with poor work outcomes in several studies. Burton et al. (1998) describes a ‘J-shaped’ curve relationship between health care costs and body mass index (BMI), and reports that both indirect and direct costs increase with increasing BMI.
Table 2-5 Evidence of incremental impact of common occupational issues on work outcomes and cost

<table>
<thead>
<tr>
<th>Section</th>
<th>Condition</th>
<th>Absenteeism (excess days per year)</th>
<th>Presenteeism (excess days per year or % for study period)</th>
<th>Cost of Workloss (excess costs per year, or as stated)</th>
<th>Total cost (excess costs per year)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>min      max</td>
<td>min      max</td>
<td>min      max</td>
<td>min      max</td>
</tr>
</tbody>
</table>
| Headache         | Migraine           | 0         8.3          | 10.4     11.2        | $400     $3,309        | Edmeads and Mackell 2002  Gerth et al. 2001
|                  |                    |                      |                      |                      |                      |                                   |
| Mental health    | anxiety Disorders  |                      |                      |                      | € 3,587             | Smit et al. 2006
| bipolar Disorders|                    | 11.3     65.5        | +20%               | $1,003   $1,219        | Matza et al. Kleinman et al. 2004 2005
|                  | depression         | 9.9       27.2        | 26       27.6        |                      | $6,836                           | Gardner et al. 2006
| Respiratory      | allergic rhinitis  | +10%     +36%         |                      | $593     $1,872        | Druss et al. 2000
|                  | asthma             |                      | +19%               |                      | $3,264                           | Blum et al. 2001
|                  | lower respiratory tract infections |                      |                      |                      | $3,748                           | Birnbaum et al. 2003
|                  | arthritis          | 25.6       26.5        |                      | $1,250   $1,802        | Muchmore et al. 2003
|                  | pain               | 9.4        21.9        |                      | $2,239   $12,025       | White et al. 2005
|                  | rheumatoid arthritis |                      |                      |                      | $4,244                           | Ozminkowski et al. 2006

31
Table 2-6: Evidence of incremental impact of health risks on work outcomes and cost

<table>
<thead>
<tr>
<th>Section</th>
<th>Condition</th>
<th>Absenteeism (excess days per year)</th>
<th>Presenteeism (excess days per year or % of study period)</th>
<th>Cost of Workloss (excess costs per year or % of study period)</th>
<th>Total cost (excess costs per year)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Health risks</td>
<td>smoking</td>
<td>min max</td>
<td>min max</td>
<td>$275 $1,807</td>
<td>$0 $960</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>alcohol</td>
<td>min max</td>
<td>min max</td>
<td>$389</td>
<td>Bertera 1991</td>
</tr>
<tr>
<td></td>
<td>Each additional risk factor</td>
<td>min max</td>
<td>+1.9% +2.4%</td>
<td>$950 $2,592</td>
<td></td>
</tr>
<tr>
<td></td>
<td>insomnia</td>
<td>3.4</td>
<td>€ 1,062</td>
<td>$1,253</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Godet-Cayre et al. 2006</td>
<td>Godet-Cayre et al. 2006</td>
<td>Ozminkowski et al. 2007</td>
<td></td>
</tr>
<tr>
<td></td>
<td>obesity</td>
<td>3.7</td>
<td></td>
<td>$90 $2,485</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Tsai et al. 2008</td>
<td></td>
<td>Trogdon et Finkelstein et al. 2005</td>
<td></td>
</tr>
</tbody>
</table>

Table 2-7 presents evidence of the impact of a range of specific medical conditions, although numerous studies were identified in this area relatively few presented data in the format of incremental impact on the work outcomes included in Table 2-7. Several studies in this section were found to report on incremental total costs that include healthcare costs. Two very influential, often cited studies included in this section are a study of the impact of chronic health conditions by Collins et al. (2005) and a range of physical and mental health conditions by Goetzel et al. (2003). Collins et al. (2005) found that 65% of respondents had at least one chronic health condition listed, absenteeism was 0.9-5.9 hours in 4-week period, on-the-job impairment was 17.8% - 36.4% decrement in ability to function at work. In a study of 374,799 subjects, Goetzel et al. (2003) identified the “top-10” most costly physical health conditions were: angina pectoris; essential hypertension; diabetes mellitus; mechanical low back pain; acute myocardial infarction; copd; back disorders (not specified as low back); trauma to spine.
and spinal cord; sinusitis; diseases of the ear, nose or throat or mastoid process. The most costly mental health disorders were: bipolar disorder (chronic maintenance); depression; depressive episode in bipolar disease; neurotic, personality and non-psychotic disorders; alcoholism; anxiety disorders; schizophrenia, acute phase; bipolar disorders (severe mania); nonspecific neurotic, personality and non-psychotic disorders; psychoses.
### Table 2-7: Evidence of incremental impact of specific medical conditions on work outcomes

<table>
<thead>
<tr>
<th>Condition</th>
<th>Absenteeism (excess days per year)</th>
<th>Presenteeism (excess days per study period)</th>
<th>Cost of Workloss (excess costs per year, or as stated)</th>
<th>Total cost (excess costs per year)</th>
</tr>
</thead>
<tbody>
<tr>
<td>ADHD</td>
<td>min max</td>
<td>min max</td>
<td>min max</td>
<td>min max</td>
</tr>
<tr>
<td></td>
<td></td>
<td>+4% +5%</td>
<td>$2,526</td>
<td>$4,336</td>
</tr>
<tr>
<td>atrial fibrillation</td>
<td></td>
<td></td>
<td>$2,913</td>
<td>$4,925</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>washed out by Wu et al. 2005</td>
<td>washed out by Wu et al. 2005</td>
</tr>
<tr>
<td>chronic conditions</td>
<td>5.6 36.9</td>
<td>+17.8% +36.4%</td>
<td>$1,685</td>
<td>$327 $392</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>+10.7% labour costs washed out by Stewart et al. 2003</td>
<td>washed out by Collins et al. 2005</td>
</tr>
<tr>
<td>diabetic retinopathy</td>
<td></td>
<td></td>
<td>$1,174</td>
<td>$6,320</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>washed out by Lee et al. 2008</td>
<td>washed out by Lee et al. 2008</td>
</tr>
<tr>
<td>fibromyalgia</td>
<td></td>
<td></td>
<td>$2,913</td>
<td>$4,925</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>washed out by White et al. 2008</td>
<td>washed out by White et al. 2008</td>
</tr>
<tr>
<td>GERD</td>
<td></td>
<td></td>
<td>$671</td>
<td>$3,355</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>washed out by Brook et al. 2007</td>
<td>washed out by Brook et al. 2007</td>
</tr>
<tr>
<td>PUD</td>
<td></td>
<td></td>
<td>$1,374</td>
<td>$3,165</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>washed out by Joish et al. 2005</td>
<td>washed out by Joish et al. 2005</td>
</tr>
<tr>
<td>gout</td>
<td>4.56 0</td>
<td></td>
<td>$1,692</td>
<td>$340</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>washed out by Cote et al. 2002</td>
<td>washed out by Cote et al. 2002</td>
</tr>
<tr>
<td>hand dermatitis</td>
<td></td>
<td></td>
<td>$1,692</td>
<td>$340</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>washed out by Fowler et al. 2006</td>
<td>washed out by Fowler et al. 2006</td>
</tr>
<tr>
<td>heavy menstrual bleeding</td>
<td></td>
<td></td>
<td>$1,692</td>
<td>$340</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>washed out by Cote et al. 2002</td>
<td>washed out by Cote et al. 2002</td>
</tr>
<tr>
<td>IBS</td>
<td>6.54</td>
<td></td>
<td>$373</td>
<td>$1,251</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>washed out by Leong et al. 2003</td>
<td>washed out by Leong et al. 2003</td>
</tr>
<tr>
<td>nephrolithiasis</td>
<td></td>
<td></td>
<td>$3,494</td>
<td>$3,494</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>washed out by Saigal et al. 2005</td>
<td>washed out by Saigal et al. 2005</td>
</tr>
<tr>
<td>osteoporosis</td>
<td>4.8</td>
<td></td>
<td>$3,670</td>
<td>$3,670</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>washed out by Wu et al. 2005</td>
<td>washed out by Wu et al. 2005</td>
</tr>
<tr>
<td>overactive bladder</td>
<td>5.6</td>
<td></td>
<td>$3,670</td>
<td>$3,670</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>washed out by Wu et al. 2005</td>
<td>washed out by Wu et al. 2005</td>
</tr>
<tr>
<td>psoriasis</td>
<td></td>
<td></td>
<td>$600</td>
<td>$1,500</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>washed out by Fowler et al. 2008</td>
<td>washed out by Fowler et al. 2008</td>
</tr>
<tr>
<td>uterine fibroids</td>
<td></td>
<td></td>
<td>$600</td>
<td>$1,500</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>washed out by Fowler et al. 2008</td>
<td>washed out by Fowler et al. 2008</td>
</tr>
<tr>
<td>uterine leiomyomata</td>
<td></td>
<td></td>
<td>$771</td>
<td>$4,624</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>washed out by Hartmann et al. 2006</td>
<td>washed out by Hartmann et al. 2006</td>
</tr>
</tbody>
</table>

ADHD = attention-deficit hyperactivity disorder; GERD = gastroesophageal reflux disease; PUD = peptic ulcer disease; IBS = irritable bowel syndrome.
2.3.2 Correlates

Several important meta-analyses and key individual studies are reported in this section to illustrate another type of research evidence that can be made available to inform employer's decision-making about investment in employee health and well-being. None of the studies in this section estimates the monetary consequences of the reduced work outcomes presented. Many of these studies are major research projects with long-term follow-up and very large sample size. Almost exclusively these studies collect data on employee factors using both self-report instruments and recorded data on sickness absence from archival systems. A list of correlation studies identified for this review, the relevant employee issue and work outcome is presented in appendix 2-4 together with a brief summary of findings for each study.

Several of these studies report observing a positive relationship between worse employee health measures and sickness absence. For example, a study by Westerlund et al. (2008) has explored the relationship between work-related sleep disturbances and sickness absence among 28,424 Swedish employees followed at 2-yearly intervals for 6 years. Logistic regression models adjusting for several factors showed the odds ratio for employees reporting work-related sleep disturbances every day compared with those who answered "not at all/seldom" within the last 3 months varied from 3.22 (1.88-5.50) to 4.26 (2.56-7.19) at different time points during the study period. Furthermore, the role health risk factors such as smoking, high alcohol use and high body mass index play as predictors of sickness absence has been somewhat established as confirmed by studies such as that by Kivimaki et al. (2002). Several other key studies also explore health-related correlates of sickness absence (Frone, 2007; Labriola et al., 2006; Almond and Healey, 2003; Aronsson et al., 2000) and productivity loss (Musich et al., 2006; Caverley et al., 2007).

Most correlation studies identified in this review, however, explore the relationship between work outcomes and work-related psychological and psychosocial factors affecting an employee. Indeed, these studies frequently provide a rationale for the need for more research activity in this area since sickness absence, for example, remains a
major occupational health problem but evidence for associations between potentially modifiable psychosocial work factors and sickness absence is still scarce (Head et al., 2007).

2.3.2.1 Sickness absence correlates
Correlation studies identified by this review are clearly dominated by empirical models demonstrating correlates of sickness absence.

Farrell and Stamm (1988) conducted a meta-analysis of 72 empirical studies and considered correlation between a total of 15 variables (job satisfaction, commitment, job involvement, psychological stress, age, tenure, sex, absence history, task significance, task variety, task autonomy, task identity, feedback, pay and shift working) and the two distinct constructs of either absence frequency or total time lost through absence. Based on a synthesis of all available evidence only two factors were found to be significantly correlated with total lost time and four factors were found to be significantly correlated with absence frequency (Table 2-8). This meta-analysis concluded that organisation-wide and work-effectiveness factors are better predictors of employee absence than are demographic and psychological factors based on the evidence included in this review.

Table 2-8: Meta-analysis results: factors correlated with employee absence (Farrell and Stamm, 1998)

<table>
<thead>
<tr>
<th>Factors correlated with total lost time:</th>
<th>Corrected correlation coefficient p&lt;0.05</th>
</tr>
</thead>
<tbody>
<tr>
<td>Work environment factor: task identity</td>
<td>-0.24</td>
</tr>
<tr>
<td>Organisation wide factor: absence control policy</td>
<td>-0.46</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Factors correlated with absence frequency:</th>
<th>Corrected correlation coefficient p&lt;0.05</th>
</tr>
</thead>
<tbody>
<tr>
<td>Psychological factor: job involvement</td>
<td>-0.43</td>
</tr>
<tr>
<td>Work environment factors of task significance</td>
<td>-0.27</td>
</tr>
<tr>
<td>Work environment factors: task variety</td>
<td>-0.06</td>
</tr>
<tr>
<td>Organisation wide factor: pay</td>
<td>-0.14</td>
</tr>
</tbody>
</table>
North et al. (1996) analysing 9,072 British civil servants in the Whitehall II Study concluded that psychosocial work environment predicts rates of sickness absence since low levels of work demands, control and support were associated with higher rates of short and long spells of absence in men and, to a lesser extent women.

Jacobson et al. (1996) report a study conducted among 250 U.S. companies involving 79,070 employees. Categorical stress data (low, moderate, high) were found to correlate with categorical absenteeism (1, 1-2, 3-4, 5+ days per year). It was found that employees reporting high stress were 2.22 times more likely to be absent more than five days than those with low stress.

Virtanen et al. (2007) found that high job strain and psychological distress predicted sickness absence in a study of 7,986 public sector employees, with a 2-year follow up using the General Health Questionnaire (GHQ-12). Employees with psychological distress had 1.3 to 1.4 times higher incidence of long-term sickness absence and high job strain predicted sickness absence (hazard ratio 1.17 in women, 1.41 in men).

Duijts et al. (2007) conducted a meta-analysis of 20 prospective, cohort epidemiologic studies to assess the influence of predictive factors on sickness absence due to psychosocial health complaints. Factors found to be significant correlates of only short-term absences (<=3 days), both short-term and longer-term (>3 days) and only longer-term absences are presented in Table 2-9, Table 2-10 and Table 2-11, respectively.
Table 2-9: Psychosocial factors significantly correlated only with occurrence of sick leave $\leq 3$ days

(Duijts et al., 2007)

<table>
<thead>
<tr>
<th>No exercising</th>
<th>Adjusted Odds Ratio</th>
<th>95% Confidence Interval</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1.19</td>
<td>1.06 - 1.35</td>
</tr>
<tr>
<td>Exposed to job strain</td>
<td>1.20</td>
<td>1.13 - 1.28</td>
</tr>
<tr>
<td>Suffering from life events</td>
<td>1.14</td>
<td>1.03 - 1.27</td>
</tr>
<tr>
<td>Going through reorganisation</td>
<td>1.32</td>
<td>1.15 - 1.52</td>
</tr>
</tbody>
</table>

Table 2-10: Psychosocial factors significantly correlated with occurrence of sick leave $\leq 3$ days and $> 3$ days (Duijts et al., 2007)

<table>
<thead>
<tr>
<th></th>
<th>$\leq 3$ days</th>
<th>Adjusted Odds Ratio</th>
<th>95% Confidence Interval</th>
<th>$&gt; 3$ days</th>
<th>Adjusted Odds Ratio</th>
<th>95% Confidence Interval</th>
</tr>
</thead>
<tbody>
<tr>
<td>Being unmarried</td>
<td></td>
<td>1.28</td>
<td>1.14 - 1.44</td>
<td></td>
<td>1.37</td>
<td>1.15 - 1.64</td>
</tr>
<tr>
<td>Psychosomatic complaints</td>
<td></td>
<td>1.43</td>
<td>1.08 - 1.90</td>
<td></td>
<td>1.79</td>
<td>1.54 - 2.07</td>
</tr>
<tr>
<td>Using medication</td>
<td></td>
<td>1.44</td>
<td>1.32 - 1.58</td>
<td></td>
<td>3.13</td>
<td>1.71 - 5.72</td>
</tr>
<tr>
<td>Having a burnout</td>
<td></td>
<td>1.28</td>
<td>1.23 - 1.34</td>
<td></td>
<td>2.34</td>
<td>1.59 - 3.45</td>
</tr>
<tr>
<td>Psychological problems</td>
<td></td>
<td>1.27</td>
<td>1.23 - 1.31</td>
<td></td>
<td>1.97</td>
<td>1.37 - 2.85</td>
</tr>
<tr>
<td>Low job control</td>
<td></td>
<td>1.27</td>
<td>1.14 - 1.39</td>
<td></td>
<td>1.28</td>
<td>1.23 - 1.33</td>
</tr>
<tr>
<td>Low decision latitude</td>
<td></td>
<td>1.23</td>
<td>1.15 - 1.30</td>
<td></td>
<td>1.33</td>
<td>1.13 - 1.56</td>
</tr>
<tr>
<td>Low fairness at work</td>
<td></td>
<td>1.19</td>
<td>1.06 - 1.33</td>
<td></td>
<td>1.30</td>
<td>1.18 - 1.45</td>
</tr>
<tr>
<td>Table 2-11: Psychosocial factors significantly correlated only with occurrence of sick leave &gt; 3 days (Duijts et al., 2007)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>---------------------------------------------------------------</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Adjusted 95% Confidence Interval</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Odds Ratio</strong></td>
<td><strong>Low education</strong></td>
<td>1.85</td>
<td>1.59 – 2.33</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>Using alcohol</strong></td>
<td>1.24</td>
<td>1.02 – 1.52</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>Being fatigued all the time</strong></td>
<td>1.32</td>
<td>1.04 – 1.69</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>Low work control</strong></td>
<td>1.15</td>
<td>1.10 – 1.20</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>Psychological job demands</strong></td>
<td>1.15</td>
<td>1.12 – 1.19</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>Low skill discretion</strong></td>
<td>1.11</td>
<td>1.02 – 1.20</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>Low decision authority</strong></td>
<td>1.49</td>
<td>1.04 – 2.13</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>Unsatisfied with the job</strong></td>
<td>1.92</td>
<td>1.49 – 2.50</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>Physically demanding job</strong></td>
<td>1.66</td>
<td>1.45 – 1.90</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>High need for recovery</strong></td>
<td>2.15</td>
<td>1.01 – 4.62</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>Threats of violence</strong></td>
<td>1.26</td>
<td>1.10 – 1.44</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>Overcommitted</strong></td>
<td>1.15</td>
<td>1.03 – 1.29</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>Low level of unemployment in community</strong></td>
<td>1.39</td>
<td>1.03 – 1.89</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Busch et al. (2007) conducted a study among 233 subjects with recent or ongoing experience of long-term sickness absence associated with non-specific chronic musculoskeletal disorders with follow-up at 1 year. Four factors were found to be significantly associated with an increased probability of being in receipt of sickness benefits at the follow-up, these were: employee’s negative recovery beliefs (odds ratio: 2.41; CI 1.22-4.77); low sense of mastery (based on Pearlin Mastery Scale measuring beliefs about self-control over life circumstance) (odds ratio: 2.08; CI: 1.27-3.40); perceived high mental demands at work (odds ratio: 1.77; CI: 1.05-2.99); and prior experience of long-term sickness absence (odds ratio: 1.86; CI 1.02-3.37).

As part of the Whitehall II prospective cohort study of 10,308 British civil servants, Head et al. (2007) found that effort-reward imbalance (based on Siegrist effort-reward imbalance questionnaire) and relational justice (measured by extent to which supervisors consider employee’s viewpoints, are able to suppress personal biases, and take steps to
deal with subordinates in a fair and truthful manner) increased the risks of both long and short spells of sickness absence. Low relational justice increased risk of long-term sickness absence by 14% in men and 28% in women; poor effort-reward imbalance increased risk of long-term sickness absence by 25% in men and 21% in women, results were similar for short spells of sickness absence.

Several studies report that job satisfaction is found to be empirically associated with sickness absence (Hausknecht et al., 2008; Sagie, 1998; Ulleberg and Rundmo, 1997; Wegge et al. 2007), although earlier meta-analyses (Hackett and Guion, 1985) suggest that this relationship is inconsistent. Farragher et al. (2005) present a systematic review and meta-analysis of 485 studies with a combined sample size of 267,995 to evaluate the research evidence linking self-reported measures of job satisfaction and measures of physical and mental well-being. Job satisfaction was found to be most strongly associated with mental/psychological problems such as burnout (corrected correlation coefficient was 0.478), self-esteem (corrected correlation coefficient was 0.429), depression (corrected correlation coefficient was 0.428), and anxiety (corrected correlation coefficient was 0.420).

2.3.2.2 Other work outcome correlates

Several other studies and reviews were identified that consider factors that are correlated with other work outcomes, including productivity (job effectiveness, presenteeism), turnover and withdrawal behaviour.

For example, in a telephone survey of 3,801 Swedish employees Aronsson et al. (2000) found that a third of employees reported going to work two or more times during the previous 12 months when they should have taken sick leave. Self-reported presenteeism is found to be significantly associated with upper back/neck pain and fatigue and mild depression.

Importantly, Van den Berg et al. (2009) have recently reported on a systematic review of studies measuring correlates of work ability, specifically all studies over the past 25 years
where work ability has been measured using the widely used Work Ability Index (WAI). Poor work ability (defined by the WAI) was found to be significantly associated with several individual characteristics and work-related factors. Table 2-12 shows results for studies included in this review presented as ranges (not pooled) and in two formats (odds ratios or correlation coefficient of regression models).

Table 2-12: Meta-analysis results showing correlates of work ability (WAI) van den Berg et al. (2009)

<table>
<thead>
<tr>
<th></th>
<th>Odds ratio</th>
<th>Correlation coefficient (r)</th>
<th>p&lt;0.05</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lack of leisure-time vigorous physical activity</td>
<td>1.80-7.18</td>
<td>1.07</td>
<td></td>
</tr>
<tr>
<td>Poor musculoskeletal capacity</td>
<td>6.39-9.12</td>
<td>0.24</td>
<td></td>
</tr>
<tr>
<td>Older age</td>
<td>1.90-3.57</td>
<td>-0.10 to -0.28</td>
<td></td>
</tr>
<tr>
<td>Obesity</td>
<td>2.71-7.51</td>
<td>-0.05 to -0.78</td>
<td></td>
</tr>
<tr>
<td>High mental work demands</td>
<td>4.75</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lack of autonomy</td>
<td>1.95</td>
<td>0.51 to 0.65</td>
<td></td>
</tr>
<tr>
<td>High physical work-load</td>
<td>1.80-2.54</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Linear regression coefficient for individual parameter

Another recent study (Bergstrom et al., 2009) conducted among one public sector organisation (n=3,757) and one private sector organisation (n=2,485) found that sickness presenteeism reported on more than five occasions in the baseline year (2000) was a significant risk factor for future sick leave (relative risk 1.40 and 1.51 in public sector and private sector, respectively).

O’Neill et al. (2009) in a study of 529 hotel workers fitted a range of models and showed for example manager support to an employee was inversely correlated with intention to leave the organisation ($\beta = -1.04$, p<0.01) and positively correlated with organisational commitment ($\beta = 0.92$, p<0.01).

Several studies demonstrate how measures of employee stress are correlated with sickness absence, productivity or staff turnover (Tuten and Neidermeyer, 2004; Virtanen et al., 2007; Ulleberg and Rundmo, 1997; Hendrix et al., 1994). Several studies show
how employee commitment measures are negatively correlated with employee withdrawal behaviour, productivity, turnover, or sickness absence (Somers, 2009; Jain, 2009; Cohen, 1998; Hausknecht et al., 2008; Sagie, 1998; Somers, 1995).

2.3.3 Effectiveness

Evidence from the literature outlined above in terms of the quantified impact of specific employee health and well-being issues and their correlation with work outcomes serves to highlight the question of what can be done to mitigate these issues. Two major reviews of employee health and well-being interventions were published in 2007.

Tompa et al. (2007) conducted a systematic review of all occupational health interventions with economic evaluations to obtain a better understanding of the evidence on the costs and consequences associated with workplace interventions for health and safety and to establish what credible evidence there is that incremental investments in health and safety are worth undertaking. The evidence was organised into 24 industry-intervention clusters, the research question could be addressed for 7 of these clusters, for the remaining 17 there was deemed to be insufficient evidence. The conclusions from this comprehensive review are there is:

- Strong evidence supporting disability management interventions in multiple sectors
- Strong evidence supporting ergonomic and other MSD injury prevention interventions in the manufacturing and warehousing sector
- Moderate evidence supporting ergonomic and other MSD injury prevention interventions in the administrative and support sector
- Moderate evidence supporting ergonomic and other MSD injury prevention interventions in the health-care sector
- Moderate evidence supporting ergonomic and other MSD injury prevention interventions in the transportation sector
- Moderate to limited evidence supporting occupational disease prevention interventions in the health-care sector
- Limited to mixed evidence of negative finding for multi-faceted interventions in the manufacturing and warehousing sector

Economic evaluation methodological issues arising from this review are discussed further in chapter 6 of this thesis.

Hill et al. (2007) conducted a review of evidence from systematic and other high quality evidence reviews in three specific areas: the management and rehabilitation of workers with cardio-respiratory health problems; musculoskeletal disorders (MSDs) and low back pain (LBP); and common mental health problems. The aim of this review was to identify the best available evidence as well as gaps and weaknesses in the evidence base in order to address the issue of what workplace practices and interventions have been shown to be effective in reducing health-related negative work outcomes. The objective of this review was to inform UK policy, hence the authors decided that reviews that dealt exclusively with evaluations of US organisations were excluded. Findings for the specific health areas were as follows:

- There is very little evidence on the impact on work outcomes of the management or rehabilitation of workers with cardio-respiratory health problems. There is some effectiveness evidence for strategies that aim to prevent or reduce cardio-respiratory health problems through general health promotion, with several positive improvements related to physical activity, diet, blood pressure and cholesterol.
- There is considerable evidence on MSDs and LBP at work, evidence suggests that interventions designed around the biopsychosocial model (combining individual- and organisational-level factors) of LBP are most effective in terms of work outcomes.
- There is limited good quality evidence of the effectiveness of interventions to address common mental health problems in the workplace. Individual-level
interventions, cognitive behaviour therapy (CBT) in particular, can be effective in reducing ill-health and absenteeism. There is contradictory evidence for organisational-level interventions to address mental health problems.

A more recent study (Proudfoot et al., 2009) has also demonstrated that CBT improves employee well-being, job satisfaction, productivity, and turnover.

### 2.3.3.1 Specific work-based interventions

Several studies report on specific types of work-based interventions. For example, Franche et al. (2005) conducted a systematic review of workplace-based return-to-work interventions and found there was strong evidence that work disability duration is significantly reduced by return-to-work interventions and there was moderate evidence that these interventions reduce costs associated with work disability duration.

Menon and Assiff (2000) provide a review of several diseases specifically with pharmacological treatment options. One influential study (Cockburn et al., 1999) found that employees treated with ‘sedating’ antihistamines for nasal allergies had up to 13% greater productivity loss than employees treated with newer ‘non-sedating’ antihistamines. A review by Burton et al. (2003) found the evidence is very good for about a dozen drug classes that pharmaceuticals reduce productivity losses caused by respiratory illnesses (asthma, allergic disorders, bronchitis, upper respiratory infections, and influenza), diabetes, depression, dysmenorrhea, and migraine. Subsequent studies provide further evidence of effect on work outcomes from drug therapies for depression (Wang et al., 2008; Wang et al., 2007; Steffick et al., 2006; Lo Sasso et al., 2006; Rost et al., 2004; Greenberg et al., 2004); migraine (Yoon et al., 2006; Knoth et al., 2004; Vicente-Herrero et al., 2004; Gerth et al., 2004) and influenza (Samad et al., 2006; Knight et al., 2005; Rothberg et al., 2003; Nichol et al., 2003). Goetzel et al. (2000) reviewed evidence of whether pharmaceuticals are a cost or an investment from an employer’s perspective.
Several older studies have considered the cost-effectiveness of various types of pre-employment screening and examination, reporting the time period it is expected that these schemes will financially breakeven as the benefits from appropriate and healthy recruitment materialise (Collings, 1971; Alexander et al., 1975; Zwerling et al., 1992; Borofsky and Smith, 1993).

2.3.3.2 Work-based health promotion

Over a period of more than 20 years, several hundred studies have evaluated the impact of work-based health promotion (HP) on employer relevant outcomes. This section reviews evidence from 13 major reviews in this area: Elias and Murphy (1986); Warner et al. (1988); Katz and Showstack (1990); Pelletier (1991, 1993, 1996, 1999, 2001); Aldana (2001); Riedel (2001); Chapman (2003); Kries and Bodecker (2004); De Greef and Van den Broek (2004).

Elias and Murphy (1986) reviewed US studies and focused specifically on their success in reducing health care utilisation and costs, some examples of these early findings are presented in Table 2-13. The review concludes that all of these studies suffer from methodological flaws and so do not provide incontrovertible evidence that HP programs reduce health care costs. The study by Gibbs et al. (1985) is highlighted as providing more reliable evidence of cost-benefit.

Table 2-13: Early studies evaluating work-based health promotion programmes

<table>
<thead>
<tr>
<th>Study</th>
<th>Findings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bowne et al., 1984</td>
<td>Reduced medical and disability costs after 1 year ($1: $1.93 cost-benefit ratio).</td>
</tr>
<tr>
<td>Shepherd et al., 1982</td>
<td>After 1 year medical claim costs were contained in the intervention group but increased in the control group (mean $85 versus $114, p&lt;0.10).</td>
</tr>
<tr>
<td>Baun et al., 1986</td>
<td>Found non-significantly lower total health care costs in the intervention group after 1 year (male $561 and female $639 versus male $1,003 and female $1,535).</td>
</tr>
<tr>
<td>Lorig et al., 1985</td>
<td>Found outpatient visits were reduced by 17% after 1 year of a health education program.</td>
</tr>
<tr>
<td>Gibbs et al., 1985</td>
<td>Savings in health care cost after 5 years were $144 per employee against program costs of $99.</td>
</tr>
</tbody>
</table>
Several conditions necessary to produce reliable evaluation evidence are outlined: use of appropriate experimental design; ability to match individual program exposure or health status with utilisation data; ability to control for baseline differences between groups and for changing trends in the general population; long follow-up periods so that time-lagged cost and effects may be assessed; inclusion of large sample sizes; appropriate use of multivariate statistics to examine interactions between employee, program and worksite characteristics.

Warner et al., (1988) reviewed 10 different programme areas encompassing some 289 published papers. They assert that the claims of HP programmes' profitability are based on anecdote, intuition and flawed analyses. The review finds a paucity of methodologically sound empirical understanding of the behavioural and health effects of workplace health promotion programs. Economic analyses based on this dearth of information are at best suggestive. Results are presented categorically rather than quantitatively. The best evidence of cost-benefit or cost-effectiveness was in the areas of hypertension and individual smoking cessation, but even this was rated as "strongly suggestive". In all other areas economic claims had almost none or no research base. It is concluded there is a virtual absence of useful information on the cost-effectiveness of many workplace interventions. It is asserted that more rigorous research is likely to find less profit potential in workplace HP programmes but would emphasise cost-effectiveness since the principle benefit of HP is health not profit.

Katz and Showstack (1990) recognise that whilst health promotion programs can enhance productivity and morale; promote employee health, staff recruitment and retention, and corporate image; containing health care costs is the primary objective for U.S. corporations. They echo previous reviews and conclude that despite the widely held belief that worksite health promotion leads to decreased health care costs little empirical evidence of this effect exists. More rigorous evaluation methods are needed to be able to draw inferences about effectiveness of programs and to evaluate whether the outcomes produced are worth the cost of implementation. To be useful methods should ensure that
results are both internally and externally valid. Evidence of the effectiveness of worksite HP programs in terms of positive changes in behaviour and health status is cited. Worksite hypertension projects have achieved higher percentages of control compared to national average (48% versus 34%). Workplace outcomes for smoking cessation and cholesterol reduction have been good (20-30% and 6-7% respectively). HP programs have also increased physical activity and fitness levels. Two well-conducted evaluations are highlighted, Johnson and Johnson's "Live for Life" program (Bly et al., 1986) and a study examining the relationship between participation in a worksite fitness program and work absences (Lynch et al., 1990). Katz and Showstack (1990) state that HP programmes should be comprehensive and broad-based to increase the likelihood of success, this includes traditional health promotion as well as corporate culture, environmental, safety and human resource policy modifications.

Over a decade Pelletier (1991, 1993, 1996, 1999, 2001) published 5 separate reviews of health and cost-effective outcome studies of comprehensive health promotion and disease prevention programmes. A total of 99 studies are included in these reviews and are subjected to systematic methodological critique. Some key studies included in this review series are presented in Table 2-14. Pelletier (1991) reviews 24 studies published in peer-reviewed journals between 1980 and 1991, evaluating comprehensive HP and disease prevention programmes in terms of health and cost effects. All 24 show positive health benefit and all those that considered cost effect or cost benefit also demonstrated a positive effect. Due to the paucity of reliable economic evaluation it is concluded that a sound analytical and empirical base for HP profitability (benefits outweighing costs) has yet to be made. The argument is presented that the strength of worksite health promotion lies not in its potential to save dollars, but rather to save and improve lives in a cost-effective manner. Economic worth then depends on the value of achieving these objectives.
<table>
<thead>
<tr>
<th>Study</th>
<th>Findings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bly et al., 1986</td>
<td>A study at Johnson and Johnson involving a sample of over 11,000 employees with a 5-year follow-up provides evidence of cost containment. Groups receiving a HP program had lower increases in inpatient costs, hospital days and admissions.</td>
</tr>
<tr>
<td>Harris, 1986</td>
<td>A study at Northern Telecom suggests that the HP programme induced lifestyle changes that contained or reduced medical costs after 1 year (estimated annual savings $3.7 million).</td>
</tr>
<tr>
<td>Bellingham et al., 1987</td>
<td>A quasi-experimental controlled study at AT&amp;T found that aggregate risks (and associated costs) for cancer and heart attack were reduced by the HP program after 2 years. Cost benefit of $312.2 million when 100,000 employees participated was estimated.</td>
</tr>
<tr>
<td>Jose et al., 1987</td>
<td>A large 6-year study assessed the impact of a HP programme on risk status, medical costs, and absenteeism. Results were positive with savings due to reduced medical claims and absenteeism valued at $1.8 million.</td>
</tr>
<tr>
<td>Golaszewski et al., 1992</td>
<td>A study conducted at Travelers Insurance with a large sample over 4 years with multiple outcome measures. Reductions in sickness absence, health care use and life insurance claims are reported; productivity gains are also inferred (not measured). Return on investment is estimated at $3.4 :$1.</td>
</tr>
<tr>
<td>Bertera, 1990, Bertera et al., 1990</td>
<td>A large study at DuPont reports a relative decline in hourly absenteeism associated with health promotion over 6 years.</td>
</tr>
<tr>
<td>Burton et al., 1991</td>
<td>Studies at First National Bank of Chicago show a reduction in health care use and days absent.</td>
</tr>
<tr>
<td>Erfurt et al., 1990, 1991</td>
<td>Studies at General Motors show reduction in health care use and risk behaviour.</td>
</tr>
<tr>
<td>Leigh and Fries, 1992, Leigh et al., 1992</td>
<td>Studies at Bank of America show cost reduction from lower health risks and claim to be the first longitudinal data relating health habits to medical costs in an older population.</td>
</tr>
<tr>
<td>Fries et al., 1993</td>
<td>Reports a 2 year randomised study at Bank of America, the intervention changed risk behaviour and led to a significant 10% reduction in cost claims, return on investment is estimated at $6: $1.</td>
</tr>
<tr>
<td>Shi, 1993</td>
<td>Reports a back pain prevention program that has modest reductions in pain but significant improvements in job satisfaction and morale with a positive net cost benefit and 179% return on investment.</td>
</tr>
<tr>
<td>Fries, 1994</td>
<td>The California PERS study reports multiple outcomes including sickness</td>
</tr>
<tr>
<td>Author et al., Year</td>
<td>Description</td>
</tr>
<tr>
<td>---------------------------</td>
<td>-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Knight et al., 1994</td>
<td>Also a study at Duke University reports reductions in sickness absence rates but no cost-effectiveness analysis is performed.</td>
</tr>
<tr>
<td>Burton et al., 1996</td>
<td>Breast cancer screening programs at First Chicago NBD Corp. report new cancers detected and estimate savings from early detection.</td>
</tr>
<tr>
<td>Greenwood et al., 1996</td>
<td>Breast cancer screening programs at Coors report new cancers detected and estimate savings from early detection.</td>
</tr>
<tr>
<td>Edington et al., 1997</td>
<td>A study at Coors examines the relationship between risk reduction and medical costs.</td>
</tr>
<tr>
<td>Fries and McShane, 1998</td>
<td>A 6-month observational study, which found reductions in risk, health care use and sickness absence.</td>
</tr>
<tr>
<td>Schrammel et al., 1998</td>
<td>Demonstrates the costs and benefits of on site mammography screening, suggests positive effects.</td>
</tr>
<tr>
<td>Synder et al., 1998</td>
<td>Presents costs and effectiveness of prostate cancer screening, suggests positive effects.</td>
</tr>
<tr>
<td>Weinrich et al., 1998</td>
<td>Compares cost-effectiveness of prostate cancer screening in worksite and church sites and finds worksites to be 20% better.</td>
</tr>
<tr>
<td>Burton et al., 1998</td>
<td>Reports the sickness absence and medical costs of employees with high body mass index (BMI) (mean $8779) compared with low BMI (mean $5425).</td>
</tr>
<tr>
<td>Ozminkowski et al., 1999</td>
<td>Reports a large-scale comprehensive disease management study, return on investment is inferred from changes in risk.</td>
</tr>
<tr>
<td>Dille, 1999</td>
<td>Compared 789 workers immunised against influenza with 931 control employees and found that reduced influenza rates were associated with cost savings in terms of sickness absence and health care use, estimated at $83.34 per person.</td>
</tr>
<tr>
<td>Melhorn, 1999</td>
<td>Reports on an intervention that reduced musculoskeletal trauma and led to reduced workers compensation costs.</td>
</tr>
</tbody>
</table>

Pelletier (1993) updated his summary of the literature with the addition of 23 new studies. Pelletier highlights that medical costs in the US would exceed $900 billion in 1993, with 51.7% paid by employers, and cost-effective patient demand management (reduction) through health promotion and disease prevention seen as essential. Pelletier (1996) updated his review for the period 1993-95. Almost all studies here report on the relationship between risk behaviour modification and health care use and costs, some with empirical cost analysis (Shi, 1993; Aldana, 1994; Salina, 1994; Conti and Burton,
1994) and some with inferred cost-effectiveness. Pelletier (1999), the fourth update, for the period 1995-1998 reports several studies that focus mainly on single outcome measures such as risk behaviour (Olson, 1995; Leutizer et al., 1995; and Byers et al., 1995) and health care utilisation/cost (Every, 1994; Goetzel et al., 1998). Pelletier (2001) reviews 15 further studies in this fifth update for the period 1998-2000. The conclusion from Pelletier’s series of reviews is that most evidence indicates reasonable clinical and cost-related results, later studies tend to have more rigorous methodologies, however, these tend more to substantiate the results of earlier and less demanding studies rather than refute them.

The review by Riedel et al. (2001) found evidence of positive effect of interventions on improving employee health for breast and colorectal cancer screening programmes, high blood pressure programmes, cholesterol programmes, depression programmes, general and back-pain related exercise programmes, smoking cessation programmes, nutrition programmes, adult vaccination for influenza and stress management. All programmes except stress management and back exercise programmes also showed evidence of positive effect on medical costs as did care seeking for minor illnesses and use of emergency room. There was less evidence about impact on performance loss, a positive effect was documented for depression, general and back pain exercise, smoking cessation and influenza vaccination programmes. High blood pressure, general exercise and smoking cessation programmes also showed evidence of positive cost-benefit or return on investment. The evidence for employee performance cost-benefit is very scarce and based on extrapolation from excess absenteeism.

Kries and Bodecker (2004) undertook a systematic review in order to provide a compilation of the evidence basis for behaviour-preventive measures and measures of prevention by adapting the working environment as provided by workplace health promotion and prevention. Evidence of the economic impact of these health promotion measures is organised into impact on absenteeism (costs) and medical costs. Findings are as follows:
• Based on relevant studies included in a review by Aldana (2001) and within the framework of quasi-experimental design, reductions in absences from work of 12% to 36% were associated with health promotion programmes. Cost-benefit ratios are reported as 1:2.5 to 1:4.85 in two studies.

• Strong evidence for the reduction of absences at work attributable to health promotion also exists based on the review of 42 studies by Chapman (2003) and a review by Golaszewski (2001).

• Based on the review by Proper et al. (2002) there is indeed evidence, if limited, that companies could profit from investment in health promotion by reduced absenteeism and it appears that this is greater in white-collar than blue-collar workers.

• Average reductions in medical costs associated with health promotion are reported as 26.1% (Chapman, 2003), with return-on-investment estimated as 1:2.3 to 1:5.9 (Aldana, 2001).

In numerous studies used to calibrate the World Health Organisation Health and Work Performance (HPQ) instrument Wang et al. (2003) found chronic health conditions have substantial workplace effects, that disease management programmes for these conditions might have a positive return on investment (ROI), but health and productivity tracking surveys are needed to evaluate the economic viability of these interventions and provide quality assurance.

2.3.4 Aligning with business strategies

Despite the amount of published literature identified in this chapter, the nature of many workplace-based assessments and evaluations means there is always a risk that significant further evidence remains in the grey literature of company or consultant reports and brochures or indeed hidden under confidentiality agreements.

Using mostly unpublished case studies from organisations across Europe, De Greef and Van den Broek (2004) have emphasised another important strategy to influence
employers investment in employee health and well-being is to demonstrate how this investment is linked into business strategies. By presenting a series of case studies it is argued that cases that show the contribution that workplace health promotion can make to the main goals of a company are more successful than cases that are perceived solely to improve employee health status.

O’Donnell (2001) has acknowledged that in organisations of all sizes the process of deciding to start or to continue with employee health and well-being initiatives is not always rational and empiric. It is asserted that more marketing concepts such as employing strategies to win emotional commitment from senior managers, such as identifying the concepts that appeal to them and highlighting attributes within this context, is required. O’Donnell (2001) asserts that to survive and be successful health and well-being initiatives must:

"...contribute to the mission, long-term goals, and short-term priorities of the organisation it serves and to be the special interest of those who approve budgets."

One obvious method to aid this strategy of aligning employee health and well-being initiatives with business strategies is the balanced scorecard approach (Kaplan and Norton, 2004) as discussed by Miller and Murphy (2006). Employee-centred initiatives need to demonstrate, either empirically or perhaps only intuitively how they are part of a ‘value chain’ for an organisation, where employee improvements can impact processes that impact customers that result in financial performance (Table 2-15). Kaplan and Norton (2004) refer to strategy maps which direct decision-makers within organisations to show how seemingly intangible assets can be converted or mapped into tangible outcomes that the organisation values. The balanced scorecard approach was very successfully adapted for use specifically with human resource strategy (Becker et al., 2001). Pratt (2001) has adapted the scorecard concept to an employee health context and developed the ‘healthy scorecard’, to emphasise the role of measures that drive people to play in making corporate strategies sustainable and successful.
2.4 Discussion

2.4.1 Key findings

A large number of studies seeking to document the impact of employee health-related issues on work outcomes and organisational costs were identified. Empirical studies of employee health conditions and health risks conducted in workplaces, reporting healthcare and absence-related costs based on routine archival data sources were most abundant in the literature identified by this review. Workplace cost-of-illness literature is clearly dominated by U.S. based studies of insurance claims data (workers' compensation and health plans) with retrospective observational studies, most frequently with a 1-year time period, either cohort or case-control design, that collect health care cost and absence-related cost (sickness absence or disability payments) data, on normally very large samples of employees, and present overall impact in terms of monetary values.
Empirical studies seeking to document the impact of employee health-related issues on measures of productivity were found to be less frequently conducted in the literature identified by this review. These studies rely on employee self-reported data sources and were sometimes combined with data from archival sources. Studies involving employee self-reported data, were generally found to more frequently not report impact in monetary values, involve a smaller number of subjects and less often included a control group when compared with studies based only on data from archival sources. Only a very few studies identified by this review explored the impact of other work outcomes such as early retirement or staff turnover.

For the employee health and well-being issues identified by this review evidence of impact is largely not standardised in terms of the metrics used to present results as can be seen by the partial evidence presented in tables 2-6, 2-7 and 2-8. Inter-study variability is also apparent where there are multiple studies presenting impact evidence in the same format. The magnitude of impact of employee health and well-being issues appears to be substantial in many studies identified by this review.

The workplace cost-of-illness literature identified by this review was found to be almost exclusively concerned with employee health issues, predominantly those conditions with an available international disease classification (ICD) code recorded in archival systems (insurance claims databases) but also (to a lesser extent) health issues related to personal health characteristics and behaviours that may be collected from routine health risk assessment audits. Psychosocial factors relating to the work environment and affecting employees’ general well-being at work were very rarely included in this literature that is primarily seeking to document the impact on work outcomes and organisational costs. For example, the impact of employee stress is mentioned in only a few of these impact studies.

Conversely, the literature focusing on a different methodology; describing the nature of observed correlation between employee issues and work outcomes; was found to
predominantly analyse psychological and psychosocial factors affecting employees; and largely not employee health. This literature is found to be dominated by models estimating correlates of sickness absence, some evidence of correlates of other work outcomes was also identified. These studies predominantly collect data on employee factors using self-report instruments and recorded data on sickness absence from archival systems. This literature consists of some substantial research projects as well as some useful and comprehensive systematic reviews and meta-analyses. The organisational impact (costs and benefits) in monetary or other terms of changes in the work outcomes studied is not explicitly discussed by these correlation studies. Rather it is implicitly assumed that absence, turnover and lost productivity associated with employee factors include some element of avoidable costs for an organisation.

A large number of studies were identified contained within numerous major reviews of the effectiveness of interventions aiming to mitigate the impact of employee health and well-being issues. The most recent systematic review of all studies of occupational health interventions with economic evaluations found that most available evidence (17 of 24 categories) was deemed insufficient to inform decision-makers whether incremental investments are worth undertaking. Evidence was found to be strongest for disability management, ergonomic and other MSD injury prevention interventions, this is confirmed by other literature reviews. Methodological concerns are expressed both in terms of basic study design issues (discussed below) and in terms of economic evaluation methodologies (discussed in chapter 6 of this thesis).

A vast amount of evaluations of health promotion and disease management interventions are identified by this review. These studies are dominated by U.S. based studies and are primarily a response to spiralling healthcare cost inflation which is seen as a threat to the global competitiveness of U.S. organisations. Effectiveness of these interventions is characterised by relative differences in healthcare and absence (workers compensation) costs, the validity of results is of course sensitive to study design issues. Several earlier reviews express methodological concerns about these studies, although later reviews conclude there is some more reliable evidence (using quasi-experimental study designs)
that these interventions do impact work outcomes and may represent an efficient use of an organisation's resources.

Finally, one review of largely unpublished case studies across Europe has reported that workplace health promotion interventions are more likely to be successful in cases where they demonstrate their attractiveness to employers by aligning with business strategies. The balanced scorecard and perhaps other management tools are suggested to help facilitate this.

2.4.2 Implications

A substantial evidence base in terms of impact, correlation and effectiveness has been identified, however, several factors may affect the utility and accessibility of this evidence base to employers.

First, an organisation's propensity to adopt rational, evidence-based decision-making in the area of employee health and well-being will clearly affect how research evidence may be used in practice. This propensity may be driven by organisational and resource factors such as availability of technical competencies to process and analyse research evidence (either in-house or via contracted consultants) as well as managerial requirements for empirical business cases to inform resource allocation decisions. These organisational factors are explored further in chapters 4 and 5 of this thesis.

Second, the nature of the research evidence itself and its relevance to decision-makers who want to make rational, evidence-based decisions in this area will affect how research evidence may be used in practice. Two fundamental issues are apparent from conducting this literature review:

1. The types of organisational costs included in these studies is pivotal to creating incentives for employers to invest in employee health and well-being.
2. Where comparability of different research evidence is feasible, employers can more reasonably make informed choices and trade-offs, creating more perceived optimisation of their investments in employee health and well-being.

**Organisational costs**

The majority of cost-of-illness studies using ‘traditional’ archival data sources, may well represent new information to decision-makers within organisations in terms of revealing previously hidden cost data, but these studies are essentially demonstrating to employers the extent of costs for which they have already insured against. The new information is simply attributing these costs to different employee health and well-being issues. This insurance claim cost data by itself does not directly reflect the impact on an employer that the employee health issues studied may actually have on organisational costs and work outcomes, indeed the insurance claim cost maybe a poor proxy for this total cost.

Of course, in any insurance-based system these data (along with much else) may be used to adjust the actuarial risk for any given organisation and this may translate into higher future insurance premiums. However, insurance premiums are based on the aggregate risk of multiple factors, the overall relevance of attempting to change one (or some) of these risk factors may depend on its prevalence and the relative contribution of other factors. Also, it is clear that even the most efficient of insurance-based systems do not operate a completely experience-based rating for actuarial risk assigned to a given organisation, as time lags in data, employee mobility and other factors such as the negotiation and purchasing power of the organisation as well as wider insurance market and macro economic conditions contribute to the premium calculations. It is well-established that insurance markets have the potential to create perverse incentives in healthcare, such as the concept of moral hazard where the insured, who is insulated to some degree from risks behaves differently to the situation where they are liable for full risks (Arrow, 1963, 1968).

The consequence of this is that whilst organisations clearly do have great incentives to contain their direct (healthcare and related sickness absence, disability etc.) insured costs,
their incentives to do so via investing resources into employee health and well-being are likely to be somewhat diluted and indirect. More effective and immediate impact on these insurance-based costs is likely to be achieved through changes to the insurance contract itself, in terms of the extent of the risk covered, co-payments and deductibles, for example. Indeed, these behaviours have been observed in insurance markets. Clearly in countries with social healthcare insurance or publicly funded healthcare systems, changes in healthcare costs are even less likely to create incentives for employers in this area, unless government regulation can successfully internalise some of these work-related costs. In short, because an employer rarely directly finances healthcare and third party payers (either state or insurance-based) are likely to distort incentives somewhat, creating incentives for better employee health management by demonstrating changes in healthcare costs is likely to only have limited impact.

All types of literature identified appear to be dominated by their focus on (sickness) absence as the primary measure of work outcome and organisational cost. This appears to be especially the case for empirical correlation studies that are built on a long history of theoretical absence models. Several issues have been recognised as problems of using absence data (Lowe, 2003). Not all absent employees are automatically non-productive and not all employees present are automatically 100% productive. The impact of absences varies depending on how work is organised (see also Pauly et al., 2002). Employers’ records of absenteeism do not reflect informal practices in some workplaces, or may simply not be very accurately recorded. Absenteeism data is typically highly skewed, most employees are not absent at all while a small proportion may account for most absence spells or duration. Frequency of absence spells may be driven by different factors than total absence time. Absence data clearly does not capture presenteeism, which may be a substantially bigger issue in many cases.

Several studies identified in the literature do go beyond analysis of these direct (insured) costs and include measurement of indirect or opportunity costs associated with employee health and well-being issues. Studies that document changes in productivity (in various measures) associated with employee health and well-being issues have the potential to
create stronger incentives to stimulate employer investment, since productivity costs are wholly absorbed by employer organisations, without third-party insurer involvement. Productivity studies also typically represent new information to employers since they reveal previously hidden costs that do not appear in conventional accounting systems and offer new potential efficiencies and growth potential for an organisation. Evidence to date also suggests that productivity losses (specifically presenteeism) associated with employee health and well-being issues may indeed be considerably greater than the losses typically demonstrated for employee absence. Indeed Johns (2009) has stated:

"Researchers are unanimous in reporting that health problems lead to considerably more productive loss via presenteeism than absenteeism."

Furthermore, the notion of demonstrating alignment with strategic business objectives as highlighted in this chapter, is attractive and may well be most persuasive in cases that include empirical as well as the inevitable intuitive aspects. Some measurement of the change in the productive capacity of labour may represent the best opportunity to provide this empirical base from which to extrapolate to or interpret impact on customers, products, sales, profits and investment.

The relative importance of different types of costs to employers is explored further empirically in chapter 5 of this thesis.

**Comparability**

Employers must clearly deal with multiple employee health and well-being issues simultaneously, although some multiple issue studies (and reviews) are identified, most research evidence is found to deal with issues singularly (e.g. what impact does GERD have?). Furthermore, evidence on health appears to be separated from evidence on psychosocial and psychological factors, perhaps due to the different professional disciplines involved.
To utilise research evidence it is inevitable that employers will need to compare across studies to establish a broader perspective of all the relevant issues within their organisation (e.g. how does the impact of GERD compare with the impact of stress, reduced job satisfaction, relational injustice etc.?) As demonstrated in this chapter, employers are faced with a very long list of factors that have potential to impact their employees, work outcomes and organisational costs. Employers are also faced with a long list of available interventions, policies and strategies to attempt to mitigate these risks. The fundamental economic issue here is how best to allocate an organisations’ finite resources and deliver the best outcome for that organisation. This is a problem of choice and trade-offs, of all the available alternatives any given organisation needs to identify what is the optimal set of actions. Research evidence is needed to aid decision-making and facilitate this choice.

From reviewing the literature some potential barriers to achieving this appear to be both methodological and logistical. It seems apparent that much valuable information about the various impacts of employee health and well-being issues and the effectiveness of interventions is available in different formats. Lack of standardised methods for presenting results from either impact or effectiveness studies is a potential barrier to the application of research into practice.

Employers need to be able to make trade-offs between investment options, between different employee health and well-being activities, indeed between all available ways of using their resources. A rational decision-maker (cost-minimising, profit-maximising) may look to supplement their organisation-specific information with guidance from research evidence.

One approach to attempt to provide employers with this comparability across a range of options is presented in the empirical case studies in chapter 7 of this thesis.
There is of course a major research challenge confronting the issue of which organisational costs to include in empirical studies. As demonstrated in this chapter, studies using insurance claims data still dominate the literature. These data are readily available as they service the transactions of the huge insurance market and they facilitate comparisons across large groups of employees defined by the parameters that are included in the database such as diagnosis codes (WHO-ICD codes). The consequence of this is that not only is there a very narrow perspective on organisational (insured) costs but also there is a narrow perspective on the employee health and well-being issues that are included. Psychosocial and many psychological aspects, that are known to be important in this area are excluded from these data sources.

The research challenge is that in order to widen both the organisational cost perspective and the employee health and well-being factors studied, new data sources must be generated. Organisational costs measured in productivity related terms such as presenteeism, job effectiveness and work ability as well as psychosocial employee factors such as job satisfaction and organisational commitment, for example, are not typically available from routine administrative data systems and require new data collection channels. The data collection methods have included individual interviews (by telephone or in person) and self-completion of survey instruments (instructor-led, postal or web-based surveys). It is clear that from a research perspective, that the "ask" method is considerably more resource intensive than the "count" method. As highlighted in the literature review, despite some major health and productivity research initiatives and substantial epidemiological correlation studies, this research evidence remains somewhat in the shadow of the largescale insurance claims evidence base.

Generalisability and perhaps also to some extent comparability of research evidence can be enhanced by attempts to improve the validity and reliability of this work. Hill et al. (2007) highlight several areas for improvement in the evidence base, these include: the increased use of experimental and control groups, including randomisation where feasible; the use of longitudinal designs that track outcome measures over a significant
period of time; and the collection of qualitative information exploring reasons why some interventions are effective.

Quantitative research demonstrating value in a systematic, unbiased manner is inherently difficult not least due to the real-world corporate environment that these studies are often conducted in. Establishing causal relationships in the context of workplace ‘value’ experiments is problematic, not least as often several initiatives are run simultaneously (not just from the health perspective, but wider organisational change programmes). Warner et al. (p.110, 1988) has listed the general research problems of studies performing economic evaluations of work-based health promotion programmes, which also have wider application, as presented in Table 2-16.

Table 2-16: Common work-based research problems (Warner et al., 1988)

- Lack of specific and consistent definitions of risk factors or interventions
- Poor definition of outcome measures
- Use of input measures as an index of programme effectiveness (e.g. participation rates rather than change in behaviour or health status)
- Reliance on multiple divergent outcome measures across studies
- Reliance on programme participants’ self-reports as measures of programme-related behavioural change
- Lack of assessment of important outcomes (may be intangible or difficult to measure)
- Absence of baseline measures against which to assess programme effects
- Absence of control groups
- Failure to assess the implications of self-selection of programme participants
- Poorly designed or nonexistent sampling strategy
- Inadequate sample size
- Lack of adequate follow-up
- Failure to consider negative short-run impacts of programmes
- Failure to consider long-run implications of successful behaviour change
- Bias introduced by evaluations being performed by programme advocates and developers
- Absence of technical analytical methods to address problems of uncertainty (sensitivity analysis) and differential timing of costs and outcomes over time (discounting)
- Lack of consideration of generalisability
Many workplace-based studies are found to use a simple before-and-after study design to assess the effectiveness associated with interventions. Robson et al. (2001) has provided a good summary of the potential problems with before-and-after study design (Table 2-17).

Table 2-17: Problems with before-and-after study design (Robson et al., 2001)

<table>
<thead>
<tr>
<th>Problem</th>
</tr>
</thead>
<tbody>
<tr>
<td>History: some other influential event which could affect the outcome, occurs during the intervention</td>
</tr>
<tr>
<td>Instrumentation/reporting: validity of measurement method changes over course of the intervention</td>
</tr>
<tr>
<td>Regression to the mean: change in outcome measure might be explained by a group with one-time extreme value naturally changing towards a normal value</td>
</tr>
<tr>
<td>Testing: taking measure could have an effect on the outcome</td>
</tr>
<tr>
<td>Placebo: intervention could have a non-specific effect on the outcome, independent of the intervention components</td>
</tr>
<tr>
<td>Hawthorne: involvement of outsiders could have an effect on the outcome, independent of the intervention components</td>
</tr>
<tr>
<td>Maturation: intervention group develops in ways independent of the intervention (e.g. ageing, increased experience, etc.) possibly affecting the outcome</td>
</tr>
<tr>
<td>Dropout: the overall characteristics of the intervention group change due to some participants dropping out possibly affecting the outcome</td>
</tr>
</tbody>
</table>

Tompa et al. (2008) suggest that researchers should, if possible avoid case-control and before-and-after study design. They advocate that researchers should consider quasi-experimental study design with features enhancing validity, such as matched contemporaneous control groups, multiple data collection points and statistical adjustments.

Publication bias is also a potential issue as very few negative studies were identified in this review of the literature. Indeed as noted earlier in this chapter there is also a potential risk that much evidence is published and remains in grey literature, protected by company interests or simply not considered for research purposes. Bias may also be
present in cases where cost-of-illness or intervention studies are used to lobby for action, intervention and investment by various parties. For example, several commentators have noted that well-conducted studies reporting that some of the most prevalent threats to productivity were migraine, respiratory problems and depression; were funded by pharmaceutical companies with products in these areas (Johns, 2009). However, this is also an issue for randomised controlled trials in clinical research.

As Hill et al. (2007) have highlighted focusing on work outcomes in literature reviews can be seen as both a strength and a weakness. Whilst this strategy does focus the level of observation on employer-relevant outcomes it may exclude employee-level health outcomes, which could have downstream impact on work outcomes. The time horizon for return-on-investment will be the critical factor here, employee health outcomes that take a long time to be translated into work outcomes may well not be very employer-relevant given short-term budgeting, net present value calculations that discount future benefits and indeed employee turnover and mobility which means that another organisation would realise the work outcome benefits from the investment.

Methodological issues specific to economic evaluation are discussed in chapter 6.

Correlation studies clearly demonstrated the highest methodological quality of studies identified in this review. These studies mostly included robust experimental and longitudinal study design, large sample sizes, long-term follow-up, control for confounding and selection bias and were commonly based on specific hypotheses or theoretical models. However, three key issues are apparent that may constrain the utility of this research evidence. First, it is dominated by psychological not health correlates. Second, it has not yet fully embraced the emergence of productivity as a measure that is highly relevant to employers. Finally, it stops short of presenting monetary valuations, estimates or models of changes in work outcomes brought about by changes in correlates.
2.5 Chapter summary

Much of the literature demonstrating the cost of employee health and well-being has been driven by the ease of data availability from insurance claims databases. This data may not, by itself, be the most relevant to employers in terms of creating incentives for investing in interventions to mitigate employee issues, due to the distortions of third-party payer systems. Cost-of-illness studies including measures of productivity are less frequently observed, this may be due to the relatively recent emergence of productivity measurement but also the more research-intensive nature of primary data collection using self-report methods. Since productivity costs are borne entirely by the employer these data may have greatest potential to influence employer behaviour regarding employee health and well-being. Correlation studies, often epidemiological research designs, are among the best methodological quality in this literature. Correlation studies may also offer the best scope for generalisability of results. Their focus on relative rather than absolute effects and the lack of estimates of monetary impact for an employer may potentially be barriers for the application of this research to routine practice. Effectiveness studies have been criticised for their poor methodological quality and in many cases (disease management and health promotion) being largely a response to spiralling healthcare costs. A mixture of data sources (archival and self-report) is likely to be required in order to broaden both the work outcomes (absenteeism, productivity etc.) that are assessed in studies and the employee health and well-being issues (health and psychosocial factors) that are included.
Overview of the thesis

Chapter 1
Introduction

Chapter 2
Literature review

Chapter 3
Thesis method

Chapter 4
Exploration of current practice: qualitative methods

Chapter 5
Managers’ survey (n=986)

Chapter 6
Economic evaluation: methodological review

Chapter 7
Empirical case studies: Employee surveys (n=1,504)

Chapter 8
Discussion, implications and recommendations
3 Method

3.1 Research methodology

"...although occasional instances of absenteeism or presenteeism seem innocuous, both behaviours say something fundamental about the relationship between employees and their organisations." Johns (p. In Carwright and Cooper (eds.), 2009)

The epistemological approach for this thesis is essentially one of post-positivist critical realism in that it recognises that all observation is fallible and has error and that all theory is revisable. Hence the research method employed for this thesis draws on a mixed approach of using either qualitative or quantitative research methods or indeed the combination of the two as appropriate to each phase of this research.

Jick (1979) has commented that there is a distinct tradition in social science research methods that advocates the use of multiple methods. This approach has variously been described as a convergent methodology, a multimethod/multitrait approach (Campbell and Fiske, 1959), convergent validation (Webb et al., 1966) and perhaps most frequently as triangulation (Webb et al., 1966; Smith, 1975; Denzin, 1978).

A triangulation of methods is used for the three primary research activities included in this thesis. Chapter 4 of this thesis uses a solely qualitative approach based on methods outlined by Miles and Huberman (1994) to elicit expert opinion of the issues. Chapter 5 of this thesis uses a combined qualitative and quantitative approach based largely on the approach advocated by Fowler (2009), Shaughnessy et al. (2009) and de Vaus (1995), where respondents are asked to supply quantitative information but are also provided opportunity to provide qualitative comment on the reasons why they gave this response. Chapter 7 of this thesis also has some scope for respondents to provide qualitative data but is essentially a quantitative econometric approach to demonstrate the extent of empirical correlation between employee health and well-being measures and estimates of employer costs.
Conducting a thorough literature review was considered a prerequisite before conducting any type of primary research within the topic of demonstrating the economic value of investments in employee health and well-being. One of the objectives of the literature reviews was to help gain a better understanding of how cost and consequence (benefit) variables had been identified, measured and valued in this context and so inform subsequent primary research design. Inevitably further review of the literature continued alongside development of the primary research activities.

The rational for the method used in chapter 4 is that a combination of both focus group and a series of one-to-one interviews is well suited to this study where research aimed to elicit the general themes from selected experts in a group discussion and then explore these further, often in more detail, within specific organisations. The exploratory nature of this phase of the research was key to the choice of method.

The rational for using a survey method for the study reported in chapter 5 is that this was likely to be the most efficient means to capture a diverse range of attitudes, thoughts and behaviours from a reasonable sample size within a realistic timeframe. A case-study method, based on in-depth analysis at one or a few organisations (Yin, 1989), was considered but was thought to further limit generalisability of findings in this situation. Using personal interviews or focus groups (Morgan, 1988) as the vehicle to collect these data was thought to present logistical challenges, would limit the sample size and would not necessarily build on the previous phase of the research presented in chapter 4.

The real-life context of conducting research in the workplace makes the traditional experimental approach problematic in terms of logistics but also it has been widely discussed (Judd et al., 1991; Rosnow and Rosenthal, 1996) that whilst good internal validity from experimental designs such as the randomised controlled trial allows prediction of cause-and-effect relationships, the artificial conditions of this design means that external validity is frequently limited and hence results can not be generalised very widely. Workplaces are not laboratories (Kessler and Stang, 2006) and hence pragmatic
research methods dominate in workplace related research. The empirical approach to economic evaluation of employee health and well-being outlined in chapter 7 builds on earlier work in this area: the ‘plausible-benefit’ model, where the required monetary value of benefits of specific occupational health services is estimated based on limited cost data only (Miller et al., 2000); and the contingent valuation approach (Miller et al., 2002) that collects willingness-to-pay data for various attributes of occupational health services from ‘purchasers’ of this internal service.

The rational for the method used for the study reported in chapter 7 is driven by the need to collect productivity (presenteeism) as well as absenteeism data to more fully characterise the costs to employers associated with variations in employee health and well-being status. Except for a few highly automated examples, the primary route to collecting productivity data is by use of a self-report instrument, since these data could not realistically be obtained by either content analysis (Weber, 1985) of any existing documentation or through naturalistic observation (Martin and Bateson, 1986). Methods using supervisors or line managers perception of an employee’s productivity were considered to be unsatisfactory as they introduce additional bias.

Recent initiatives in the UK (BiTC, 2008) have attempted to shortcut the need to collect productivity data, for example, by estimating the relationship between presenteeism and absenteeism. However, to date there is very limited evidence on the correlation between presenteeism and absenteeism. The benchmark dataset given in the BiTC tool is almost entirely from the U.S. literature and the generalisability of this evidence to the UK setting is highly questionable. For example, the coverage of occupational sick pay is significantly lower in the U.S. compared to the UK (Levin-Epstein, 2005; Sainsbury Centre for Mental Health, 2007). The financial consequences of sickness absence fall more on the employee and hence less formally recorded sickness absence is observed and correspondingly a higher proportion of overall productivity cost of ill health will be reflected in presenteeism (Sainsbury Centre for Mental Health, 2007). Furthermore there is some rationale that presenteeism may need to be costed in a different way than absenteeism. There is some evidence that lower-paid workers tend to take more days off
sick than higher-paid workers; there is no evidence of such a relationship in the case of presenteeism (Hilton, 2005). Hence the method used in chapter 7 of this thesis is aligned to Johns (2009) who has stated:

"What is needed now, however, are studies that explicitly measure both presenteeism and absenteeism, rather than making inferences about presenteeism from absenteeism levels."

The survey method was used in full awareness of some inherent limitations of this approach and attempts are made to mitigate these where possible. Clearly a descriptive single survey provides cross-sectional data, a snapshot at a single point in time. Future research may wish to include time series or longitudinal approaches. Whilst a survey is a useful method to describe observed correlations, by itself it is not sufficient to determine the direction of causality in these relationships. The survey relies on self-reported data; inevitably this may include deliberate or honest errors or omissions. Respondents may have confused or false memory, particularly if recall periods are long. Of course, respondents are aware that they are part of an experiment when responding to surveys and this itself may introduce bias and induce modified or adjusted behaviours. Respondents may consciously or unconsciously wish to portray themselves in a positive way or conform to expectations of others; the way questions on the survey are posed can of course induce bias also. Finally, the time commitment of researchers and respondents involved in surveys needs to be realistically assessed and compared with alternative methods to decide whether this is an efficient means of collecting these data.

3.2 Definitions

3.2.1 Health and well-being

Throughout this thesis the term employee health and well-being is deliberately used in order to maintain the widest possible definition and not be restricted to a strictly health-based or indeed a human resource-based model. It is perhaps useful to briefly review
some definitions from the literature that serve as terms of reference for the method used in this thesis.

The World Health Organisation (p.1, WHO, 1948) has famously defined health as:

“a state of complete physical, mental, and social well-being and not merely the absence of disease or infirmity.”

Quick et al. (2007) have asserted that definitions of health need to go beyond the disease-based model and include a sense of purpose, positive self-regard, and quality relationships with others.

Danna and Griffin (1999) in their review of health and well-being in the workplace literature have attempted to define and distinguish between the concepts of health and well-being as follows:

“While definitions and measures of health and well-being vary, there tend to be two salient person-related concepts that are often combined with a more societal-level perspective. The first is that health and well-being can refer to the actual physical health of workers, as defined by physical symptomatology and epidemiological rates of physical illness and diseases. The second is that health and well-being can refer to the mental, psychological, or emotional aspects of workers as indicated by emotional states and epidemiological rates of mental illnesses and diseases.” (p. 361)

“The term health generally appears to encompass both physiological and psychological symptomology within a more medical context... therefore we suggest the term health as applied to organizational settings be used when specific physiological or psychological indicators or indexes are of interest and concern.... Well-being tends to be a more broad and encompassing concept that takes into consideration the whole person. Beyond specific physical and/or

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psychological symptoms or diagnoses related to health, therefore, well-being should be used as appropriate to include context-free measures of life experiences (e.g., life satisfaction, happiness), and within the organizational research realm to include both generalized job-related experiences (e.g., job satisfaction, job attachment), as well as more facet-specific dimensions (e.g., satisfaction with pay or co-workers).” (p. 364)

The definition provided by Danna and Griffin (1999) draws on a model (Figure 3-1) presented by Warr (1999), which distinguishes between job-specific well-being and context-free well-being. Warr proposes that job-specific and context-free well-being can be viewed in terms of three axes: displeasure-to-pleasure, anxiety-to-comfort, and depression-to-enthusiasm.

Figure 3-1: A model of employee well-being (Warr, 1999)

The environment
Job features

Job-specific well-being
1. Displeasure-pleasure
2. Anxiety-comfort
3. Depression-enthusiasm

Context-free well-being
1. Displeasure-pleasure
2. Anxiety-comfort
3. Depression-enthusiasm

The environment
Non-job features

Socio-demographic factors
(age, gender, etc.)

Individual factors
Affective dispositions, standards of comparison, other personal characteristics (preferences, competencies)
With reference specifically to mental issues Dewe and Kompier (p.10, 2008) have distinguished between mental capital and mental well-being:

"Mental capital refers to the totality of an individual’s cognitive and emotional resources, including their cognitive capability, flexibility and efficiency of learning, emotional intelligence (e.g. empathy and social cognition), and resilience in the face of stress. The extent of an individual’s resources reflects his/her basic endowment (genes and early biological programming), and their experiences and education, which take place throughout the life course."

"Mental well-being is a dynamic state in which the individual is able to develop their potential, work productively and creatively, build strong and positive relationships with others, and contribute to their community. It is enhanced when an individual is able to fulfill their personal and social goals and achieve a sense of purpose in society."

3.2.2 Absenteeism and presenteeism

Rosse (1991) has commented that definitions for lateness, absenteeism and turnover may seem very obvious and intuitive such as:

"People who are scheduled to work and do not show up at the appointed time are tardy; if they do not show up for a whole shift, they are absent; if they continue to be absent without adequate explanation, they are typically considered to have terminated their employment relationship." (Rosse, 1991)

But in practice more detailed definitions are often required. Gaudet (1963) described as many as 41 definitions and measures of absence that have been proposed, whilst most can be categorised as measures of absence frequency or measures of time lost others include attempts to incorporate the motivation for the absence (excused versus unexcused; voluntary versus involuntary; functional versus dysfunctional; ‘Blue Monday’ indexes
Hensing et al. (1998) narrows this down and suggests five basic measures: frequency, length, incidence rate, cumulative incidence, and duration.

In recent years the addition of the term presenteeism to widespread usage in this area has sometimes added further confusion. Table 3-1 is taken from Johns (2009) where it is highlighted how the definition of the term presenteeism has evolved in a relatively short timeframe. Early definitions (a and b) portray presenteeism as good, the opposite to (bad) absenteeism and meaning excellent attendance. Johns (2009) declares other definitions have associated presenteeism with somewhat obsessive behaviour (definitions c, d and e); at odds with one’s health status (definitions e, f and g); and often less than fully productive (definitions h and i).

Johns (2009) has commented that research concerning presenteeism has been markedly atheoretical and has attempted to formulate the beginnings of a theoretical framework by highlighting key variables that might be incorporated (Figure 3-2). This ‘working model’ assumes that fully productive regular attendance is interrupted by a “health event”. To some extent, the nature of this health event (acute, episodic, chronic) will dictate whether absenteeism or presenteeism ensues. It is then proposed that work context factors and personal factors further influence the choice between absenteeism and presenteeism. It is suggested that at the margin, variables such as job insecurity, strict attendance policies, teamwork, dependent clients, a positive attendance culture, and adjustment latitude in the job are more likely to be associated with presenteeism behaviours; whilst easy replacement might favour absenteeism. Similarly in terms of personal factors the model suggests there is some research evidence to indicate that employees with positive work attitudes, favourable justice perceptions, who are workaholics, or conscientious or the psychological hardy are more likely to exhibit presenteeism. Absenteeism, it is claimed, might more likely be the default behaviour for the stressed, those with external health locus of control, those with the proclivity for adopting a sick role and those with the perception that absenteeism is legitimate behaviour.
Table 3-1: Definitions of Presenteeism (Johns, 2009)

a. Attending work, as opposed to being absent (Smith, 1970)
b. Exhibiting excellent attendance (Canfield & Soash, 1955; Stolz, 1993)
c. Working elevated hours, thus putting in "face time," even when unfit (Simpson, 1998; Worrall et al., 2000)
d. Being reluctant to work part time rather than full time (Sheridan, 2004)
e. Being unhealthy but exhibiting no sickness absenteeism (Kivimaki et al., 2005)
f. Going to work despite feeling unhealthy (Aronsson et al., 2000; Dew et al., 2005)
g. Going to work despite feeling unhealthy or experiencing other events that might normally compel absence (e.g., child care problems) (Evans, 2004; Johansson & Lundberg, 2004)
h. Reduced productivity at work due to health problems (Turpin et al., 2004)
i. Reduced productivity at work due to health problems or other events that distract one from full productivity (e.g., office politics) (Hummer, Sherman, & Quinn, 2002; Whitehouse, 2005)
3.3 Theoretical models

3.3.1 Traditional models

Theoretical models, of course provide the foundation for empirical research. This section briefly highlights some theoretical background that has influenced the method of this thesis.

Steers and Rhodes (1978) famously developed a model of employee attendance in work organisations based on a review of 104 empirical studies. It is suggested that work attendance is directly influenced by two primary factors; attendance motivation and ability to come to work. Alexanderson (p.241, 1998) conducted a review of sickness absence studies with the objective of understanding theories used in explaining sickness absence, factors were categorised into three major groups: national level, workplace and local community, and individual factors. Table 3-2 lists the factors included in these 3 groups.

Table 3-2: Factors associated with sickness absence (Alexandersson, 1998)

| National Level | • Overall economic level and economic change  
|                | • Industrial development of the nation  
|                | • Degree of freedom in the contract between employers and employee  
|                | • Status and organisation of unpaid work  
|                | • Climate and meteorology  
|                | • Composition of the labour force (selection into and out of the labour force, employment intensity among different groups)  
|                | • Organisation of the labour market (gender segregation, structural rationalisations)  
|                | • Social insurance systems (sickness benefits, disability pensions, pregnancy and parental leave)  
|                | • General changes in attitudes in society  
| Workplace and Community Level | • Nature of work environment (physical hazards, repetitiveness, monotony, no learning possibilities, size of
| Workplace, job type or sector, personnel policy, social network and support, stress, sense of control) | • Absence culture at work  
• Absence culture in the local community and family  
• Organisation of the local community (geography, socio-economic levels, labour market, access to day-care/healthcare, prevalence of violence etc.)  
• Local practices applied to medical care and social insurance |
|-------------------------------------------------|------------------------------------------------------|
| Individual Level | • Characteristic of the individual (age, gender, health, genetic and acquired disposition, lifestyle, education, race, immigrant status, personality, family situation, personal resources and capabilities, life situation and phase in the life cycle, occupation and/or working hours)  
• Attitudes and motivation  
• Malingering  
• Coping strategy |

Steers and Rhodes (1984) have categorised causal factors driving absence behaviour into 8 categories: personal factors, work attitudes, job content factors, organisation wide factors, economic and market factors, immediate work environment factors, external environmental factors (such as seasonal fluctuations and weather conditions), and organisational change factors (such as alcohol programmes, health examinations).

Absenteeism has also been shown to be related to overall satisfaction with work content and there is evidence suggesting an inverse relationship with satisfaction with pay, co-workers, supervision, organisational commitment and job involvement (Scott and Taylor, 1985; Steers and Rhodes, 1984; Terborg et al., 1982). There is some evidence that employee turnover rates are related to overall job satisfaction with work content, organisational commitment, satisfaction with supervision and leadership styles (Carsten and Spector, 1987; Steel and Ovalle, 1984).
This body of work would strongly suggest the need to include both employee engagement type measures as well as measures of employee physical and psychological health and well-being within the primary research conducted for this thesis.

### 3.3.2 Employee withdrawal

Theoretical models of employee turnover and absenteeism showing how these relate to individual differences in job attitudes dominate the literature, however, Rosse (1991) introduced the useful term of ‘employee withdrawal’ to refer to a range of behaviours that includes much more than just absence and exit from employment. For example, lateness is a concept that may be included in withdrawal behaviour; Adler and Golan (1981) have shown that employee lateness correlates with dissatisfaction with work content, supervision, pay, promotion opportunities, co-workers and overall job satisfaction.

Rosse and Miller (1984) developed a model for this behaviour; they start from the perspective that although some withdrawal is undoubtedly beyond the control of the individual most represents the outcome of a rational process of determining how to cope with dissatisfying work and/or life conditions. However, they acknowledge that it is also important to go beyond the idea of withdrawal. Employees withdraw to avoid undesirable aspects of a situation but this is clearly not the only coping strategy. Indeed given that there is some evidence of progression through withdrawal behaviours, from lateness to absence to quitting, for example, withdrawal may be an option of last resort. The Rosse and Miller (1984) model builds on Hirschman (1970) that asserts that employees have available to them three major choices of response when faced with a dissatisfying work situation:

- exit (withdrawal)
- voice (attempts to change rather than escape an undesirable situation)
- loyalty (waiting patiently for things to improve)

To include this range of behaviours the term employee adaptation is used in the model instead of just employee withdrawal. A model of employee adaptation is depicted in
Figure 3-3. Some trigger for job dissatisfaction is used as an indicator of a need to adapt. The unhappy worker begins a search for possible means of resolving the dissatisfaction. The model asserts that the various forms of withdrawal (presenteeism, absence, turnover) are to some extent substitutable, with the choice of strategy being dependent on such things as lack of an alternative job, a stringent absence control policy or social pressure from family or colleagues. The behaviour may also be a function of the success of strategies attempted in the past. Finally, following Staw (1984) the model acknowledges the strong influence of an employee's belief about the cause of dissatisfaction, whether there is internally directed or externally directed blame will influence choice of coping strategy.

Figure 3-3: Model of Employee Adaptation (Rosse and Miller 1984)

Theories of employee withdrawal and adaptation as outlined here would suggest that multiple employee responses to stressors will need to be included within primary research for this thesis if the full extent of work outcomes and organisational costs are to be captured.
3.3.3 Economic outcomes

As part of the Foresight project (Dewe and Kompier, 2008) on mental capital and well-being aiming to advise UK government and the private sector, a 'consensus' model was developed based on input from a large number of stakeholders and expert opinion. An adapted version of this model is presented Figure 3-4.

The core of this model is the employee who is equipped with varying skills and resources. The top of the diagram represents the economic environment, which has elements at the global scale and more regional or local scales, but which results in conflicting pressures for managers, as they are squeezed between competitive demands and the need to ensure well-being at work for their staff. The sector to the left of the employee represents the various aspects of the work environment, which affect well-being. This highlights the number and diversity of the various stressors that affect work and well-being. The scales at the bottom represent the work-life balance, which the individual needs to strike – between the various stressors of the work environment and his/her own well-being, both within work and outside work. The sectors to the right of the employee represent the positive (pink) and negative (red) well-being outcomes that can result.

This model is particularly pertinent to the objectives of this research. It clearly demonstrates that whilst positive well-being outcomes may lead to more success in dealing with the increasingly tough external economic environment, negative individual employee well-being outcomes are strongly associated with organisational stress outcomes that have negative economic consequences.

Given the seemingly overwhelming number of options for ways to influence employee well-being as illustrated by the Dewe and Kompier model and the fact that all
organisations have finite resources to manage this; this thesis attempts to explore whether demonstrating the economic value of the various ways to impact some of these driving factors can lead to better decision-making, better selection of appropriate interventions and better employee health and well-being management.

Figure 3-4: A conceptual model of well-being at work (adapted from Dewe and Kompier, 2008)
Overview of the thesis

Chapter 1
Introduction

Chapter 2
Literature review

Chapter 3
Thesis method

Chapter 4
Exploration of current practice: qualitative methods

Chapter 5
Managers’ survey (n=986)

Chapter 6
Economic evaluation: methodological review

Chapter 7
Empirical case studies: Employee surveys (n=1,504)

Chapter 8
Discussion, implications and recommendations
4 Exploration of current practices

4.1 Introduction

The review of literature presented in chapter 2 of this thesis has clearly demonstrated that there is a considerable body of work describing the very significant impact that employee health and well-being issues can have. The costs to society are considerable, as discussed in chapter 1. The share of costs borne specifically by the employer may be somewhat dependent on macroeconomic factors such as the system of healthcare financing in the geographical area the employer is operating in. Publicly financed healthcare systems and blurring of what may or may not be work-related issues can potentially lead to cost externalisation: where a company is able to transfer some indirect costs and force negative effects on third parties. For example, in the UK some of the cost of poor working conditions in private organisations may actually be borne by the National Health Service.

In the context of environmental economics Pigou (1932) famously argued that in a market, companies tend to operate in their own self-interest and because the harm of pollution is wholly external to the market there is no structural incentive for companies to avoid polluting behaviour. Pigou's proposal was to 'internalise' these costs by government regulation and imposing taxes on polluting companies commensurate to the impact of this external effect. Mossink and De Greef (2002) have reviewed across European countries the extent to which the costs of occupational injuries and illnesses are borne by those perceived to be responsible for causing these issues. Several systems designed to bring the costs back to the company who inflicted the costs are discussed, these cost internalisation strategies include imposing liabilities, legal sanctions and differentiation in insurance premiums.

For sometime now, corporate social responsibility (CSR), the explicit inclusion of community or external interests into corporate decision-making, has emerged as an alternative form of cost internalisation (Orlitzky et al., 2003). This approach can be viewed as attempting to build bridges between an 'external' impact and the companies'
own interests, the focus is on making what Pigou described as factors wholly external to the market somewhat more linked into the market in some way. Hence, publication of a company CSR report, which may demonstrate activities and investment in areas apparently external to the market, may well play a role in building the image and reputation of an organisation, which can impact its relationships not only with its own employees but external stakeholders such as customers, trade unions, media and investors. Similarly public or media focus on poor 'external' impacts may have negative impacts on corporate reputation (Yeung, 2002).

The effects of CSR can be broadly monitored using employee and customer satisfaction surveys, but it may be difficult to isolate these effects. Investment is somewhat more tangible and ethical or socially aware investment has developed rapidly with the emergence of dedicated indices (Dow Jones Sustainability Index) and it has been demonstrated that investors are indeed prepared to put their money where their morals are (Lewis and McKenzie, 2000).

More recently another approach to this cost internalisation issue has developed, the health and productivity literature has focussed attention more on the role of employee health and well-being in protecting and enhancing the value of human capital, a key component in the factors of production for any organisation. This approach seeks to stimulate better management of employee health and well-being not through the redistribution of external effects (regulation and litigation) or by attempting to create indirect links from the value of corporate image but rather more explicitly by better demonstration and quantification of the costs that are actually internal to the company and may impact costs, revenue and competitiveness. Hence as was seen in chapter 2, the more recent literature describing impact of employee health and well-being supplements the somewhat traditional U.S. insurance-based cost (health care plans and workers compensation schemes) approach with measures of workloss impact: the effects of absence, turnover and more recently the effect of productivity. This literature suggests that the cost impact of employee health and well-being borne by employers is substantial.
The true costs may be even greater as not all effects are being measured. Productivity measurement is an important and growing development in this literature (Evans, 2004); it is potentially a very substantial effect with tangible cost impact internal to the company. In a large U.S study it was found that health-related productivity costs were four times greater than medical costs and that the full cost of poor health is driven by different health conditions than those driving medical and pharmacy costs alone (Loeppke et al., 2007). In the U.K., a 2007 sickness absence survey (EEF, 2007) found that 90% of respondents identified lost production as the largest cost arising from employee health issues. A recent U.S. survey found that Chief Finance Officers have very limited information to manage and reduce lost productivity (Parry, 2006).

Furthermore, to assist organisations decision-making on what can be done to mitigate impact from employee health and well-being there is a rapidly expanding literature on a range of interventions implemented in varying contexts, that demonstrate that they can be effective at improving work outcomes, and in many cases economic evidence is also presented suggesting that these are likely to be a cost-effective use of an organisations’ resources. This literature suggests that in many cases ‘treating’ or preventing employee health and well-being issues is likely to have a lower economic impact to the employer than not ‘treating’ or preventing these issues. In addition, the literature exploring correlates between employee issues and work outcomes sheds light on why certain issues have impact and how and why certain intervention strategies can be effective under different circumstances.

Despite these advancements in the availability of information, highlighting the often hidden full economic impact to employers and demonstrating efficient ways to tackle these issues, there is much workplace evidence to suggest that in the UK, for example, things could be better and there may still be suboptimal investment in employee health and well-being issues. Cooper and Dewe (2008) have recently discussed some of these challenges, reporting evidence from the 2006 Labour Force Survey (HSE, 2007) that states that 0.42 million employees in Britain stated they were experiencing stress, depression or anxiety at work at levels that were making them ill. Furthermore, the direct
cost of absence and labour turnover to the British economy in 2006 is estimated at a record high £13.2 billion (CBI/AXA, 2007). Another workplace survey (CIPD, 2007) has found that only a third of employers actually have a health and well-being strategy in place, and only 41% of employers in the survey stated that they monitor the cost of absence. One national survey found that most organisations found it difficult to estimate the cost impact of injuries and none of the organisations studied had attempted to measure the full cost impact of employee ill health. Yet most participants did perceive the costs to constitute a considerable loss (Haefeli et al., 2005). Shearn (2003) found there is a scarcity of business benefit case studies with well-designed methodologies in the UK.

Some of the methodological issues concerning the economic evidence presented in the literature have been discussed in chapter 2, however, in order to better understand why progress appears to have been slow in creating genuine economic incentives for employers in the UK to invest in employee health and well-being there is a need to understand both the role of information itself (types, quality, etc.) and the role of organisational factors influencing how this information may or may not be used. An exploration of current UK practice may provide some better understanding regarding how the business case for employee health and well-being is currently constructed and used in practice. If research evidence is not being applied in practice, it is important to understand the barriers.

4.1.1 Objectives of this chapter

The specific objectives of the study exploring current UK practices presented in this chapter are:

- To better understand the information needs of key stakeholders within organisations when involved in decision-making on employee health and well-being investment.
• To examine the role that employee health plays in the overall performance of an organisation and how this can be captured and effectively communicated to appropriate decision-makers.
• To further define employer relevant outcome measures.
• To inform the subsequent (more quantitative) manager survey.
• More broadly to help scope the project, to hone this researcher’s language and labelling in this field and gain a broader understanding of the context in which this research programme would operate.
• To network with stakeholders who could be involved with the subsequent survey or the empirical case studies.

4.2 Method

Qualitative research organises and classifies people’s descriptions, reports, and comments (Miles and Huberman, 1994). It is concerned with the meanings people attach to their experiences and their interpretation of events. It uses open-ended questions to elicit this information and these can be administered in interviews or focus groups.

A focus group is a form of group interview whereby the data obtained arise from interaction and discourse generated by group discussion. Topics are supplied by the researcher who acts as facilitator for the discussions. One-to-one qualitative interviews allow for more depth to be generated than in a focus group, as the respondent is able to give more explanation about their own motivations and perceptions. A combination of both focus group and a series of one-to-one interviews is well suited to this study where research aimed to elicit the general themes from group discussion and then explore these further within specific organisations.

4.2.1 Recruitment

A purposeful sampling strategy was used for the focus group to reflect a range of industrial sectors Table 4-1. For the one-to-one interviews a sample of convenience was
used, made up of those responding to an advertisement placed in the Society of Occupational Health newsletter as well as identified key opinion leaders in the field of occupational health and safety Table 4-2.

Table 4-1: Focus group participants

<table>
<thead>
<tr>
<th>Title</th>
<th>Type of Business</th>
</tr>
</thead>
<tbody>
<tr>
<td>Environment, Health &amp; Safety Analyst</td>
<td>Energy</td>
</tr>
<tr>
<td>Environment, Health &amp; Safety Manager</td>
<td>Energy</td>
</tr>
<tr>
<td>Environment, Health &amp; Safety Policy &amp; Strategy Director</td>
<td>Telecommunications</td>
</tr>
<tr>
<td>Health &amp; Safety Manager</td>
<td>Bakery</td>
</tr>
<tr>
<td>Health &amp; Safety Manager</td>
<td>Furniture Retailer</td>
</tr>
<tr>
<td>Health &amp; Safety Manager</td>
<td>Office Supplies</td>
</tr>
<tr>
<td>Health Services Manager</td>
<td>Energy Supplier</td>
</tr>
<tr>
<td>Occupational Epidemiologist</td>
<td>Pharmaceuticals</td>
</tr>
<tr>
<td>Safety, Health &amp; Environment Manager</td>
<td>Pharmaceuticals</td>
</tr>
<tr>
<td>Professor of Health Psychology</td>
<td>Education</td>
</tr>
</tbody>
</table>
Table 4-2: One-to-one interview participants

<table>
<thead>
<tr>
<th>Title</th>
<th>Type of Business</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chief Medical Officer</td>
<td>Confectionary &amp; Beverages</td>
</tr>
<tr>
<td>Chief Medical Officer</td>
<td>Engineering</td>
</tr>
<tr>
<td>Chief Medical Officer</td>
<td>Health &amp; Beauty Retail</td>
</tr>
<tr>
<td>Group Occupational Physician</td>
<td>Precious Metals &amp; Specialty Chemicals</td>
</tr>
<tr>
<td>Health &amp; Safety Director</td>
<td>Environmental Services</td>
</tr>
<tr>
<td>Managing Director Occupational Health Service</td>
<td>Private Health Care/Insurance</td>
</tr>
<tr>
<td>Director of Occupational Health and Safety Services</td>
<td>NHS Trust</td>
</tr>
<tr>
<td>Special Assistant to UK VP</td>
<td>Food &amp; Beverages</td>
</tr>
<tr>
<td>Vice President for Health</td>
<td>Energy</td>
</tr>
</tbody>
</table>

4.2.2 Research participants

Participants in the study represented a broad range of industrial sectors including: retail, manufacturing, engineering, research and development, health care, and service industries. Participants in both the focus group and the one-to-one interviews were drawn from larger organisations: nine from organisations with more than 50,000 employees, three employing between 25,000 and 50,000, three employing between 10,000 and 25,000 and three employing less than 10,000.

Nine participants attended a focus group held at Loughborough University in April 2006. Nine separate in depth one-to-one interviews were then conducted, each held at the interviewee's workplace. Hence this qualitative study involved some eighteen occupational health and safety professionals. This sample was considered appropriate to serve the objectives of the study, not least due to the scale of some of the organisations represented. In aggregate the organisations represented by the study participants employ some 800,000 people globally, with a combined turnover in excess of £400 billion.
4.2.3 Research instruments and analyses

All participants received prior information about the project by e-mail. The focus group ran for 2 hours in total. One-to-one interviews lasted around ninety minutes. All discussions were semi-structured. A schedule of questions was prepared under four broad categories: attitudes, information, measurement, and communication. This was used to stimulate free-flowing discussion among participants. All discussions were recorded and transcribed with the permission of participants.

Within the four broad pre-specified categories data were analysed by sorting verbatim material into emergent themes and sub-themes as described by Miles and Huberman (1994). The first phase involved physically organising and subdividing data into meaningful segments by cutting and pasting material into categorical collections. The second phase involved determining criteria for organising data into themes (coding the data) and a subsequent search for patterns within themes to draw meaningful conclusions. The initial set of codes (or top-level themes) corresponds to questions in the interview schedule. In addition topics arose spontaneously in the discussion (emergent themes) and were coded. In total some 127 verbatim quotes (appendix 4-1) were classified using the coding framework Table 4-3. In presenting results only a limited number of quotes are selected to illustrate each theme. All data was analysed by hand without the use of any specialist qualitative analysis software.

To validate this method two approaches were used. First, respondent validation was sort by sending the relevant meeting transcript and the list of coded quotes to all participants to validate that this was an accurate representation of what was said. All participants approved the text. Second, an independent researcher assessed the coding of each quote. No changes to the major groupings of data resulted from independent coding, although several potential discrepancies to sub-categories were discussed. The work received approval from the Loughborough University ethics committee.
### Table 4-3: Coding framework

<table>
<thead>
<tr>
<th>ATTITUDES</th>
<th>Rationale</th>
<th>Faith</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Intuitive business case</td>
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<td></td>
<td>People management</td>
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<td></td>
<td></td>
<td>Reputation</td>
</tr>
<tr>
<td>Barriers</td>
<td>Health not a business issue</td>
<td></td>
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<td></td>
<td>Interaction between stakeholders</td>
<td></td>
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<td></td>
<td>Translating business case into real life</td>
<td></td>
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<tr>
<td></td>
<td>Cost not value</td>
<td></td>
</tr>
<tr>
<td>INFORMATION</td>
<td>Information used</td>
<td>Cost of illness</td>
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<td></td>
<td></td>
<td>Absence</td>
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<td></td>
<td></td>
<td>Health spend</td>
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<td>Insurance</td>
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<td></td>
<td></td>
<td>Retention</td>
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<td></td>
<td></td>
<td>Productivity</td>
</tr>
<tr>
<td>Role of information</td>
<td>Benchmarking</td>
<td>Return on investment (ROI)</td>
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<tr>
<td></td>
<td></td>
<td>Wanting to believe</td>
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<td></td>
<td></td>
<td>Aligning with business</td>
</tr>
<tr>
<td>MEASUREMENT</td>
<td>Data capture</td>
<td>Data sources</td>
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<td></td>
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<td>Data systems and processes</td>
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<td></td>
<td>Data issues</td>
<td>Credibility</td>
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<td></td>
<td></td>
<td>Participation</td>
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<tr>
<td></td>
<td></td>
<td>Attitudes</td>
</tr>
<tr>
<td>COMMUNICATION</td>
<td>Audience</td>
<td>Marketing</td>
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<td></td>
<td></td>
<td>Influence</td>
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<tr>
<td></td>
<td>People</td>
<td>Business language</td>
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<tr>
<td></td>
<td></td>
<td>Spokesman</td>
</tr>
</tbody>
</table>
4.3 Results

4.3.1 Current rationale

Statements about what motivates current attitudes towards employee health were coded into four sub-themes. A pure ‘faith’ or ‘belief’ that expenditure on employee health is a good thing for both the employee and their organisation was described as one rationale. Respondents stated how they build the conceptual link between employee health and organisational performance:

"...POP approach – people, quality, profit. Look after your people, they will make you a quality product and eventually you will end up with mass profit." (Bakery, Health & Safety Manager)

This ‘faith’ rationale was described as more about establishing broad linkages than an empirical case. Respondents said the faith rationale had most influence when supported by key advocates in senior roles. This rationale commonly draws on wider context supporting arguments such as demographic changes in working populations and pension provision.

A second rationale is the intuitive business case. Here a little more detail is added to arguments compared to the ‘faith’ rationale. There is a perception that the audience for these business cases require very simple and intuitive reasoning that are not overly empiric. Respondents described some basic analyses, for example:

"...intuitively without actually having the figures... average waiting time to physiotherapy is almost six weeks ... days lost at a base salary ... opportunity for lost sales so therefore paying 6 times 30 pounds, £180 which is going to save £1000 " (Retail, Chief Medical Officer)

Estimates of faster return to work times were often used in this context. The intuitive business case was also said to focus on the well-known existing issues for an organisation, such as ill-health retirement. The limitations of a purely intuitive business case were also widely acknowledged, more substantial expenditures may require more empirical business cases:
"...they don't want more and more statistics ... but the message we got rather, from a very senior manager was, we are convinced. But if you want more money, more interventions, get a little bit of data to give us." (Pharmaceuticals, Occupational Epidemiologist)

A third rationale to support the case for employee health is its contribution to people management within an organisation. This is again an intuitive argument where health is one aspect that can impact supply, cost and efficiency of labour inputs to an organisation. This may require some mapping from health metrics to people management issues:

"...we are looking at cost of capital. ... cost of investment, rate of return on investment, human capital issues, lack of technical capability, competence and its availability in a shrinking market place... so aging workforce, shrinking populations in the western world... those are very interesting to the management of the company and actually there is a link .... Actually if you protect the health of your workforce you might have a more available resource ...... able to cope with the varying demands of your workplace." (Energy, Vice President for Health)

A fourth rationale to support the case for employee health is around reputation. Corporate reputation may be important for in-house issues such as employee engagement with the business. Several respondents spoke of the risk to supply chain because of reputation issues, in competitive markets companies may be quick to change supplier rather than be associated with any negative reputation. Respondents described how the perceived social responsibility of corporations could threaten the commercial success of their products in certain markets.

4.3.2 Barriers

Respondent’s statements about the barriers to employee health activities were coded into four sub-themes: the attitude that health is not a business issue; the degree of interaction between stakeholders; translating the business case into real life; and a cost rather than value attitude within the management of organisations.
Many respondents reported a challenging attitude within their organisations because health can sometimes be viewed as a peripheral support function to the core business with uncertainty about what share of benefits flow to the individual or to the organisation:

"... health professionals talk about health and actually most organisations that's not what they are about so shutters go up fairly quickly and imaginations of incredible costs." (Energy, Vice President Health)

Most participants cited lack of interaction or communication between different functions within an organisation as a barrier:

"... a massive disconnect between the ... stakeholders, so HR do not talk to health and safety, HR do not talk to senior management, senior management do not feed the data back to HR and so forth." (Telecommunications, Environmental, Health & Safety Policy & Strategy Director)

Actually realising the business case in reality rather than theoretically was also a commonly reported barrier:

"... you can do a return on investment but you've then got to translate it into where has it impacted. It's not just about money then but are they seeing tangible return in those people remaining at work and productive...It's not just the straight return on investment but is can they feel that impact." (Energy supplier, Health Services Manager)

It was also highlighted that many managers and many organisations focus much more on cost than value, this approach and attitude can act as a barrier to employee health activities:

"...that is the mindset of managers, it's that they are held to this cost, cost, cost, and the way to run the business, budget is everything, control of that, getting the budgets do it - so they are very focused on costs but they don't look at value and they don't look at strategy from year to year." (Precious metals & specialty chemicals, Group Occupational Physician)
4.3.3 Types of information

Respondents were asked to comment on the types of information that are used to put the case for employee health spending. Information on the cost of illness is used to raise awareness of the size of the problem:

"...we started estimating what [health] costs were and we said probably about 15% of payroll value so we've used payroll value as what we related the cost to." (Precious metals & specialty chemicals, Group Occupational Physician)

There was much agreement that sickness absence data is important:

"...although we might want to talk about productivity the main metric we are stuck with is absence." (Private health care & insurance, Managing Director Occupational Health)

The spend per employee metric was cited as relevant in absolute as well as relative terms:

"I know, our current spend would probably be around about £15 per employee per year which is very low compared with some other organisations." (Health & beauty retail, Chief Medical Officer)

The insurance premium for employers' liability was reported as being used in discussions about employee health issues:

". the corporation really want to know, we are paying 2 million this year, how can we get that number down... But once they have gone through that negotiation of a new premium it seems to be all forgotten until the next year." (Telecommunications, environmental, Health & Safety Policy & Strategy Director)

Beyond these four metrics there was scant discussion of other types of information that are being used to put the case for employee health spending. One respondent highlighted staff retention:
"...you want to retain employees and you’ve got high level scientists who work in the scientific bit of the organisation...so actually you want to focus on their mental wellbeing, retaining them, committing them, motivating them, intellectual capital argument.." (Precious metals & speciality chemicals, Group Occupational Physician)

Interestingly, among these respondents productivity information was not used:

"...productivity is a factor but it’s not at a mature level at the moment." (Health & beauty retail, Chief Medical Officer)

4.3.4 Role of information in decision-making

Respondents were also keen to talk about the purpose or role of this information in persuading organisations to think more about employee health. Whatever types of information were used benchmarking with peer organisations was seen as very influential:

"...our organisation compares itself to its major...competitors...and its very much interested in well how do we measure up against those. How do we then measure up as a global industry so its not just within the industry but as a company, in the top ten, in the FTSE 100." (Energy, environment, Health & Safety Manager)

Respondents spoke much about the art as well as the science of management, where there are rational and emotional drivers for decision-making. It was asserted that ‘wanting to believe’ in employee health would determine how any information would be used:

"You’ve got to believe, to start off with.... It’s just if you don’t believe probably there is nothing that would ever persuade you to because you can always find some degree of fault in it." (Health & beauty retail, Chief Medical Officer)

There was consensus among respondents that all arguments and supporting information should strive to align with the business and its objectives. Not all respondents thought this was currently happening:
"...it's actually less about data and more about information supporting the driving of a business."
(Energy, Vice President for Health)

4.3.5 Measurement

In terms of measurement, discussions centred on data capture and data issues. Comments about data capture sources focussed on the inadequacies of sickness absence recording systems. The success of using employee surveys as a data source was seen to depend on the perceived credibility of the survey instrument and its sponsors. The quality of these data sources was seen as very much related to the policies, procedures and data systems that organisations have in place. Three main data issues emerged during measurement discussions. For an empirical approach to be persuasive credibility is key:

"...some of the data just doesn't look believable and if it doesn't look believable people won't believe it, but if it's coming from a reliable source then it would." (Environmental services, Health & Safety Director)

Whilst outcomes data were useful, respondents stressed that process measures describing uptake and utilisation of services where also instrumental:

"...how many people may have stopped smoking... the education and how many people have been involved in that." (Engineering, Chief Medical Officer)

Respondents' attitudes towards measurement generally may help explain the paucity of data in most organisations:

"I don't know that we are very sort of measurement driven in those areas if I am honest..." (Confectionary & beverages, Chief Medical Officer)
4.3.6 Communication

All respondents interviewed were dissatisfied with the way employee health messages were communicated within their organisation. Communication discussions centred on two themes; the audience receiving these messages and the people delivering them.

There were comments about basic marketing techniques of fitting the messages to the different audiences:

"we use a range of marketing tools in order to do that, so it's to try and get the message across. So there are different styles and techniques and messages and evidence based approaches for each one of them." (Environmental services, Health & Safety Director)

There was discussion around identifying the true influencers:

"I don't think you get the audience that you really should ... it's learning who your influencers are in terms of getting them to do what you want them to do basically... I definitely think we are talking to the wrong people." (Energy, environment, Health & Safety Manager)

Respondents asserted that communications about employee health need to adopt more business-style language:

"..our [core] business is all about brands and marketing and perception... you need people who are experts in doing that and with respect, with the best will in the world, our occupational health departments are staffed by people who are ex-nurses and ... marketing is not their core skill." (Food & beverages, Special Assistant to UK VP)

4.4 Discussion

4.4.1 Key findings

The main objective of the study described in this chapter was to better understand the information that is used in business cases for employee health activities. This study collected new data on information needs for employee health related business cases as
perceived by occupational health and safety professionals employed by major organisations in the UK. Interviews and a focus group with 18 occupational health and safety professionals at major organisations in the UK were conducted to explore attitudes, motivations, behaviours and information needs about employee health investment.

The occupational health and safety professionals interviewed for this study have described how employee health issues are discussed in their organisations. Ethical arguments about it being the ‘right thing to do’ are common and are believed to have impact. Unsurprisingly legal compliance is stated to be the driver of most employee health activity. Higher-level activities and resource do require a business case. It is suggested that currently business cases for employee health are often not overly empirical, with more intuitive arguments appealing to people management issues, notions of corporate reputation and alignment with business objectives. Data on benchmarking and some kind of return-on-investment assessment are normally required. Data on cost of illness (mostly expressed via sickness absence), direct health expenditure per employee and insurance premiums are also used. These data are mostly captured by existing sources and procedural systems, although sickness absence data especially is often thought to be unreliable. Data on staff retention and productivity were considered relevant but not currently used or analysed by this sample. There was support for the notion that more robust empirical business cases may help overcome some of the barriers that were identified, for example where costs are more quantifiable than benefits.

4.4.2 Implications

Basic labour economics provides a clear rationale why employers ought to have some level of interest in employee health. The health stock of the individuals within an organisation will in some way affect their supply of labour, in terms of quality (productivity and performance) and quantity (absence and exit), which will impact the efficiency and cost of labour. Labour is one of the key factors of production and so employee health is an indirect component of any organisation’s production function: the way it turns inputs into outputs. Furthermore it is clear that an organisation’s outputs can
be compromised if employee health issues affect product/service quality or reputation. Failure to comply with legal (or even ethical) requirements for employee health may indeed have economic consequences in terms of longer-term customer loyalty and attracting and retaining talented employees.

There appears to be a clear development opportunity for UK organisations to better harness the developing health and productivity literature in order to provide better information about the economics of employee health decisions. There was support for the notion that more robust empirical business cases may help overcome some of the barriers that were identified, for example where costs are more quantifiable than benefits. However, there appear to be two main factors currently deterring this approach. Firstly, the time and resource costs associated with collecting more and better data are perceived to be too great. Secondly, there is a perception among the respondents in this survey that the management of their organisations are more likely to be persuaded by intuitive, emotional and ethical arguments than empirical approaches. However, it was also clear that there was widespread dissatisfaction with the way employee health issues are currently communicated to management. Greater understanding of all stakeholders' information needs and a wider appreciation of the value as opposed to the cost of information may help address these problems.

Previous research has identified that incentives, whether economic, legal or ethical, need to be used appropriately for organisations with varying levels of motivation about employee health issues. For example it has already been highlighted that so-called softer drivers will work with highly motivated, higher risk firms (Wright, 1998). Budworth and Khan (2000) have developed the continuous improvement model, which describes three categories of organisations, those not interested in employee health issues; the compliers and then the advocates. Whereas the basic drivers for the first group are likely to be things like enforcement and regulation the advocates group will be influenced by reputation, longer-term costs and corporate social responsibility.
Demonstrating the real economic value of investing in employee health is undoubtedly a complex and intensive undertaking. However, ignoring the business case approach is also not an option since whilst treating (and preventing) illness costs money (direct costs), not treating (and preventing) illness also costs money (indirect costs). Health economic evaluation seeks to explicitly identify, measure and value all relevant cost and benefit parameters and aims to inform all decision-makers of a) the circumstances where indirect costs exceed direct costs and hence treatment (or prevention) becomes a clear investment opportunity; and subsequently b) the relative costs and benefits (cost-effectiveness) of the different intervention options available.

There is a need to continually work with all stakeholders involved with employee health issues by dissemination of success stories in the form of case studies and literature reviews. Better measurement of relevant parameters such as productivity and reputation risk is likely to have a significant effect on the impact of the business case. Amongst the occupational health and safety profession it is clear that better communication of the employee health business case could substantially improve its impact, especially with focus on increased business relevance, alignment with business culture, language, and systems.

4.4.3 Methodological limitations

Clearly the sample size of this study may limit the extent to which these results may be generalisable. Smaller businesses are not represented in this sample. In addition, by design only one professional grouping is included at this stage of the research programme. There is a need to consult other stakeholders in this process, not least to understand how attitudes, information, measurement and communication needs align. The next phase of this research programme will compare the needs of the different stakeholders for employee health within organisations using a quantitative survey of health professionals, human resource specialists and business managers.
4.5 Chapter summary

This study has found that business cases for employee health are often not overly empirical, with more intuitive arguments appealing to people management issues, notions of corporate reputation and alignment with business objectives. There is scope to make significant improvements to the business case for employee health investments in UK organisations through better measurement of impact on productivity and reputation risk and greater business-aligned communication by health professionals. This study found some evidence to support the view that more empirical business cases that meet the needs of decision-makers are more likely to attract investment into employee health activities.
Overview of the thesis

Chapter 1
Introduction

Chapter 2
Literature review

Chapter 3
Thesis method

Chapter 4
Exploration of current practice: qualitative methods

Chapter 5
Managers' survey (n=986)

Chapter 6
Economic evaluation: methodological review

Chapter 7
Empirical case studies: Employee surveys (n=1,504)

Chapter 8
Discussion, implications and recommendations
5 Managers’ survey

5.1 Introduction

Perceptions, attitudes and opinions of all types of managers involved in employee health and well-being management are likely to have an important impact on the behaviours, actions and decisions of these individuals, and subsequently on policies towards employee health and well-being within their organisations.

It is very well established that employee health and well-being clearly has multi-factorial influences (Cartwright and Cooper, 2009), however, one important consequence of this for organisations is that a multi-disciplinary approach is inevitably required. Management of an employee’s job, working environment, health, safety and general well-being ordinarily requires input from different professional groups, including occupational health and safety professionals, human resource managers and general (line) managers. This agenda requires collaborative working among multiple groups of specialist and generalist professionals who may have very different experiences, attitudes and levels of information regarding the role of employee health and safety within their organisation.

Several studies have previously reported differences in perceptions of various aspects of occupational health between managers, employees and professional service providers.

Lian and Laing (2007) found differences in perceptions among managers and occupational health professionals about the services that are provided, for example, many more managers believed that occupational health service coverage was wider and more comprehensive and included health services unrelated to work.

Williams et al. (1994) conducted a postal survey of 150 managers in medium and large companies, 37 union representatives and 88 occupational physicians and found a wide discrepancy of views over the importance of different occupational health services. For example, managers were found to rate the importance of counselling in the work place
much higher and immunisation for travel and work and the rehabilitation and resettlement of sick and injured workers much lower than other respondents.

Bradshaw et al. (2004) interviewed 28 SME managers and concluded that there was genuine confusion concerning who should be providing occupational health and indeed to what degree employers should be responsible for the health of their employees, particularly where ‘non-work’ related ill health was concerned such as risks associated with smoking and obesity.

Reid and Malone (2003) surveyed 760 employees and 34 HR managers within the Irish Civil Service and found that significantly more HR managers rated occupational health as important. It was also found that employees prioritised group-directed preventative services, whilst HR managers prioritised ‘fit for work’ services notably pre-employment health assessments.

None of these studies, however, have specifically addressed the costs and benefits of employee health, safety or well-being. Several HSE-sponsored research projects have been commissioned to examine this issue in the UK.

Wright (1998) conducted a literature review of factors motivating proactive health and safety management. Wright et al. (2000) conducted 120 interviews and found that the business reasons for improving occupational health risk management should be increased by improving the presentation of the business case and by increasing the perceived possibility of prosecution, especially of individuals. A subsequent telephone survey of 1900 employees found that most improvements are prompted by better understanding of health risk management. Wright and Marsden (2002) surveyed 638 UK employers and found they would be motivated to improve occupational health and safety and rehabilitation if the cost of insurance increased and they believed there was a link between their performance and the cost of insurance.
Antonelli et al. (2006) using 6 SME case studies found that organisations believed that improving health and safety was integral to business risk management and they were motivated by the potential risk to the business if this was not addressed. It was also reported that, common to other research experience, these organisations rarely systematically or comprehensively tracked the costs and benefits of undertaking health and safety initiatives.

Perceptions of the cost implications of health and safety failures have been examined in interviews with 283 managers, health and safety personnel and workers’ representatives. Haefeli et al. (2005) found that a combination of interlinked factors were influential in driving the health and safety agenda in most organisations, these included: avoidance or reduction of liability claims; potential legal exposure; concern over the cost of insurance premiums; external pressures from insurance companies; maintenance of corporate image and reputation; customer and client expectations; government targets; moral obligations; staff morale; absence, recruitment and retention; and impact on productivity, efficiency and quality of service delivery.

None of these studies, however, have explicitly compared perceptions between different groups of respondents or different types of managers within organisations. The exploration of current practice presented in chapter 4 of this thesis has identified the interaction between different stakeholders as a critical success factor in the management of employee health and safety. Lack of collaboration and communication between health and safety professionals, human resource managers and general management/leadership was cited as a barrier to improving employee health and safety management.

The availability of relevant information about employee health, safety and well-being has the potential to impact on both an individual’s perceptions and subsequent behaviours. Indeed the study by Haefeli et al. (2005) also identified potential levers for change among the 129 case-study organisations including the generation of new economic information such as the demonstration of the cost benefits of interventions and the wider financial impact of health and safety. Hence, it is also important to understand the level of
information availability for all managers involved in employee health and safety management, whether specialist or generalists.

The study presented in this chapter is intended to build on the existing literature exploring differences between different professional groups involved in employee health and safety management but with a more specific focus on the costs and benefits for an organisation.

5.2 Aims of this chapter

Specifically, the aims of this chapter are:

- To better understand managers attitudes towards employee health and safety.
- To better understand the level of information availability regarding employee health and safety issues.
- To compare attitudes and information availability between different types of managers and types of industry.
- To better understand the information that is used in business cases for employee health and safety activities.

5.3 Methods

A survey of managers working in organisations was considered the most appropriate way to address these research objectives. Based on Fowler (2009), Shaughnessy et al. (2009) and de Vaus (1995) the methods to develop this survey broadly followed the following six steps:

- Making an informed choice of survey method.
- Creating a questionnaire that is valid, reliable and unbiased.
- Designing a questionnaire and implementation plan that can achieve a high response rate.
- Obtaining a random or representative sample of sufficient size.
• Developing procedures that ensure people are treated ethically.
• Conducting a scientifically defensible statistical analysis.

The generalisability and overall utility of survey results rests on the ability to infer characteristics of a target population from the answers provided by a sample of respondents. Groves (1989) has identified four potential sources of errors in survey methodology: coverage, sampling, measurement and non-response error. This study has recognised the need to minimise these sources of error in order for the survey to be successful in its objective, the methods used to address these are discussed in the following sections.

5.3.1 Survey design

A list of topic areas on which to design questions was initially drawn up under the three headings of attitudes, information and the business case. To address the issue of measurement bias, survey questions were constructed with reference to the survey methodology literature.

Jenkins and Dillman (1997) discuss the concepts of access, motivation and cognition. Respondents must be able to easily access the survey (download it in the case of web-based surveys), they must be able to comprehend what is expected of them, know what actions are required for responding and be motivated to take those actions. To help questions on a survey to be good measures: valid (measure what they are intended to measure) and reliable (consistent in comparable situations), Fowler (2009) suggests several practical steps including ensuring questions are clearly and carefully worded avoiding ambiguity and inadequate wording; ensuring consistent meaning for all respondents; limiting the use of purely open-ended questions; appropriate use of the ‘don’t know’ response option; and consideration to the number of categories and their labels for ordered categorical scales.
Doyle (2008) also cautions that a common error in survey design is an over reliance on questions asking about attitudes and describing of subjective states, rather than more factual reporting on behaviours or experience, for example. It is suggested that when asking attitude questions, researchers need to be aware of four key points:

- people are sometimes simply not aware of their true attitudes,
- weakly held attitudes are easily changed,
- people tend to respond as if their attitudes are long-held and well-formed (and this may not be the case),
- attitudes may be sensitive to minor variation in how questions are worded or ordered.

Although an explicit objective of this study is to better understand attitudes towards employee health and safety management the design of the survey was conscious of attempting to balance questions about attitudes with questions based on behaviours and experience. Fowler (2009) also emphasises that answers to a subjective question cannot be interpreted directly; it only has meaning when differences between samples exposed to the same questions are compared.

To enhance validity of subjective questions in this study the design explicitly reviewed ambiguity of wording, standardised presentation and vagueness in response form. The response alternatives offered (for closed-end questions) are unidimensional and monotonic. Ordered categories on a continuum predominantly have four or five categories in order to more accurately measure real variation among respondents, without excessive categories producing unreliable noise. For all rating (Likert) scales each category is assigned a text descriptor as well as its rating number to help address the issue of questions meaning the same thing to all respondents.

To enhance the validity of factual reporting Cannell et al. (1977) highlighted four basic reasons why respondents report events with less than perfect accuracy: a) they do not understand the question; b) they do not know the answer; c) they cannot recall it,
although they do know it; and d) they do not want to report the answer in the survey context.

To enhance clarity of question wording and attempt to increase respondents understanding of questions on the survey, this study used the checklist suggested by Doyle (2008), presented in Table 5-1.

Table 5-1: Checklist process to revise wording of survey questions (Doyle, 2008)

<table>
<thead>
<tr>
<th>Question</th>
</tr>
</thead>
<tbody>
<tr>
<td>Is the question one which respondents can easily answer based on their experience?</td>
</tr>
<tr>
<td>Is the question simple enough, specific enough, and sufficiently well-defined that all of the respondents will interpret it in the same way?</td>
</tr>
<tr>
<td>Does the question contain any words or phrases, which could bias respondents to answer one way over another?</td>
</tr>
<tr>
<td>Is it clear to respondents exactly what types of answers are appropriate?</td>
</tr>
<tr>
<td>Does the question focus on a single topic or does it contain multiple topics that should be broken up into multiple questions?</td>
</tr>
<tr>
<td>Are any listed response options mutually exclusive?</td>
</tr>
<tr>
<td>Are any assumptions implied by a question warranted?</td>
</tr>
</tbody>
</table>

For several questions in this study, the proportion of respondents who do not know specific information is an important finding. The objective of questions about awareness of key employee health and safety metrics, for example, is to identify who knows this information rather than to analyse the data that can be reported. To distinguish respondents who do not know from those who may know but do not recall or are unwilling to do the work to provide an answer, two techniques were used. First, respondents were given advance notice (in cover letter and survey introduction screen) that they would be asked about sickness absence and injury data. Second, these questions were structured in a staged manner, respondents were asked to give a binary response (yes or no) whether they currently knew about given metrics and then given the opportunity to provide specific data, descriptions or comment.
Responses limited by social desirability issues, not wanting to provide answers in a survey format, were not considered to be a big issue in this context due to the nature of questions content and the respondents being surveyed. All respondents were provided with assurance of confidentiality and anonymity.

A self-administered web-based survey was chosen as the most appropriate vehicle to efficiently access sufficient data to address the objectives of this study. An online survey software package (Survey Monkey™) was used to design the survey instrument and collect all responses by secure web-based data capture. This study followed Dillman (1998), who has provided some key principles for designing web-based questionnaires as presented in Table 5-2.

Table 5-2: Principles for designing web-based surveys (Dillman, 1998)

<table>
<thead>
<tr>
<th>Principle</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Provide a welcome screen that is motivational, emphasises the ease of responding and instructs respondents on action needed for proceeding.</td>
</tr>
<tr>
<td>• Begin with a question that is fully visible on the first screen, is easily comprehended and answered by all respondents.</td>
</tr>
<tr>
<td>• Present each question in a conventional format similar to that normally used on paper surveys.</td>
</tr>
<tr>
<td>• Limit line length to decrease the likelihood of questions wrapping over the respondent’s screen.</td>
</tr>
<tr>
<td>• Do not require respondents to provide an answer to each question before being allowed to answer any subsequent ones.</td>
</tr>
<tr>
<td>• Use graphical symbols that convey a sense of where the respondent is in the completion process.</td>
</tr>
<tr>
<td>• Be cautious about using question structures that have known measurement problems on paper surveys (e.g. check-all-that-apply and open-ended questions.)</td>
</tr>
</tbody>
</table>

Hence this study considered visual layout for different computer screen-formats; chose not to apply the forced-response option that can be applied to specific questions using this software package; and provided a ‘percentage complete’ graphic on each page of the online survey, as shown in Figure 5-1.

Closed response questions with a ‘check-all-that-apply’ instruction for respondents was limited to one question only in the survey (question 24). All other questions were closed.
response but most also had an additional open-ended section, for respondents to enter free

An example of the final survey instrument that was used for this study is presented in
appendix 5-1. After an initial instructions page the online survey instrument was made
up of five sections of questions as follows:

1. Employee health and safety in your organisation (questions 1 to 9)
2. Your experience of business cases relating to employee health and safety
   (questions 10 to 15)
3. Your views on the drivers for employee health and safety management (questions
   16 to 19)
4. Your views on the cost impact of employee health and safety issues (questions 20
to 24)
5. Awareness of key employee health and safety metrics (questions 25 to 34)

This was followed by a demographics section to collect data on industry type, sector,
organisation size and professional groupings. Each section of the online survey was
designed as a new screen page, after completing each section the respondent was required
to click a 'next' button to proceed to the next section.
This survey asks for your views and experience of employee health and safety issues within your organisation.

There are 6 brief sections. The survey should take around 15 to 20 minutes.

In section 5 you will be asked about your knowledge of sickness absence and injury data. If you have this data easily available in your organisation you may want to refer to this when giving your responses to this section.

All responses are of course in confidence.

We would like to thank you for your support to this important research project.

For any questions about this research please contact Paul Miller, Department of Human Sciences, University of Loughborough. E-mail: P.S.J.Miller@lboro.ac.uk

The final question in section 1 of the survey (question 9) was designed as a conditional logic response, this exploited the useful adaptive design capability of the electronic survey format. Only those respondents indicating some level of experience (response options 1-3) with a business case relating to employee health and safety were asked questions in section 2 of the survey, specifically about their experience of that business case. Respondents not indicating experience of a business case (response options 4 and 5) were automatically directed straight to section 3, bypassing section 2.

The survey was designed to provide data in three broad areas: attitudes, information and the business case. Each of these areas are structured with sub-themes. Questions about attitudes ask respondents about the current situation, influencing factors and perceived costs relating to employee health and safety. Questions about information ask respondents about awareness of issues, availability of data and current knowledge of key employee health and safety metrics. Questions about the business case asked about the use of empirical data, types of professionals involved and levels of satisfaction.
The University of Loughborough ethical approval checklist was completed, submission to ethics committee was not required as the research did not involve subjecting participants to any intervention, did not involve any vulnerable groups, results were to be reported at group level and all data were to be collected anonymously.

5.3.2 Sample selection

Based on the discussions during the exploration of current practice presented in chapter 4 of this thesis, three main groups of stakeholders were identified as the most relevant groups required to collaborate for the successful management of employee health and safety, these were: health and safety professionals (H&S); human resource (personnel) managers (HR) and general (line) managers (GM).

The sampling strategy was based on these professional groupings and had three main elements. First, several professional bodies were approached to collaborate with this study. For the health and safety group the Institution of Occupational Safety and Health (IOSH) and the UK Health and Safety Executive (HSE) agreed to endorse this research and listed study details under their research activities sections on their web site. Regional branches of IOSH were invited to disseminate information about this study to its members. NHS Plus, a network of NHS occupational health providers, sent an e-mail invitation to participate (with hyperlink to the online survey) to its own distribution list. The Society of Occupational Medicine (SOM), agreed to publish a notice in its monthly (paper-based) newsletter to all members. For the human resource managers group, regional offices across the UK of the Chartered Institute for Personnel and Development (CIPD) were contacted and several agreed to make information available to their members via e-mail. For the general (line) managers group the Confederation of British Industries (CBI) and the Institute of Directors (IoD) were approached to participate but declined, Business in the Community (BiTC), a Prince of Wales charity with some 800 member organisations across the UK agreed to send information to its Business Action on Health group.
Second, individuals that participated in the one-to-one interviews, the focus group and previous research projects connected with the Department of Human Sciences were also contacted and invited to participate in this survey.

Finally, all contacts from all professional groups were encouraged to recruit other colleagues to participate in the survey. For example, occupational health professionals were asked to contact human resource and line managers within their organisation.

The sampling strategy for this study was completely random with respect to type of industry, size of organisation and other factors, other than via the indirect influence of the make up of professional bodies and previous collaborating organisations that were approached. Coverage and non-response bias should be minimised as all groups ought to have been provided with an equal chance to respond. However, oversampling of, for example, small and medium-sized enterprises may be required to fully represent these groups, due to less available resource for activities such as survey completion. Some level of sampling error may inevitably be present due to the vested interest problem, where respondents with particular interest in employee health and safety management may be more likely to respond to the survey than managers with more neutral views or disinterest.

The overall sample made up of the three professional groups of interest was expected to be unbalanced, with considerable over-representation from the general (line) managers, as most organisations operate with a high ratio of generalist to specialist (HR, Occupational Health) managers.

Sample size calculations are particularly interesting for this study since this survey has several challenging attributes: it deals predominantly with categorical data with multiple analysis groups (>2) and with unequal allocation between groups.
It has been noted that for a given sample size the maximum statistical power is achieved by having equal numbers of subjects in each group but frequently observational studies naturally deviate from this and intervention studies deviate from this by design (Campbell et al., 1995). Assuming sample sizes as calculated for a 1:1 ratio but then allocated in the ratio 2:1, is likely to have quite minimal impact, with the loss of power estimated around 5%. However, an allocation in the ratio of 5:1 would result in a loss of power of around 25%.

**Figure 5-2: Sample size calculations for categorical data**

Analysis of variance (ANOVA) is of course a much used approach to compare groups based on means. An et al. (2008) point out, however, that adequate sample size for the omnibus $F$-test does not necessarily provide adequate statistical power for the post hoc multiple comparisons typically performed in ANOVA. Indeed, Fisher realised when developing the ANOVA that there was a potential problem of Type I error inflation when multiple $t$-tests were conducted on three or more groups and suggested a more stringent alpha could be used. Hsu (1989) has compared several different procedures including
Dunnetts method and Tukey's method for sample size computation for designing multiple comparison experiments and concludes these give a higher probability of correct multiple comparison inference compared to the standard $F$-test.

Moreover, whilst it may be appropriate to compare group mean ratings or scores for several of the questions in this survey, most questions have ordered categorical responses, for example on a 1 to 5 Likert scale. With categorical data and multiple groups the most appropriate statistical analysis is the chi-squared ($\chi^2$) test. In order to calculate the total sample size required to detect differences between the groups using the chi-squared test, information about effect size ($w$), significance level ($\alpha$), power ($1-\beta$) and degrees of freedom is required. The degrees of freedom can be calculated by cross-tabulation for any given survey question as $(r-1)(c-1)$, where $r$ is the number of rows and $c$ is the number of columns. For example, question 1 has 4 categorical responses (columns) and in the primary analysis has 5 professional groups (rows), hence 12 degrees of freedom. A software package for statistical power calculations (G*Power Version 3.1, Faul et al., 2007) was used to perform multiple calculations.

Figure 5-2 shows total sample size required by effect size ($w$) when assuming 5% significance, 80% power and 5 degrees of freedom. Using Cohen's categories of effect size (Cohen, 1992), a large effect ($w = 0.5$) will be detected with a sample of less than 50 subjects and a medium effect ($w = 0.3$) will be detected with a sample of 143 subjects. For the primary analysis (by group) several questions in this survey have 12, 16 or 20 degrees of freedom, when $w = 0.3$ the required total sample sizes are 193, 215 and 233, subjects respectively.

For smaller effect sizes the total sample size calculation becomes highly sensitive to changes in $w$. Detection of a small effect ($w = 0.1$) requires a considerably larger sample of 1283 subjects, when assuming 5% significance, 80% power and 5 degrees of freedom. Marginally increasing $w$ to 0.11 reduces this required sample to 1061, when $w = 0.12$ this is 891 and when $w = 0.15$ the total sample size calculation is 571 subjects.
5.3.3 Piloting

The draft survey was pilot tested with two groups in its online format. The first was made up of a group of 7 general managers from one large organisation. The second consisted of the 18 occupational health and safety professionals that were involved in the earlier phase of this research exploring current practices.

During the pilot phase a checklist for survey and question design (Iraossi, 2006) was used, as presented in Table 5-3.

Table 5-3: Checklist questions for pilot testing

- Do respondents understand the survey’s objective?
- Do the respondents feel comfortable answering the questions?
- Is the wording of the survey clear?
- Is the time reference clear to the respondents?
- Are the answer choices compatible with the respondents’ experience in the matter?
- Do any of the items require the respondent to think too long or hard before responding? Which ones?
- Which items produce irritation, embarrassment, or confusion?
- Do any of the answers collected reflect what you want in regards to the purpose of the survey?
- Is there enough diversity in the answers received?
- Is the survey too long?
- According to your test audience, have any other important issues been overlooked?

The survey instrument was perceived by both groups to have good face validity and was both acceptable and feasible for use in this setting. There were several positive comments about the efficiency of the web-based survey format and no reported problems with access or navigating the self-administered computer-based survey. One respondent reported an issue with a question not fitting on their screen dimensions with all the response options visible and scrolling down was an irritation.

Several questions were programmed to have the forced-response option applied during the pilot test, respondents clearly signalled a strong dislike for this aspect and advised
that most people would simply give up on the survey rather than be forced to provide an answer. No respondents reported that the survey was too long, most said they completed the survey in less time than the stated completion time. There was a request for more open-ended responses to be included for respondents to give reasons for their responses, this was incorporated into the revised design.

5.3.4 Data management

Pilot testing was conducted during February and March 2008 and data collection took place from April to July 2008. Response rates were regularly monitored for progress towards a target sample size of around 500, based on the sample size calculations presented above.

Web-based questionnaire data were collected using Survey Monkey™, downloaded from the secure website in spreadsheet format (Microsoft Excel 2000), subjected to a simple data management process to prepare the data for analysis and then imported into a statistical package (SPSS for Windows student version 16) for analysis.

5.3.5 Data analysis

The primary analysis is to compare responses by professional groups. As secondary analyses, data are analysed by type of industry, by sector (public or private) and size of organisation (small, medium or large). Statistical analysis is based on cross-tabulation for each question by each of these strata independently, without multivariate adjustment. In the results section of this chapter selected categorical distributions are presented together with their significance levels based on the chi-squared statistic. When the p-value for this test is small (usually <0.05) there is evidence to reject the null hypothesis that distributions are the same across repeated measures.

Full response counts and percentages by category and histograms for all questions were generated together with standard SPSS outputs from the chi-squared test including
Pearson Chi-Square critical value, degrees of freedom and significance level. Selected details from this output is presented in the results section of this chapter.

To compare mean rating scores and their ranks for repeated measures (questions 16, 20 and 21) the Friedman’s test is used. The test statistic for the Friedman's test is a chi-squared with \( a-1 \) degrees of freedom, where ‘\( a \)’ is the number of repeated measures. When the p-value for this test is small (usually \(<0.05\)) there is evidence to reject the null hypothesis that distributions are the same across repeated measures.

Qualitative data in the form of open-ended textual comments were also collected alongside quantitative data. Verbatim comments were grouped by their quantitative response category for each question and analysed for emergent themes (Miles and Huberman, 1994). Illustrative quotes are presented in the results section.
5.4 Results

5.4.1 Response rate

A total of 986 respondents started the online survey, this is a measure of the number who opened the hyperlink to the web-based survey. It is not possible to report on the number of respondents who viewed the invitation to participate and declined to open the hyperlink.

Figure 5-3: Rate of compliance by sequential section and question through the survey

Rates of compliance through sequential sections and questions of the survey are presented in Figure 5-3 and clearly show that there was some drop-out between sections but overall around 70% completed all 34 questions in these sections.

5.4.2 Sample characteristics

As anticipated the sample disposition was unbalanced in terms of professional groups, with general and ‘other’ managers outnumbering health and safety and human resources professionals by around seven to one. A total of 407 (41%) respondents indicated they
worked in general management (GM, group 3), a further 142 (14%) respondents stated ‘other’ (group 4) and additional comments suggested these roles were predominantly line managers or supervisors. A total of 79 (8%) respondents indicated they worked predominantly in the area of health and safety (H&S, group 1) and 53 (5%) respondents stated that they worked in the area of human resources or personnel management (HR, group 2). A total of 305 (31%) did not indicate their professional group.

The full sample of 986 consisted of respondents from several different types of industry as presented in detail in Table 5-4. For analyses these are grouped into five types of industry categories with sample sizes as follows:

1. Manufacturing (n=118)
2. Professional, scientific & technical activities (n=225)
3. Human health (n=128)
4. Other stated (n=200)
5. Not stated (n=315)

A total of 188 (19%) respondents stated that they worked in the public sector (sector 1) and 447 (45%) in the private sector (sector 2). A further 11 (1%) stated they worked in the private (not for profit) sector, 35 (4%) respondents were from organisations involved in both public and private sectors and 305 (31%) did not indicate which sector they were employed in.

Respondents were predominantly drawn from large organisations (size 3) with 451 (46%) stating they worked in organisations with more than 250 employees. A total of 65 respondents were from small organisations (size 1), with 50 or less employees, and 64 from medium sized organisations (size 2), with 250 or less employees. Some 406 (41%) respondents did not indicate the number of employees in their organisation.
Table 5-4: Survey respondents by industry type

<table>
<thead>
<tr>
<th>Industry Type</th>
<th>All</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>% (n)</td>
</tr>
<tr>
<td><strong>What type of industry does your organisation predominantly operate in?</strong></td>
<td></td>
</tr>
<tr>
<td>C. Manufacturing</td>
<td>12%</td>
</tr>
<tr>
<td>D. Electricity, gas, steam and air conditioning</td>
<td>0.6%</td>
</tr>
<tr>
<td>F. Construction</td>
<td>0.9%</td>
</tr>
<tr>
<td>G. Wholesale &amp; retail trade; repair of motor vehicles and motorcycles</td>
<td>0.5%</td>
</tr>
<tr>
<td>H. Transportation &amp; storage</td>
<td>0.5%</td>
</tr>
<tr>
<td>I. Accommodation &amp; food service activities</td>
<td>0.1%</td>
</tr>
<tr>
<td>J. Information &amp; communication</td>
<td>0.9%</td>
</tr>
<tr>
<td>K. Financial &amp; insurance activities</td>
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<td>M. Professional, scientific &amp; technical activities</td>
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<td>N. Administrative &amp; support service activities</td>
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<td>O. Public administration and defence; compulsory social security</td>
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<td>P. Education</td>
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<tr>
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<td>U. Activities of extraterritorial organisations and bodies</td>
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<td>Other</td>
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Table 5-5 presents sample characteristics for all respondents who stated their industry, sector, organisation size and professional grouping.
Table 5-5: Sample characteristics by industry, sector, size and professional group

<table>
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<th>Industry</th>
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<th>Group</th>
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</tbody>
</table>

Industry: 1=Manufacturing; 2=Professional, scientific & technical activities; 3=Human health; 4=Other stated; 5=Not stated
5.4.3 Attitudes

5.4.3.1 Current situation

Based on the continuous improvement model (Budworth and Khan, 2000), this survey found that 82% of all respondents described their organisation’s attitude towards employee health and safety as an “advocate”, an organisation that actively promotes employee health and safety issues. Significant differences between the groups was observed, 86% of the GM group rated their organisation as an “advocate” compared to 67% and 70% of the H&S and the HR groups, respectively (p < 0.05). One quarter of respondents from the H&S and HR groups described their organisation as a “complier”; an organisation that ensures it is legally compliant in this area and no more. Only 3% of all respondents said that their organisation was “yet to be fully engaged” (level-1).

Several additional qualitative comments were provided, one respondents rating their organisation as level-1 said there is a:

"...poor appreciation of Health and Safety, other business pressures take priority and willingness to assign responsibility to others."

Another respondent who rated their organisation as level-2 (complier) stated:

"Although there is top level commitment to these issues, many managers (at senior, middle and supervisor levels) either don’t understand the importance and benefits of commitment or use operational priorities as an excuse for inaction."

A respondent from a level-3 (advocate) organisation said:

"XXXX is seen as an industry leader and our stakeholders (government, general public, employees, unions) have high expectations that we hold excellence in health and safety as a core value."
Two thirds of all respondents (66%) reported that they believed their organisation’s current perception was that the benefits of managing employee health and safety outweighed its costs (slightly or greatly). Half of the HR and “other managers” groups responded with the highest rating that benefits greatly outweighed costs, supported by comments such as:

“The business would not carry the costs of any activity that did not provide tangible benefits, certainly in recent times. Investment in employees has clearly paid off in retention of staff over the years.”

Others qualified their statement of belief was not empirical:

“Have not carried out a study to review the costs versus benefits I believe that the benefits outweigh the costs is true but have no data to back this up.”

The H&S group most frequently rated this question on the perceived balance of costs and benefits lower than the other groups, with 44% of this group believing that their organisation did not think benefits outweighed costs (p < 0.001). One of these respondents stated that:

“Managers on the operational side of the business look upon health and safety as a cost factor. It is difficult to convince them that the cost of accidents; enforcement notices, etc also effects their budgets.”

A very clear difference was found between professional groups regarding their level of satisfaction with current arrangements for employee health and safety (p < 0.001). Around half of the manager groups (HR 53%, GM 50%, Other 56%), said they had level-3 satisfaction, “I am proud of what we do”, compared with 29% at this level in the H&S group. More than half (52%) of the H&S group said they had level-1 satisfaction, “we could do more”, compared with less than 20% at this level in the other groups. One of these level-1 respondents from the H&S group gave the following additional comment:
"Our arrangements are sufficient to comply with the law, but I feel a more professional approach could be taken which would enhance the employment relationship and offer a better environment for employees."

5.4.3.2 Influencing factors

Table 5-6 shows the perceived importance of factors influencing organisations to invest in employee health and safety in rank order according to mean rating score for all respondents, the H&S, HR and GM groups. Friedman’s test statistic comparing the mean ratings for these 11 factors (p<0.001) suggests that there is evidence to reject a null hypothesis that the distribution is the same across these repeated measures, differences between mean rating scores for these factors are significant.

Table 5-6: Relative importance of factors influencing an organisation to invest in employee health and safety management

<table>
<thead>
<tr>
<th>Rank (all)</th>
<th>Rank (H&amp;S)</th>
<th>Rank (HR)</th>
<th>Rank (GM)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. q16c Bad publicity, damage to reputation</td>
<td>q16c</td>
<td>q16c</td>
<td>q16c</td>
</tr>
<tr>
<td>2. q16a Evidence of serious operational impacts on employees</td>
<td>q16b</td>
<td>q16a</td>
<td>q16d</td>
</tr>
<tr>
<td>3. q16b Evidence of how to reduce costs by improved health and safety management</td>
<td>q17</td>
<td>q17</td>
<td>q16d</td>
</tr>
<tr>
<td>4. q16d Evidence of how to reduce costs by improved health and safety management</td>
<td>q16d</td>
<td>q16d</td>
<td>q16d</td>
</tr>
<tr>
<td>5. q17 Business cases</td>
<td>q16b</td>
<td>q16b</td>
<td>q16b</td>
</tr>
<tr>
<td>6. q16a Experience of high profile incident</td>
<td>q16a</td>
<td>q16a</td>
<td>q16a</td>
</tr>
<tr>
<td>7. q16a Better understanding of how to improve employee health and safety management</td>
<td>q16g</td>
<td>q16g</td>
<td>q17</td>
</tr>
<tr>
<td>8. q16f Insurance premium discounts for good employee health and safety record (e.g. penalties for poor record)</td>
<td>q16f</td>
<td>q16b</td>
<td>q16f</td>
</tr>
<tr>
<td>9. q16g Customer demands</td>
<td>q16f</td>
<td>q16f</td>
<td>q16h</td>
</tr>
<tr>
<td>10. q16h Public pressure</td>
<td>q16h</td>
<td>q16h</td>
<td>q16g</td>
</tr>
<tr>
<td>11. q16i Shareholder pressure</td>
<td>q16i</td>
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</tr>
</tbody>
</table>

Note: Factors that are highlighted in colour were found to have significant differences between the professional groups when comparing the distribution across the categorical responses (for example, q16d (red) is ranked 3rd by all respondents, 4th by H&S and HR respondents and 3rd by GM respondents).
There is agreement across all the professional groups that bad publicity and damage to reputation is the most important influencing factor. The mean score for all respondents is 3.644 on the 1 to 5 rating scale where 1 is “no influence”, 2 is “relevant (but other factors more important)”, 3 is “considered (alongside other factors)”, 4 is “considered important (supported by other issues)”, and 5 is “drives decisions”. Overall, 60% of respondents rated this factor 4 or 5. Differences between the professional groups were not significant ($p = 0.161$).

Two factors were rated almost the same overall as next most important (secondary factors) in terms of influencing investment: evidence of adverse commercial impact of poor employee health and safety (mean rating 3.555) and evidence of how to reduce cost by improved health and safety management (mean rating 3.550). For both of these factors respondents from the GM and “other managers” groups rated these factors significantly higher than those in the H&S and HR groups ($p < 0.05$), this is also clearly demonstrated by the different rank orders (see q16e (blue) and q16d (red) in Table 5-6). Evidence of adverse commercial impact of poor employee health and safety was rated as a “driver of decisions” to influence investment by 20% of all respondents. Evidence of how to reduce cost by improved health and safety management was rated as a “driver of decisions” to influence investment by 16% of all respondents.

Four factors were rated almost the same overall as next most important (tertiary factors) in terms of influencing investment: extended legal requirement to pay for full rehabilitation of employees with work-related illness (mean rating 3.384); business cases (mean rating 3.360); experience of high profile incidents (mean rating 3.342); and better understanding of how to improve employee health and safety management (mean rating 3.340). For the extended legal requirements factor there were significant and relatively large differences between professional groups (H&S group mean = 2.8, GM group mean = 3.53, $p < 0.001$), 56% of the GM group rated this factor 4 or 5 level of importance compared to 28% of the H&S group. The HR group rated the experience of a high profile incident significantly lower than other groups ($p < 0.01$). Differences between the groups for the other two factors were not significant.
The role of the business case as a factor influencing organisations to invest in employee health and safety management overall ranked in the middle of a list of factors in terms of mean ratings (5 of 11), with both the H&S and HR groups ranking this as their third most important factor. More than 40% of respondents rated the business case as level-3 ("considered (alongside other factors)") and a further 35% as level-4 ("considered important (supported by other issues)"), with no significant difference between the groups in terms of categorical responses.

Insurance premium discounts for good employee health and safety records (and penalties for poor records) had a mean rating of 3.174 and ranked eighth overall of the eleven options presented to respondents. Differences between the professional groups were not significant.

The remaining three factors: customer demands, public pressure and shareholder pressure ranked lowest of all options. The HR group placed significantly more importance than the other groups on customer demands (p < 0.01). Differences between the groups regarding the importance of public pressure were not significant. The GM group placed significantly more importance than the other groups on shareholder demands (p < 0.001), although all groups ranked this lowest of all options.

Analysis of influencing factors by industry and sector found that respondents in the public sector rated insurance premium discounts for good employee health and safety records significantly higher than the respondents in the private sector (p < 0.001), for example 56 % in the public sector rated this factor as important or driving decisions (level-4 or 5) compared to 37% in the private sector. No significant differences were found for other influencing factors.

Analysis of influencing factors by size of organisation found significant differences for one factor only. Small organisations were most likely to state that bad publicity/damage to reputation drives decisions (level-5) about investment in employee health and safety...
management. Some 39% of small organisations rated this level-5, compared to 14% of medium-sized organisations and 24% of large organisations (p < 0.05).

Many of the additional textual comments provided by respondents highlighted the moral obligation for an employer as a key influencing factor, for example:

"The key driver is 'doing the right thing' we have a moral duty of care to ensure our employees have a safe and healthy work environment and we minimise our environmental impact."

Several comments also pointed to a belief in the specific business benefits associated with investment in employee health and safety:

"We invest because we believe in its value in terms of enhancing employee engagement and productivity."

Several respondents also provided comment that they believed influencing factors within their organisation were more logistical or tactical, for example these included:

"...opportunism, emergent strategy formulation, access to external source of funding, organisational politics, ability to make a good case, negotiating and influencing skills of those proposing change."

The role of the business case for employee health and safety investment was rated highly overall in terms of influencing organisations, respondents rating this factor at the highest level ("drives decisions") also gave additional comments very strongly supporting the notion of the business case, for example:

"Robust attitude to cost control demands clear business case justification for any substantial expenditure."

Among other respondents also rating the role of the business case very highly the scope, measurement and monetary valuation of benefits deriving from employee health and safety investments were identified as very important, for example:
"Business bottom line drives most change in any organisation. When proof is shown to reduce costs by increasing employee health and safety, most organizations will act upon the data."

"Business case will be more than financials and include non-financial measures such as feedback through employee surveys."

Some respondents justified their low rating for the role of the business case based on perception of the way decisions are made within their organisation:

"Decision is usually driven by what is seen as good practice for a blue chip company, intuition, personal values and staff expectations."

Many respondents to this section also provided a statement of preference about how decisions should be made within their organisation, for example:

"People's safety is not related to the business case - it is a necessity!"

"Cost is considered but overriding safety of employees is paramount regardless of cost."

"Cost/benefit is considered in finding solutions but employee safety and wellbeing is the primary concern."

5.4.3.3 Costs
A total of 760 of 812 respondents (94%) stated that they believed better employee health and safety management could reduce costs, although 40% stated that they considered it unlikely that this would be a significant reduction, 54% stated they believed this could be a significant reduction. Similarly 743 of 812 respondents (92%) stated that they believed that improving employee health and safety can have a meaningful impact on the performance of their organisation.

Among the 6% of respondents who stated they thought better employee health and safety management would add to costs rather than reduce them, several gave the rational that
they considered their organisation was already at a good level and further investment would not be so beneficial, for example:

"We already do a lot which I believe is giving a significant reduction compared to where we would be if we did nothing. I am not convinced (yet) that doing any more can make further significant impact. I think it is continuing to do what we do with the same energy and commitment."

Others were unconvinced that the value of benefits could outweigh the costs:

"Never seen any evidence but I doubt it would drive costs down by very much given the likely cost of putting measures in place."

Among the additional comments provided by respondents stating they believed that better employee health and safety management could significantly reduce costs for their organisation, four main themes emerged. Many comments were based on practical experience in this area, for example one respondent reported on a project, which very precisely had been shown to have:

"3.4: I return-on-investment (ROI)"

Many respondents highlighted the issue of hidden costs relating to employee health and safety management, for example:

"Especially in the area of employee absence (through injury or illness) - I don't believe that many people are aware of the financial cost to the business of these types of absence."

Several additional comments in this section also used a rational based on individual's intuitive logic, for example:

"Without appropriate H&S interventions, our costs would rise significantly."

"Healthy employees and/or preventive medicine are cheaper than treating illness."

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"Contractually absent employees receive full pay and a replacement has to be employed."

Several comments also related to the belief in a cascade of benefits for an organisation that could flow from better employee health and safety management.

"Better H&S will reduce accidents/incidents which in turn reduces the possibility of litigation and could result in lower insurance premiums."

"Health and safety issues greatly disrupt operations and badly effects morale and motivation of staff."

"I believe that healthier living reduces peoples apathy towards work and a safer working environment and culture reduces work based accidents, both leading to reduced spending on these activities."

Additional comments provided by respondents to the question of whether they believed improving health and safety could have a meaningful impact on the performance of their organisation broadly followed the themes of the previous question relating to costs. For example:

"Absolutely; when employees believe that the company cares about their health and welfare, they give back more to the company in terms of their time, energy, commitment -- and this contributes greatly to a high performing culture."

Among the 8% who stated they did not believe there could be a meaningful impact on performance the main justification appeared to be based on diminishing returns, for example:

"I think the benefits of further H&S legislation are now a process of diminishing returns. Costs are starting to outweigh benefits. However, the H&S lobby still keeps rolling on trying to make minor, common sense issues a big deal."

One respondent from the H&S group, challenged whether employee health could contribute to an organisation's performance:
"From a health perspective, I think it is a lofty goal to think you can improve everyone's health to the degree to which it improves performance on an organisation of this size."

Table 5-7 shows what respondents perceive to be the biggest costs to their organisations arising from employee health and safety issues in rank order according to mean rating score for all respondents, the H&S, HR and GM groups. Friedman's test statistic comparing the mean ratings for these 13 factors (p<0.001) suggests that there is evidence to reject a null hypothesis that the distribution is the same across these repeated measures, differences between mean rating scores for these factors are statistically significant.

Table 5-7: Perception of biggest costs to the organisation arising from employee health and safety issues

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<td>Q20b Lost production</td>
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<td>Q20j</td>
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<tr>
<td>2</td>
<td>Q20j Impact on reputation/image</td>
<td>Q20a</td>
<td>Q20b</td>
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<tr>
<td>3</td>
<td>Q20k Impact on product/service quality</td>
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<td>Q20k</td>
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<td>4</td>
<td>Q20c Staff turnover</td>
<td>Q20k</td>
<td>Q20l</td>
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<tr>
<td>5</td>
<td>Q20i Compensation/legal claims</td>
<td>Q20i</td>
<td>Q20i</td>
</tr>
<tr>
<td>6</td>
<td>Q20a Health insurance premiums</td>
<td>Q20c</td>
<td>Q20a</td>
</tr>
<tr>
<td>7</td>
<td>Q20a Sick pay</td>
<td>Q20h</td>
<td>Q20h</td>
</tr>
<tr>
<td>8</td>
<td>Q20h Employee liability insurance premiums</td>
<td>Q20d</td>
<td>Q20e</td>
</tr>
<tr>
<td>9</td>
<td>Q20l Loss of contracts/customers/revenue</td>
<td>Q20l</td>
<td>Q20c</td>
</tr>
<tr>
<td>10</td>
<td>Q20e Ill health retirement</td>
<td>Q20m</td>
<td>Q20m</td>
</tr>
<tr>
<td>11</td>
<td>Q20d Greater use of temporary contract workers</td>
<td>Q20e</td>
<td>Q20d</td>
</tr>
<tr>
<td>12</td>
<td>Q20f Direct treatment costs</td>
<td>Q20f</td>
<td>Q20f</td>
</tr>
<tr>
<td>13</td>
<td>Q20m Material damage</td>
<td>Q20f</td>
<td>Q20f</td>
</tr>
</tbody>
</table>

The two factors that are highlighted in colour were found to have significant differences between the professional groups when comparing the distribution across the categorical responses; each professional group also reflects this in the different ranking of these factors.

Lost production had the highest mean rating among all respondents (2.97); the large number of respondents in the GM and “other managers” groups dominated this with more than two-thirds of these groups rating this factor as a “significant cost impact” or that it
impacts financial performance" of their organisation (level 3 or 4). Differences between the professional groups were significant (p < 0.001), the HR group rated this factor slightly lower than GM and "other managers" groups overall, with 34% stating lost production was a manageable cost. The H&S group rated this factor lower than all the other groups overall (although still ranked as 3 of 13 factors), with some 24% labelling lost production as having only a "trivial cost impact" (level 1).

Impact on reputation/image is perceived as an important cost factor and has the second highest mean rating (2.87) of all options by respondents in this survey. This factor is ranked highest amongst both the H&S and HR groups, although differences between the groups in terms of categorical responses were not significant (p = 0.758).

There is a level of agreement across the professional groups about the magnitude of cost impact in terms of impact on product/service quality, this factor ranks third highest overall (2.72) with no significant differences between the groups.

Five other factors are found to have very similar overall rating scores in terms of their perceived scale of cost to an organisation: staff turnover (2.65), compensation/legal claims (2.64), health insurance premiums (2.62), sick pay (2.60), and employee liability insurance premiums (2.54). Table 5-7 clearly shows that there is a big difference between the groups regarding the perceived cost of health insurance premiums, with the H&S and HR groups ranking this near the bottom and the GM group ranking this close to the top of this list. More than 75% of the H&S group rated health insurance premiums as either a trivial or manageable cost (level 1 or 2), compared for example to 54% of the GM group stating that this was a significant cost or one that impacts the financial performance of their organisation (level 3 or 4), (p < 0.001).

Three factors were rated very similar as relatively less substantial cost items: loss of contracts/revenue/customers (2.43), ill-health retirement (2.41), and greater use of temporary workers (2.35). Direct treatment costs (2.29) and material damage costs (2.19) were rated overall as the least substantial factors in this list.
Analysis of the perceived biggest costs by industry and sector found significant differences for several factors. Respondents working in industry categories 1, 2 and 3 rated sick pay most frequently as a manageable cost (level-2) and lower than respondents from other industry categories (p< 0.05), respondents from the public sector most frequently rated sick pay as a significant cost (level-3) and higher than the private sector (p< 0.05). Respondents from the public sector were more likely to perceive the following factors as bigger costs than respondents from the private sector: direct treatment costs, health insurance and employee liability premiums, and compensation/legal claim costs significantly (p < 0.001), ill-health retirement, loss of contracts/customers/revenue and material damage (p < 0.01).

There were significant differences between the groups in terms of whether individuals felt that they have a good understanding of the full costs arising from employee health and safety issues in their organisation (p < 0.001). In the H&S group 38% replied yes compared with 58% saying no. In the HR group, respondents were equally divided. Among general and other managers around 80% stated that they did not feel that they had a good understanding of the full costs. In contrast it was also found that HR, general and “other” managers were significantly more likely to state that they did believe that their organisation currently has a good understanding of the full costs, where as 60% of the H&S group did not (p < 0.001). Respondents from the private sector were found to be more likely than respondents from the public sector to believe that their organisation had a good understanding of full costs (52% versus 42%, p <0.05).

Additional comments from respondents stating that they did not have a good understanding of the full costs arising from employee health and safety included:

"I don't have all of the actual figures so don't know the full costs. I am aware of whether the overall costs are increasing or decreasing."

"To be perfectly honest this survey has prompted me to think about things I've not thought about before!"
Many comments from respondents stating that they did believe that their organisation had a good understanding of these costs were based on assumptions that this is part somebody else's job, for example:

"Assume so based on the programmes that are funded and put in place to drive health and well being."

"H&S Manager keeps track of certain things; HR others."

"I believe someone in the organisation knows -- likely in HR and senior management."

Respondents stating that they did not believe that their organisation understood these costs also said:

"Although data is available not presented in a meaningful way that relates to £."

"Doesn't seem to appreciate the hidden benefits of good health and safety, and only measures the visible costs/savings in general - although this is improving."

"Never discussed in leadership team meetings."

"Never seen the data and probably would have if we had it."

Fig 5-4 shows respondents perceptions of what the barriers are to organisations understanding the full cost impact arising from employee health and safety issues. Respondents were asked to “vote” for as many factors as they considered relevant, the H&S group selected a mean of 3.1 factors as relevant, whilst groups 2 to 5 (all non H&S respondents) selected a mean of 2.5, 2.6, 2.3 and 2.6 factors, respectively.
Figure 5-4: Barriers to your organisation understanding the full cost impact arising from employee health and well-being issues

Measurement issues and time were consistently ranked as the two most important barriers overall and by each of the groups. The GM group were more likely to rank the factor "not core to the business" as the next most important barrier, whilst the H&S group ranked "incentive" and the HR group ranked "lack of awareness" as their third most important barrier. Lack of awareness and cost were considered to be of some importance to groups 4 and 5. A lack of skills and the "costs are unlikely to be big enough to matter" factor were ranked lowest overall, with around 5% of respondents considering this a barrier in their organisation.

Most respondents clearly stated that they did not think their organisation would benefit from changing the current total level of spend on items related to employee health and safety, with 55% indicating that spend should stay about the same and only 19% stating
they thought it should be increased. A significant difference was observed for respondents in the H&S group; where 38% thought that their organisation would benefit from increasing the current level of spend.

An example of an additional comment from each level of response is given below. One respondent stating spend should be increased said:

“I don’t think we do enough on the positive side, to bolster motivation and celebrate more. The emphasis is overloaded to the ‘stick’ approach. Too much challenge, not balanced by enough support.”

A respondent who thought spend should stay the same said:

“Don’t need to spend more, just ensure fully engaged employees in this area. Focus on leadership rather than the individual.”

One respondent who thought spend should be decreased added:

“What ever is spent today seems to deliver the appropriate benefits. A key question could be can this be delivered for less?”

5.4.4 Information
5.4.4.1 Awareness
Levels of awareness of health and safety issues among respondents are presented in Figure 5-5 in terms of mean rating scores by group. For each of the 7 factors presented, differences between the groups in terms of distribution of categorical responses are found to be significant (p < 0.05). Based on mean rating scores the H&S group is most aware compared with other groups in terms of what the key issues are (mean rating 4.42); the options to change interventions (mean rating 3.67) and the balance of costs and benefits (mean rating 3.56). The HR group are most aware compared to other groups in terms of what interventions are in place (mean rating 4.45); the effectiveness of current interventions (mean rating 4.04) and the overall cost impact of health and safety issues
for their organisation (mean rating 3.87). Levels of awareness about the cost of current interventions are almost identical in the H&S and HR groups (mean rating 3.5).

Awareness of all issues among the other groups (groups 3 to 5) is consistently lower and on average tends towards being limited (level-3) for three issues in particular: cost of current interventions; options to change interventions and balance of costs and benefits.

Awareness of what the key health and safety issues are was reported as high with 80% of all respondents stating that their awareness was either modest (level 4) or detailed (level 5), unsurprisingly the mode response among the H&S and HR groups was the highest category (level 5).

Awareness of the overall cost impact of health and safety issues was slightly lower overall. The mode response for all groups was modest awareness (level 4), with more than 29% of the GM group stating limited awareness (level 3) and around a quarter of the H&S and HR groups stating detailed awareness (level 5).

Awareness of what current interventions are in place was high, with a higher proportion of the GM and “other managers” groups a little less aware (level 4 versus 5) than the H&S and HR groups, as might be expected. Awareness of how effective current interventions are was rated as modest (level 4) by around 40% of each group, with about a third of the H&S and HR groups stating they had detailed awareness (level 5) and around 40% of the GM and “other managers” groups stating they had limited, very limited or no awareness (level 1-3).

Awareness of the cost of current interventions was generally lower than other aspects. The mode response for 3 of the groups (H&S, GM and “not stated”) was limited awareness (level 3), the most frequent response from the “other managers” group was very limited awareness (level 2), for the HR group this was modest awareness (level 4). Around 50% of both the H&S and HR groups rated their awareness of the cost of current interventions as either modest or detailed.
Awareness of options to change the mix of health and safety interventions was mostly limited (level-3) among all groups other than the H&S group (63% modest or detailed awareness). Awareness of options to change the current balance of costs and benefits of health and safety issues was mostly limited (level-3) among all groups other than the H&S group (52% modest or detailed awareness).

Analysis of levels of awareness by sector found that respondents from private sector organisations were more likely than respondents from public sector to report higher levels of awareness about what the key health and safety issues are, for example 39% compared to 29% with detailed (level-5) awareness (p < 0.05). Analysis by industry found significant differences in terms of the levels of awareness of the overall cost impact of health and safety issues, with respondents from industry category 2 (professional,
scientific & technical) most likely to rate this as limited awareness (level-3) and lower than the other industry categories (p < 0.05).

Additional comments provided by respondents highlighted the role of cascading information from specialist expertise to general management, for example:

"As a Safety Professional being aware and making others aware is core communication process and essential in 'promoting' best practice, however if mind sets are fundamentally divorced from H&S and the business focus is on budgets and expend then difficulties will and do arise."

"As line manager I would not expect to have some of the detailed information implied above - I would expect that to be given to me if appropriate by our SHE experts."

Furthermore, there was an acknowledgement of the need for greater awareness in certain areas, for example:

"Although I have detailed awareness of issues I think we could be better at evaluating the costs involved and the hard cash benefits for the business. Currently it is mostly seen as instinctively it must save us money."

The level of satisfaction with current awareness about health and safety issues was high overall, with 79% of all respondents satisfied or fully satisfied. The mode response among all groups is satisfied (level 3), with more than 60% of the GM and "other managers" groups giving this response. The H&S group is more divided, with 24% unsatisfied (level 2), 37% satisfied (level 3) and 34% fully satisfied (level 4). Several additional comments among respondents who stated they were satisfied suggested that greater awareness for themselves or others in their organisation might be required, for example:

"Maybe I should know more about the costs - but the benefits and impacts of our health and safety policies and procedures are clear to me."
"But the managers and Directors just don't want to know. I have tried to tell them, but they think they know better or are simply not bothered."

Several respondents from the GM group acknowledged they were relatively unaware of issues but had high satisfaction, as this was considered sufficient for their role:

"I know what I need to know to get my job done."

Additional comments among respondents stating they were unsatisfied with their awareness included the following examples:

"I don't know anything about costs or benefits of safety at XXXX"

"I feel satisfied about the majority of it but as a manager we have so much to do, this side of things is the side that gets prioritised below others. In reality, it should be a much higher priority and part of the way we normally do things, part of the job."

"While XXXX promotes health and safety awareness, I would like to know more about what is being done to improve value and lower costs."

A total of 766 respondents (78%) stated that they did not know approximately, how much their organisation currently spent on items related to employee health and safety. The remaining 22% did indicate the level of spending. Respondents in the H&S and HR groups were more likely to indicate the level of spending than the other groups (circa 40% versus 20%, p < 0.001). The proportion of respondents explicitly stating they did not know current spend, was 83% in industry category 2 (professional, scientific & technical) and found to be significantly higher than the 74% observed in industry category 3 (human health) (p < 0.01). A much smaller proportion (37%) stated that they did not know how the level of spend on all items related to employee health and safety in their organisation compared to other organisations in their peer group, whilst 35% stated they thought spend was the same as peers and 25% thought that spend was more or significantly more than peers. Respondents from industry category 1 (manufacturing) more frequently stated their organisation spends more than peers compared with other
categories who most frequently stated spend was about the same as peers (p < 0.01).
Public sector respondents were more likely to state that their organisation spends more or
significantly more than peers (level-4 or 5) compared to private sector respondents (p <
0.05).

5.4.4.2 Availability
Table 5-8 shows respondents’ ratings on the level of availability of quantifiable
information within their organisation about a list of cost items arising from employee
health and safety issues presented in rank order according to mean rating score for all
respondents, the H&S, HR and GM groups. Friedman’s test statistic comparing the mean
ratings for these 13 cost items (p<0.001) suggests that there is evidence to reject a null
hypothesis that the distribution is the same across these repeated measures, differences
between mean rating scores for these factors are statistically significant. For all cost
items except two (health insurance premiums, lost production) statistically significant
differences in the distribution of categorical responses was observed.

The availability of quantifiable information about cost items was generally rated low.
None of the cost items listed had an overall (all groups) mean rating above level-3
("could be available by special request"), 8 of the 13 cost items presented had an overall
rating of less than 2.5, with 2 items rated less than level-2 ("could be available with a lot
of effort"). For each cost item, the proportion rating availability of information at level-1
("unlikely to be available in my organisation) ranged from 14% (staff turnover) to 40%
(impact on reputation). The HR group consistently rated the availability of information
significantly higher than the other groups (for 7 of 13 cost items), with 5 cost items
receiving a mean rating greater than level-3 within this group. The GM or “other
managers” groups rated the availability of information lower than the other groups for all
13 cost items presented.

All respondents rated information about sick pay as the most available (mean rating
2.84). The HR group were significantly more positive about the level of availability of
sick pay information (p < 0.001), their mode response was level-4 (“available from
routine systems") compared to level-3 ("could be available by special request") for the other groups.

Staff turnover (mean rating 2.78) and the greater use of temporary workers (mean rating 2.61) ranked next highest overall. There were significant differences between the groups for both these cost items with the HR group reporting higher ratings (p < 0.01), the proportion rating in the top two categories (level-4 or 5) for staff turnover and greater use of temporary workers was 49% and 40%, respectively.

Table 5-8: Availability of quantifiable information about cost items arising from employee health and safety issues (colours used to highlight differences in rank order between groupings)

<table>
<thead>
<tr>
<th>Item</th>
<th>rank (all)</th>
<th>rank (H&amp;S)</th>
<th>rank (HR)</th>
<th>rank (GM)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Sick pay</td>
<td>Q21a</td>
<td>Q21a</td>
<td>Q21a</td>
<td></td>
</tr>
<tr>
<td>2 Staff turnover</td>
<td>Q21a</td>
<td>Q21a</td>
<td>Q21a</td>
<td></td>
</tr>
<tr>
<td>3 Greater use of temporary workers</td>
<td>Q21a</td>
<td>Q21a</td>
<td>Q21a</td>
<td></td>
</tr>
<tr>
<td>4 Health insurance premiums</td>
<td>Q21a</td>
<td>Q21a</td>
<td>Q21a</td>
<td></td>
</tr>
<tr>
<td>5 Ill health retirement</td>
<td>Q21a</td>
<td>Q21a</td>
<td>Q21a</td>
<td></td>
</tr>
<tr>
<td>6 Employee liability insurance premiums</td>
<td>Q21a</td>
<td>Q21a</td>
<td>Q21a</td>
<td></td>
</tr>
<tr>
<td>7 Lost production</td>
<td>Q21a</td>
<td>Q21a</td>
<td>Q21a</td>
<td></td>
</tr>
<tr>
<td>8 Compensation/ legal claims</td>
<td>Q21a</td>
<td>Q21a</td>
<td>Q21a</td>
<td></td>
</tr>
<tr>
<td>9 Direct treatment costs</td>
<td>Q21a</td>
<td>Q21a</td>
<td>Q21a</td>
<td></td>
</tr>
<tr>
<td>10 Material damage</td>
<td>Q21a</td>
<td>Q21a</td>
<td>Q21a</td>
<td></td>
</tr>
<tr>
<td>11 Impact on product/ service quality</td>
<td>Q21a</td>
<td>Q21a</td>
<td>Q21a</td>
<td></td>
</tr>
<tr>
<td>12 Impact on reputation/ image</td>
<td>Q21a</td>
<td>Q21a</td>
<td>Q21a</td>
<td></td>
</tr>
<tr>
<td>13 Loss of contracts/ customers/ revenue</td>
<td>Q21a</td>
<td>Q21a</td>
<td>Q21a</td>
<td></td>
</tr>
</tbody>
</table>

The availability of information about health insurance premiums (mean rating 2.55), ill-health retirement (mean rating 2.51) and employee liability insurance premiums (mean rating 2.42) rated quite similar overall. Information about ill-health retirement ranked higher in the H&S group (2 of 13), although the HR group had higher absolute mean ratings for this item. The GM group rated the availability of information about ill-health retirement and employee liability insurance premiums significantly lower than the other groups (p < 0.01).
There was general agreement among all groups about the relatively low level of availability of quantifiable information about lost production (mean rating 2.32) arising from employee health and safety issues. Overall, 24% of respondents said that this information was unlikely to be available in their organisation (level-1) whilst a further 36% thought it could be available with a lot of effort (level-2). Both the H&S and HR groups ranked this item 9 of the 13 items presented. The GM group rank this item marginally higher although their mean rating is numerically lower than the other groups.

Information availability about compensation/legal claims (mean rating 2.29) and direct treatment costs (mean rating 2.27) rated similar overall. For information about compensation, responses across the five categories were very similar for the H&S and HR groups, whilst the GM and “other managers” groups gave significantly lower ratings (p < 0.001), for example, 34% of the GM group stated that this was unlikely to be available in their organisation (level-1). For information about direct treatment costs the mode response for all groups was level-2, however, respondents in the H&S group were significantly more likely to rate this lower than the other groups (p < 0.01), with 34% rating this item at level-1.

Information availability about material damage (mean rating 2.15) ranks low overall, with the H&S group stating significantly more information is available to them compared to the other groups.

The remaining three cost items: impact on product/service quality (mean rating 2.08), impact on reputation/image (mean rating 1.98) and loss of customers/contracts/revenue (mean rating 1.96) are ranked as having the least available information by all groups, although there are still significant differences observed between the groups.

No significant differences were found in analysis of the availability of quantifiable information by sector. Significant differences were found in analysis of quantifiable information by industry for the following factors: sick pay, lost production, staff turnover, and loss of contracts/customers/revenue (p < 0.05); employee liability insurance.
premiums and impact on product/service quality ($p < 0.01$); compensation legal/claims ($p < 0.001$). Respondents from industry category 1 (manufacturing) were most likely to rate information availability higher for sick pay, lost production, staff turnover and impact on product/service quality. Respondents from industry category 4 (other stated sectors) were most likely to rate information availability higher for loss of contracts/customers/revenue, employee liability insurance premiums and compensation legal/claims.

5.4.4.3 Key employee health and safety metrics

The proportions of respondents stating they did know about sickness absence rates in their organisation are presented in Figure 5-6. Among the H&S and HR groups around 50% explicitly stated that they did not know approximately how many days were lost due to overall sickness absence and around 70% stated that they did not know how many days were lost due to work-related ill-health over the last 12-month period, which was significantly lower than the other groups where around 80% stated that they did not know ($p < 0.001$). When asked whether they knew how many employees were currently on long term sick (more than 20 days) overall respondents were split equally between yes and no (49.4% vs. 50.6%). The HR group more frequently (68%) stated that they did know numbers on long-term sick; the H&S group more frequently (60%) stated that they did not know ($p < 0.05$). Just over half (53%) of all respondents explicitly stated that they did believe that their organisation’s sickness absence data was sufficiently accurate, although significant differences between the groups were observed with 65% of the HR group stating “yes”, 33% of the H&S group stating “no” and 30-40% of the other groups stating “don’t know” ($p < 0.001$).
A significantly greater proportion of respondents from industry categories 1 (manufacturing) and 4 (other) (27% and 30% respectively, compared to 16-20% in the other industry categories) stated that they did know how many days were lost due to overall sickness absence ($p < 0.01$). Respondents from industry categories 1 and 4 were also more likely than other categories to report they knew how many days were lost due to work-related ill-health ($p < 0.01$). Respondents from the private sector were more likely than respondents from the public sector to state that they currently knew how many employees they had on long-term sick (54% versus 40%, $p < 0.01$). Significant differences between the industry categories were observed regarding belief in the accuracy of their organisation's sickness absence data. Respondents from manufacturing industries were least likely compared to other categories to state they did not know (20%) and most likely (59%) to say they did believe data was sufficiently accurate. Private sector respondents were more likely than public sector respondents to state they did believe their sickness absence data was sufficiently accurate (59.7% versus 40.4%, $p < 0.01$).
Respondents gave additional comments on some of the reasons why they did not know about sickness absence, these included that it was somebody else's job to know:

"....but the figure is measured and known."

"I don't know as I don't need to in my job but I do know how to find out if I need to."

Several respondents said that data are available for different cohorts of employees:

"I am aware of the numbers at my Region/District level...not nationally."

Several respondents gave justification for why they were confident in their organisations' sickness absence data:

"We use a linked Payroll/T&A/HR system requiring biometric clocking through a finger scanner for all employees."

Respondents believing their organisations' sickness absence data were not sufficiently accurate provided qualitative comments such as:

"Accurate in numerical and cost terms but poor in root cause recording."

"The reporting isn't taken seriously by any level of the organisation however hard the process is communicated and cascaded."

The proportions of respondents stating they did know about accident rates in their organisation are presented in Figure 5-7. As might be expected respondents in the H&S and HR groups were significantly more likely to know about accidents rates than the other groups for all accident categories except non-injury. However, among the H&S and HR groups 51% and 55% explicitly stated that they did not know approximately how many reportable accidents their organisation had experienced over the past 12 months. For injury accidents, minor accidents and non-injury (damage/loss only) accidents these
proportions were progressively higher and for the latter category were not significantly different from the other groups.

Private sector respondents were more likely to report knowing about all categories of accident rates than public sector respondents as follows: reportable accident (33% versus 22%, \( p < 0.01 \)), injury accidents (31% versus 19%, \( p < 0.01 \)), minor accidents (27% versus 15%, \( p < 0.01 \)), and non-injury (damage/loss only) accidents (18% versus 9%, \( p < 0.01 \)).

Respondents from industry category 1 (manufacturing) and 4 (other) consistently had the highest reported knowledge of accident rates in all categories whilst respondents from industry category 3 had the lowest proportion reporting they did know about accident rates in all categories as follows: reportable accident (35% versus 22%, \( p < 0.05 \)), injury accidents (32-33% versus 19%, \( p < 0.05 \)), minor accidents (28-30% versus 13%, \( p < 0.01 \)), and non-injury (damage/loss only) accidents (20-22% versus 9%, \( p < 0.05 \)).

Stated reasons why respondents did not know about accident rates were similar to sickness absence data that this was somebody else's job or good data was not available, for example:

"I don't but our H&S dep't and HR dep't do."

"We have a reporting system but not everyone will submit all incidences."
Results for respondents reported current awareness of staff turnover rates are presented in Figure 5-8. Overall, 65% of respondents explicitly stated that they currently did not know about approximate staff turnover rates. The pattern of response for each group was generally quite similar except for the HR group that was significantly more likely (62%) to state that they did know how many staff left their organisation over the past 12 months ($p < 0.001$). Private sector respondents were more likely to know about staff turnover rates compared to public sector respondents (41% versus 23%, $p < 0.001$).

Respondents were asked whether their organisation has in place any way to assess lost productivity due to employee illness and injury. There was significant difference between the groups, with around 60% of groups 3 to 5 stating they did not know, 58% and 40% of the H&S and HR groups, respectively, explicitly stating that no information
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system was in place to assess this lost productivity. These results appear to be consistent with the earlier question that found that the availability of quantifiable information about lost production was likely to be low. Analysis by industry category found that respondents from category 1 (manufacturing) were most likely (22%) to say yes, respondents from category 4 (other) were most likely (39%) to say no and respondents from category 5 (not stated) were most likely (68%) to say they did not know, compared to the other groups (p < 0.01).

Figure 5-8: Awareness of staff turnover rates

5.4.5 Business cases

Overall, some 41% of all respondents stated that they had provided input to, reviewed or used (responses 1, 2 or 3 question 9) a business case relating to employee health and safety. A clear difference between the professional groups was observed (p < 0.001),
with 78% of respondents in the H&S group and 51% in the HR group reporting involvement compared with 32% of respondents in the GM group.

Use of empirical data was reported in a higher proportion of business cases on the current burden of health and safety issues compared with business cases on the expected benefits of proposed health and safety interventions. A limited proportion of business cases were reported to have included empirical data on the current burden of a health and safety issue as follows: sickness absence (43%), injury rates (46%), staff turnover (28%), productivity (20%), insurance premiums (15%), and legal costs (11%). Respondents in the H&S group and the HR group reported significantly more empirical data in business cases than the other groups for all variables except productivity ($p < 0.01$). No differences by sector were observed. Differences by industry category in the proportion of business cases using empirical data on the current burden of health and safety issues is presented in Figure 5-9, categories 1 (manufacturing) and 4 (other stated) report highest proportions.
Analysis of results by size of organisation for business cases using empirical data on the current burden of health and safety issues found significant chi-squared statistics ($p < 0.01$) for the following variables: sickness absence, staff turnover, productivity, insurance premiums, and legal costs. The differences between the groups for each factor appears to be due to a consistently markedly lower proportion of respondents from large organisations (9-19%) stating they did not know whether these factors were included in the business case compared to small and medium-sized organisations (33-52%). A similar pattern was observed for the subsequent question asking about whether empirical data on the expected benefits of an intervention were included.

Several other variables with empirical data that were included in the business case were recorded as qualitative comments, for example:
"Long (4 weeks or more) & short term sickness rates plus Bradford scores."

"Occupational Health costs - pre-employment; and during employment; PHI costs."

"Rehabilitation costs were also available, along with costs of arranging temporary cover."

"We also looked at Management time and effort to oversee the system."

Empirical data on the expected benefits of proposed health and safety interventions was reported in a proportion of business cases as follows: sickness absence (30%), injury rates (28%), staff turnover (14%), productivity (16%), insurance premiums (10%), and legal costs (7%). Respondents in the H&S group and the HR group reported significantly more empirical data in business cases than the other groups for the following variables: sickness absence, insurance premiums and legal costs (p < 0.05). Respondents in industry categories 1 (manufacturing) and 4 (other stated) reported significantly more empirical data in business cases than the other categories for the following variables: sickness absence and legal costs (p < 0.05).

As qualitative comments, several respondents also referred to empirical assessment of employee engagement through regular employ surveys.

The impact of a health and safety intervention on an organisation’s reputation was most frequently characterised in business cases as a “description of expected impact” by the H&S (37%), HR (40%) and GM (29%) groups, however, some 47% of the H&S group stated that reputation was either not included or was only mentioned with little detail in the business cases they were most recently involved with. Additional comments that respondents provided referred to how intuitively important reputation is but that it is routinely not measured in any way. One respondent described an incentive not to measure this as follows:

“A costed estimated becomes a deliverable and a target. Dangerous when the metrics and estimates have little evidence basis.”
A credible return-on-investment (ROI) calculation was included in business cases reported by 13% of all respondents. Around 50% of each of the professional groups explicitly stated that an ROI calculation was not included in their most recent experience of a business case, whilst some 30% of respondents did not know whether ROI was included. The additional comments in this section suggested that it may be somebody else’s role to consider ROI and that benefit measurement is a problematic, for example:

"Cost implication of advice is often given, however ROI not considered as I do not make the financial decision. The budget holder has the information to make this decision."

"ROI was not included as it was difficult to measure benefit in this instance."

Occupational Health and Safety professionals and Human Resources personnel were most frequently described as being “part of a mixed team” in business cases. A clear difference between the professional groups was observed (p < 0.001), some 38% of the H&S group described the Occupational Health and Safety professionals’ role as a “driver of change”, whereas a similar proportion (36%) of the HR group described their role as “technical advisor”, furthermore 20% of the GM group stated that these professionals were not involved in the business case. Likewise, some 32% of the HR group state that the Human Resources role was as a “driver of change”, whereas 28% of overall respondents say that Human Resources was not involved in their most recent experience of a business case.

General Management and Leadership were most frequently described as being “part of a mixed team” in business cases, no significant differences between the professional groups were observed. Finance and Legal was most frequently reported as not involved in 62% and 65% of business cases, respectively. Legal was described as a “technical advisor” to business cases among 48% of the HR group.

Respondents from industry category 1 (manufacturing) and 4 (other stated) were more likely than the other categories to report that finance (p < 0.01), and general management
(p < 0.001), were involved in the business case. Significantly more respondents from category 4 also reported that legal were included (p < 0.05).

Several additional textual comments provided by respondents indicated that it is most likely to be health and safety professionals driving change who are required to bring other members of their organisation with them, for example:

"Currently the driver is from the expert role in Health and Safety pulling in leadership - the initiative is to get this working the other way round once the business is clearly convinced of the evidence of the benefits and these become embedded in business targets and objectives."

Among all respondents with experience of a business case 22% stated that they were either unsatisfied or completely unsatisfied with this process overall, 60% said that the business case was useful and 11% stated that they were fully satisfied and found that the business case was pivotal in their experience. No significant differences between the professional groups were observed. Among those stating dissatisfaction with the business case, many additional comments referred to data about the benefits, for example:

"Review process by finance were unable to accept benefits would be achieved, apparently unable grasp concept of "invest to save" when applied to supporting own staff."

"The organisation does not measure much. As such, interventions are near impossible to assess."

"We could have involved more detailed data."

Among respondents who were satisfied with their most recent experience of a business case, many additional comments included strong support, for example:

"Interventions have reduced sickness and turnover rates."

"Spend to save initiative - sound business case critical to justifying expenditure."

Whilst others who indicated satisfaction also acknowledged some difficulties:
"Business case was useful to the business and production but not OH."

"Very difficult to do but I think we've got a reasonable outcome (i.e. credible)."

Although satisfied with overall business case some respondents also commented on other factors influencing decision making, for example:

"Often there is an emotional or intuitive part to the decision."

"But most small businesses don't want tons of statistics, they just want you to tell them what's legal, what's good and what is better if they get time. We deal with most decisions on an emotional basis. If the client doesn't think this is for him/her, then no amount of ROI, finance etc. is going to help."

5.5 Discussion

The aims of this chapter were:

- To better understand managers attitudes towards employee health and safety
- To better understand the level of information availability regarding employee health and safety issues
- To compare attitudes and information availability between different types of managers and types of industry
- To better understand the information that is used in business cases for employee health and safety activities

5.5.1 Key findings

Although the clear majority of all groups are positive, respondents from manager groups (2 to 5) are found to be significantly more positive about the current situation regarding their organisation's attitude towards employee health and safety issues in terms of the continuous improvement model categorisation, the perceived balance of costs and benefits and level of satisfaction, than respondents from the H&S group.
All groups ranked bad publicity/damage to reputation as the most important factor and shareholder pressure as the least important factor in terms of influencing their organisation to invest in employee health and safety management. There was agreement in the ranking of 7 of 11 factors between the H&S and HR groups. There were significant differences between all groups for several factors. The H&S group placed more importance on the experience of a high profile incident. The GM group attach more weight to evidence of adverse commercial impact of poor employee health and safety; evidence of how to reduce costs by improved employee health and safety management and extended legal requirements to pay for full rehabilitation of employees with work-related illness. The role of the business case as a factor influencing organisations to invest in employee health and safety management overall ranked in the middle of a list of factors (5 of 11). Both the H&S and HR groups ranked the business case as their third most important influencing factor, many additional textual comments provided suggests that whilst several other factors are perceived to have more influence for the other groups (3 to 5) the business case is described more as a minimum requirement that would be expected.

The vast majority (>90%) of all respondents stated that they believed better employee health and safety management could reduce costs and have a meaningful impact on the performance of their organisation. This belief appears to be based on some practical experience of this and some empirical understanding of the hidden costs but also to a large extent on intuitive logic and a belief in the cascade of benefits that are expected to flow from better employee health and safety management.

Lost production, impact on reputation/image and impact on product/service quality were ranked by all groups as among the biggest perceived costs to the organisation arising from employee health and safety issues. The majority of respondents overall and within each group except the HR group stated that they did not feel that they had a good level of understanding of the full costs arising from employee health and safety issues in their organisation. The majority of respondents overall and within each group, except the
H&S group, stated that they did believe that others in their organisation did have a good understanding of these costs. Measurement issues and time were found to be rated as the most important barriers to organisations understanding the full cost impact arising from employee health and safety issues in each of the groups. More than half of respondents in each group thought that their current level of spending on items related to employee health and safety should remain the same, of those stating they thought this should increase the largest proportion were from the H&S group.

Regarding levels of awareness of health and safety issues the H&S group are found to be most aware compared with other groups in terms of what the key issues are; the options to change interventions and the balance of costs and benefits. The HR group is found to be most aware compared to other groups in terms of what interventions are in place; the effectiveness of current interventions and the overall cost impact of health and safety issues for their organisation. Levels of awareness about the cost of current interventions are found to be almost identical in the H&S and HR groups. Awareness of all issues among the other groups (groups 3 to 5) is consistently lower and on average tends towards being limited (level-3) for three issues in particular: cost of current interventions; options to change interventions and balance of costs and benefits. Although relatively unaware on many issues respondents from groups 3 to 5 reported high levels of satisfaction with their current level of awareness, this appears to be based on statements about appropriateness and others within their organisation being more responsible for these issues.

The vast majority of respondents overall (78%) and in each group were not prepared to explicitly state that they did know approximately how much their organisation currently spent on employee health and safety, although some 40% of the H&S and HR groups, and 20% of the other groups were able to indicate the level of spending.

In contrast only 37% of all respondents stated that they did not know how their organisation’s spend in this area compared to other organisations in their peer group, whilst the majority did explicitly state whether this was lower, the same or higher.
In terms of availability of quantifiable information about cost impact arising from employee health and safety issues all groups ranked sick pay and staff turnover among the factors with the most available information and the impact on product/service quality, reputation/image and loss of contracts/customers/revenue as the factors with the least available information. Differences between the groups in terms of categorical responses were found to be significant for 11 of 13 factors. The HR group consistently rated the availability of information significantly higher than the other groups (for 7 of 13 factors), whilst the GM or “other managers” group consistently had the lowest ratings (13 of 13 factors).

Reported current awareness of information on key employee health and safety metrics was found to be relatively low. The majority of respondents to this survey (overall and in each group) were not prepared to explicitly state that they did know approximate sickness absence or accident rates for their organisation. Around half of the H&S and HR groups and one fifth of the GM group stated they currently did know the top-level statistics (sickness absence days lost overall and the number of reportable accidents) much fewer reported knowing more details. Reported current awareness about employees on long-term sickness absence (more than 20 days) was significantly higher in the HR and GM groups. The majority of respondents in each group reported that they were not currently aware of staff turnover rates, except in the HR group where respondents were significantly more likely to report awareness of this metric.

Involvement in a business case relating to employee health and safety was reported by more than three-quarters of the H&S group, half of the HR group and one-third of the GM group. Empirical data was included in less than half of the business cases reported overall, data on sickness absence and injury rates were most likely to be included. Respondents from the H&S and HR groups were significantly more likely to report use of empirical data. Non-empirical descriptive impact on reputation was included in around one-third of business cases. Credible return-on-investment (ROI) estimates were rarely
reported as included in the business case. Respondents generally reported satisfaction with the business case, however some 22% were not satisfied.

Analysis by the 5 simplified type of industry categories found several significant results. Respondents from categories 4 and 5 (‘other’ and ‘not stated’) perceived sick pay to be a bigger cost than the other categories. Compared to other categories respondents from category 2 (professional, scientific & technical) reported lower awareness of the overall cost impact of health and safety issues and were most likely to state they did not know current spend on employee health and safety issues. Compared to other categories respondents from category 1 (manufacturing) were more likely to state their organisation spends more than peers on employee health and safety and were more likely to rate information availability higher for sick pay, lost production, staff turnover and impact on product/serve quality. Respondents from category 4 (‘other’) were more likely to rate information availability higher for loss of contracts/customers/revenue, employee liability, insurance premiums and compensation/legal claims, as well as most frequently reporting that legal professionals were involved in business cases. Respondents from both category 1 (manufacturing) and category 4 (‘other’) were more frequently able to report on sickness absence rates and accident rates than other categories, these groups were also more likely to report use of empirical data on sickness absence and legal costs and involvement of finance and general management in business cases. Respondents from category 1 (manufacturing) were most likely to state that they did believe absence data was sufficiently accurate and that they did have ways to assess lost production due to employee illness or injury in place.

Analysis by sector (simplified to public versus private) found several significant results. Compared to respondents from the private sector, respondents from the public sector were more likely to rate insurance premium discounts higher as an influencing factor for employee health and safety investment; were more likely to perceive 8 of 13 factors as bigger costs to their organisation; and more likely to state that their organisation spends more than its peers on employee health and safety management. Private sector respondents reported higher levels of awareness about what the issues are for health and
safety management in their organisation; were more likely to state that they currently knew about accident rates and how many employees were on long-term sick; and were most likely to state that they did believe absence data was sufficiently accurate.

Analysis by size of organisation found that compared to medium and large-sized organisations, small organisations were most likely to state that bad publicity/damage to reputation drives decisions about investment in employee health and safety management. Respondents from large organisations were also more likely to know about the use of empirical data in business cases than those from small or medium-sized organisations.

5.5.2 Implications

The two specialist manager groups in this survey (H&S and HR) are found to have broadly similar attitudes and levels of information relating to employee health and safety management. Both groups have a very positive belief in the potential impact of employee health and safety management on their organisations; both have very similar views on the relative importance of different influencing factors to motivate organisations to invest in employee health and safety; both reported remarkably similar levels of awareness of health and safety issues (across 7 factors); similar proportions in these groups were able to report on current spend in this area, and on sickness absence and accident rates.

The HR and H&S groups are, however, found to differ in two key areas. First, the HR group reports higher levels of information in specific domains, most notably in terms of understanding the full costs arising from employee health and safety as well as the availability of quantifiable information about cost impact; and reporting of current long-term sick employees and staff turnover. Second, the H&S group more frequently report being involved in business cases than the HR group. One implication of this finding is that the HR group may have greater or easier access to more information of relevance to employee health and safety management but this may not be fully exploited in cases where HR are not involved in business cases unless this can be communicated to other
parties. This study has also found that less than half of reported business cases included empirical data, but this was found to be higher where HR were involved in the business case.

Generalist managers (groups 3-5) are found to differ from specialist managers in several important aspects: as investment influencing factors they attach more weight to evidence of adverse commercial impact of poor employee health and safety and evidence of how to reduce costs by improved employee health and safety management; however of all groups they are found to have the lowest awareness of health and safety issues; the lowest availability of information about cost impact; the lowest current knowledge of staff turnover, sickness absence and accident rates; the lowest involvement in business cases and when involved, the lowest reporting of using empirical data. One implication of this finding is that, generalist managers' apparent demand for specific evidence to influence decision-making regarding employee health and safety may not be satisfied by the information that is routinely available to them. Many qualitative comments collected in this survey have pointed towards a reliance on specialist (technical) managers to cascade employee health and safety information to generalist managers. This study has found that whilst specialist managers are clearly better informed on many aspects, this may not be the specific information most required by generalist managers.

Generalist managers are found to demand more evidence about the value of investing in employee health: the costs and benefits (commercial impact); but information availability about cost impact arising from employee health and safety issues is found to be poor and the level of individuals' understanding of the full costs arising from employee health and safety issues is found to be very poor, even among specialist managers. Measurement issues and time are found to be the biggest barriers to understanding the full cost impact arising from employee health and safety issues.

Two aspects were found to be common to many respondents in this survey. First, there was considerable importance attached to the need for 'belief' in the employee health and well-being agenda expressed by respondents from all groups. This is very much inline
with results from the study presented in chapter 4 of this thesis. There appears to be a widely held view that decision-makers are unlikely to be influenced by empirical analyses unless they first believe that engaging in these types of activities are the right thing for their organisation to do at this time. Second, there also appears to be some lack of clarity on the precise roles and responsibilities among different stakeholders for the employee health and well-being agenda. Many respondents, from all groups, report that certain aspects are not their responsibility and they assume that someone else within their organisations takes care of this. The implications of these two aspects are that a) some wider context information and communication may be needed in order for empirical analyses to have most impact; and b) better management of employee health and well-being may also include basic project management aspects such as clarity of roles and responsibilities.

Results from this survey suggest that within respondents organisations there may be a misalignment of a) the availability of quantifiable information about the cost impact of employee health and safety and b) the perception of what the biggest costs to an organisation arising from employee health and safety issues may be. This is most apparent when comparing results presented in Table 5-6 and Table 5-7. Lost production ranks as the biggest perceived cost but information availability about this is quite poor. Impact on reputation/image and the impact on product/service quality are also perceived as among the biggest costs to an organisation yet information availability for these factors is consistently rated as among the worst by all groups.

Wright (1998) found that the fear of loss of corporate credibility and a belief that it is necessary and morally correct to comply with health and safety regulations were the two main factors in the UK which motivate both SMEs and large organisations to initiate health and safety improvements.
5.5.3 Methodological implications

The final sample size for this survey of almost one thousand respondents, was better than was anticipated during the planning stages. Indeed this sample is bigger than the annual CBI /AXA (2007) or CIPD (2007) sickness absence and turnover surveys that are widely cited, although the unit of analysis is this study is the individual manager rather than the consolidated view of the organisation. This is at least in part due to the data collection strategy employed in this study as well as the level of interest in this topic among respondents. Web-based data-capture via an online survey facilitated efficient access to a substantial sample size within a modest timeframe.

Based on previous online surveys (Dillman, 2007) compliance with questions in the latter stages of a relatively long survey was expected to drop off substantially. One strategy employed in this survey to attempt to mitigate this problem of increasing proportions of missing data towards the end of the survey, was to place questions that respondents may find easiest to answer towards the end of the survey. This strategy appears to have had some success as shown in Figure 5-3, although some drop off in level of compliance is observed, this is not overly dramatic with most drop out occurring after section 1 and compliance rates for section 4 and 5 quite similar. However, it could be argued that analysis between groups in this study is somewhat limited by this strategy since categorisation by professional group was based on the question asking which areas the respondents worked in predominantly which was placed in the final section of the survey.

One important methodological issue that this study attempted to account for was to be able to distinguish between what information was ‘known’ and what was ‘knowable’ by the respondent. Whilst the survey design methods used clearly captured data that was in the moment of response either known (and data supplied) or unknown by the respondent, it may be likely that other methods are required to fully explore what data in ‘knowable’ within these organisations. Several qualitative comments made assertions that the respondent assumed that they could obtain the information requested but were currently unaware. More detailed assessment of archival records and personal interviews may be
required to properly understand, for example, what is 'knowable' about the total cost of employee health and well-being.

5.6 Chapter summary

The two specialist manager groups in this survey (H&S and HR) are found to have broadly similar attitudes and levels of information relating to many aspects of employee health and safety management. The HR and H&S groups are, however, found to differ in two key areas. First, the HR group reports higher levels of information in specific domains. Second, the H&S group more frequently report being involved in business cases than the HR group. Generalist managers (groups 3-5) are found to differ from specialist managers in several important aspects; their apparent demand for more specific evidence to influence decision-making regarding employee health and safety may not be satisfied by the information that is routinely available to them. A general ‘belief’ in employee health and well-being and the clarity of roles and responsibilities among the multiple stakeholders that are required to manage these issues are found to be critical success factors within organisations included in this survey. Among all respondents, lost production is both perceived as one of the largest costs associated with employee health and well-being issues and as having among the poorest information availability.
Overview of the thesis

Chapter 1
Introduction

Chapter 2
Literature review

Chapter 3
Thesis method

Chapter 4
Exploration of current practice: qualitative methods

Chapter 5
Managers' survey (n=986)

Chapter 6
Economic evaluation: methodological review

Chapter 7
Empirical case studies: Employee surveys (n=1,504)

Chapter 8
Discussion, implications and recommendations
6 Economic evaluation

6.1 Introduction

"To measure efficiency, the shampoo factory counts the bottles out the door, what do we count?" Dr Alan Reid, former Chief Medical Officer Boots plc.

As discussed in chapter 2 of this thesis, several systematic reviews of interventions to address a range of employee health and well-being issues have been conducted: Aldana, (2001); Hill et al. (2007); Proper et al. (2002); Riedel et al. (2001); and Tompa et al. (2007). There is some consensus amongst these reviews that in studies, too often economic analyses are either absent or constrained by the quality of the economic evaluation method used. Tompa et al. (2008) also cite reviews by DeRango and Franzini (2003) and Goossens et al. (1999) that have reached similar conclusions, as well as Niven (p.294, 2002) who strongly asserted that “well-designed and conducted evaluations of programme costs and benefits were nearly impossible to find.”

Although studies also have to face the challenge of study design issues in the workplace setting, as discussed in chapter 2, there is a danger that even well-designed studies are failing to communicate a credible and hence persuasive economic message to employer audiences, due to poor economic evaluation methodologies. For example, after multiple reviews of health management programmes in the U.S., Serxner et al. (p.2, 2006) states:

"one point of significant skepticism among those attempting to make decisions about investments in health management programmes is the reported ROI [return-on-investment]...."

Similarly, Kessler and Stang (p.2, 2006) have concluded that despite several years and much evidence highlighting specific health conditions with the most impact on work outcomes and organisational costs:

"Only a small minority of employers has embraced the notion that reallocation of existing healthcare resources to focus on these conditions or expanding healthcare benefits to include more of these conditions can be cost-effective."
It is clear from the literature reviews in chapter 2, that the methods by which studies arrive at estimates such as the financial return-on-investment are often poorly reported or just not transparent. Where methods are described they may appear to vary considerably between studies, with the apparent concern that small changes in methodological techniques, the choice of cost and consequence variables selected for inclusion, or the timeframe; can substantially change the overall conclusions from the economic evaluation (Dugdill and Springett, 2001).

Researcher bias is also a potential reason for skepticism from employers, this stems from the potential danger that many economic analyses are seen as a form of marketing and promotion for providers of employee health and well-being products, services and consultancy. Value-for-money is an inherent component of the demand function for almost any good or service, appealing to an individual’s (or indeed an organisation’s) preference for value-for-money attributes is a powerful and persuasive tactic that is irresistible to most sales strategies. Kessler and Stang (2006) have commented that to date most of the enthusiasm for the notion that employee health and well-being initiatives are an investment opportunity for employers has been confined largely to service providers (pharmaceutical companies, health plans and management consultants).

Economic evaluation methodologies in the context of employee health and well-being will, to some extent, always be constrained by the practical limitations of conducting robust studies and obtaining sufficient data in the workplace setting. However, in cases were methodological weakness is due to the limited expertise in economic evaluation techniques or the lack of emphasis placed on this aspect by researchers involved in this area, then there is an opportunity to enhance the quality of economic information (Tompa et al., 2008).

Evidence of current UK experience of the business case, collected in this thesis (chapters 4 and 5), suggests there is scope for improvement in how economic information is incorporated into decision-making. One potential way to contribute to this is to explore
methods to enhance the rigour of economic evaluation methods in this area and hence boost the credibility of economic information and its potential to create incentives for employers. To this end methodological literature for health economic evaluation is discussed in a narrative review of methods in order to identify some of the key issues among employee health and well-being studies.

6.1.1 Objectives of the chapter

The objectives of this chapter are:

- To identify the specific economic evaluation methodological issues that have been identified in studies performing economic evaluations of employee health and well-being interventions.
- To review economic evaluation methodologies that might be more widely used in the context of employee health and well-being.

6.2 Economic evaluation guidelines

Detailed guidelines for performing economic evaluations in a general health care context are well established, with major international consensus based projects such as the Washington Panel on cost-effectiveness (Gold et al., 1996) and the methodological guidelines provided by health technology assessment bodies such as the National Institute for Clinical Excellence (NICE, 2009). Possibly the most cited textbook for economic evaluation in healthcare (p.28, Drummond et al., 2005), includes the famous ‘Drummond checklist’ (Table 6-1), which was also adopted for use by authors and reviewers of economic evaluations submitted to the British Medical Journal (Drummond et al., 1996). It is perhaps significant that Drummond’s first (of more than 500) peer-reviewed publication (confirmed by personal correspondence) was as a co-author on Atherley et al. (1976), which outlines a method of performing an economic evaluation of occupational health activities.
Table 6-1: The ‘Drummond checklist’ for assessing economic evaluations, Drummond et al., 2005 (p.28)

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<td>1.</td>
<td>Was a well-defined question posed in answerable form?</td>
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<td>2.</td>
<td>Was an adequately comprehensive description of the competing alternatives given?</td>
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<td>3.</td>
<td>Was the effectiveness of the intervention established?</td>
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<td>4.</td>
<td>Were all the important and relevant costs and consequences for each alternative identified?</td>
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<td>5.</td>
<td>Were costs and consequences measured accurately in appropriate physical units?</td>
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<td>6.</td>
<td>Were costs and consequences valued credibly?</td>
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<td>7.</td>
<td>Were costs and consequences adjusted for differential timing?</td>
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<tr>
<td>8.</td>
<td>Was an incremental analysis of costs and consequences of alternatives performed?</td>
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<tr>
<td>9.</td>
<td>Was allowance made for uncertainty in the estimation of costs and consequences?</td>
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<tr>
<td>10.</td>
<td>Did the presentation and discussion of study results include all issues of concern to users?</td>
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Following Gold et al. (1996) and NICE (2009), Tompa et al. (2008) have developed a reference case for economic evaluation, but in this case tailored to economic evaluations in occupational health and safety. The aim of presenting a formalised reference case is to provide methodological guidance for best practice but primarily it is to attempt to encourage standardisation, which will make results from very different studies more readily comparable and aid employers’ resource allocation decisions.

Nicholson et al. (2005) provide guidance on making a business case for employee health. Indeed Marsden et al. (2004) have compared and contrasted the formalised economic evaluation approach with the practical application of the business case approach. Both of these approaches whilst aiming to support decision-making will differ in terms of several methodological issues, including:

- The perspectives included in the analysis
- The timeframe used
- Which costs and consequences (benefits, outcomes) are identified and included
- How costs and consequences are measured
The analytical approaches commonly used
The methods used to value costs and consequences

The following section discusses these six methodological issues. Fundamentally, the business case may not always require comprehensive quantitative analyses of all relevant costs and consequences and intuition, descriptions or intangibles may be included (Mardsen et al., 2004) often due to speed of decision-making required. Indeed, aspects such as demonstrating alignment with business strategies may rely on non-empirical approaches. Crucially, an economic evaluation may include a business case approach but typically goes beyond this (Tompa et al., 2008) as it is more comprehensive and systematic in its approach.

6.3 Methodological issues

6.3.1 Perspective

The foundations of economic evaluation are in welfare economics, which is based on the societal perspective, measuring changes in social welfare brought about by allocating resources to a particular programme (Boardway, 1974; Ng, 1983; Garber and Phelps, 1997). Multiple stakeholders are commonly affected by employee health and well-being issues including the employee, co-workers, family, insurers, health care systems, social services, etc. and the employer. Employee health and well-being can be a societal issue.

With only a few exceptions nearly all studies identified in the literature reviews presented in chapter 2 of this thesis conducted economic analyses from the perspective of the employer. Indeed when considering employee health strategies the traditional evaluation perspective has been that of the employer: the buyer of labour. The logic has been that an employer will invest if the cost savings to the firm (injury and illness avoided and so on) is greater than the cost of the employee health and well-being strategy. In this case the employer has a clear incentive to invest in the health of their employees and even the health of their employee's families. The nature of occupational health investment means that benefits can flow to individuals other than just the employer. Thus a firm may
decide not to invest in a certain health programme as they estimate costs outweigh benefits from their own perspective, whilst the benefits for the firm, the worker and society combined may far outweigh the costs. This situation arises because of the problem of cost externalisation. The costs of poor or unhealthy working conditions may be borne outside the firm, for example, through reliance on publicly funded health, social and welfare services. A partial analysis using only the employer perspective may lead to societal (Pareto) inefficiency, since the firm could profit at the expense of employee health and society’s wealth, it could also be viewed as socially unjust and may even be costly to the firm in the longer run.

Weil (2001) advocates economic evaluation within a social welfare framework as this measures the opportunity cost to society of using resources for any given activity. Societal perspective might also inform public policy makers on the burden of occupational illness and injury and the level of responsibility that employers ought to be taking, which may influence statutory requirement thresholds.

Pauly et al. (2002) discuss the relative costs to employers and employees of sickness absence under a range of assumptions, which can inform the distribution of benefits from any policy to reduce absenteeism. By use of theoretical modelling they present the case where the objective of converting employee health improvement into higher employer profits clearly will not work. If the health improvement delivered to an employee by an occupational health strategy is permanent and transferable (i.e. health promotion to quit smoking) then the health capital is general and not specific to the firm making the investment. In a competitive labour market if competing employers are then willing to pay higher wages to attract these healthier employees because of their enhanced productivity then the firm making the investment must also pay higher wages in order to retain their employees. The result, therefore, is that investment in occupational health in this case clearly benefits the employee through higher wage rates and improved health. In the short-run the employer will benefit from reduced absenteeism. The distribution of benefits is thus a key aspect of economic evaluation in the area of occupational health.
The ethical framework principle for study perspective proposed by Tompa et al. (p. 236, 2008) in their reference case is as follows:

"The perspective of particular evaluative studies will be determined in conjunction with relevant stakeholders and supplemented where necessary by analyses that incorporate significant external effects."

It is acknowledged that this may result in a perspective narrower than the societal perspective as the theoretical foundations of economic evaluations may dictate; but also it will be different from and broader than the perspective of the business bottom line. Societal perspectives may be cumbersome, difficult and lengthy to fully implement but more fundamentally may dilute incentives for specific stakeholders, such as employers. Too narrow a perspective may simply produce erroneous results by excluding key costs and consequences to certain stakeholders.

6.3.2 Timeframe

Serxner et al. (2006) has provided very practical guidelines for analysis of economic return specifically from health management programmes within the workplace and suggests that health management initiatives, particularly in large populations, require some 3 to 5 years to recognize the true effectiveness of the programme. Prior to evaluation it is recommended that reasonable annual programme impact targets be set that fully acknowledge the timeframe required for interventions to realise their maximum impact and included “ramp-up” time. Premature evaluation of programmes can be misleading.

The effectiveness studies reviewed in chapter 2 of this thesis commonly had an evaluation time horizon of one year, there is a danger that this time frame is not long enough to observe the full effects (good or bad) of the intervention. Observed effects in short timeframe evaluations may be one-off or short-lived effects, including Hawthorne effects, where the outcome being measured can be effected by the mere involvement of
outside input to deliver the intervention and is independent of the intervention components, as mentioned earlier (Robson et al., 2001). If interventions require continual long-term investment then, decision-makers need to understand the long-term nature of effects and how sustainable these may be.

### 6.3.3 Identifying costs and consequences

The basic paradigm for economic evaluation is to assess both costs and consequences of a given activity in a comparative sense and this essentially involves three stages: identification, measurement and valuation (Drummond et al., 2005). These stages are discussed in the following sections.

In all sections of the literature reviewed in chapter 2 of this thesis very few studies include information on the identification of all relevant costs and consequences and the subsequent rational for the selection of variables that are included for measurement in the evaluation. Identification is considered a vital stage of economic evaluation as it provides a 'thought-map' of all elements that may be affected by an intervention and it is detached from the measurement stage with the temptation to only include those measures that can most easily be measured or for which data are most readily available. In essence, it is an attempt to ensure that evaluations are thought- rather than data-driven (Drummond et al., 2005). This process of identification can also usefully include all stakeholders to ensure all issues are considered that may be relevant.

Environmental economics has a long history of identifying the sometimes-complex costs and consequences of environmental risk and interventions to mitigate these. For example, Dziegielewksa et al. (2007) recently presented a useful example of the concept of total economic value, drawing on early work on option value (Weisbrod, 1964) and non-use value (Krutilla, 1967).

The concept of total economic value is presented in Figure 6-1. Conceptually the total economic value of a 'commodity' such as an occupational health programme is made up
of use value and non-use value. Use values can be further sub-divided into direct use value, indirect use value and option value. Non-use value here is essentially existence value, which arises from the satisfaction of merely knowing that the asset exists, although the evaluator has no intention of using it, but also bequest value (that future generations may benefit also).

Figure 6-1: Total economic value concept (Dziegielewska et al., 2007, p.1)

Direct use value is determined by the contribution that a commodity makes to production. Indirect use value includes the benefits derived from a commodity, which contribute to the conditions or support the environment that facilitates current production. Option value is the premium that consumers are willing to pay for an unutilised asset, to avoid the risk of not having it available in the future when it might be demanded (e.g. benefits from reduced uncertainty).

This concept may also have application in occupational health economics. Direct use value may, for example, be identified as reduction in sickness absence or impaired productivity. Indirect use value may be identified as employee morale, staff retention,
corporate image and so on. There may also be cases where it is relevant to factor in option value and non-use value components of an intervention.

Indirect value could potentially stem from reduced wage costs. The theory of compensating wage differentials states:

"The following are the circumstances which make up for a small pecuniary gain in some employments, and counterbalance a great one in others: First, the agreeableness or disagreeableness of the employments themselves...the wage of labour vary with the ease of hardship of the employment."

[Adam Smith, Wealth of Nations, 1776, book 1, chapter 10, paragraph 4]

If labour markets reward risk then occupational health strategies, which can influence actual or perceived occupational risks, will reduce the need for the risk premium element of wages. Hence wages costs may be lower due to the presence of occupational health strategies (Weil, 2001).

Indirect, option and existence value may also stem from employee morale-type benefits. Much of occupational health is about positive health maintenance and promotion. Strategies for occupational health may contribute to a perceived culture of partnership, whereby the company is seen to accept responsibility for the welfare of employees. This may be seen as a non-pecuniary employment benefit. Enhanced morale may generate benefits for the company in terms of increased productivity. It may also influence staff retention, which can have significant cost implications. Berger et al. (2001) discuss the complementary nature of investments in occupational health and education/training. A firm’s investment in training its employees will not be maximised if those trained employees are frequently absent due to illness or injury. Occupational health can have value in protecting and maintaining all investments in human resources. The morale effect may also enhance the general reputation of the company, which could make recruitment easier and result in reduced industrial disputes and litigation against the company. Good morale may also be conducive to more flexible working.
Examples of studies having gone through this identification stage of economic evaluation include Atherley et al. (1976). Fourteen component company costs are identified and methods of possible quantification outlined. Five company benefit variables are also identified, they are:

- Avoided loss of employee’s work time at time of treatment.
- Avoided sickness absence, avoided medical costs through early OHS action.
- Savings in staff time in other departments due to OHS activity.
- Savings in legal claims and compensation.

Employee costs and benefits are also identified. From both the company and employee perspective a further list of 'soft' non-quantifiable benefits is listed. The hard test of financial viability is then whether the sum of company benefits exceeds company costs. If the hard test fails, decision-makers may wish to then consider including ‘soft’ benefits if they believe the sum of company soft benefits exceeds the discrepancy found in the hard test. If the company thinks employee costs and benefits should also be considered these can be included.

More recently, Miller et al. (2000) identified five expected benefits from health investments at work:

- Maximise health and morale of employees.
- Maximise performance and increase productivity.
- Minimise medico-legal costs.
- Enhance workplace safety.
- Reduce sickness absence.

A simple model to define threshold levels of these variables is presented.
6.3.4 Measurement

Quantification of the consequences of occupational health is often based on an estimation of the counterfactual, that is, a projection of what would have happened if occupational health strategies had (or had not) been in place (Weil, 2001). This situation arises predominantly due to compromised study design in workplace settings, as discussed earlier in this thesis.

Many analyses in the literature are somewhat partial, since only a subset of the possible or identified cost and consequence variables are actually measured in the economic analysis. Often this may be due to data availability issues with few studies presenting details on the cost of the intervention itself (Tompa et al., 2008). The literature review in chapter 2 of this thesis demonstrated that there was a reliance on archival data sources in both burden-of-illness (impact) and intervention (effectiveness) studies with relatively little primary data collection.

There are essentially three main approaches to measuring costs and consequences for evaluation of occupational health strategies (Lemer and Lee, 2006): the expert-observer approach, employer datasets, or employee/patient self-report. The expert-observer approach, commonly used in ergonomic research for example, uses a trained objective observer to collect real-time data in the workplace, hence avoiding issues such as recall bias. Workplace observation is often limited as a viable research option since it is somewhat intrusive (which may induce bias itself), labour intensive and costly. As was highlighted in chapter 2 of this thesis, employer archival data sources can be useful in some circumstances but often do not include relevant measures of productivity at the level of the individual employee. Self-report measures are becoming increasingly popular research options in health and productivity studies. Lerner and Lee (2006) list three broad reasons for why self-report is selected over other data-collection methods:

- The questionnaire respondent may be the best available information source: self-report constitutes the gold standard for many types of information, especially in terms of eliciting perceptions and attitudes but also health status measurement.
• Self-reported data are a practical substitute for gold-standard data: for example, in a health survey asking employees to report which of a list of chronic diseases that they know they have may be preferred to each employee undergoing a physical examination. Whilst this may be a less “cumbersome, costly or even potentially unethical” (Lerner and Lee, 2006) approach to obtaining data there may be some trade-offs for these shortcuts, such as revealing unknown diseases and health issues at a physical examination.

• Self-report methods are chosen when objective data are simply unavailable or inaccessible, as is most frequently the case for work-productivity.

There are of course a number of issues that self-report measurement instruments need to address to be acceptable research tools. Practicality in administration: how long a survey takes to complete and the difficulty of the questions, is a very logistical but real barrier to a successful self-report measure. Of course, self-report measures need to demonstrate the psychometric properties of reliability and validity. Reliability refers to the reproducibility of the data or the degree to which results can remain stable when no change occurs, for example, when examined using the test-retest approach. Hays et al. (1998) describes three main types of validity:

• Content validity: the degree to which attributes of a concept are sampled in a measure.
• Construct validity: the relationship of one measure to another measuring a parallel concept.
• Criterion validity: a survey instrument’s relationship to a gold-standard measure.

Furthermore, Tourangeau (2000) has described survey questions as a process requiring respondents to perform four tasks:

• Interpret the questions meaning.
As discussed in the methods section of chapter 5 of this thesis, careful wording and structuring of questions can help respondents interpret and understand the meaning of questions. Two further issues are very apparent in self-report research methods. First, recall error is a major potential impediment to self-report data collection methods. Second, there may be sensitivities or social expectations, which could potentially bias responses given to some questions. In the area of work productivity, for example, revealing lack of job performance or effectiveness at work may well be perceived as threatening questions by many respondents, threatening questions are well-known to seriously decrease reporting accuracy (Sudman and Bradman, 1982).

6.3.4.1 Productivity measurement

The loss in productivity or reduced employee performance whilst at work due to milder work injury or illness, the so-called 'presenteeism' effect, is somewhat difficult to measure. Directly asking employees using survey instruments (self-report) has been a common approach in quantifying this lost productivity whilst at work. Numerous self-report productivity measures are now available.

Reilly et al. (1993) developed the Work Productivity and Activity Impairment (WPAI) questionnaire, which simply asks subjects to rate their percentage productivity whilst at work. Van Roijen et al. (1996) developed the Health and Labour Questionnaire (HLQ), which asks subjects how many additional hours they would have had to work to compensate for lost productivity whilst at work. Osterhaus et al. (1992) employed a method using the number of days in the past two weeks that an individual went to work with health problems and asked the average efficiency of those days using a visual analogue scale. Brouwer et al. (1999) also report on the 'QQ' method, where the change in quantity of work performed and the change in quality of work are rated on a daily basis using visual analogue scales. In a comparison of measures Brouwer et al. (1999) has also
shown empirically that the HLQ generates the lowest estimates, the Osterhaus method the highest and the ‘QQ’ approach somewhere in-between. A widely used and validated instrument is the Work Limitations Questionnaire (WLQ) (Lerner et al., 2001). The WLQ aims to measure a) the degree to which employed individuals have experienced health-related deficits in job performance in the prior two weeks and b) health-related work-productivity loss (presenteeism). Several reviews of productivity instruments have also been conducted (Lofland et al., 2004; Prasad et al., 2004; Evans, 2006).

Two of the most widely used and validated productivity measurement instruments are the Work Ability Index (WAI) (Tuomi et al., 1998) and the Health and Work Productivity Questionnaire (HPQ) (Kessler et al., 2003, 2004).

The WAI measure was developed by Tuomi et al. (1998) from the Finish Institute of Occupational Health. Ilmarinen (2007) describes the WAI as an instrument used in clinical occupational health and research to assess work ability during health examinations and workplace surveys. Typically, an employee completes the questionnaire before an interview with an occupational health professional who rates the responses according to the scoring framework. WAI is a summary measure of seven items (range 7–49) (Table 6-2). Validity and reliability of the WAI has been widely tested (Ilmarinen et al., 2004; Radkiewich et al., 2005; de Zwart et al., 2002).
Table 6-2: Work Ability Index items

<table>
<thead>
<tr>
<th>Item</th>
<th>Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Current work ability compared with the lifetime best</td>
<td>0-10</td>
</tr>
<tr>
<td>Work ability in relation to the demands of the job</td>
<td>2-10</td>
</tr>
<tr>
<td>Number of current diseases diagnosed by a physician</td>
<td>1-7</td>
</tr>
<tr>
<td>Estimated work impairment due to diseases</td>
<td>1-6</td>
</tr>
<tr>
<td>Sick leave during the past year (12 months)</td>
<td>1-5</td>
</tr>
<tr>
<td>Own prognosis of work ability 2 years from now</td>
<td>1-7</td>
</tr>
<tr>
<td>Mental resources</td>
<td>1-4</td>
</tr>
</tbody>
</table>

The HPQ (Kessler et al., 2003, 2004) is from the Harvard School of Public Health. Psychometric properties of the instrument are well tested; the HPQ has undergone various levels of validity and reliability testing and displayed some level of criterion validity and reliability. The employee self-report data collected by the HPQ have been shown to correlate well with more objective measures of productivity in organisations. The instrument is endorsed by the World Health Organisation (WHO), which adds to credibility and has value in attracting collaborating organisations to participate in research studies and potential to enhance response rates. Administrative burden and complexity is acceptable. The instrument has been extensively used in a range of industrial settings. Unlike several productivity instruments it is applicable to broader populations, which may be impacted by a range of health and well-being issues. The HPQ also provides results that may be quantified in monetary terms for inclusion in formal economic evaluation. The HPQ is further discussed in chapter 7.

To date, however, the economic evaluation of health interventions has not explicitly included indirect (workloss) costs within formal estimates of cost-effectiveness ratios. Moreover, the U.S. Panel on Cost-Effectiveness (Gold et al., 1996) argues explicitly against including monetary losses that are due to decreased productivity related to disease (or gains associated with their avoidance). This position speculates that disease-related losses of patient income are captured by a decrease in utility and would, therefore, be
paralleled by a decrease in the benefit measure, assessed by the quality-adjusted life-year (QALY) statistic. If this is the case then productivity losses are captured in the denominator of the cost-effectiveness ratio, and thus including such monetary costs in the numerator would be double counting.

Members of the U.S. Panel have already advised some concession on the exclusion of indirect costs from the cost-effectiveness ratio. It has been argued that monetary valuation of productivity losses, which are incurred by other members of society (principally employers), should be included since these are relevant and clearly out with any utility measurements (Weinstein et al., 1997). Several health technology assessment authorities (including LFN, Sweden) now recommend in their methods guidelines including productivity measures within cost-effectiveness evaluation of health care interventions. Uegaki et al. (2007) reports consensus-based finding and recommendations for estimating the costs of health-related productivity loss from a company’s perspective.

6.3.4.2 Other measures

Quantifying the impact of occupational health on risk wages might use econometric analysis. Empirical tests of the theory of compensating wage differentials have used hedonic pricing equations to consider job-related risks of death or serious injury and have found that wage compensation for risk does exist. (Thaler and Rosen, 1976; Viscusi, 1978; Herzog and Schlottman, 1990). This approach could also be employed to estimate the effect of occupational health on wage costs.

Changes in employee morale, and then performance or productivity may be related to individual (work-related) quality of life (QoL). Whilst morale and performance in the workplace may sometimes be difficult to observe and measure there is a wealth of research literature on QoL measurement. There is also a wide range of validated instruments available for QoL measurement. There is a growing literature applying QoL assessment in an occupational health context. Jette et al. (1996) considers the potential value of and exactly how health-status instruments may be used in the occupational-
health setting. Pransky et al. (1996) state that researchers have developed new conceptual models of health-related quality of life and associated questionnaires and study designs that maximize use of administrative databases and the generalisability of results. Maruyama et al. (1991) examine the relationship between QoL among workers of a major manufacturing company, health practices and primary symptoms/problems. They designed their own specific working-life satisfaction scale, a Health Practice Index (HPI) and scores for primary symptoms/problems. The findings pointed to strong correlation between working-life satisfaction (QOL), the Health Practice Index (HPI) and scores for primary symptoms/problems. Beaton et al. (1997) compare the measurement properties over time of five generic health status assessment techniques used in the workplace. Their results suggest that the SF-36 was the most appropriate questionnaire to measure health changes in the population studied.

Van Laar (2007) have reported an example of using a newly developed work-related quality of life instrument the WRQoL. This new scale expands the concept of quality of working life by incorporating a broad six-factor structure derived from a theoretical review. The six factors are: job and career satisfaction, general well-being, home–work interface, stress at work, control at work and working conditions.

6.3.5 Analytical issues

Tompa et al. (2008) in their systematic review of occupational health studies that included economic evaluations report that many studies fail to report on some basic analytical issues that are included in economic evaluation guidelines as presented above. Three key analytical issues that need to be addressed when performing economic evaluations are how to deal with non-normal data distributions; the handling of uncertainty in the analysis and the role of differential timing of costs and consequences.

Cost data of all kinds are often found to deviate from the assumptions of normality used for conventional parametric statistical analyses. Cost data are usually positively skewed with variability increasing as the mean cost increases (Diehr et al., 1999). The standard
solution for analysis of skewed cost data is logarithmic transformation (Briggs and Gray, 1998), and then analysis using conventional parametric statistics. Other parameters included within formal economic evaluations of employee health and well-being issues may also be skewed or otherwise not normally distributed; statistical analyses included in an economic evaluation must account for this.

Another major issue to consider in any economic evaluation is uncertainty (Briggs and Fenn 1998, Briggs and Gray 1999). Whilst all evaluations strive to be rigorous and systematic in their approach they will inevitably be subject to some uncertainty. The measurement of key cost and benefit variables is crucial to the result of any economic evaluation. Results are sensitive to the input variables to the analysis. To test the level of uncertainty of measured variables sensitivity analyses should be performed. It is advised to vary the most important and most uncertain variables within a plausible and justifiable range in order to test the robustness of the evaluation carried out.

Sensitivity analyses can take many forms including simplistic one-way analysis, changing only one variable at a time; multi-way analysis, changing several variables; worst-case and best-case analysis; and threshold analysis (what values would variables have to reach to change the result?) as well as fully probabilistic approaches where information about the distributional form for each input parameter is also included.

Whilst cost and benefit estimates for an economic evaluation may be drawn from an observed distribution from which statistical inferences can be made and then sensitivity analyses conducted, the ratio statistic (the cost-effectiveness ratio such as a ‘cost per QALY’) often receives none of this attention. Cost and benefit estimates are normally accompanied by confidence intervals reflecting the variability and the range of data. The cost-effectiveness ratio itself is given as a point estimate, since this is a ratio producing confidence intervals is not straightforward. Methods developed to resolve this problem of uncertainty around the cost-effectiveness ratio itself include production of a cost-effectiveness acceptability curve (Van Hout et al., 1994; Lothgren et al., 2000), which takes a more probabilistic approach.
Finally, any economic evaluation with a time horizon of more than 1 year must consider adjusting the analysis in light of the possible differential timing of costs and benefits and to account for inflation and time preferences (Drummond et al., 2005). The technique of discounting is used to make these adjustments, with future costs and health gains receiving less weight than current costs and health gains. Brouwer et al. (2005) has argued that although discounting may seem a rather technical procedure, its consequences on the cost-effectiveness ratio are often substantial. This is particularly the case for preventative or health promotion interventions since attaching lower weight to future health makes preventive health interventions seem less cost-effective. For many employee health and well-being initiatives the analytical issue of discounting is highly relevant since often most of the costs will occur in the near-term and benefits flow in the mid- to long-term. Tompa et al. (2008) report very scant use of the discounting technique in the occupational health literature, it is suggested that this may in part be simply due to lack of technical competencies in economic evaluation methodologies. However, it may also be partially strategic on the part of advocates of these interventions since down weighting future benefits of occupational health interventions may make the difficult task of persuading employers to invest even harder.

6.3.6 Valuation

Firms are interested in return-on-investment information. The multi-dimensional metrics used to measure the benefits of investing in health (sickness absence, staff turnover, employee morale, reduced risk, productivity, etc.) require valuation in terms of money metrics if they are to be incorporated into cost–benefit estimates of return-on-investment. Research on valuation methods has evolved rapidly.

Earlier work in this field used revealed preference approaches, which are based on the fact that individuals' choices often leave behind 'behavioral foot-prints', which convey information about preference and valuation. Regression analyses of risk and wages in labour markets have been used to estimate the value of risk reduction (Arabsheibani and Marin, 2000). There has been much debate about whether the human-capital approach of
simply multiplying work-time lost by the wage rate should be replaced by the friction-
cost approach that acknowledges that firms typically find ways to respond to work loss (Koopmanschap et al., 1995)

Stated preference valuation methods have also been proposed. Contingent valuation
surveys eliciting employers willingness-to-pay for the whole spectrum of benefits derived
from health investments (i.e. not just sickness absence) have been used to derive
valuations for occupational health (Miller et al., 2002). The role of quality-of-life metrics
in this type of economic evaluation has also been discussed (Lamers et al., 2005).
Discrete choice experiments have also been used; this is a method that estimates the value
of preventing one event relative to another, rather than asking respondents to provide
direct monetary valuations of alternative preventative measures. The estimated ratios for
alternative events are then applied to a 'peg' monetary valuation in order to estimate the
corresponding monetary values (Karnon et al., 2005).

The most powerful form of economic evaluation is cost-benefit analysis (CBA) since it
provides decision-makers with greatest comparability across infinite different uses of
scarce resources. This is because CBA converts all benefits from a project (an
investment) into monetary values and since costs are also measured in this way decision
rules can be clearly guided by net benefits: the extent to which the value of benefits
outweighs the value of costs. The sticking point, however, is how to value
multidimensional benefits on a monetary scale, four methods from the economist’s tool
kit are discussed. One further method adopting a non-monetary valuation scale is
considered.

6.3.6.1 Human Capital Approach
In both cost-of-illness studies and the economic evaluation of health technologies costs
associated with lost or impaired ability to work or to engage in leisure activities (time
spent convalescing) are considered as productivity or ‘indirect’ costs to the disease or
intervention in question. These productivity costs are almost always valued using the
human capital approach. This is a method of shadow pricing which equates the loss of
healthy time to the loss of production by using the money wage to value that time. It is based on neoclassical economic theory of competitive (full employment) labour markets, which asserts that the wage rate for any individual equals the marginal product of their work. Hence forgone earnings can quantify the economic value of lost healthy time.

The human capital approach is generally criticised on three fronts. First, the presence of imperfections (inequities, unemployment) in the labour market mean that often wage rates may not reflect the marginal product of a worker. Second, problems arise when valuing time that does not have a market value, such as for people not in the labour market. Third, as Mishan (1971) pointed out the human capital approach to valuation is not consistent with the principles of welfare economics on which economic evaluation is founded. The only value it considers is the change in labour productivity whereas a wider definition of value should consider opportunity cost: what an individual is willing to sacrifice in order to receive the benefits from a given health intervention.

Furthermore the human capital approach to valuation is likely to misestimate the true value of strategies to reduce absenteeism. Pauly et al. (2002) conclude that the cost of work loss can be much greater than the wage when perfect substitutes for lost labour are not available and there is team production or a penalty for not meeting a given output threshold target.

### 6.3.6.2 Friction Cost Approach

Koopmanschap et al. (1995) argued that valuation using the human capital approach may well overstate the true extent of production losses since firms typically do not passively accept reduced productivity they react to sickness related workloss in obvious ways. In the short-term work may be transferred to other employees (with spare capacity), non-urgent work may just be cancelled and absent workers may in fact make up for any lost productivity on their return to work. In the longer-term someone previously unemployed may replace an absent worker. Hence from the societal perspective opportunity cost is zero as the alternative for any replacement is to have no productive output during unemployment.
The friction cost method relaxes the assumption of perfect labour markets and accepts that true production losses are related to firm-level and macro-economic conditions. It assumes that production losses only occur during the friction period, the time needed to replace a sick worker. Using the friction cost method productivity costs are calculated by estimating the frequency and duration of friction periods, the value of lost production and macroeconomic consequences.

Liljas (1998) and Weinstein (1997) have argued against the use of the friction cost method essentially because of its departure from conventional microeconomic theory. It may be plausible to relax the artificial assumptions of the perfect labour market. But if unemployment reduces the opportunity cost of labour to zero after a friction period, to be consistent, this must also be applied to direct labour inputs to the health intervention in question. The opportunity costs of doctors and nurses’ time is clearly not zero. Also the friction cost methods assumes the value placed on leisure time by the unemployed is also zero. The implication of this is that the unemployed will accept any wage above unemployment benefit. Finally, the notion that spare capacity exists to make-up the time or that a pool of reserve labour is available is inconsistent with the firm’s profit maximisation objective.

Boonen et al. (2002) report productivity costs relating to ankylosing spondylitis as $1,257 and $8,862 per Dutch employee using the friction-cost and human capital method, respectively. Hutubessy et al. (1999) show that the indirect costs of back pain in the Netherlands estimated by the human capital method were more than three times as high as the friction cost method (US$4.6 billion vs. US$1.5 billion).

6.3.6.3 Hedonic Pricing

An alternative means of arriving at monetary values for occupational health consequences is to use a revealed preference method called hedonic pricing. Observing employee and employer behaviour in labour markets with varying risks can elicit
valuations of relevance to occupational health. As Weil (2001) describes workers are compensated for their human capital (education, skills, experience and so on) but also the level of job-related risk. Clearly workers desire both higher wages and safer working conditions, but at the margin they may trade risk for wages. This element is the compensating or risk-premium wage, the value individuals place on a change in the level of risk. Firms balance the costs of higher wages to compensate for more risky work against the costs of lowering exposure to risk through changes in production practices (such as occupational health strategies).

Using large observational datasets it is therefore possible to estimate the size of compensating risk premiums for the risk of mortality. These risk premia are then often used to generate estimates for the implied value of life. They can also potentially be used to value any changes in risk of mortality (or even morbidity) brought about by an occupational health strategy.

In practice, hedonic pricing is more complicated since the wage-risk relationship is not straightforward, and all other factors influencing the supply and demand for labour need to be controlled for. Secondly, for risk-premium wages to truly reflect risk trade-offs workers must have choice in the labour market, this requires perfect job mobility and perfect information. Thirdly, there may be a problem disentangling the effects of wages and risk of mortality from industry- and occupational- and job-level effects. Finally it may be difficult to separate the impact of mortality and morbidity on changes in wages.

6.3.6.4 Contingent Valuation
The contingent valuation (CV) method is now perhaps the economist’s standard tool when faced with multidimensional outcomes without market values. It is based on stated preference, using surveys relevant individuals are asked how much they are hypothetically willing to pay for a certain project which has a given profile of benefits which might include changes in risk of mortality and morbidity. Alternatively, subjects may be asked how much they are willing to accept to compensate them for the removal of
a certain project. The CV method is appealing since it provides a direct estimate of the value of benefits generated by a project in a relatively simple manner; it provides a single value for multidimensional and otherwise intangible benefits.

There are standard CV problems with how to ask the questions. Seemingly trivial aspect such as the order of questions, how they are framed or how benefits are described are known to impact results. There is also the issue of who relevant subjects are. Should a survey include employers, employees or the general population? Finally, the main problem is the relationship between willingness-to-pay and ability to pay. It is difficult to get away from the fact that inevitably willingness-to-pay is a function of ability to pay and results may be more a reflection of wealth than valuation of benefit, even after attempts to control for this.

6.3.6.5 QALY Approach

The Washington Panel on cost-effectiveness (Gold et al., 1996) state that the cost associated with lost or impaired ability to work or to engage in leisure activities due to morbidity could be monetized and incorporated into the numerator of the cost-effectiveness ratio or it could be assessed in the quality-adjusted life-year (QALY) and placed in the denominator. Their recommendation is that these productivity costs be incorporated into the calculation of the QALY, which is intended to capture the full impact of morbidity and mortality.

The QALY combines life years (quantity of life) gained as a result of a health programme with some judgement on the quality of those life years. This judgement element is labelled utility. Utility is simply a measure of preference, where values can be assigned to different states of health (relevant to the programme) that represent individual preferences. This is normally done by assigning (visual analogue) or eliciting (standard gamble technique, time-trade off technique) values between 1.0 and 0.0, where 1.0 is the best imaginable state of health (completely healthy) and 0.0 is the worst imaginable (perhaps death). States of health may be described using many different instruments (SF-
36, Nottingham Health Profile, Sickness Impact Profile, EuroQol EQ-5D), which provide a profile of scores in different health domains. EuroQol EQ-5D for example simplifies health into just five domains: mobility, self-care, usual activities, pain/discomfort and anxiety/depression. Each domain is given a score from 1 to 3, so the health profile would read 11111 for the best scores in all domains and 33333 for the worst. EuroQol EQ-5D has 243 possible health profiles, all of which have already been assigned a utility value by general population surveys.

Since the QALY is an all embracing measure, all health gain, risk reduction and morale effects from an occupational health strategy could potentially be encapsulated by this non-monetary measure. The additional cost associated with generating additional QALYs using occupational health strategies could be combined into a ratio to give a cost per QALY gained efficiency measure. Decision-makers would then be able to compare these with other ways of generating QALYs (where the information is available) or indeed against some acceptable threshold value that they are willing to pay for a QALY, for example UK NICE (NICE, 2009) sets threshold at £20,000 per QALY. There may of course, also be a need to understand the relationship between change in QALY and change in variables more directly of interest to the firm such as productivity.

There are problems with the consistency of the QALY measure but the main issue of money-value remains. To provide the decision-maker with perfect comparability across projects the QALY itself will need to be monetized. Unless firms evaluate all projects in term of cost per QALY, evaluating occupational health in this way does not provide the decision-maker with the required information. Contingent valuation methods could be used to place a monetary value on the QALY, but this would be subject to all the problems of the CV methods outlined above.
6.4 Discussion

6.4.1 Key findings

The objectives of this chapter were:

- To identify the specific economic evaluation methodological issues that have been identified in studies performing economic evaluations of employee health and well-being interventions
- To review economic evaluation methodologies that might be more widely used in the context of employee health and well-being

From examination of the literature (chapter 2) and exploration of current practice in the UK (chapters 4 and 5) it is apparent that there is great scope to improve the quality of economic evaluations that are used to inform decision-making in the area of employee health and well-being. Employers are apparently somewhat cynical about the credibility of ‘economic’ evidence to date that may be used for objectives other than identifying the most efficient use of resources in this area. It would appear that, to date there has been little scope for more formalised economic evaluation approaches alongside: a) intuitive but largely non-empirical business cases and b) somewhat thinly veiled sales and marketing pitches that use largely crude return-on-investment estimates.

Health economic evaluation methods, at least outside of the occupational setting, are now somewhat established with several methodological guidelines available that have been adopted by academics and practitioners (Gold et al., 1996; Drummond et al., 2005); authors and peer-reviewers (Drummond et al., 1996); as well as national level healthcare decision-makers (NICE, 2009). Great experience and expertise in health economic evaluation methods has now been developed in many countries, but remains largely underexploited by those concerned with employee health and well-being in an occupational context.
To identify how to enhance economic evaluations in occupational health settings several key methodological issues are identified in the areas of evaluation perspective and timeframe; identification, measurement and valuation of costs and consequences; and specific analytical issues including statistical analyses, sensitivity analyses and discounting techniques.

Evaluation perspectives and timeframes may need to balance theoretical positions and practical application in the workplace setting. Hence, whilst a societal cost perspective may be theoretically advised it is likely to be practically unmanageable and of less interest to employers. However, there may also be real advantages to broadening the evaluation perspective beyond too narrow definitions of company costs.

The formalised process of identification of all relevant cost and consequences parameters is largely missing from the occupational health economic evaluation literature. This step in the economic evaluation process engenders a more comprehensive and systematic approach which could lead to the inclusion in empirical assessment of factors not previously used to evaluate the impact of interventions in this area. There may be practical lessons to learn from the field of environmental economics in this regard.

Measurement of costs and consequences for economic evaluation in occupational settings has three main approaches: expert-observer, archival employer-based datasets and self-report. Evaluations will often collect data from a mixture of these sources, but the role of self-reported data is likely to be very important. The practical feasibility as well as the validity and reliability of self-report measurement instruments must be rigorously assessed. Numerous productivity measures have now been developed, the WAI (Tuomi et al., 1998) and the HPQ (Kessler et al., 2003, 2004) instruments are among those with most evidence of successful utilisation, validity and reliability.

Other suggested methods of quantifying or measuring costs and consequences for economic evaluation in occupational settings have been presented. The literature focusing on the statistical value of life attempts to measure the extent of wage
compensation due to job or workplace risk by econometric analyses of labour market datasets. The literature measuring more traditional quality of life has also had some application to an occupational health setting.

The valuation phase of an economic evaluation has largely focussed on the human capital approach in the occupational setting, despite acknowledgement of some shortcomings of this approach. The emergence of the friction-cost valuation method during the mid-1990’s sparked much debate in the health economics literature, but has led to only a couple of studies in the occupational setting adopting this approach. This chapter has also identified three other valuation approaches that could be considered for application in this area: hedonic pricing, contingent valuation and a QALY approach.

6.4.2 Implications

One obvious application of the findings in this chapter is that there is clear scope to relatively easily and rapidly improve the quality of economic evaluations conducted in the occupational health and well-being setting by redirecting the resources and methodologies that are well established in the more general field of health economic evaluation. Utilisation of the intellectual capital and vast experience that already exists in this applied field of economics and is widely used in health technology assessment and reimbursement decision making in healthcare (e.g. NICE, 2009) could potentially be exploited to efficiently and effectively enhance the quality of economic evaluation conducted in occupational health settings.

Evidence from the literature and from the studies presented in chapters 4 and 5 of this thesis suggests that there is some dissatisfaction with the economic information that is currently presented to organisations when making decisions about employee health and well-being management. Indeed as highlighted above much of this information is viewed somewhat negatively. The results from the managers’ survey also suggest that there may be some level of demand for better quality and more relevant economic information, such as the inclusion of productivity measurement. This may therefore imply that there may
be some willingness to adopt more formalised economic evaluation techniques within workplace decision-making in order to deliver better quality and more relevant and robust information.

However, substantial practical barriers to the widespread introduction of formalised economic evaluation methods in the workplace may still exist. The studies presented in chapters 4 and 5 also detected widespread use of non-empirical approaches to decision-making and much use of intuition, faith and belief-based assessments of employee health and well-being management within organisations as well as a belief that senior managers and decision-makers may prefer these non-empirical assessments.

6.5 Chapter summary

Formalised economic evaluation methods are distinctly absent from the occupational health literature. Economic information that is presented is largely viewed with skepticism by organisations. By redirecting the resources and methodologies that are already well established in the more general field of health economic evaluation there is great potential scope to improve the quality of economic evaluations that are used to inform decision-making in the area of employee health and well-being. Several key methodological issues are identified in the areas of evaluation perspective and timeframe; identification, measurement and valuation of costs and consequences; and specific analytical issues including statistical analyses, sensitivity analyses and discounting techniques. Whilst the application of these methods is very likely to improve the quality of information available to decision-makers within organisations, organisational and perhaps cultural barriers will have to be overcome to facilitate these more evidence-based approaches.
Overview of the thesis

Chapter 1
Introduction

Chapter 2
Literature review

Chapter 3
Thesis method

Chapter 4
Exploration of current practice: qualitative methods

Chapter 5
Managers' survey (n=986)

Chapter 6
Economic evaluation: methodological review

Chapter 7
Empirical case studies: Employee surveys (n=1,504)

Chapter 8
Discussion, implications and recommendations
7 Empirical case studies

7.1 Introduction

Individuals and organisations respond to economic incentives. Relevant information about employee health and well-being has the potential to be an important lever for organisations to make investments in this area. It is clear that where there is robust information that an organisation’s efforts to enhance employee health and well-being are associated with positive outcomes that are valued by the organisation (in addition to the individual employee) and are estimated to: a) outweigh the investment costs the organisation is required to make and; b) represent an attractive investment relative to other opportunities available to the organisation, then there is potential for a rational economic incentive to induce this investment behaviour by these organisations.

It is also already well known that whilst employee health and well-being may be generally associated with certain outcomes valued by an organisation, such as productivity, the drivers of employee health and well-being are inevitably multifactorial. For example, employee performance is impacted to varying degrees by physical and psychological health, employee engagement, motivation, job design, working conditions, relationships and management amongst other things.

The review of literature presented in chapter 2 has shown that a vast amount of information is already available to decision-makers in at least three types of literature: evaluations of specific interventions aiming to enhance employee health and well-being that sometimes include return on investment estimates; burden of illness assessments that include a work perspective; and a literature focussing on predictors of absenteeism and turnover.

The exploration of current practice discussed in chapters 4 and 5 would suggest, however, that economic incentives to invest in employee health and well-being are currently at best weak. The classical economic response for why rational incentives do not deliver the desired behaviour is that they are distorted by a lack of information.
There are several issues with and indeed gaps in the information available to organisations to help them make decisions on how best to allocate resources to employee health and well-being strategies.

First, within organisations information about employee health and well-being is at best partial and disconnected; where employee health information is collected it is often assessed separately from human resource management type information. Employee surveys are widely used in larger organisations to assess concepts such as employee engagement, organisational climate, work environment and management issues. Health audits are widely used to assess health risks, describe health status and the prevalence and management of existing conditions. The problem is that these two information sources are commonly collected independently of each other (often from the same employees), hence there is little empirical data connecting employee health and well-being metrics with well established human resource management metrics.

Second, employee health or human resource management metrics are rarely linked empirically or directly to employer relevant outcomes such as absence, productivity, turnover or impact on revenue or costs. An organisation can monitor its performance on employee survey or health audit measures by time series analysis or benchmarking against peer organisations where this is feasible, but without some connection to some kind of measures of impact on the organisation, it is difficult for decision-makers to assess which of the many metrics that can be collected in employee surveys are most important from the organisation’s perspective. Hence, it is generally very difficult for organisations to compare the relative merits of investing in very different strategies to enhance the very many different measures of employee health and well-being, due to a lack of relevant information.

Third, instead of empirically connecting employee metrics with employer relevant outcomes within an organisation, the relative importance of each employee metric to an organisation (the impact that changes in different employee metrics may have on
employer relevant outcomes) is assessed by management using more subjective
judgement. External information, such as burden of illness literature or compensation
awards from legal cases may also be used as a proxy to assess relative impact. The
problem is that this is likely to result in inefficient or perverse resource allocation rules.
In the absence of empirical evidence the causes that lobby hardest are most likely to
receive resources but also what are perceived to be the ‘biggest problems’ are likely to be
prioritised for the biggest resources independent of the relative effectiveness or indeed
cost-effectiveness of the interventions to mitigate these problems.

Fourth, as demonstrated in chapter 2 of this thesis, there is a considerable literature on the
effectiveness and cost-effectiveness of specific interventions to enhance employee health
and well-being. It is less clear how organisations can best utilise this existing evidence to
inform their own resource allocation decisions. Ideally, it would be meaningful to
construct a league-table approach for published studies on these interventions with
ranking by return-on-investment (ROI) estimates as a result of cost-benefit analyses.
However, there are both practical and methodological barriers to this approach. Clearly
there are many more opportunities for interventions to improve employee health and
well-being than there are published studies about interventions that have done so, any
league-table of interventions is likely to be partial evidence. Moreover, variability in
context, baselines and methods used in these studies means that unadjusted comparison
of ROI evidence is unlikely to be valid.

As discussed in chapter 5, generalisability of ROI evidence may depend on greater
understanding of both the baseline employee cohort characteristics and the mechanism
through which the intervention achieves its outcomes. Organisations have also identified
issues of quality and reliability especially relating to estimates of return on investment.
Decision-makers also appear to be aware of issues of sponsor bias, where the sponsor of
the research evidence clearly is not independent of the outcome and has some vested
interest such as service provision or consultancy but also where organisations become
bias towards a positive outcome due to sunk cost issues. To some extent organisations
are also aware of the issue of publication bias, where less information about studies with negative outcomes is available.

Finally, whilst the literature on predictors of employee absence and turnover has developed considerably beyond the early analyses and has informed much policy in this area it is limited in how it can inform economic behaviour and the allocation of scarce resources for three main reasons: it is dominated by psychological not health correlates (primarily job satisfaction); it has not yet embraced the emergence of productivity as a measure that is highly relevant to employers; and it stops short of presenting monetary valuations of changes in absence and turnover associated with changes in predictors.

The study reported in this chapter is an acknowledgment that employers need better information about the relative value to their organisation of the many different and varied ways of attempting to improve employee health and well-being that involves a broad multivariate and indeed multidisciplinary approach. The intended contribution of this study is a method that provides empirical estimates of the monetary impact to employers of marginal changes in a range of employee metrics, which can provide a framework, independent of specific interventions, for organisations to systematically review optimal resource allocation towards employee health and well-being policy.

7.1.1 Aims of this chapter

This chapter examines the extent to which correlation between certain employee health and well-being metrics and employer relevant outcomes can be described and used to inform decisions about allocation of an organisation's finite resource towards employee health and well-being interventions.

By use of datasets from 7 diverse organisations and a pooled analysis (n=1,490) the following research questions are explored:
• To what extent can lower employee health and well-being status be shown to be associated with higher costs to the employer?

• To what extent can the marginal value to an employer of marginal changes in employee health and well-being metrics be estimated?

7.2 Method

7.2.1 Study design

From its conceptual design this study intended to use multivariate analyses to explore the relationships between employer relevant measures and a range of employee health and well-being measures that there are theoretical reasons for believing may be correlated to the outcomes of interest to the employer and that which are at least partly under the control of an organisation’s management. Hence in designing an empirical study the first issue is to identify which variables to include. Which employer relevant measures should be included as the dependent variable in this analysis? Which employee health and well-being measures should be included as correlates of employer relevant measures?

7.2.1.1 Defining the dependent variable

In considering appropriate measures to include as the dependent variable in this study three aspects were reviewed:

• Relevance to employers
• Theoretical basis
• Feasibility of empirical assessment

Literature review (chapter 2) and an exploration of current practice (chapter 4) have identified a range of measures of interest to employers in this context including sickness absence, productivity, turnover, insurance premia (employee liability, medical), litigation cases, product quality (customer service), health care costs (direct treatment, prevention or health promotion provision), organisation reputation or image and loss of current or future business as well as the ability to attract investment where governed by ethical
criteria such as corporate social responsibility. The survey of managers (chapter 5) has identified that lost production is perceived to be the biggest cost to an organisation arising from employee health and safety issues. There is also evidence of a preference for the net impact of these measures and potential impacts on revenues to be converted to monetary values to enable financial or economic assessment.

In presenting the method of this thesis, chapter 3 has discussed some of the theoretical basis for empirical work in this area. Theoretical models of employee turnover and absenteeism showing how these relate to individual differences in job attitudes dominate the literature, however, Rosse (1991) introduced the useful term of 'employee withdrawal' to refer to a range of behaviours that includes much more than just absence and exit from employment. Conceptually Rosse (1991) defines withdrawal as:

"...all behaviours that serve to increase the psychological or physical distance between employees and their work roles."

The broader perspective of employee withdrawal may consider behaviours including coming into work as late as possible, leaving early as well as reduced performance on the job whether due to wilful work avoidance and underperformance or due to some impairment or loss of motivation associated with the work environment.

Issues of identifying, measuring and valuing employer relevant variables are discussed in chapter 6. In terms of assessing the feasibility of empirical study, the employee withdrawal behaviours of sickness absence and presenteeism have been empirically assessed in many studies already using self-report measures (Lerner and Lee, 2006) or routine administrative records (Greenberg and Birnbaum, 2006). As discussed in chapter 6, several methods are available to attach monetary valuations to these measures.

Measures such as employee turnover rates, frequency and cost of litigation cases or relevant insurance premia, will need to be reported and analysed at a group level. Hence, to address the issue of whether a group with lower employee health and well-being status
have higher turnover, litigation or insurance costs, variability between groups will need to be analysed. Group-level analyses, inter-organisation or inter-cluster of some form, will clearly require a different study design and sample size calculation to measures analysed at the level of the individual employee within a group. Where the absolute level of occurrence of turnover, litigation or insurance cases is low then analysis will need to detect small differences attributable to variation in employee health and well-being, hence to achieve sufficient statistical power larger sample sizes are likely to be required. Parameters collected to control for variation between groups may also differ to those to control for variation between individuals. Selection of these parameters requires good theoretical understanding of the factors driving variability in these measures. Whilst there may be established literature on predictors of turnover, there is less understanding of insurance or litigation costs in this context.

Measurement of variables such as customer service and organisational reputation will also require analysis at the group level but will also involve collecting data from current or potential customer groups as well as groups of employees. The number of confounding factors influencing these measures also is likely to be large which makes isolating the impact of employee health and well-being metrics analytically more problematic. This is also the case when considering macro measures of organisational performance, such as standard reported financial results. Hence any estimates of monetary values attributed to changes in employee health and well-being metrics will have great uncertainty.

Finally, there may be inter-temporal issues to consider in the assessment of feasibility of designing an empirical study. The obvious case here is for investment in health promotion, where organisational benefits may flow from sometime in the future but ongoing investment is required. Longitudinal empirical analyses may be ideal to monitor changes in metrics and their correlates over time; however, cross-sectional empirical analyses may be more pragmatic and operationally acceptable to organisations.
In light of the factors outlined above, the preferred employer relevant dependent variable selected for this empirical study is the estimated cost of workloss, where workloss is a measure of absence time and loss of performance whilst at work (presenteeism). Rather than attempting to construct different models for absence, presenteeism and so on, individually, the approach of this study follows that of Rosse (1991) and considers workloss as a single concept.

7.2.1.2 Selecting explanatory variables
The decision on which concepts to include as explanatory variables and which instruments should be used to measure these in the empirical study is discussed in chapter 3. The review of concepts for inclusion was driven by general theories of workloss behaviour and previous empirical studies that identify poor employee motivation and engagement, poor working conditions including environment, management and role as well as impaired employee physical or mental health status as predictors of different forms of workloss. Measurement instruments reviewed for inclusion in the empirical study were required to meet the following criterion (in order of importance):

- Theoretical rational for correlation with workloss or employer costs.
- Evidence of validity and reliability.
- Accepted and widely used.
- Appropriate for combining in multi-instrument employee survey.
- Appropriate for diverse range of employees in multiple industrial sectors.

7.2.1.3 Developing the employee questionnaire package
The study was designed to collect individual employee-level cross-sectional data at multiple, diverse organisations. A single questionnaire package was designed by combining widely used existing instruments measuring employee health status, well-being, engagement and working conditions with a widely used existing instrument measuring productivity.
The questionnaire package comprised seven sections, to measure the following concepts:

- General employee demographics and job characteristics
- Workloss
- The level of substitutability, team production and time sensitivity of an individual's work
- Job satisfaction, organizational commitment and intention to turnover
- Health status
- Working environment and level of work related stress
- Prevalence of commonly occurring health problems and their treatment

A sample version of the questionnaire is provided in appendix 7-1.

General demographic measures included: age, gender, marital status, number of children, tenure (full-time/part-time), ethnic or national origin, and level of education. Job characteristics measures included: length of time in current job, length of time in the organisation, income category, job category and number of supervisees/line reports.

The World Health Organisation (WHO) Health and Work Performance Questionnaire (HPQ) (Kessler et al., 2003; Kessler et al., 2004) was used to estimate productivity losses associated with decreased on-the-job performance and absenteeism. The objective of using the HPQ is to provide an estimate of overall workloss quantified in units of time. Permission to use this instrument in this study was sought and granted by the developers.

Data analysis methods for estimating the monetary cost of workloss to organisations are presented below. In general, however, as discussed in chapter 6, there are alternative valuation methods available to attach monetary values to estimates of workloss time, the simplest being the human capital approach, which simply uses the wage rate to value employee time. To estimate the cost of workloss to an organisation in monetary values, the estimate of workloss time from the HPQ was multiplied by the employees stated gross wage rate. This represents the unadjusted estimated cost of workloss.
In order to create some evidence-based transformation rules to estimate the monetary impact on organisations from decreased workplace functioning under various role-specific conditions, additional questions were included in the questionnaire package based on work by Pauly et al. (2002, 2008). Employees were asked about the level of substitutability, team production and time sensitivity of their work. Responses to these questions were used to derive multipliers for absenteeism and presenteeism hours for each employee; these were used in estimating the adjusted costs of workloss.

The questionnaire package included a measure of job satisfaction based on that developed by Cammann et al. (1983) and used as part of the job facet module of the Michigan Organisational Assessment Package (MOAP). This instrument distinguishes between satisfaction with extrinsic rewards (pay, fringe benefits and job security), intrinsic rewards (chances to learn new things, chances to accomplish something worthwhile, and chances to do something that makes you feel good as a person) and satisfaction with social rewards (the way you are treated by other people, the respect you receive from people you work with, and the friendliness of the people you work with).

A measure of employees’ intention-to-turnover, also known as intention-to-quit, was also included in the questionnaire package; this is based on the scale included in the general attitudes module of the Michigan Organisational Assessment Package (MOAP) (Cammann et al., 1983).

Organisational commitment is included using measures developed by Cook and Wall (1980) to assess quality of working life primarily for use with UK blue-collar employees. The developers distinguish three components: organisational identification, organisational loyalty and organisational involvement. Identification is defined as pride in the organisation leading to internalisation of the organisation’s goals and values. Loyalty is defined as affection for the attachment to the organisation leading to a sense of belongingness manifesting as ‘a wish to stay’. Involvement is defined as the willingness to invest personal effort as a member of the organisation, for the sake of the organisation.
To assess the working environment and levels of workplace stress that employees may be exposed to, the UK Health and Safety Executive (HSE) Management Standards Indicator Tool (HSE website, 2009) was also included in the questionnaire package. The HSE Management Standards cover six key areas of work design: demands, control, support, relationships, role and change. The demands section assesses issues of workload, work patterns and work environment. The control section assesses how much say an employee has in the way they do their work. The support section is divided into managerial support and peer support to assess encouragement, sponsorship and resources provided by the organisation, line management and colleagues. The relationships section assesses promoting positive working to avoid conflict and dealing with unacceptable behaviour. The role section assesses whether employees understand their role within the organisation and whether the organisation ensures that they do not have conflicting roles. The change section assesses how organisational change is managed and communicated in the organisation.

Employee health status was assessed using the General health questionnaire (GHQ-12) (Goldberg and Williams, 1988) as well as the health status aspects of the World Health Organisation Health and Work Performance Questionnaire (HPQ) (Kessler et al. 2003, Kessler et al. 2004). The GHQ was developed as a screening device for identifying minor (non-psychotic) psychiatric disorders for use with patients in a primary health care setting or general population survey. The GHQ focuses on two major areas, the inability to carry out normal functions and the appearance of new and distressing psychological phenomena. The academic supervisor to this research is a full licensed user for the GHQ instrument.

The HPQ provides a summary physical health status score by asking employees to rate the extent to which they have been bothered by a range of commonly occurring physical conditions during the past 4 weeks. Asking employees to report the proportion of time over the past 4 weeks they considered themselves to be in different mental health states derives a summary mental health status score.
The HPQ instrument also asks employees to state whether they have any of the 28 health conditions listed, and whether they currently, previously or have never received professional treatment for this condition. These measures allow reporting of the prevalence of treated and untreated disease as well as the extent of co morbidity within each population.

These measures of health status were considered more appropriate for this research than for example the SF-36 instrument that has been designed for a patient rather than employee population and indeed may require more space within the questionnaire package and more time for employees to complete.

7.2.1.4 Piloting the employee questionnaire package

The questionnaire package was initially tested with members of the panel of Occupational Health and Safety professionals that were involved in the focus group and one-to-one interviews. The questionnaire package was perceived by this expert panel to have good face validity and was both acceptable and feasible for use in this setting.

Comments from these experts could be grouped into five categories, as follows:

- Guarding against revealing respondent identity in small organisations (e.g. via combination of demographic questions).
- Specific comments on language to simplify some questions.
- Degree of overlap (i.e. different sections with similar questions).
- Strong dislike for forced-response questions or forced-format of response (on web-based version). The experts advised that this policy might be counterproductive, instead of ensuring compliance with all questions more likely to reduce overall response rate.
- Questionnaire package should be flexible to the needs of organisations that wish to participate, for example removal of specific questions that might be considered unacceptable and indeed the opportunity to add in supplementary questions that may be of specific value to that organisation.
Both the paper-based and web-based versions of the questionnaire package were formally piloted with one organisation. This pilot consisted of 8 people (Production Director, Technical Team Leader, 2 Production Managers, Planning Manager, H&S Manager, HR Manager, Group Occupational Health Physician). The questionnaire package was perceived by this pilot sample to have good face validity and was both acceptable and feasible for use in this setting. There was a comment that the questionnaire package may be a little long for some employees in this organisation to complete, however, the total time for completion (20 to 30 minutes) was considered acceptable.

7.2.1.5 Sample size calculations

Sample size calculations were explored based on testing the hypothesis that the estimate for the cost of workloss is associated with the various employee health and well-being measures used in the questionnaire package. Assuming we wish to compare the mean workloss costs between two groups, where in any given organisation group 1 is those with some lower-level health or well-being status and group 2 is those with some higher-level health or well-being status, assuming some arbitrary definitions for each measurement scale and approximately equal numbers in each group. The number required in each group is given by $n$ in Equation 1:

$$n = f(\alpha, \beta) \cdot \frac{2s^2}{\sigma^2}$$

Where $\alpha$ is the significance level, $1 - \beta$ is the power of the test, $\sigma$ is the smallest difference between the means regarded as important to detect, $s$ is the standard deviation of the cost of workloss.

Table 7-1 shows a range of scenarios for sample size calculations assuming we wish to be 90% sure of detecting a difference in the mean cost of workloss as stated, as significant at the 5% level, the smallest difference in the means regarded as being important to detect and the standard deviation of the cost of workloss are varied. The plausible range over which both $\sigma$ and $s$ should be varied is uncertain. Given that $\sigma$ in the context of this
research represents a cost difference per employee per month, it may be plausible to assume that the smallest important difference may be in the range from £50 to £250. Analysis of previous workloss datasets suggests the standard deviation of workloss cost data is often large, it may be reasonable to assume $s$ in the range £200 to £500.

Table 7-1 Sample size calculation scenarios

<table>
<thead>
<tr>
<th>$n$ = number required per group</th>
<th>Standard deviation of cost of workloss ($s$)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>£500</td>
</tr>
<tr>
<td>£50</td>
<td>2100</td>
</tr>
<tr>
<td>£100</td>
<td>525</td>
</tr>
<tr>
<td>£150</td>
<td>233</td>
</tr>
<tr>
<td>£200</td>
<td>131</td>
</tr>
<tr>
<td>£250</td>
<td>84</td>
</tr>
</tbody>
</table>

Green (1991) has presented some basic guidance for sample size calculations in regression analysis. In order to test the overall fit of the regression model a minimum sample size of $50 + 8k$ is recommended, where $k$ is the number of predictors in the model. Hence in a model with 10 predictors, a sample size of $50 + 8(10) = 130$ is required. In order to test individual predictors in the model a minimum sample size of $104 + k$ is recommended; hence with 10 predictors a sample size of $104 + 10 = 114$ is required. Field (2005) provides a simplification of more precise graphs developed by Miles and Shevlin (2001) to show the sample size required in regression depending on the number of predictors and the size of expected effect assuming 80% level of power, this is shown in Figure 7-1.
Sample sizes for small effects are not included on this graph as they are considerably higher (estimated at 400 for 1 predictor, rising to circa 600 for 2 to 5 predictors). As a general interpretation to detect a large effect in a multiple regression model a sample of 80 will be sufficient with up to 20 predictors included, to detect a medium effect the sample should always be greater than 60 and a sample of 200 will be sufficient with up to 20 predictors.

It is also acknowledged that the ability to achieve any required sample size will be constrained by the real-world environment; the ability to recruit sufficient organisations to participate in the study and indeed recruit sufficient employees within each organisation to complete the questionnaire package.

The University of Loughborough ethical approval checklist was completed, submission to ethics committee was not required as the research did not involve subjecting
Sample sizes for small effects are not included on this graph as they are considerably higher (estimated at 400 for 1 predictor, rising to circa 600 for 2 to 5 predictors). As a general interpretation to detect a large effect in a multiple regression model a sample of 80 will be sufficient with up to 20 predictors included, to detect a medium effect the sample should always be greater than 60 and a sample of 200 will be sufficient with up to 20 predictors.

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The University of Loughborough ethical approval checklist was completed, submission to ethics committee was not required as the research did not involve subjecting
participants to any intervention, did not involve any vulnerable groups, results were to be reported at group level and all data were to be collected anonymously.

7.2.2 Data collection

Multiple approaches were employed to recruit collaborating organisations for this study. First, organisations that had previously collaborated with the Department of Human Sciences were approached. Second, contacts from organisations involved in the earlier phases of this research; the focus group, the one-to-one interviews and participants in the managers’ survey that elected to provide contact details were invited to participate. Third, the study was advertised through professional groups (Society of Occupational Medicine, IOSH) via websites and newsletters. Fourth, information about the study was communicated to delegates at relevant congresses (Institute for Health and Productivity Management, Enterprise for Health, and Business in the Community Business Health Action Forum).

A four-stage process was proposed to collect data.

1. Collaborating organisations nominated specific groups/departments for inclusion in this study.
2. All employees within each nominated group/department were either sent an invitation to complete the questionnaire via an e-mail including a hyperlink to the web based questionnaire or invited to attend a seminar and provided with the paper based version of the questionnaire (as agreed with collaborating organisations).
3. Key contacts at collaborating organisations were sent a request for group-level data and asked to provide group/department level data from routine records and administrative systems.
4. Organisations then reviewed the summary statistics on self-report employee-level data in order to reconcile this with summary statistics on group-level archival data and to review any special circumstances that need to be considered.
Data collection methods and protocols were established by agreement with each of the collaborating organisations. All collaborating organisations each reviewed the questionnaire and obtained organisational approval to participate in the study.

Organisations were given some flexibility to make small changes to the questionnaire package. One organisation requested two additional questions to be included in the package, one to enable analysis by different named departments and one to collect data on smoking status. One organisation requested an additional question to identify which of the 11 sites employees were based at. One organisation requested the removal of the question on income, as it was considered this might reduce response rates overall. One organisation requested some changes to the demographics section and also requested a new supplementary section (16 questions) on health attitudes be added.

Data for one organisation were collected during October 2008; the organisation’s Group Occupational Health Physician conducted a health seminar for all employees in groups of 40-50 employees at a time over two days. At the end of each seminar employees were invited to complete the paper version of the questionnaire and given the choice to complete there and then and return, or to take away and return. Employees were also given the opportunity to complete the web-based questionnaire.

For the other 6 organisations data were collected between October 2008 and February 2009. Web-based data capture was used for these organisations. Employees were contacted directly by e-mail from each collaborating organisation, containing a brief description of the project, a statement on why it was considered important to the organisation and an embedded hyperlink to the web-based version of the questionnaire. Employees were given 2 or 3 weeks to complete the questionnaire; one interim reminder e-mail was sent.

7.2.2.1 Data management

Paper-based questionnaire data were manually entered into a spreadsheet (Microsoft Excel 2000) for data management and then imported into a statistical package (SPSS for
Windows student version 16) for analysis. To check for data entry errors a random sub sample was crosschecked for accuracy. Web-based questionnaire data were downloaded from the secure website in spreadsheet format (Microsoft Excel 2000), subjected to the data management process and then imported into a statistical package (SPSS for Windows student version 16) for analysis.

The data management process primarily involved checks that free text data entry were within plausible ranges as far as the employer could assess; and preparing the dataset for data analysis. A data management spreadsheet was used to document all data transformation and coding rules, as well as the quality and consistency checks applied to each variable. In general no imputation rules were applied for missing data, and these were excluded from the analysis. However, for the income variable, where data were missing the group mean was used as an imputed value. The number of respondents with missing data for the income question was very low and as follows: organisation A (19), organisation C (5), organisation D (6), organisation E (11), organisation F (4) and organisation G (0). For one organisation (B) that preferred not to collect income data from employees, values were imputed by job type based on data from the other 6 organisations. Clearly if data are skewed mean values may not be the best measure of central tendency, however with cost data it has been argued that mean values have more relevance and meaning to decision-makers than median or mode cost (Briggs and Gray, 1999).

The data management process to convert raw data from employee responses to questions on workloss, job satisfaction, organisational commitment, health status and the working environment is outlined below.

7.2.2.1.1 Data management for workloss
The HPQ instrument produces estimates for absenteeism in terms of workloss hours within the past 4 weeks based on questions in Table 7-2.
Table 7-2: HPQ questions to estimate absenteeism

<table>
<thead>
<tr>
<th></th>
<th>Question</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>About how many hours altogether did you work in the past 7 days?</td>
</tr>
<tr>
<td>2</td>
<td>How many hours does your employer expect you to work in a typical 7-day week? -If it varies, estimate the average</td>
</tr>
<tr>
<td>3a</td>
<td>In the past 4 weeks (28 days), how many days did you miss an entire workday because of problems with your physical or mental health? -Please include only days missed for your own health, not someone else's health</td>
</tr>
<tr>
<td>3b</td>
<td>In the past 4 weeks (28 days), how many days did you miss an entire workday for any other reason (including holiday)?</td>
</tr>
<tr>
<td>3c</td>
<td>In the past 4 weeks (28 days), how many days did you miss part of a workday because of problems with your physical or mental health? -Please include only days missed for your own health, not someone else's health</td>
</tr>
<tr>
<td>3d</td>
<td>In the past 4 weeks (28 days), how many days did you miss part of a workday for any other reason (including holiday)?</td>
</tr>
<tr>
<td>3e</td>
<td>In the past 4 weeks (28 days), how many days did you come in early, go home late, or work on your day off?</td>
</tr>
<tr>
<td>4</td>
<td>About how many hours altogether did you work in the past 4 weeks (28 days)? (For example, 40 hours per week for 4 weeks = 160 hours; 35 hours per week for 4 weeks = 140 hours.) - Round to the nearest hour</td>
</tr>
</tbody>
</table>

Where all HPQ questions are included, three measures can be derived using either a 4-week or 7-day recall period. Developers of the HPQ recommend using the four-week estimates, as these tend to smooth out any up or down spikes that might have occurred in any given week. However, it is recommend that both measures should be included as it is acknowledged that some employees find it harder to estimate the number of hours worked in a four-week period. Inclusion of both also allows for some consistency checks to be performed. The three standard measures are absolute absenteeism, relative absenteeism and relative hours of work.

4-week absolute absenteeism is calculated as simply the difference between reported employer expected hours in 7 days (multiplied by 4) and reported actual hours worked in past 4 weeks as in Equation 2:
Equation 2

\[ 4 \times (\text{response to question 2}) - (\text{response to question 4}) \]

It is important to note that this measure includes time away from work for any reason, including holidays and agreed absences, this measure is designed to deal with the issue of employees using annual leave when actually sick. Absolute absenteeism is expressed in raw hours, with a negative lower bound (in cases where employee works more than expected) and an upper bound equal to the number of hours the employee is expected to work.

4-week relative absenteeism is calculated simply as the proportion of expected hours that an employee is absent as Equation 3:

Equation 3

\[ \frac{(4\text{-week absolute absenteeism})}{4 \times (\text{response to question 2})} \]

Relative absenteeism ranges between a negative number (in cases where employee works more than expected) and 1.0 (always absent).

4-week relative hours of work is calculated simply as the proportion of expected hours that an employee reports actually worked in past 4 weeks as Equation 4:

Equation 4

\[ \frac{(\text{response to question 4})}{4 \times (\text{response to question 2})} \]

Relative hours of work score plus relative absenteeism score must sum to 1.0.

A further measure can be used to estimate absenteeism hours specifically due to problems with physical or mental health, assuming eight hours per day lost and four hours per part day lost, as Equation 5:

Equation 5

\[ 8 \times (\text{response to question 3a}) + 4 \times (\text{response to question 3c}) \]
Question 3 in Table 7-2 is not used directly in calculating absenteeism using the HPQ method; instead it is used as a ‘prequest’ technique, priming the employee to give more accurate information than otherwise to question 4 (Kessler et al. 2003). Developers of the HPQ acknowledge that question 4 is consciously designed to be difficult to answer and that the objective is to force employees into thinking carefully about their response to this question.

The HPQ also produces estimates for decreased on-the-job performance or presenteeism, based on the questions presented in Table 7-3 and this can be presented in terms of work loss hours within the past 4 weeks. The HPQ presenteeism section has two multi-part questions; the first question prepares the employee by asking them to think about the proportion of time at work (on a 5 point scale) that their relative or absolute performance may be at different levels; the second question requires the employee to indicate overall performance for themselves and peers.

Table 7-3: HPQ questions to estimate presenteeism

| 1a | How often was your performance higher than most workers on your job? |
| 1b | How often was your performance lower than most workers on your job? |
| 1c | How often did you do no work at times when you were supposed to be working? |
| 1d | How often did you find yourself not working as carefully as you should? |
| 1e | How often was the quality of your work lower than it should have been? |
| 1f | How often did you not concentrate enough on your work? |
| 1g | How often did health problems limit the kind or amount of work you could do? |
| 2a | The usual performance of most workers in a job similar to yours? |
| 2b | Your usual job performance over the past year or two? |
| 2c | Your overall job performance on the days you worked during the past 4 weeks (28 days)? |

Kessler et al. (2003) state that simple scoring of self-reported performance is the only approach available in the absence of objective benchmark data, hence it is assumed that responses on the 0-10 scale in questions 2a, 2b and 2c indicate percent performance. 4-week absolute presenteeism is calculated as in Equation 6:
Equation 6

\[10x(response\ to\ question\ 2c)]\]

Absolute presenteeism has a lower bound of zero (total lack of performance during time on the job) and an upper bound of 100% (no lack of performance during time on the job).

Relative presenteeism can also be calculated as the ratio of the actual performance to the stated performance of most workers doing a similar job as Equation 7:

Equation 7

\[((response\ to\ question\ 2c))/(response\ to\ question\ 2a)\]

The distribution of relative presenteeism is normally restricted to the range 0.25 to 2.0, so the worst relative performance is 25% of other workers’ performance and the best performance is 200% of other workers’ performance.

Two consistency checks are used for the self-report absence estimates. First, an internal consistency measure compares the aggregate hours worked with the components: contracted hours, workloss and adjustments, as Equation 8:

Equation 8

\[(4\ week\ actual\ hours\ worked) - (4 \times \text{expected}\ weekly\ hours) - (8\text{hours}\ \times\ \text{sick}\ \text{days}) - (8\text{hours}\ \times\ \text{days\ off}) - (4\text{hours}\ \times\ \text{half\ days\ sick}) - (4\text{hours}\ \times\ \text{half\ days\ off}) + (4\text{hours}\ \times\ \text{days\ come\ in\ early/leave\ late})\]

In cases where this internal consistency calculation generates large numbers this suggests inconsistency between data provided for the number of expected hours, estimates of hours worked and estimates of time away from work. Large negative numbers for this consistency statistic suggest:

- Missing data for the 4-week actual hours worked estimate.
- Underestimate or errors in the 4-week actual hours worked estimate: too low given other data. Examples of this are where the employee reports
contracted hours and do not include stated overtime hours, or reports weekly hours not monthly hours.

- Overestimate or errors in estimates of time away from work.
- Overestimates or errors in estimates of the amount of ‘overtime’ days.

Large positive numbers for this consistency statistic suggest:

- Underestimate or errors in estimates of time away from work (too low) missing or not reported.
- Overestimate or errors in the 4-week actual hours worked estimate (too high), so this does not account for the stated estimates of time away from work. Example of this is where the employee reports 4-week contracted hours as actual hours worked despite reporting time away from work.

A second external consistency check is also used. Self-report estimates of actual sickness absence time within the past 4-week period, reported as whole or part days and converted to hours using Equation 5, are compared with sickness absence rates reported by employers using routine administrative systems within each organisation, ideally for the same employee cohort or at least a larger group of employees which included this cohort.

Overall workloss hours are calculated as the sum of absence hours (using either Equation 2 or Equation 5) and presenteeism hours (by applying the result from Equation 6 to the number of contracted hours for the 4-week period). For each organisation participating in this study all standard HPQ measures, absolute absenteeism, relative absenteeism and relative hours of work, are reported.

Analysis of workloss costs and correlation with other variables in this study is based on absence hours calculated using Equation 5, because this measure focuses more specifically on sickness absence rather than the broader concept of time away from work for any reason. Furthermore, as expected data for questions 3a and 3c in Table 7-2 were more complete than for question 4. Question 4 had more missing data per se, but also
after review of internal consistency (Equation 8) had further cases excluded from this analysis.

To calculate a simple cost per hour estimate, annual income is converted to weekly income (divided by 52) and then divided by the contracted hours per week. The unadjusted cost or workloss estimate is simply the number of workloss hours multiplied by the cost per hour.

7.2.2.1.2 Data management for adjusted workloss

Table 7-4 shows the questions included in the employee questionnaire for availability of substitutes (AS), time sensitivity of work (TS) and level of team production (TP).

To facilitate more realistic costing of the impact of workloss on an organisation, workloss time was weighted in light of reported levels of AS, TS and TP. Table 7-5 shows how a simple multiplier was calculated by using estimates from Pauly et al. (2008) on the probability that an episode of absence or presenteeism (for an acute condition) has no effect on output, and the probability an episode totally shuts down the team’s or department’s output. Through personal communication with the authors further probabilities were also obtained: the probability an episode has a minor effect on output and the probability an episode has a moderate effect on output.

Baseline probability is for a job with the least restrictive characteristics (AS=1, TS=1 and TP=1), each deviation from this profile shows the marginal change on the probability of effect in question. For example, using this method a job profile with AS=2, TS=2 and TP=2 has a probability that an episode of absence will have no effect on output calculated as: [63.5% - 11.3% - 10.7% - 14.6% = 26.9%], where 63.5% is the baseline probability, minus 11.3% is the decrement in probability due to AS, minus 10.7% is the decrement in probability due to TS and minus 14.6% is the decrement in probability due to TP.

Arbitrary weights are attached to the definition of minor and moderate effect on output of 90% and 50% production, respectively. Complete shutdown is equated to zero.
production and no effect on output to 100% production. The expected value of the impact of workloss with different job profiles can then be estimated.

The various permutations of levels for AS, TS and TP reported by each employee in the empirical study were assigned an overall multiplier for absent time and an overall multiplier for presenteeism time based on the expected values column in Table 7-5. These multipliers are used to adjust workloss time and generate the adjusted cost of workloss analysis.

Table 7-4: questions to adjust cost of workloss estimates

<table>
<thead>
<tr>
<th></th>
<th>Question</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>How easy is it to have a colleague or an outside temp worker pick up the most important responsibilities of your job if you were at work but less than well?</td>
</tr>
<tr>
<td>2</td>
<td>How easy is it to have a colleague or an outside temp worker pick up the most important responsibilities of your job if you were absent from work for the entire day due to illness?</td>
</tr>
<tr>
<td>3</td>
<td>If you miss time from work due to illness to what extent are sales lost or important deadlines missed?</td>
</tr>
<tr>
<td>4</td>
<td>To what extent can your team / colleagues function if you are absent due to illness?</td>
</tr>
</tbody>
</table>
Table 7.5: Calculation of simple work-loss multipliers to adjust for effect of availability of substitutes (AS), time sensitivity (TS) and team production (TP). Based on Pauly et al. (2008)

<table>
<thead>
<tr>
<th>Effect on output:</th>
<th>Absence</th>
<th>Presenteeism (acute)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Baseline probability:</td>
<td>63.5</td>
<td>78.6</td>
</tr>
<tr>
<td>AS</td>
<td>1</td>
<td>6.93</td>
</tr>
<tr>
<td>2</td>
<td>-11.3</td>
<td>10.35</td>
</tr>
<tr>
<td>3</td>
<td>-22.7</td>
<td>14.69</td>
</tr>
<tr>
<td>4</td>
<td>-28.6</td>
<td>17.52</td>
</tr>
<tr>
<td>5</td>
<td>-19.5</td>
<td>13.34</td>
</tr>
<tr>
<td>TS</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>2</td>
<td>-10.7</td>
<td>-2.8</td>
</tr>
<tr>
<td>3</td>
<td>-13.1</td>
<td>-7.1</td>
</tr>
<tr>
<td>4</td>
<td>-18.4</td>
<td>12.90</td>
</tr>
<tr>
<td>5</td>
<td>-11.1</td>
<td>10.29</td>
</tr>
<tr>
<td>TP</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>2</td>
<td>-14.6</td>
<td>-21</td>
</tr>
<tr>
<td>3</td>
<td>-22.6</td>
<td>-25.7</td>
</tr>
<tr>
<td>4</td>
<td>-41.3</td>
<td>-44.5</td>
</tr>
<tr>
<td>5</td>
<td>-26.1</td>
<td>-35.6</td>
</tr>
<tr>
<td>Output weighting</td>
<td>1</td>
<td>1</td>
</tr>
</tbody>
</table>

7.2.2.1.3 Data management for explanatory variables

The general health questionnaire (GHQ-12) comprises 12 items, 6 items are positively phrased and six items are negatively phrased. Each item has four response options. There is ongoing debate about how the GHQ-12 should be scored and whether coding should take account of negative phrasing (Hankins, 2008). Item scores were coded according to 2 different methods: Likert method (all items coded 0-1-2-3), and the GHQ methods (all items coded 0-0-1-1). For practical reasons this study chose not to use the other two possible coding methods: Modified Likert method (all items coded 0-0-1-2) or the C-GHQ method (positive items coded 0-0-1-1, negative items coded 0-1-1-1).
Job satisfaction overall score and sub-components: intrinsic, extrinsic and social job satisfaction are scored as the mean of the individual questions that make up each component. Partial missing data within a component was allowed and a mean score was still calculated, missing data for a whole component was not allowed and these cases were not included in the analysis of these measures.

Organisational commitment overall score and sub-components: identification, involvement and loyalty are scored as the sum of the individual questions that make up each component, with three questions reverse scored. Partial missing data was not allowed, cases with missing data were not included in the analysis of these measures.

HSE management standards indicator overall score and sub-components: demands, control, managerial support, peer support, relationships, role and change are scored as the mean of the individual questions that make up each component, with twelve questions reverse scored. Partial missing data within a component was allowed and a mean score was still calculated, missing data for a whole component was not allowed and these cases were not included in the analysis of these measures.

To facilitate analysis of data on pre-existing health conditions 4 new variables were created. The HPQ uses categorical coding for 28 specified health conditions, as follows:

1) No, don’t have this condition
2) Yes, but never received professional treatment
3) Yes, previously (but don’t currently receive) professional treatment
4) Yes, currently receiving professional treatment

A dummy variable was created as a simple indicator of prevalence of each health condition with the HPQ category 1 coded as =0 and the categories 2,3 and 4 coded as =1. A continuous variable was also created to indicate the extent of co-morbidity, this was
simply the sum of all 28 scores for the dummy variable prevalence. A dummy variable for the presence of co-morbidities (more than one pre-existing condition) was also created. A further dummy variable was created to reduce HPQ categories 2, 3 and 4 into a dichotomous response of not currently treated (=0) and currently treated (=1).

HPQ physical health score was calculated simply as the mean of all 11 questions in this component. HPQ mental health score was calculated simply as the mean of all 6 questions in this component.

7.2.2.2 Data analysis

Data analysis consisted of 3 phases:

i) Production of summary level descriptive statistics;

ii) Bivariate analysis of correlation between the workloss parameters of interest and individual explanatory variables included in the study;

iii) Multivariate regression analysis.

Summary level descriptive statistics were generated and an initial draft report provided to each participating organisation. This analysis provides each organisation with estimates for the absolute levels of each measure included in the study, for comparison with existing information. This analysis also provides each organisation with the relative levels of each measure via benchmarking with the other organisations participating in the study.

The variable of primary interest in this study is the estimated cost of workloss. Cost data are usually positively skewed with variability increasing as the mean cost increases (Diehr et al., 1999). The standard solution for analysis of skewed cost data is logarithmic transformation (Briggs and Gray, 1998), (Coyle, 1996), (Rascati et al., 2001), (Rutten-van Molken et al., 1994) and then analysis using conventional parametric statistics. Data for unadjusted cost of workloss, adjusted cost of workloss as well as number of workloss
hours were transformed by taking natural logs. More symmetrical and normal distribution was approximated after logarithmic transformation.

Bivariate analysis of correlation between (log transformed) unadjusted cost of workloss, adjusted cost of workloss and number of workloss hours and individual explanatory variables included in the study was conducted. The objective of this analysis is to demonstrate which variables are observed to be significantly and independently correlated with the workloss variables of interest, as well as the strength of this correlation. Pearson's product-moment correlation coefficient, \( r \), is used as a measure of correlation. Cohen (1992) has suggested what constitutes a large and small effect:

\[
\begin{align*}
    r = \pm 0.10 & \text{ (small effect), the effect explains 1\% of the total variance} \\
    r = \pm 0.30 & \text{ (medium effect), the effect accounts for 9\% of the total variance} \\
    r = \pm 0.50 & \text{ (large effect), the effect accounts for 25\% of the total variance}
\end{align*}
\]

Data were analysed for each individual organisation separately and then as a single pooled dataset.

The rationale for regression model structure in sickness absence research has been that Poisson distributions are a natural choice for modelling count data such as number of sickness episodes per year (Roelen et al., 2008), (Cameron and Trivedi, 1998) whilst logistic regression models have been used to compare characteristics of employees with zero absences and any positive number of absences (Bockerman and Illmakunnas, 2008). Log-linear models are commonly used in regression models with cost as the dependent variable (Manning, 1998). There has been discussion in the literature about the limitations of the simple logarithmic transformation for cost prediction models, as back transformation (to a true monetary scale) has been demonstrated to not always be a simple matter of exponentiation. The back transformation techniques such as Duan's smearing estimate (Duan, 1983) and the method developed by Zhou (Zhou et al., 2001) focus specifically on models with heteroscedasticity. There has also been some interest in
applying generalised linear models (GLM) to analysis of cost data (Blough et al., 1999),
(Manning and Mullahy, 2001).

For this study, multivariate ordinary least square (OLS) regression models were fitted to
the data, with (log transformed) unadjusted cost of work loss, adjusted cost of work loss
or work loss hours as the dependent variable. The primary objective of these models was to
demonstrate possible correlates of work loss costs and to show the relative effect that
different employee metrics may have rather than to construct a predictive model of the
total cost of work loss. Hence the interpretation of individual specific regression
coefficients is of primary interest, rather than estimation of cost of work loss per se. For
this study issues of transformation or interpretation are focussed on the meaning of the
parameter coefficient in a log-linear model.

Log-linear models fitted to the data were assessed for compliance with basic underlying
assumptions. All variables included in the OLS regression are assumed to be continuous
linear measures or are dummy variables (categorical measures with zero or 1 outcome).
The predictors in the models all had some variation in value, that is, all had non-zero
variance. The Durban-Watson statistic, to test for serial correlation, was consistently
close to 2 for all models suggesting the assumption of independent errors is tenable. To
test the assumption of homoscedasticity, that is, at each level of a predictor variable, the
variance of the residuals should be constant, standardised residuals were plotted against
standardised predicted values from the model. Fig 7-2 suggests that assumptions of
linearity and homoscedasticity are met as data are randomly dispersed around zero (with
the few zero cost of work loss values separated from this cluster). Had points on this
graph formed more of a funnel shape, becoming more spread out across the graph
(increasing variance across the residuals) then heteroscedasticity would be present.
The homoscedasticity assumption directly impacts the data analysis plan, because the interpretation of regression coefficients in a log-linear model with homoscedasticity has been well established in the econometrics literature (Halvorsen and Palmquist, 1980), (Gujarati, 1995), (Greene, 2003). Equation 9 shows the derivation of how $\beta$, the regression coefficient for any given predictor, represents the proportional change in $Y$ for a unit change in $X$ in a log-linear model.
Equation 9

\[
\begin{align*}
\ln Y &= \alpha + \beta X + \mu \\
\frac{d \ln Y}{dx} &= \beta, \text{ but } d \ln Y = dY / Y \\
\frac{dY}{Y \ dx} &= \beta
\end{align*}
\]

For example, if \( \beta = 0.3 \), then a unit change in \( X \) is associated with a 30% change in \( Y \).

The relationships between estimated cost of workloss and job satisfaction, organisational commitment, intention-to-turnover, HSE Management Standards Indicators and health status were analysed using multiple log-linear regression (ENTER) in SPSS for windows (version 16), controlling for age, gender, number of children, time in job, time in organisation, number of supervisees, income, number of sickness absence hours and number of presenteeism hours. These regression models were repeated with estimates for adjusted cost and self-reported workloss hours as the dependent variable. Goodness of model fit was assessed first based on all variables with a theoretical rationale for correlation with cost of workloss included and then with removal of non-significant variables.

All models were fitted to data from each organisation (except one, organisation G, due to low numbers) as well as a pooled dataset combining data from the 6 different organisations. For the individual organisation models the top ten most frequently reported untreated existing conditions were included as dummy variables. For the pooled data models existing health states were characterised only as the number of co-morbidities (one continuous variable and one dummy variable).

Statistical advice was provided by University of Loughborough Department of Mathematics and Statistics advisory service.
7.3 Results

7.3.1 Study sample

Seven organisations were recruited to participate in this study.

Organisation A is a utility services and environmental solutions company, the world's fourth largest privately owned water company, serving over 8 million customers across central regions of the UK. Organisation A employs around 5,000 people in UK. The customer service call centres based in the UK were selected to participate in this study.

Organisation B is involved in the brewery industry specifically the manufacture, sales and marketing of beers and ciders. Organisation B has approximately 4,500 employees in the UK and has recently become part of a larger group. The sales and marketing group based in the UK were selected to participate in this study.

Organisation C is a business services provider with particular interest in employee health and well-being. Organisation C is the UK's leading provider of HR and payroll services, flexible benefits and employee assistance programmes (EAP). In the UK organisation C has 800 staff looking after 1.7 million employees and globally employs 9,500 people to look after over 25 million customers' employees on behalf of 110,000 businesses. A cross-section of UK staff were selected to participate in this study.

Organisation D is a manufacturing company; principal activities are the manufacture of autocatalysts, heavy-duty diesel catalysts and pollution control systems, catalysts and components for fuel cells, catalysts and technologies for chemical processes, fine chemicals, chemical catalysts and active pharmaceutical ingredients and the marketing, refining, and fabrication of precious metals. Organisation D has operations in over 30 countries and employs around 8,700 people. Three organisation D business units were selected to participate in the study.
Organisation E is a large global pharmaceutical company, involved in research and development, manufacture, sales and marketing of pharmaceutical products. Organisation E employs around 60,000 people globally. A department in the UK was selected to participate in this study; this department is responsible for information management of drug development projects.

Organisation F is a National Health Service (NHS) Authority responsible for making sure that health services in this English region are fit for purpose, well planned, high quality and meets all Department of Health targets. The NHS in this region employs around 77,000 staff. All staff employed by organisation F were invited to participate in this study.

Organisation G is a small research organisation involved in research, policy work and analysis to improve practice and influence policy in mental health as well as public services. Organisation G employs 25 people, all were invited to participate in this study.

In total 1,504 employee responses to the questionnaire package were received. Table 7-6 details the number of responses for each organisation as well as the response rates. Given the number and types of questions included in the questionnaire package, response rates in the range of 50-60% were considered good.

Table 7-6: Questionnaire response rates

<table>
<thead>
<tr>
<th>Organisation</th>
<th>Number of Employees Sent Survey</th>
<th>Number of Responses</th>
<th>% Response rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>980</td>
<td>586</td>
<td>60%</td>
</tr>
<tr>
<td>B</td>
<td>850</td>
<td>426</td>
<td>50%</td>
</tr>
<tr>
<td>C</td>
<td>400</td>
<td>177</td>
<td>44%</td>
</tr>
<tr>
<td>D</td>
<td>260</td>
<td>148</td>
<td>57%</td>
</tr>
<tr>
<td>E</td>
<td>150</td>
<td>77</td>
<td>51%</td>
</tr>
<tr>
<td>F</td>
<td>100</td>
<td>77</td>
<td>77%</td>
</tr>
<tr>
<td>G</td>
<td>25</td>
<td>14</td>
<td>56%</td>
</tr>
</tbody>
</table>
Basic characteristics of these samples are presented in Table 7-7. The continuous variables presented here (age, number of children, time in organisation, time in job, income and number of supervisees) as well as the binary categorical variable (gender) are included in the subsequent regression models.
Table 7-7: Sample characteristics

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
<th>F</th>
<th>G</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>n=586</td>
<td>n=426</td>
<td>n=177</td>
<td>n=148</td>
<td>n=77</td>
<td>n=77</td>
<td>n=14</td>
</tr>
<tr>
<td>Gender</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>39.2%</td>
<td>69.7%</td>
<td>41.8%</td>
<td>80.4%</td>
<td>39%</td>
<td>26%</td>
<td>21.4%</td>
</tr>
<tr>
<td>Female</td>
<td>59.0%</td>
<td>30.3%</td>
<td>57.1%</td>
<td>19.6%</td>
<td>61%</td>
<td>72.7%</td>
<td>78.6%</td>
</tr>
<tr>
<td>Marital Status</td>
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<td></td>
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<tr>
<td>Married / Cohabiting</td>
<td>48.0%</td>
<td>77.5%</td>
<td>68.4%</td>
<td>76.6%</td>
<td>70.1%</td>
<td>74.0%</td>
<td>64.3%</td>
</tr>
<tr>
<td>Separated</td>
<td>4.1%</td>
<td>2.1%</td>
<td>3.4%</td>
<td>2.1%</td>
<td>2.6%</td>
<td>3.9%</td>
<td>7.1%</td>
</tr>
<tr>
<td>Divorced</td>
<td>4.9%</td>
<td>4.0%</td>
<td>2.8%</td>
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<td>5.2%</td>
<td>7.8%</td>
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<tr>
<td>Widowed</td>
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<td>0%</td>
<td>0.6%</td>
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<td>0%</td>
<td>0%</td>
<td>0.7%</td>
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<tr>
<td>Never Married</td>
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<td>15.2%</td>
<td>22.1%</td>
<td>11.7%</td>
<td>28.6%</td>
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<td>Full-time Permanent</td>
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<td>93.7%</td>
<td>89.3%</td>
<td>96.5%</td>
<td>84.4%</td>
<td>74.0%</td>
<td>42.9%</td>
</tr>
<tr>
<td>Part-time Permanent</td>
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<td>5.9%</td>
<td>7.9%</td>
<td>3.5%</td>
<td>6.5%</td>
<td>2.6%</td>
<td>14.3%</td>
</tr>
<tr>
<td>Job-Share</td>
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<td>-</td>
<td>-</td>
<td>-</td>
<td>9.1%</td>
<td>1.3%</td>
<td>-</td>
</tr>
<tr>
<td>Fixed term contract</td>
<td>1.5%</td>
<td>0.2%</td>
<td>1.7%</td>
<td>-</td>
<td>13.0%</td>
<td>42.9%</td>
<td></td>
</tr>
<tr>
<td>Education</td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CSE or equivalent</td>
<td>12.3%</td>
<td>2.8%</td>
<td>3.4%</td>
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<td>0%</td>
<td>1.3%</td>
<td>0%</td>
</tr>
<tr>
<td>O-Level or equivalent</td>
<td>28.0%</td>
<td>24.9%</td>
<td>23.2%</td>
<td>21.1%</td>
<td>5.2%</td>
<td>5.2%</td>
<td>7.1%</td>
</tr>
<tr>
<td>A-Level or equivalent</td>
<td>28.3%</td>
<td>24.2%</td>
<td>18.1%</td>
<td>22.5%</td>
<td>3.9%</td>
<td>14.3%</td>
<td>0%</td>
</tr>
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<td>Degree</td>
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<td>37.6%</td>
<td>33.3%</td>
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<td>35.7%</td>
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<td>Post-grad</td>
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<td>39%</td>
<td>41.6%</td>
<td>57.1%</td>
</tr>
<tr>
<td>Vocational</td>
<td>3.8%</td>
<td>2.1%</td>
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<td>No formal qualifications</td>
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<td>Job Type</td>
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<tr>
<td>Executive or Senior Manager</td>
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<td>8.7%</td>
<td>2.3%</td>
<td>4.3%</td>
<td>5.2%</td>
<td>16.9%</td>
<td>28.6%</td>
</tr>
<tr>
<td>Professional</td>
<td>8.7%</td>
<td>11.5%</td>
<td>35.6%</td>
<td>15.1%</td>
<td>62.3%</td>
<td>32.5%</td>
<td>28.6%</td>
</tr>
<tr>
<td>Technical Support</td>
<td>8.9%</td>
<td>0.9%</td>
<td>6.2%</td>
<td>11.5%</td>
<td>9.1%</td>
<td>1.3%</td>
<td>7.1%</td>
</tr>
<tr>
<td>Sales</td>
<td>4.3%</td>
<td>54.2%</td>
<td>5.6%</td>
<td>8.6%</td>
<td>0%</td>
<td>0%</td>
<td>0%</td>
</tr>
<tr>
<td>Clerical &amp; Administrative Support</td>
<td>58.3%</td>
<td>7.3%</td>
<td>23.2%</td>
<td>6.5%</td>
<td>5.2%</td>
<td>32.5%</td>
<td>7.1%</td>
</tr>
<tr>
<td>Service Occupation</td>
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<td>0%</td>
<td>0%</td>
<td>7.2%</td>
<td>0%</td>
<td>1.3%</td>
<td>0%</td>
</tr>
<tr>
<td>Precision Production &amp; Crafts Worker</td>
<td>0.9%</td>
<td>0%</td>
<td>0%</td>
<td>25.2%</td>
<td>0%</td>
<td>0%</td>
<td>0%</td>
</tr>
<tr>
<td>Operator or Labourer</td>
<td>1.5%</td>
<td>0.2%</td>
<td>0.6%</td>
<td>21.6%</td>
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</table>
### Table 7-7 cont’d

<table>
<thead>
<tr>
<th>Age (years)</th>
<th>A (n=586)</th>
<th>B (n=426)</th>
<th>C (n=177)</th>
<th>D (n=148)</th>
<th>E (n=77)</th>
<th>F (n=77)</th>
<th>G (n=14)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean</td>
<td>32.89</td>
<td>39.65</td>
<td>37.36</td>
<td>43.36</td>
<td>37.67</td>
<td>42.65</td>
<td>37.07</td>
</tr>
<tr>
<td>Min</td>
<td>17</td>
<td>20</td>
<td>19</td>
<td>19</td>
<td>21</td>
<td>22</td>
<td>26</td>
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<td>Max</td>
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<td>64</td>
<td>63</td>
<td>64</td>
<td>61</td>
<td>62</td>
<td>59</td>
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</table>

<table>
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<tr>
<th>Number of Children</th>
<th>0</th>
<th>58.4%</th>
<th>39.9%</th>
<th>57.1%</th>
<th>34%</th>
<th>35%</th>
<th>42.9%</th>
<th>42.9%</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1</td>
<td>14.2%</td>
<td>15.5%</td>
<td>14.7%</td>
<td>17%</td>
<td>10%</td>
<td>14.3%</td>
<td>28.6%</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>17.9%</td>
<td>34%</td>
<td>16.4%</td>
<td>31%</td>
<td>27%</td>
<td>33.8%</td>
<td>28.6%</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>5.5%</td>
<td>8.9%</td>
<td>8.5%</td>
<td>12%</td>
<td>4%</td>
<td>3.9%</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>4</td>
<td>1.0%</td>
<td>0.9%</td>
<td>1.1%</td>
<td>4%</td>
<td>1%</td>
<td>3.9%</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>4+</td>
<td>0.5%</td>
<td>0.7%</td>
<td>1.1%</td>
<td>1%</td>
<td>-</td>
<td>1.3%</td>
<td>-</td>
</tr>
<tr>
<td>Mean</td>
<td>0.75</td>
<td>1.18</td>
<td>0.84</td>
<td>1.40</td>
<td>1.04</td>
<td>1.16</td>
<td>0.86</td>
<td></td>
</tr>
<tr>
<td>Standard Deviation</td>
<td>1.06</td>
<td>1.12</td>
<td>1.16</td>
<td>1.26</td>
<td>1.07</td>
<td>1.21</td>
<td>0.86</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Time in organisation</th>
<th>Mean (years)</th>
<th>5.53</th>
<th>9.46</th>
<th>6.45</th>
<th>11.72</th>
<th>9.06</th>
<th>3.73</th>
<th>2.18</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Standard Deviation</td>
<td>6.05</td>
<td>8.11</td>
<td>7.70</td>
<td>9.31</td>
<td>7.76</td>
<td>4.96</td>
<td>1.82</td>
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</table>

<table>
<thead>
<tr>
<th>Time in job</th>
<th>Mean (years)</th>
<th>2.27</th>
<th>4.02</th>
<th>3.64</th>
<th>8.16</th>
<th>3.78</th>
<th>2.42</th>
<th>1.89</th>
</tr>
</thead>
<tbody>
<tr>
<td>Standard Deviation</td>
<td>2.12</td>
<td>4.88</td>
<td>5.08</td>
<td>7.07</td>
<td>3.43</td>
<td>3.30</td>
<td>1.35</td>
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</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Income</th>
<th>Mean</th>
<th>£17,606</th>
<th>£30,621</th>
<th>£30,828</th>
<th>£28,960</th>
<th>£45,500</th>
<th>£38,459</th>
<th>£37,500</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Standard Deviation</td>
<td>£9,072</td>
<td>£5,301</td>
<td>£15,342</td>
<td>£11,277</td>
<td>£16,060</td>
<td>£18,886</td>
<td>£17,431</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Number supervised</th>
<th>Mean (FTE)</th>
<th>3.2</th>
<th>1.72</th>
<th>2.07</th>
<th>2.71</th>
<th>2.0</th>
<th>3.42</th>
<th>0.82</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Standard Deviation</td>
<td>10.5</td>
<td>4.81</td>
<td>5.2</td>
<td>8.08</td>
<td>4.81</td>
<td>15.43</td>
<td>1.54</td>
</tr>
</tbody>
</table>

### 7.3.2 Workloss

Self-reported sickness absence rates are found to be higher than rates provided by employers (Table 7-8). This is consistent with experience in some organisations that not all absence is routinely recorded. Indeed, only one of the participating organisations (D)
stated that they did believe that their recorded sickness absence data was sufficiently accurate. Employer-reported data is based on a larger cohort of employees than the self-report data and is an imputed monthly average based on a longer time period (e.g. most recent 12-month data available), hence seasonal variation may not be fully characterised in these employer-reported data. It is also plausible that an element of selection bias could be included in this study, where employees with most recent experience of sickness absence may perhaps be more inclined to respond to this voluntary questionnaire.

Table 7-8: Comparison of employee self-reported and employer-reported sickness absence rates

<table>
<thead>
<tr>
<th>Means</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
<th>F</th>
<th>G</th>
</tr>
</thead>
<tbody>
<tr>
<td>n=586</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>n=426</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Self-report sickness absence rate (days per employee per month) Standard error</td>
<td>0.83</td>
<td>0.31</td>
<td>0.33</td>
<td>0.59</td>
<td>0.84</td>
<td>0.60</td>
<td>0.27</td>
</tr>
<tr>
<td>0.12</td>
<td>0.06</td>
<td>0.11</td>
<td>0.18</td>
<td>0.40</td>
<td>0.27</td>
<td>0.19</td>
<td></td>
</tr>
<tr>
<td>Employer-reported sickness absence rate (days per employee per month)</td>
<td>0.813</td>
<td>0.008</td>
<td>0.06</td>
<td>0.34</td>
<td>0.53</td>
<td>0.09</td>
<td>0.10</td>
</tr>
<tr>
<td>Difference in means (significance)</td>
<td>0.017</td>
<td>0.302</td>
<td>0.27</td>
<td>0.25</td>
<td>0.31</td>
<td>0.51</td>
<td>0.17</td>
</tr>
<tr>
<td>NS = not significant</td>
<td>(NS)</td>
<td>(NS)</td>
<td>(NS)</td>
<td>(NS)</td>
<td>(NS)</td>
<td>(NS)</td>
<td>(NS)</td>
</tr>
</tbody>
</table>

A summary of the mean estimates for workloss, job satisfaction, organisational commitment, HSE management standards indicator scores, intention to quit and health status for each organisation is presented in Table 7-9. Mean self-reported sickness absence time for the previous 4-week period ranged from 2.16 hours (G) to 6.73 hours (E).

Workloss due to self-reported reduced performance whilst at work, so called presenteeism, was found to account for many more hours than workloss due to sickness absence. Mean self-reported presenteeism time for the previous 4-week period ranged from 27.85 (C) to 39.56 (G) hours. The ratio of presenteeism to absenteeism for four organisations (A, D, E, F) is within a range of 4.8 to 6.5. The remaining three
organisations in this study (B, C, G) are found to have a much higher ratio, where presenteeism hours are more than 10 times greater than sickness absence hours, each of these organisations reports a low level of sickness absence hours.

The unadjusted estimates of the mean cost of workloss per employee per month ranged from £338 (A) to £936 (E). Adjusted cost estimates, to account for availability of substitutes, time sensitivity and team production, were somewhat higher.

As expected the distribution of data for both workloss hours and the estimated cost of workloss was positively skewed. Table 7-10, Table 7-11 and Table 7-12 show that mean values are greater than median values, standard deviations are large relative to the mean values and the skewness statistics are greater than zero. The proportion of zero values, employees reporting no workloss in previous 4 weeks, was relatively low overall ranging from 3.1% (E) to 13.9% (D). As described in the data analysis section, to account for skewed distributions data for workloss hours, cost and adjusted cost of workloss were log transformed and analysed using parametric statistics.
Table 7-9: Summary of mean scores

<table>
<thead>
<tr>
<th></th>
<th>A(standard deviation)</th>
<th>B(standard deviation)</th>
<th>C(standard deviation)</th>
<th>D(standard deviation)</th>
<th>E(standard deviation)</th>
<th>F(standard deviation)</th>
<th>G(standard deviation)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>n=586</td>
<td>n=426</td>
<td>n=177</td>
<td>n=148</td>
<td>n=77</td>
<td>n=77</td>
<td>n=14</td>
</tr>
<tr>
<td><strong>Workloss</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4 week sick hours</td>
<td>6.65 (21.7)</td>
<td>2.47 (9.7)</td>
<td>2.67 (10.2)</td>
<td>4.69 (16.9)</td>
<td>6.73 (25.4)</td>
<td>4.79 (16.9)</td>
<td>2.16 (5.2)</td>
</tr>
<tr>
<td>4 week presenteeism hours</td>
<td>32.00 (21.3)</td>
<td>31.2 (21.5)</td>
<td>27.85 (18.1)</td>
<td>30.46 (29.3)</td>
<td>31.75 (16.9)</td>
<td>29.19 (20.9)</td>
<td>39.56 (19.7)</td>
</tr>
<tr>
<td>4 week unadjusted workloss cost</td>
<td>£338 (£287)</td>
<td>£501 (£361)</td>
<td>£524 (£466)</td>
<td>£510 (£606)</td>
<td>£936 (£665)</td>
<td>£655 (£620)</td>
<td>£888 (£422)</td>
</tr>
<tr>
<td>4 week adjusted workloss cost</td>
<td>£400 (£350)</td>
<td>£618 (£444)</td>
<td>£669 (£614)</td>
<td>£649 (£749)</td>
<td>£1200 (£886)</td>
<td>£847 (£834)</td>
<td>£1090 (£545)</td>
</tr>
<tr>
<td><strong>Job Satisfaction (1-5 Score)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Intrinsic job satisfaction</td>
<td>3.39 (0.95)</td>
<td>3.73 (0.80)</td>
<td>3.45 (0.97)</td>
<td>3.47 (0.95)</td>
<td>3.55 (0.83)</td>
<td>3.75 (0.79)</td>
<td>3.91 (0.93)</td>
</tr>
<tr>
<td>Extrinsic job satisfaction</td>
<td>3.12 (0.87)</td>
<td>3.24 (0.65)</td>
<td>3.03 (0.84)</td>
<td>3.53 (0.76)</td>
<td>3.45 (0.76)</td>
<td>3.46 (0.81)</td>
<td>3.48 (0.85)</td>
</tr>
<tr>
<td>Social job satisfaction</td>
<td>3.82 (0.86)</td>
<td>4.00 (0.68)</td>
<td>4.10 (0.78)</td>
<td>3.55 (0.98)</td>
<td>4.01 (0.59)</td>
<td>3.80 (0.82)</td>
<td>3.73 (0.96)</td>
</tr>
<tr>
<td>Overall job satisfaction</td>
<td>3.44 (0.71)</td>
<td>3.66 (0.56)</td>
<td>3.53 (0.71)</td>
<td>3.52 (0.70)</td>
<td>3.67 (0.53)</td>
<td>3.67 (0.59)</td>
<td>3.71 (0.60)</td>
</tr>
<tr>
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<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Organisational identification (3-21 score)</td>
<td>14.75 (3.80)</td>
<td>17.43 (2.95)</td>
<td>15.10 (3.95)</td>
<td>15.32 (3.90)</td>
<td>15.58 (4.07)</td>
<td>16.57 (3.09)</td>
<td>16.36 (2.87)</td>
</tr>
<tr>
<td>Organisational involvement (3-21 score)</td>
<td>16.49 (3.08)</td>
<td>18.22 (2.22)</td>
<td>17.19 (2.27)</td>
<td>16.76 (3.26)</td>
<td>16.97 (3.06)</td>
<td>18.34 (2.17)</td>
<td>18.09 (2.12)</td>
</tr>
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<td>Organisational loyalty (3-21 score)</td>
<td>12.75 (4.13)</td>
<td>14.74 (3.79)</td>
<td>12.70 (4.30)</td>
<td>13.35 (4.16)</td>
<td>13.68 (4.19)</td>
<td>13.8 (3.52)</td>
<td>11.73 (5.29)</td>
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<td>Organisational Commitment Overall (9-63 score)</td>
<td>43.98 (9.34)</td>
<td>50.39 (7.48)</td>
<td>44.98 (9.37)</td>
<td>45.36 (9.41)</td>
<td>46.22 (8.36)</td>
<td>48.71 (7.04)</td>
<td>46.18 (8.00)</td>
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<td><strong>HSE Management Standards Indicator (1-5 Score)</strong></td>
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<td>Demands</td>
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<td>3.20 (0.54)</td>
<td>3.14 (0.66)</td>
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<td>3.86 (0.49)</td>
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<td>Managerial Support</td>
<td>3.75 (0.75)</td>
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<td>Mean (SD)</td>
<td>Mean (SD)</td>
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<td>Peer Support 3.87</td>
<td>3.82 (0.72)</td>
<td>3.93 (0.83)</td>
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<td>3.71 (0.88)</td>
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<td>(0.67)</td>
<td>(0.59)</td>
<td>(0.67)</td>
<td>(0.79)</td>
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<td>(0.58)</td>
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<td>Relationships 4.18</td>
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<td>3.77 (0.51)</td>
<td>4.33 (0.89)</td>
<td>4.13 (0.51)</td>
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<td>(0.59)</td>
<td>(0.51)</td>
<td>(0.89)</td>
<td>(0.51)</td>
<td>(0.71)</td>
<td>(0.88)</td>
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<td></td>
<td>Role 4.21</td>
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<td>3.98 (0.64)</td>
<td>3.98 (1.04)</td>
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<td>(0.54)</td>
<td>(0.62)</td>
<td>(0.64)</td>
<td>(0.62)</td>
<td>(0.54)</td>
<td>(1.04)</td>
</tr>
<tr>
<td></td>
<td>Change 3.25</td>
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<td>3.39 (0.70)</td>
<td>3.20 (0.82)</td>
<td>3.22 (0.90)</td>
<td>3.39 (0.64)</td>
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<td>(0.70)</td>
<td>(0.82)</td>
<td>(0.90)</td>
<td>(0.64)</td>
<td>(0.68)</td>
<td>(0.66)</td>
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<tr>
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<td>HSE MSI Overall 3.72</td>
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<td>3.78 (0.44)</td>
<td>3.58 (0.49)</td>
<td>3.70 (0.58)</td>
<td>3.69 (0.41)</td>
<td>3.75 (0.43)</td>
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<tr>
<td></td>
<td>(0.66)</td>
<td>(0.44)</td>
<td>(0.49)</td>
<td>(0.58)</td>
<td>(0.41)</td>
<td>(0.43)</td>
<td>(0.56)</td>
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<tr>
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<td>Intention to turnover (1-7 score) 2.51</td>
<td>2.03 (2.07)</td>
<td>2.36 (1.64)</td>
<td>1.95 (1.92)</td>
<td>2.68 (1.60)</td>
<td>2.09 (2.08)</td>
<td>3.36 (1.54)</td>
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<tr>
<td></td>
<td>(0.79)</td>
<td>(1.60)</td>
<td>(0.82)</td>
<td>(1.12)</td>
<td>(0.84)</td>
<td>(0.45)</td>
<td>(2.77)</td>
</tr>
</tbody>
</table>

**Health Status**

GHQ12 1-4 responses coded as:

|                      | GHQ 0-0-1-1 (0-12 score) 2.05 | 2.22 (3.03)       | 2.65 (2.92)       | 1.85 (3.19)       | 1.90 (2.83)       | 2.16 (2.17)       | 2.16 (3.13)       | 3.00 (4.60)       |
|                      | (0.67)            | (3.19)            | (2.83)            | (2.17)            | (3.13)            | (4.60)            |
|                      | GHQ Likert 0-1-2-3 (0-36 score) 11.25 | 11.40 (5.77)     | 11.89 (5.27)      | 11.27 (5.89)      | 10.29 (5.48)      | 11.17 (5.48)      | 13.09 (5.10)      | 13.09 (8.98)      |
|                      | (0.67)            | (5.27)            | (5.89)            | (5.48)            | (5.10)            | (8.98)            |

**HPQ Health Score:**

|                      | 4 week Physical Health (1-4 Score) 1.75 | 1.63 (0.56)       | 1.74 (0.47)       | 1.60 (0.56)       | 1.80 (0.47)       | 1.79 (0.45)       | 1.79 (0.55)       |
|                      | (0.64)            | (0.56)            | (0.47)            | (0.45)            | (0.55)            | (0.55)            | (0.56)            |
|                      | 4 week Mental Health (5-1 Score) 4.31 | 4.48 (0.86)       | 4.37 (0.71)       | 4.19 (0.71)       | 4.17 (1.12)       | 4.33 (0.84)       | 4.33 (0.91)       |
|                      | (0.86)            | (0.71)            | (1.12)            | (0.84)            | (0.91)            | (0.45)            |

**Number of co-morbidities**

|                      | 2.54 | 2.26 (2.64)       | 1.99 (2.15)       | 2.19 (2.33)       | 2.84 (2.50)       | 2.34 (2.83)       | 2.64 (2.55)       |
|                      | (2.64) | (2.15)            | (2.33)            | (2.50)            | (2.83)            | (2.55)            | (3.61)            |
Table 7-10: Analysis of cost of workloss

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
<th>F</th>
<th>G</th>
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<tbody>
<tr>
<td>Mean</td>
<td>£338</td>
<td>£500</td>
<td>£524</td>
<td>£510</td>
<td>£936</td>
<td>£655</td>
<td>£888</td>
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<tr>
<td>Median</td>
<td>£288</td>
<td>£438</td>
<td>£346</td>
<td>£346</td>
<td>£731</td>
<td>£423</td>
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</tr>
<tr>
<td>Range</td>
<td>£2462</td>
<td>£2280</td>
<td>£2662</td>
<td>£4221</td>
<td>£3833</td>
<td>£2891</td>
<td>£1615</td>
</tr>
<tr>
<td>Standard Deviation</td>
<td>£287</td>
<td>£361</td>
<td>£466</td>
<td>£606</td>
<td>£665</td>
<td>£620</td>
<td>£422</td>
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<tr>
<td>Skew</td>
<td>2.409</td>
<td>1.643</td>
<td>1.748</td>
<td>3.037</td>
<td>1.658</td>
<td>1.498</td>
<td>0.003</td>
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<tr>
<td>Kurtosis</td>
<td>10.685</td>
<td>4.223</td>
<td>3.718</td>
<td>12.596</td>
<td>4.686</td>
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</tr>
<tr>
<td>% reported zero cost</td>
<td>9.3%</td>
<td>7.6%</td>
<td>5.8%</td>
<td>13.9%</td>
<td>3.1%</td>
<td>13.6%</td>
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</table>

Note: raw skew and kurtosis values are cited here.

Table 7-11: Analysis of adjusted cost of workloss

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<th>E</th>
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<tr>
<td>Mean</td>
<td>£400</td>
<td>£618</td>
<td>£669</td>
<td>£649</td>
<td>£1200</td>
<td>£847</td>
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<tr>
<td>Median</td>
<td>£326</td>
<td>£547</td>
<td>£463</td>
<td>£455</td>
<td>£958</td>
<td>£540</td>
<td>£1023</td>
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<td>Range</td>
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<td>£2853</td>
<td>£3559</td>
<td>£5539</td>
<td>£5530</td>
<td>£4320</td>
<td>£1922</td>
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<td>Standard Deviation</td>
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<td>£444</td>
<td>£614</td>
<td>£794</td>
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<td>£834</td>
<td>£545</td>
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<td>Skew</td>
<td>2.403</td>
<td>1.539</td>
<td>1.858</td>
<td>3.154</td>
<td>2.106</td>
<td>1.881</td>
<td>-0.030</td>
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</table>

Note: raw skew and kurtosis values are cited here.
Table 7-12: Analysis of workloss hours

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<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
<th>F</th>
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</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>n=586</td>
<td>n=426</td>
<td>n=177</td>
<td>n=148</td>
<td>n=77</td>
<td>n=77</td>
<td>n=14</td>
</tr>
<tr>
<td>Mean</td>
<td>38.64</td>
<td>33.67</td>
<td>30.58</td>
<td>35.36</td>
<td>38.48</td>
<td>34.14</td>
<td>41.75</td>
</tr>
<tr>
<td>Median</td>
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<td>30.00</td>
<td>28.00</td>
<td>29.60</td>
<td>30.00</td>
<td>29.60</td>
<td>42.00</td>
</tr>
<tr>
<td>Range</td>
<td>344</td>
<td>208</td>
<td>138</td>
<td>288</td>
<td>221</td>
<td>160</td>
<td>72</td>
</tr>
<tr>
<td>Standard Deviation</td>
<td>32.20</td>
<td>25.01</td>
<td>21.8</td>
<td>39.79</td>
<td>30.43</td>
<td>29.93</td>
<td>19.54</td>
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<tr>
<td>Skew</td>
<td>3.434</td>
<td>2.227</td>
<td>1.723</td>
<td>3.204</td>
<td>3.760</td>
<td>1.855</td>
<td>0.147</td>
</tr>
<tr>
<td>Kurtosis</td>
<td>22.616</td>
<td>9.330</td>
<td>5.100</td>
<td>14.532</td>
<td>20.760</td>
<td>4.877</td>
<td>-0.821</td>
</tr>
</tbody>
</table>

Note: raw skew and kurtosis values are cited here.

7.3.3 Bivariate correlation

A correlation coefficient matrix for all 35 variables included in the pooled dataset is presented in appendix 7-2. Correlation between specific pairs of key variables in this study is in line with theoretical expectations and similar to results found in other studies (Alexanderson, 1998; Scott and Taylor, 1985; Steers and Rhodes, 1984; Terborg et al., 1982).

Overall job satisfaction scores are inversely correlated with health status measures (co morbidities $r = -0.180$, existing condition $r = -0.130$, GHQ $r = -0.312$, HPQ physical health score $r = -0.188$, HPQ mental health score (negative scale) $r = 0.111$, p<0.001). Job satisfaction score is also highly correlated with organisational commitment (overall and component) scores ($r = 0.622$, p<0.001) and HSE Management Standards Indicator (overall and component) scores ($r = 0.640$, p<0.001). There is a strong inverse correlation between job satisfaction and the intention to quit score ($r = -0.452$, p<0.001). Both self-report sick hours and presenteeism hours are also found to be inversely correlated with job satisfaction ($r = -0.064$, p<0.05 and $r = -0.108$, p<0.001 respectively). Income is also observed to be positively correlated with job satisfaction ($r = 0.177$, p<0.001). Only the extrinsic job satisfaction component, which includes satisfaction with income, is found to be significantly correlated with estimates of workloss costs ($r = 0.103$, p<0.001).

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Overall organisational commitment scores are inversely correlated with health status measures (co morbidities $r = -0.150$, existing condition $r = -0.108$, GHQ $r = -0.236$, HPQ physical health score $r = -0.200$, HPQ mental health score (negative scale) $r = 0.131$, $p<0.001$). Organisational commitment scores are also highly correlated with HSE Management Standards Indicator (overall and component) scores ($r = 0.600$, $p<0.001$). There is a strong inverse correlation between organisational commitment and the intention to quit score ($r = -0.560$, $p<0.001$). Both self-report sick hours and presenteeism hours are also found to be inversely correlated with organisational commitment ($r = -0.118$ and $r = -0.202$, $p<0.001$ respectively). Income is also observed to be positively correlated with organisational commitment ($r = 0.270$, $p>0.001$).

Overall HSE Management Standards Indicator scores are inversely correlated with health status measures (co morbidities $r = -0.191$, existing condition $r = -0.130$, GHQ $r = -0.359$, HPQ physical health score $r = -0.203$, HPQ mental health score (negative scale) $r = 0.113$, $p<0.001$). There is a strong inverse correlation between HSE Management Standards Indicator overall scores and the intention to quit score ($r = -0.365$, $p<0.001$). Both self-report sick hours and presenteeism hours are also found to be inversely correlated with HSE Management Standards Indicator overall scores ($r = -0.067$, $p<0.05$ and $r = -0.205$, $p<0.001$ respectively). Income is also observed to be positively correlated with HSE Management Standards Indicator overall scores ($r = 0.078$, $p>0.001$).

GHQ scores correlate as expected with the other health status measures in the study including co-morbidities ($r = 0.279$, $p<0.001$), existing conditions ($r = 0.152$, $p<0.001$), HPQ physical health score ($r = 0.336$, $p<0.001$), and HPQ mental health score (negative scale) ($r = -0.163$, $p<0.001$). GHQ score is also correlated with intention to quit score ($r = 0.216$, $p<0.001$). Both self-report sick hours and presenteeism hours are also found to be correlated with GHQ score ($r = 0.109$ and $r = 0.269$, $p<0.001$ respectively).

Correlation between (log transformed) workloss hours, cost and adjusted cost of workloss and all variables included in the study was also explored using bivariate analysis. This was conducted for each of the seven organisations and for a pooled analysis. Table 7-13...
Significant inverse correlation was observed between self-reported (log transformed) workloss hours in the past 4 weeks and the following variables independently: age, number of children, time in job, intrinsic job satisfaction, all components of organisational commitment measure, the HSE management standards indicators for control, management support, relationships, role and overall score; and HPQ mental health score. Hence without controlling for any other variables, this analysis shows that self-reported workloss hours are found to be higher among employees that are younger, employees with fewer children and employees with less time in the job. The negative relationship with intrinsic job satisfaction, organisational commitment and HSE management standards indicators is aligned with theoretical expectations, with worse scores associated with higher workloss. The HPQ mental health score is coded on a reverse scale (where 1 is worse and 5 is best) hence a negative correlation with workloss hours is intuitive, worsening mental health symptoms are associated with higher workloss hours.

Significant positive correlation was observed between self-reported (log transformed) workloss hours in the past 4 weeks and the following variables independently: intention to quit, number of co-morbidities and GHQ-12 score (using both GHQ and Likert coding method). The direction of these correlations is aligned with theoretical expectations, workloss hours are observed to be higher when intention to quit is higher, and employees have more co-morbid health conditions and worse scores on GHQ-12.

Estimates of the (log transformed) cost and adjusted cost of workloss were found to be significantly and independently correlated with 9 variables included in this study (as well as income, sick hours and presenteeism hours that are used in the estimation of workloss cost). Both the estimates of cost and adjusted cost of workloss were correlated with the same 9 variables.
Significant positive correlation was observed between the cost of workloss and the following variables: number of supervisees, extrinsic job satisfaction and GHQ-12 score (using both GHQ and Likert coding method). Significant negative correlation was observed with the following variables: organisational involvement, HSE management standards indicators for demands, peer support, role and overall score. Figure 7-3 shows Pearson correlation coefficients for variables correlated with (log transformed) adjusted cost of workloss.

The direction of these correlations is aligned with theoretical expectations, with the potential exception of extrinsic job satisfaction. The positive relationship between extrinsic job satisfaction and the cost of workloss, suggests that employees who are more satisfied with pay, benefits and job security are more likely to incur greater workloss costs.

Figure 7-3: Pearson correlation coefficients for variables correlated with (log transformed) adjusted cost of workloss
Note (Figure 7-3): ** = correlation is significant at 0.01 level. * = correlation is significant at 0.05 level. Key:
Prehours = presenteeism hours; likert (GHQ) = health status score using GHQ12 likert method; GHQ = health status score using GHQ12 basic method; extrinsic = extrinsic job satisfaction score; supervisees = number of people supervised; HSEoverall = overall score on HSE management stress indicator; orginvolve = organisational involvement score; HSEpeersupport = HSE management stress indicator score for peer support; HSEdemands = HSE management stress indicator score for demands; HSErole = HSE management stress indicator score for role.

The size of effect on workloss time and cost estimates, according to categorisation by Cohen (1992), for individual variables included in this analysis is predominantly small ($r < +/- 0.10$), with GHQ-12 scores (Likert coding method) and HSE MSI role score showing highest correlation with $r$ in the range 0.18 to 0.24, in the pooled dataset analysis. The individual effect of the sick hours variable is small to medium ($r$ in the range 0.19 to 0.31), whilst the individual effect of the presenteeism hours variable is large ($r$ in the range 0.59 to 0.75).

Analysis of each organisation separately also found that workloss hours were significantly and positively correlated with extrinsic job satisfaction at two organisations (A, C) and HPQ physical health score at two organisations (B, D). The HPQ physical health score was also significantly correlated with cost of workloss at one organisation (B). Significant negative correlation was observed between extrinsic job satisfaction and workloss hours at one organisation (D).

Dummy variables for the most frequently reported untreated existing health conditions at each organisation were included, significant positive correlation was found between reporting frequent/severe headaches or depression and workloss hours and cost of workloss at one organisation (A). Significant positive correlation was also found between reporting chronic back/neck pain and workloss hours in one organisation (D).
Table 7-13: Bivariate correlation - pooled dataset (n=1490)

<table>
<thead>
<tr>
<th>Variable</th>
<th>Cost of workloss (log transformed)</th>
<th>Adjusted cost of workloss (log transformed)</th>
<th>Workloss hours (log transformed)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>.017</td>
<td>.019</td>
<td>-.085**</td>
</tr>
<tr>
<td>Children</td>
<td>.018</td>
<td>.033</td>
<td>-.065**</td>
</tr>
<tr>
<td>Time in job</td>
<td>-.037</td>
<td>-.047</td>
<td>-.082**</td>
</tr>
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<td>Supervisees</td>
<td>.082**</td>
<td>.088**</td>
<td>.020</td>
</tr>
<tr>
<td>Income</td>
<td>.232**</td>
<td>.243**</td>
<td>.002</td>
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<td>Sick hours</td>
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<td>.192**</td>
<td>308**</td>
</tr>
<tr>
<td>Preservice</td>
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<td>.593**</td>
<td>.750**</td>
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<td>-.100**</td>
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<td>.049</td>
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<td>-.112**</td>
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<td>-.045</td>
<td>-.045</td>
<td>-.060**</td>
</tr>
<tr>
<td>HSE peersupp</td>
<td>-.065*</td>
<td>-.068*</td>
<td>-.057</td>
</tr>
<tr>
<td>HSE relations</td>
<td>-.034</td>
<td>-.028</td>
<td>-.070**</td>
</tr>
<tr>
<td>HSE role</td>
<td>-.180**</td>
<td>-.155**</td>
<td>-.210**</td>
</tr>
<tr>
<td>HSE overall</td>
<td>-.074*</td>
<td>-.062**</td>
<td>-.126**</td>
</tr>
<tr>
<td>Intent to quit</td>
<td>.028</td>
<td>.028</td>
<td>.080**</td>
</tr>
<tr>
<td>Comorbid</td>
<td>.053</td>
<td>.051</td>
<td>.085**</td>
</tr>
<tr>
<td>GHQ</td>
<td>.135**</td>
<td>.135**</td>
<td>182**</td>
</tr>
<tr>
<td>Likert (GHQ)</td>
<td>.193**</td>
<td>.185**</td>
<td>.241**</td>
</tr>
<tr>
<td>HPQ mhs4w</td>
<td>-.049</td>
<td>-.044</td>
<td>-.077**</td>
</tr>
</tbody>
</table>

**. Pearson correlation is significant at the 0.01 level. *. Pearson correlation is significant at the 0.05 level.
7.3.4 Log-linear regression models

Results from analysis of multiple regression models fitted to the data for each organisation and the pooled dataset are presented in appendix 7-3. Table 7-14 and Table 7-15 show model fit. Three models were fitted to data for each individual organisation and six models fitted to the pooled dataset. The R squared statistic, showing the proportion of variance explained by the model, is generally low. The F-ratio, the ratio of the average variability in the data that a model can explain to the average variability unexplained by that same model, is statistically significant (at $p<0.05$ level) in all but 6 models (shaded areas in Table 7-14).

Table 7-14: Model fit by organisation

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
<th>F</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>$n=586$</td>
<td>$n=426$</td>
<td>$n=177$</td>
<td>$n=148$</td>
<td>$n=77$</td>
<td>$n=77$</td>
</tr>
<tr>
<td>Model 1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>R$^2$</td>
<td>0.240</td>
<td>0.225</td>
<td>0.387</td>
<td>0.414</td>
<td>0.523</td>
<td>0.012</td>
</tr>
<tr>
<td>F-ratio</td>
<td>3.039</td>
<td>1.948</td>
<td>1.997</td>
<td>1.595</td>
<td>1.634</td>
<td>2.083</td>
</tr>
<tr>
<td>Sig.</td>
<td>0.000</td>
<td>0.002</td>
<td>0.012</td>
<td>0.045</td>
<td>0.108</td>
<td>0.169</td>
</tr>
<tr>
<td>Model 2</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>R$^2$</td>
<td>0.224</td>
<td>0.225</td>
<td>0.383</td>
<td>0.421</td>
<td>0.509</td>
<td>0.012</td>
</tr>
<tr>
<td>F-ratio</td>
<td>2.773</td>
<td>1.936</td>
<td>1.966</td>
<td>1.639</td>
<td>1.435</td>
<td>2.077</td>
</tr>
<tr>
<td>Sig.</td>
<td>0.000</td>
<td>0.002</td>
<td>0.014</td>
<td>0.036</td>
<td>0.166</td>
<td>0.169</td>
</tr>
<tr>
<td>Model 3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>R$^2$</td>
<td>0.259</td>
<td>0.254</td>
<td>0.363</td>
<td>0.393</td>
<td>0.574</td>
<td>0.391</td>
</tr>
<tr>
<td>F-ratio</td>
<td>3.36</td>
<td>2.280</td>
<td>1.807</td>
<td>1.494</td>
<td>1.931</td>
<td>1.629</td>
</tr>
<tr>
<td>Sig.</td>
<td>0.000</td>
<td>0.000</td>
<td>0.027</td>
<td>0.022</td>
<td>0.041</td>
<td>0.340</td>
</tr>
</tbody>
</table>

All variables were initially included and different models fitted by removal of non-significant variables.

Model 1 dependent variable = ln(costworkloss) (log transformed unadjusted cost of workloss). Model 2 dependent variable = ln(adjustedcostworkloss) (log transformed adjusted cost of workloss). Model 3 dependent variable = ln(worklosshours) (log transformed total workloss hours (absenteeism & presenteeism)).
Table 7-15: Model fit - pooled dataset

<table>
<thead>
<tr>
<th>Pooled n=1490</th>
<th>Model 1</th>
<th>Model 2</th>
<th>Model 3</th>
<th>Model 4</th>
<th>Model 5</th>
<th>Model 6</th>
</tr>
</thead>
<tbody>
<tr>
<td>R²</td>
<td>0.161</td>
<td>0.162</td>
<td>0.166</td>
<td>0.130</td>
<td>0.487</td>
<td>0.507</td>
</tr>
<tr>
<td>F-ratio</td>
<td>5.707</td>
<td>5.774</td>
<td>5.942</td>
<td>5.369</td>
<td>27.326</td>
<td>27.742</td>
</tr>
<tr>
<td>Sig.</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
</tr>
</tbody>
</table>

All variables were initially included and different models fitted by removal of non-significant variables.

Model 1 dependant variable = Incostworkloss (log transformed unadjusted cost of workloss), with dummy variables for organisation in pooled analysis. Model 2 dependant variable = Inadjustedcostworkloss (log transformed adjusted cost of workloss), with dummy variables for organisation in pooled analysis. Model 3 dependant variable = Inworklosshours (log transformed total workloss hours (absenteeism & presenteeism), with dummy variables for organisation in pooled analysis. Model 4 dependant variable = Inadjustedcostworkloss (log transformed adjusted cost of workloss), with no control for organisation. Model 5 dependant variable = Incostworkloss (log transformed unadjusted cost of workloss), with dummy variables for organisation in pooled analysis, explanatory variables for sickness absence hours and presenteeism hours are included. Model 6 dependant variable = Incostworkloss (log transformed unadjusted cost of workloss), with dummy variables for organisation in pooled analysis, explanatory variables for sickness absence hours, presenteeism hours and income are included.

Results for models 5 and 6 in the analysis of the pooled dataset (Table 7-15) show the effect of the inclusion of component variables used in the calculation of the dependent variables. Model 5 includes self-reported sickness absence hours and presenteeism hours as explanatory variables as does models 6 with the further addition of income as another explanatory variable.

Table 7-16 provides a summary of variables found to be significantly correlated with the dependant variable in each multivariate regression model. Overall 11 of the 35 variables included in this study have a significant correlation in at least one of the regression models fitted.

When controlling for all other variables included in the model an employees’ GHQ-12 score (Likert coding method) and extrinsic job satisfaction score are found to be significantly and positively correlated with (log transformed) cost and adjusted cost of workloss in the 3 largest datasets included in the study (A, B, C) as well as the pooled analyses. GHQ-12 score (Likert coding method) is also correlated with (log transformed) workloss hours in the two largest organisation datasets (A, B) as well as the pooled analysis. Extrinsic job satisfaction score is also correlated with (log transformed) workloss hours in the two organisation datasets (A, C) as well as the pooled analysis.
The number of supervisees and the social job satisfaction score are found to be correlated with (log transformed) cost and adjusted cost of workloss in one organisation (A) and the pooled analyses.

Organisational involvement score is found to be inversely correlated with workloss hours, cost and adjusted cost of workloss in two organisations (A, E) and the pooled analyses.

HSE Management Standards Indicator role component score is found to be inversely correlated with cost and adjusted cost of workloss in two organisations (B, D) and the pooled analyses.

Length of time in organisation is also significantly correlated with the dependent variable in several models, positive correlation with cost of workloss is observed in one organisation (A) and negative correlation with workloss hours and cost of workloss is observed in another organisation with a much smaller sample (E). In the pooled analyses length of time in organisation is only significantly correlated with the adjusted cost of workloss variable.

Intrinsic job satisfaction is found to be inversely correlated with workloss hours and cost of workloss in one organisation (A), but not in the pooled analysis.

HSE Management Standards Indicator score for demands is found to be correlated with workloss hours, but this is only significant in the pooled analysis.

HSE Management Standards Indicator score for peer support and management support were significantly correlated with the dependent variable in several models.

The correlation coefficients for explanatory variables in the log-linear models presented in Table 7-16 are interpreted as the proportional change in the dependant variable associated with a unit change in that explanatory variable.
### Table 7-16: Summary of significant variables in all regression models

<table>
<thead>
<tr>
<th></th>
<th>Pooled Models</th>
<th>ST Models</th>
<th>SN Models</th>
<th>CER Models</th>
<th>JM Models</th>
<th>AZ Models</th>
<th>NESHA</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>n=1490</td>
<td>n=586</td>
<td>n=426</td>
<td>n=177</td>
<td>n=148</td>
<td>n=77</td>
<td>n=77</td>
</tr>
<tr>
<td>Supervisees</td>
<td>0.022</td>
<td>0.024**</td>
<td>0.009**</td>
<td>0.018**</td>
<td>0.018</td>
<td>0.019</td>
<td>-</td>
</tr>
<tr>
<td>Extrinsic</td>
<td>0.371*</td>
<td>0.360*</td>
<td>0.210*</td>
<td>0.356**</td>
<td>0.302**</td>
<td>0.226</td>
<td>NS</td>
</tr>
<tr>
<td>Timeinorg</td>
<td>NS</td>
<td>0.022**</td>
<td>NS</td>
<td>0.037**</td>
<td>0.048</td>
<td>NS</td>
<td>-0.053* NS -0.054* -0.035*</td>
</tr>
<tr>
<td>Social</td>
<td>0.183*</td>
<td>0.205*</td>
<td>NS</td>
<td>0.239*</td>
<td>0.311**</td>
<td>0.344**</td>
<td>0.203*</td>
</tr>
<tr>
<td>Orginvolvement</td>
<td>-0.088</td>
<td>-0.070*</td>
<td>-0.087*</td>
<td>-</td>
<td>-0.080*</td>
<td>NS</td>
<td>-0.163* -0.174* -0.111*</td>
</tr>
<tr>
<td>Intrinsic</td>
<td>0.093**</td>
<td></td>
<td>0.110**</td>
<td>0.103**</td>
<td>0.080*</td>
<td>NS</td>
<td>NS</td>
</tr>
<tr>
<td>Likert (GHQ)</td>
<td>0.063**</td>
<td>0.068**</td>
<td>0.047**</td>
<td>0.065**</td>
<td>0.091**</td>
<td>0.094**</td>
<td>0.069**</td>
</tr>
<tr>
<td>HSEDemands</td>
<td>NS</td>
<td>0.125*</td>
<td></td>
<td></td>
<td>0.181**</td>
<td>0.184**</td>
<td>0.112</td>
</tr>
<tr>
<td>HSERole</td>
<td>-0.379**</td>
<td>-0.235**</td>
<td>-0.474**</td>
<td>NS</td>
<td>-0.219**</td>
<td>NS</td>
<td>3.309  3.444 -</td>
</tr>
<tr>
<td>HSEPeersupport</td>
<td>NS</td>
<td>0.382**</td>
<td>-</td>
<td>0.198**</td>
<td>0.202**</td>
<td>1.686*</td>
<td>NS</td>
</tr>
<tr>
<td>HSEMansupport</td>
<td>NS</td>
<td></td>
<td></td>
<td>0.841**</td>
<td>0.814**</td>
<td>0.480*</td>
<td>-2.656 -2.814</td>
</tr>
</tbody>
</table>

** Significant at the 0.01 level, *Significant at the 0.05 level

Model 1 dependent variable = ln(costworkloss) (log transformed unadjusted cost of workloss), with dummy variables for organisation in pooled analysis. Model 2 dependent variable = ln(costworkloss) (log transformed adjusted cost of workloss), with dummy variables for organisation in pooled analysis. Model 3 dependent variable = ln(worklosshours) (log transformed total workloss hours (absenteeism & presenteeism), with dummy variables for organisation in pooled analysis. Model 4 dependent variable = ln(worklosshours) (log transformed adjusted cost of workloss), with no control for organisation. Note: Extrinsic = extrinsic job satisfaction score; timeinorg = time (years) employed in organisation; social = social job satisfaction score; orginvolvement = organisational involvement score; intrinsic = intrinsic job satisfaction score; likert(GHQ) = health status score using GHQ12 likert method; HSEDemands, HSERole, HSEPeersupport, HSEMansupport are components of HSE management stress indicator for demands, role, peer support and managerial support.
7.4 Discussion

7.4.1 Key findings

The objective of the study described in this chapter was to address the following two research questions:

- To what extent can lower employee health and well-being status be shown to be associated with higher costs to the employer?
- To what extent can the marginal value to an employer of marginal changes in employee health and well-being metrics be estimated?

This study has found that it has been feasible to practically implement a methodology that has demonstrated meaningful and statistically significant correlation between employee health and well-being measures and estimates of the cost of workloss.

Workloss time as defined in this study, combined self-reported sick hours and presenteeism hours, is found to be substantial. On average, reported workloss time represented close to one quarter of contracted hours, almost one week's workloss per month. This workloss time is clearly dominated by estimates for self-reported presenteeism hours.

Previous studies have consistently shown that presenteeism costs exceed absenteeism costs. The ratio of presenteeism to absenteeism for four of the seven participating organisations in this study (A, D, E, F) is within a range of 4.8 to 6.5 and is very consistent with other published studies (Collins et al., 2005; Ozminowski et al., 2004; Goetzel et al., 2004; Stewart et al. 2003) which report ratios of 6.8, 6.0, 5.1 and 4.6 respectively. Further studies (Stewart et al., 2003b; Tilse and Sanderson, 2005; Hilton, 2007; Sainsbury, 2007) have reported much lower ratios of 2.6, 1.9, 1.9 and 1.8 respectively.

Estimates of the cost of workloss in this study, using adjustments based on job profile characteristics or a simple unadjusted human capital approach of applying the wage rate to workloss time, suggest that workloss is not a trivial cost to these organisations.
The absolute values (without any time or purchasing parity adjustments) for cost of workloss estimates in this study are considerably higher than Goetzel et al. (2004) and Ozminowski et al. (2004), who reported presenteeism only costs of $1,500 and $2,000-$2,800 per employee per year, respectively. However, results from this study are more in line with a study estimating presenteeism costs in Australian call centres (Tilse and Sanderson, 2005), that reported costs of $397 per employee for a 4-week period.

Bivariate correlation between key employee health and well-being measures is consistent with previous studies (Alexanderson, 1998; Scott and Taylor, 1985; Steers and Rhodes, 1984; Terborg et al., 1982). Employee engagement or well-being measures (job satisfaction, organisational commitment, HSE Management Standards Indicator) are all found to be highly correlated with each other and inversely correlated with health status, and intention to quit. These employee engagement measures are also each found to be inversely correlated with workloss time, both self-reported sickness absence hours and presenteeism hours, with presenteeism having the stronger effect. Income is found to postively correlate with these three measures of employee engagement, with organisational commitment (overall and all components) and job satisfaction (overall and all components) having the strongest effects. Income is also inversely correlated with one measure of health status included in this study (HPQ 4-week physical health score), intention to quit and self-reported sickness absence hours.

Bivariate correlation between estimates of the cost of workloss and other variables in this study is in line with theoretical expectations. Health status (measured by GHQ-12), one sub-component of job satisfaction (extrinsic), one sub-component of organisational commitment (involvement), HSE Management Standards Indicator overall score (as well as 3 sub-components: peer support, demands and role) and the number of supervisees are each found to independently correlate with estimates of the cost of workloss. In one organisation (A) it was found that workloss costs were higher among employees reporting that they currently had depression or frequent and severe headaches, this is consistent with previous studies in these health conditions (Birnham et al., 2000; Conti and Burton, 1994; Kessler et al., 1999; Leon et al., 2002; Simon et al., 2000; Loeppke et al., 2003).
As the unadjusted or adjusted cost of workloss is a composite variable derived from workloss hours (sickness absence and presenteeism) and income, the analysis of bivariate correlation with workloss hours alone shows somewhat different results. Twelve variables (age, number of children, time in job, intrinsic job satisfaction, organisational identity, organisational commitment (overall), HSE Management Standards Indicators component scores (control, managerial support and relationships), intention to quit, co-morbidities and HPQ 4-week mental health score) are found to each correlate only with workloss hours and not workloss costs. Four variables (organisational involvement, HSE Management Standards Indicators overall score and role component, GHQ-12) show bivariate correlation with both workloss hours and estimates of workloss costs.

This study fitted multivariate regression models to the data that significantly explained a proportion of the variance in cost of workloss and workloss hours. The proportion of variance explained by these models is low to modest, as has been found in other studies (Farragher et al., 2005). All variables found to be correlated with the cost of workloss in the bivariate analysis except for two (HSE Management Standards Indicator overall score and demands component), were also significant correlates in the multivariate analyses as well as a further four variables (time in organisation, social and intrinsic job satisfaction, and HSE Management Standards Indicator managerial support component).

The correlation coefficients for explanatory variables in the log-linear models are interpreted as the average proportional change in cost of workloss associated with a unit change in that explanatory variable. Hence, based on the pooled dataset, unit changes in variables are observed to be associated with an approximate percentage change in the cost of workloss as follows: an additional supervisee (+2%), one point improvement in extrinsic job satisfaction on 1 to 5 scale (+36%), an additional year in the organisation (+2%), one point improvement in social job satisfaction on 1 to 5 scale (+18 to 24%), one point improvement in organisational involvement on 3 to 21 scale (-9%), one point worsening in GHQ-12 on 0 to 36 scale (+6 to 7%), and a one point improvement in HSE Management Standards Indicator role component on 1 to 5 scale (-38 to 47%).
7.4.2 Implications

This study could have several implications for decision-makers within organisations responsible for allocating resources towards employee health and well-being policies. For participating organisations, this study has helped make visible some previously invisible cost implications associated with reduced productivity and workloss. The inclusion of estimates for presenteeism costs demonstrate the magnitude of potential financial loss to organisations. Estimates of the monetary value of workloss equivalent to almost one quarter of an organisation's monthly wage bill are material and highlight the necessity of active management of these issues.

This study provides organisations with information on the relative marginal effects on cost to an organisation of changes in different employee health and well-being measures. This knowledge could help manage the financial impact of workloss and aid resource allocation decisions by providing estimates of the value to an organisation of effects that could be delivered by a range of interventions or policies.

This study could have implications on how the business case for specific employee health and well-being interventions is constructed. This study could help facilitate the separation of a) information about intervention effectiveness and b) information about relationships between employee metrics and cost to a specific organisation. Whilst intervention effectiveness may sometimes be somewhat context dependant, estimates of its cost-effectiveness are rarely likely to be generalisable between organisations, since this is dependant upon the current distribution of the levels of specific employee metrics among current employees and their relationship with cost to the organisation. By use of the methodology outlined in this study organisations could better model the organisation-specific impact of any intervention effects observed in different contexts.

There are also several implications of specific results from this study. Lower employee health and well-being scores with respect to organisational involvement, GHQ-12 and HSE Management Standards Indicator role component score are found to be associated with higher costs to the employer, in multiple analyses in this study. The effectiveness of interventions to achieve changes in these scores will be assessed by each of the participating organisations in light of the potential for their associated marginal impact on workloss costs.
The role of job satisfaction component scores in explaining the cost of workloss appears to be explained more by income effects than workloss hours on their own. All job satisfaction components (intrinsic, extrinsic and social) and overall scores are positively correlated with income. Only the intrinsic job satisfaction scale is found to be independently correlated with workloss hours (inversely correlated with both sickness absence and presenteeism hours), all other job satisfaction measures are not found to be independently correlated with workloss hours. Hence workloss occurring among employees reporting greater job satisfaction is more likely to be more costly. This is particularly intuitive for the extrinsic job satisfaction measure, as might be expected employees who state that they are more satisfied with pay, benefits and job security tend to have higher income. Self-reported sickness absence hours and income were found to be inversely correlated in the pooled dataset, lower income employees report more sickness absence hours in line with previous studies (Hilton et al., 2005). Self-reported presenteeism hours and income were not found to be significantly correlated in the pooled dataset.

Overall, the approach suggested in this study could potentially play a role in creating incentives to more actively manage the economics of employee health and well-being.

### 7.4.3 Methodological limitations

The methodological limitations of this study derive mainly from the inevitable reliance on employee self-reported data for certain parameters. The measurement of presenteeism time is clearly important in this study and overall workloss cost estimate results are sensitive to these measures. Much work has been done to support the validation of self-report instruments to assess presenteeism (Kessler et al., 2003). The HPQ instrument used in this study has been widely used and has been shown to correlate with objective measures of productivity.

The data management processes including consistency checks across an individual’s responses to workloss questions should help to minimise any erroneous or ‘protest’ responses that may be included, although this did not appear to be very prevalent among the data collected in this study.
Employees were asked to rate their average work performance during the past 4 weeks against an anchor of 100% as their normal performance. One limitation of this approach is that some individuals may be reluctant to ever rate themselves at 100% performance, for various reasons. In these cases, a ceiling effect will be present for this measure and presenteeism time may be overestimated. Similarly, whereas employees who are clearly sick may indicate very low work performance scores, it is conceivable that some employees may be reluctant to score themselves very low even in an anonymous and confidential survey. Floor effects are also a possibility.

As more datasets using the HPQ (and indeed other productivity measures) are developed, further work may need to explore the possibility of both ceiling and floor effects in these measures. Several practical adjustments could be made, for example, an organisation may wish to impose some arbitrary ceiling that could be used for estimation of presenteeism workloss, such as 95% or 90%. Further options could be to make adjustments to the self-report 4 week absolute presenteeism estimate, in light of performance rating provided for the longer time period ("over the past year or two") or the response to relative performance questions (relative peers or colleagues in a similar job).

A further limitation of the method used in this study is the potential exclusion of some relevant employees in the dataset for each organisation. Whilst organisations made every attempt to encourage all employees within the selected departments to participate in this research it was not mandated and hence some element of voluntary response remains. Response rates were relatively good within each department, but some selection bias can not be ruled out completely with this method. Employees absent at the time of the survey, including those on long-term sick, were clearly not included but these could be clearly identified and followed-up separately if desired. More problematic may be the employees who were present but chose not to respond, reasons for non-compliance could be explored through other channels within participating organisations to test the extent of any potential selection bias.

The method of this study also only uses cross-sectional data (single-timepoint) due primarily to time and resource constraints, further work in this area may prefer to adopt a longitudinal approach. Furthermore, although sample sizes were generally
very good in this study, assessment of the impact of specific diseases, with relatively low prevalence, is likely to require larger sample sizes than collected in this study.

The regression models used in this study assumed the simplest structural relationship between the dependant and explanatory variables. However, linearity assumptions may need to be further examined as more data on employer costs and employee health and well-being becomes available. Logistic regression models could also be employed to compare characteristics of employees with or without workloss or its subcomponents. Finally, the adjusted estimates of the cost of workloss to account for job characteristics is somewhat experimental and further work is needed to show how sensitive results may be to these adjustments.

7.5 Chapter summary

Using datasets from 1,504 employees from 7 diverse organisations, this study has found that it has been feasible to practically implement a methodology that has demonstrated meaningful and statistically significant correlation between employee health and well-being measures and estimates of the cost of workloss. Multivariate regression models are used to demonstrate the marginal value to an employer of marginal changes in employee health and well-being metrics. This approach has potential to provide organisations with new information that can help prioritise specific employee health and well-being strategies and create incentives for specific allocation of resources.
Overview of the thesis

Chapter 1
Introduction

Chapter 2
Literature review

Chapter 3
Thesis method

Chapter 4
Exploration of current practice: qualitative methods

Chapter 5
Managers’ survey (n=986)

Chapter 6
Economic evaluation: methodological review

Chapter 7
Empirical case studies: Employee surveys (n=1,504)

Chapter 8
Discussion, implications and recommendations
8 Discussion, implications and recommendations

8.1 Introduction

This thesis is concerned with demonstrating the economic value of investments in employee health and well-being, focusing on how economic information is and could be generated and how organisations process this information in their decision-making regarding employee health and well-being issues. The thesis explores the notion that better, more appropriate information and more rigorous economic evaluation methodologies are important in creating incentives for organisations to invest in and better manage the health and well-being of their employees. The thesis takes an interdisciplinary approach in that it attempts to draw together medical and health as well as psychological and psychosocial correlates of employee health and well-being in an economic framework that might aid decision-making and resource allocation within organisations.

A series of studies have been presented: firstly an exploration of the existing international literature reporting cost-of-illness and cost-effectiveness type studies; then a study exploring current practice using a focus group followed by a series of individual interviews with key occupational health professionals in the UK, which was a highly valuable starting point to scope this research; next was a survey of specialist (H&S, HR) and generalist managers’ attitudes, perceptions, information needs and experience of employee health and well-being ‘business cases’; then economic evaluation methods and their application to the occupational health setting were reviewed; and finally a study using employee self-report data to construct empirical case studies to demonstrate the correlation between employer costs and employee health and well-being metrics. These studies have combined qualitative and quantitative research methods.

This research is particularly timely and work in the area of the economics of occupational health is very much in demand by all stakeholders. As it developed, this research project has attracted interest from several organisations including the UK Department of Health. The recent publication of several major government-backed reports ("The Black Report" (Black, 2008); "The Boorman Review" (Hassan et al.
2009); and the Foresight Mental Capital and Well-being Project (Dewe and Kompier, 2008) has further stimulated interest.

One important feature of the economic framework approach developed in this thesis is that it is able to decouple a) economic information about intervention effectiveness and b) economic information about relationships between employee metrics and cost to an organisation. Hence organisations can first assess exactly where (in the wide spectrum of options) interventions may be needed or may be most (cost)-effective. This feature is key since most economic assessments conducted to date have been conducted on interventions that have already been invested in and are subject to bias from vested interest and sunk costs.

The broad aim of this research was to gain insight into the extent that the level of information demonstrating the value (costs and benefits) of investments in health and well-being specifically in the workplace could be used to provide further incentives for private firms (or indeed budget optimising publicly funded organisations) to devote resources towards employee health and well-being.

The specific aims of this research, listed in chapter 1, are addressed by the 3 primary data collection studies. The studies presented in chapters 4 and 5 of this thesis suggest that the objectives of investment in employee health and well-being are multifaceted but are likely to include economic factors. This finding is aligned with the initial hypothesis that some combination of ethical, legal and economic factors determine the extent of employee health and well-being activities in any organisation. The managers' survey suggests that whilst there are several key differences between the information needs of specialist and generalist managers, there does appear to be strong demand for economic value information about employee health and well-being investments. The reasons why some organisations choose to invest in employee health, to a greater extent than others and to that required by regulation are unlikely to be fully explained by these survey studies. However, these studies did identify a trend that the motivators for many organisations currently appear to be based on belief and intuition rather than empirical rationality. The managers' survey also suggests that in the assessment of health and well-being investments the outcome measures that are
considered among the most important are the impact on the reputation of the organisation and employee productivity.

The exploration of current practice (chapter 4) and the managers' survey (chapter 5) combined with the multiple literature reviews served to directly inform the design and development of the empirical case studies presented in chapter 7. This quantitative analysis aimed to address the final specific research aim which was to identify how sensitive employer relevant outcomes are to changes in employee health and well-being status.

This final chapter is organised into three sections: a summary of main findings, methodological considerations and implications for practice.

8.2 Overview of main findings

The main findings of the primary research activities included in this thesis are summarised below.

8.2.1 Exploration of current practice

The occupational health and safety professionals interviewed for this study have described how employee health issues are discussed in their organisations. Ethical arguments about it being the 'right thing to do' are found to be common and are believed to have impact, as has been shown in previous studies (Wright, 1998). Unsurprisingly legal compliance is stated to be the driver of most employee health activity. Higher-level activities and resource are reported to require a business case. It is suggested that currently business cases for employee health are often not overly empirical, with more intuitive arguments appealing to people management issues, notions of corporate reputation and alignment with business objectives. These findings are somewhat aligned with existing studies by Haefeli et al. (2005) and Shearn (2003).

Data on benchmarking and some kind of return-on-investment assessment are normally required. Data on cost of illness (mostly expressed via sickness absence), direct health expenditure per employee and insurance premiums are also used. These
data are mostly captured by existing sources and procedural systems, although sickness absence data especially is often thought to be unreliable. Data on staff retention and productivity were considered relevant but not currently used or analysed by this sample. There was support for the notion that more robust empirical business cases may help overcome some of the barriers that were identified, for example where costs are more quantifiable than benefits.

8.2.2 Manager survey

The two specialist manager groups in this survey (H&S and HR) are found to have broadly similar attitudes and levels of information relating to several aspects of employee health and safety management. The HR and H&S groups are, however, found to differ in two key areas. First, the HR group reports higher levels of information in specific domains, most notably in terms of understanding the full costs arising from employee health and safety as well as the availability of quantifiable information about cost impact; and reporting of current long-term sick employees and staff turnover. Second, the H&S group more frequently report being involved in business cases than the HR group.

Generalist managers are found to differ from specialist managers in several important aspects: as investment influencing factors they attach more weight to evidence of adverse commercial impact of poor employee health and safety and evidence of how to reduce costs by improved employee health and safety management; however of all groups they are found to have the lowest awareness of health and safety issues; the lowest availability of information about cost impact; the lowest current knowledge of staff turnover, sickness absence and accident rates; the lowest involvement in business cases and when involved, the lowest reporting of using empirical data.

Generalist managers are found to demand more evidence about the value of investing in employee health: the costs and benefits (commercial impact); but information availability about cost impact arising from employee health and safety issues is found to be poor and the level of individuals' understanding of the full costs arising from employee health and safety issues is found to be very poor, even among specialist
managers. Measurement issues and time are found to be the biggest barriers to understanding the full cost impact arising from employee health and safety issues.

Results from this survey suggest that within respondents’ organisations there may be a misalignment of a) the availability of quantifiable information about the cost impact of employee health and safety and b) the perception of what the biggest costs to an organisation arising from employee health and safety issues may be. For example, lost production ranks as the biggest perceived cost but information availability about this is quite poor. Impact on reputation/image and the impact on product/service quality are also perceived as among the biggest costs to an organisation yet information availability for these factors is consistently rated as among the worst by all groups.

Involvement in a business case relating to employee health and safety was reported by more than three-quarters of the H&S group, half of the HR group and one-third of the GM group. Empirical data was included in less than half of the business cases reported overall, data on sickness absence and injury rates were most likely to be included. Respondents from the H&S and HR groups were significantly more likely to report use of empirical data. Non-empirical descriptive impact on reputation was included in around one-third of business cases. Credible return-on-investment (ROI) estimates were rarely reported as being included in the business case.

Analysis by sector found several significant results. Compared to respondents from the private sector, respondents from the public sector were more likely to rate insurance premium discounts higher as an influencing factor for employee health and safety investment; were more likely to perceive 8 of 13 factors as bigger costs to their organisation; and more likely to state that their organisation spends more than its competitors on employee health and safety management. Private sector respondents reported higher levels of awareness about what the issues are for health and safety management in their organisation; were more likely to state that they currently knew about accident rates and how many employees were on long-term sick; and were most likely to state that they did believe absence data was sufficiently accurate.
Analysis by size of organisation found that compared to medium and large-sized organisations, small organisations were most likely to state that bad publicity/damage to reputation drives decisions about investment in employee health and safety management. Respondents from large organisations were also more likely to know about the use of empirical data in business cases than those from small or medium-sized organisations.

The findings from this study build on the studies that have previously shown some differences between occupational health professionals’ and general managers’ perceptions of employee health and well-being issues (Lian and Laing, 2007; Williams et al., 1994; Bradshaw et al., 2001; Reid and Malone, 2003) as well as studies that have specifically addressed the costs and benefits of employee health and well-being (Wright, 1998; Wright et al., 2000; Wright and Marsden, 2002; Antonelli et al., 2006; Haefeli et al., 2005).

### 8.2.3 Empirical case studies

The study presented in chapter 7 of this thesis found that it has been feasible to practically implement a methodology that has demonstrated meaningful and statistically significant correlation between employee health and well-being measures and estimates of the cost of workloss.

Workloss time as defined in this study, combined self-reported sick hours and presenteeism hours, is found to be substantial. On average, reported workloss time represented close to one quarter of contracted hours, almost one week’s workloss per month. This workloss time is clearly dominated by estimates for self-reported presenteeism hours. Estimates of the cost of workloss in this study, using adjustments based on job profile characteristics or a simple unadjusted human capital approach of applying the wage rate to workloss time, suggest that workloss is not a trivial cost to these organisations. Measures of workloss in this study are very consistent with some existing studies that have measured both presenteeism and absenteeism (Collins et al., 2005; Ozminowski et al., 2004; Goetzel et al., 2004; Stewart et al., 2003).
Bivariate correlation between key employee health and well-being measures is consistent with previous studies (Alexanderson, 1998; Scott and Taylor, 1985; Steers and Rhodes, 1984; Terborg et al., 1982). Employee engagement or well-being measures (job satisfaction, organisational commitment, HSE Management Standards Indicator) are all found to be highly correlated with each other and inversely correlated with health status, and intention to quit. These employee engagement measures are also each found to be inversely correlated with workloss time, both self-reported sickness absence hours and presenteeism hours, with presenteeism having the stronger effect. Income is found to positively correlate with these three measures of employee engagement, with organisational commitment (overall and all components) and job satisfaction (overall and all components) having the strongest effects. Income is also inversely correlated with one measure of health status included in this study (HPQ 4-week physical health score), intention to quit and self-reported sickness absence hours.

Bivariate correlation between estimates of the cost of workloss and other variables in this study is in line with theoretical expectations. Health status (measured by GHQ-12), one sub-component of job satisfaction (extrinsic), one sub-component of organisational commitment (involvement), HSE Management Standards Indicator overall score (as well as 3 sub-components: peer support, demands and role) and the number of supervisees are each found to independently correlate with estimates of the cost of workloss. In one organisation (A) it was found that workloss costs were higher among employees reporting that they currently had depression or frequent and severe headaches, this is consistent with previous studies in these health conditions (Birnham et al., 2000; Conti and Burton, 1994; Kessler et al., 1999; Leon et al., 2002; Simon et al., 2000; Loeppke et al., 2003).

As the unadjusted or adjusted cost of workloss is a composite variable derived from workloss hours (sickness absence and presenteeism) and income, the analysis of bivariate correlation with workloss hours alone shows somewhat different results. Twelve variables (age, number of children, time in job, intrinsic job satisfaction, organisational identity, organisational commitment (overall), HSE Management Standards Indicators component scores (control, managerial support and relationships), intention to quit, co-morbidities and HPQ 4-week mental health score)
are found to each correlate only with workloss hours and not workloss costs. Four variables (organisational involvement, HSE Management Standards Indicators overall score and role component, GHQ-12) show bivariate correlation with both workloss hours and estimates of workloss costs.

This study fitted multivariate regression models to the data that significantly explained a proportion of the variance in cost of workloss and workloss hours. The proportion of variance explained by these models is low to modest, as has been found in other studies (Farragher et al., 2008). All variables found to be correlated with the cost of workloss in the bivariate analysis except for two (HSE Management Standards Indicator overall score and demands component), were also significant correlates in the multivariate analyses as well as a further four variables (time in organisation, social and intrinsic job satisfaction, and HSE Management Standards Indicator managerial support component).

The correlation coefficients for explanatory variables in the log-linear models are interpreted as the proportional change in cost of workloss associated with a unit change in that explanatory variable. Hence, based on the pooled dataset, unit changes in variables are observed to be associated with an approximate percentage change in the cost of workloss as follows: an additional supervisee (+2%), one point improvement in extrinsic job satisfaction on 1 to 5 scale (+36%), an additional year in the organisation (+2%), one point improvement in social job satisfaction on 1 to 5 scale (+18 to 24%), one point improvement in organisational involvement on 3 to 21 scale (-9%), one point worsening in GHQ-12 on 0 to 36 scale (+6 to 7%), and a one point improvement in HSE Management Standards Indicator role component on 1 to 5 scale (-38 to 47%).

**8.3 Methodological considerations**

**8.3.1 The research design: strengths and weaknesses**

The aims of this research were indeed challenging, the study in chapter 7 constituting the first known example of employer costs being empirically linked to employee health and well-being metrics in this way. This economic framework approach
enables organisations to compare the relative marginal values of efforts to improve a whole gambit of employee metrics. This could of course be extended beyond those metrics collected in the empirical cases studies for this thesis.

Perhaps the main strength of the research design used in this thesis is its iterative development of an economic framework approach based on considerable input from multi-disciplinary professionals working within organisations that could adopt such an approach. As much as possible the ‘end-users’ have been integrated into the design and development (Fowler, 2009) of the approach outlined in the empirical case studies. From the outset of this research, consultation with professionals in this area has proved highly valuable. Another strength has been the use of multiple methods (Jick, 1979; Campbell and Fiske, 1959; Webb et al., 1966; Smith, 1975; Denzin, 1978); use of both qualitative and quantitative research techniques has created a better understanding of many issues, but also collecting primary data directly from both employers (different types of managers) as well as employees has enabled examination of organisational as well as informational issues. The diversity of organisations (industries, sectors, size) and the diversity of employees (job characteristics, demographics) included in this research is also a strength as it has potential to aid generalisability. The somewhat ecological approach (Sallis and Owen, 2002) adopted by this research has potential value since behaviour is studied in the context in which it is enacted rather than introducing sometimes-artificial conditions required by more experimental designs, which are inevitably difficult to make operational in a workplace context.

One further strength of this research has been the use of web-based survey tools, which has enabled effective, and efficient data collection and management of a reasonable sample within a practical time period. The design and development of materials using this format was considered to be a highly cost-effective use of research time and resources. For respondents this format of completing questionnaires was efficient and feasible and involved minimal disruption to their workplace. Despite these advantages of the web-based survey, consideration must also be given to the possibility of excluding sections of potential respondents who do not have access to computer hardware or computer skills to provide a response (Dillman, 2007).
A number of potential weaknesses or limitations of the research design can be identified. Sample selection is key to both the manager survey and the empirical case studies based on employee surveys. The potential selection bias associated with use of a web-based survey format has already been mentioned, although this was not thought to be a significant issue for most organisations involved, with employees mostly having personal computers. One manufacturing organisation, where access to computers was clearly very limited for employees, elected to use a paper-based format of the survey and indeed provided health seminars for employees, to aid completion rates.

An element of sample selection bias may be present in these studies. Clearly conducting research in workplace settings is challenging, as employers see the more apparent and immediate costs to their organisation in terms of the interruption of normal business and production as employees spend time answering questions and the benefits of engaging in research need to be strong and well communicated (Warner et al., 1988). Hence recruiting collaborating organisations to workplace research projects is inherently very difficult. The sampling strategies adopted for the primary research in this thesis could be identified as a weakness as it under represents various groups such as smaller organisations who may be disproportionately effected by engaging in research projects.

Whilst collaborating organisations made every attempt to encourage all employees within the selected departments to participate in this research it was not mandated and hence some element of voluntary response remains. Response rates were relatively good within each department, but some selection bias can not be ruled out completely with this method. Employees absent at the time of the survey, including those on long-term sick, were clearly not included but these could be clearly identified and followed-up separately if desired. Potentially more problematic may be the employees who were present but chose not to respond, reasons for non-compliance could be further explored through other channels within participating organisations to test the extent of any potential selection bias. As outlined in section 7.2.3, one step in the data collection method that aimed to identify potential selection bias was the review of summary data by each collaborating organisation. Each organisation was
provided with a summary report, including respondents’ demographics, in order to reconcile this with their own records and archival data for the relevant department or unit of analysis in question. Respondent samples were considered to be broadly representative of their wider populations, clearly this is key as the overall utility of survey results rest on the ability to infer characteristics of a target population from the answers provided by the sample of respondents (Groves, 1989).

Furthermore the potential for survivor bias (Applebaum et al., 2007), or healthy worker effect, cannot be ruled out in both the manager and employee surveys. Potential respondents with the most extreme experiences, attitudes and health and well-being status could be more likely to have exited their employment in these organisations, voluntarily or otherwise. The effect of this would be to create a somewhat false impression, by a larger proportion of employees who are less impaired or impacted by their jobs and their workplace. In cases where this is considered a significant issue analysis of turnover rates and length of service could be used to control for this bias.

A further weakness of the research design, particularly for the empirical case studies, is that data are cross-sectional, that is, collected at a single time point. This aspect of the research design was constrained by both the available research resource and time but moreover by the difficulty of recruiting organisations prepared to commit to multiple employee surveys over a period of time. Many larger organisations reported the problem of ‘survey fatigue’ among their staff. As the benefits of the approach used in this research are communicated and disseminated it is hoped that this may help persuade organisation to collaborate in more longitudinal studies. Cross-sectional data are a limitation since clearly the dynamics of time effects will also be of interest. Longitudinal studies could be used to show changes in employee health and well-being measures and employer costs over time (Fowler, 2009; Shaughnessy et al., 2009; de Vaus, 1995). This will be particularly important in the evaluation of specific interventions, which may have differential timing of costs (now) and benefits (downstream). Cross-sectional data may also be subject to seasonal effects that could impact data collected. For example, there may be a potential impact of winter on health status and proximity to holiday periods (summer, Christmas, etc.) may impact some measures.
The methodological limitations of the empirical case studies derive mainly from the inevitable reliance on employee self-reported data for certain parameters. The explanatory variables used in these studies (e.g. employee engagement, health status and work environment measures) are all based on widely-used, validated self-reported measures. However, it is the measurement of productivity in terms of presenteeism time that is clearly pivotal in this study. The self-report method for collection of productivity data receives particular attention when it is a component part of a dependent variable. In this study presenteeism time is part of the overall workloss cost estimate and results in terms of absolute measures of workloss costs are sensitive to these measures. Using the categorisation presented by Lerner and Lee (2006) that was discussed in chapter 6 of this thesis, whilst self-report may be widely accepted as the gold standard approach for parameters such as job satisfaction and the like, self-reported methods for productivity measurement are generally still relatively immature and are perceived at best as a practical substitute for gold-standard measures or indeed the sole option for collection of these data where objective data are simply unavailable or inaccessible.

Some of the problems associated with self-reported data have been well documented. Cannell et al. (1977) highlighted four basic reasons why respondents report events with less than perfect accuracy: a) they do not understand the question; b) they do not know the answer; c) they cannot recall it, although they do know it; and d) they do not want to report the answer in the survey context. Cammann et al. (1983) have summarised three well-known defects of collecting data by questionnaire as: 1) valid responses depend upon the clarity of the questions and the linguistic competence of the respondents; 2) even when modified by the use of open-ended response opportunities the questionnaire method imposes upon the respondent a predefined array of topics and response categories that may not fit the "real" situation of the respondent well; 3) responses may be inadvertently biased or knowingly distorted. Kessler and Stang (2006) highlight that self-reports of factual information are all subject to three types of errors: 1) lack of understanding on the part of the respondent
Several tactics were employed in the empirical studies presented in this thesis in an attempt to minimise these issues with self-reported data. First, the selection of productivity instrument was based on one of the most widely used and validated measures available. Much work has been done to support the validation of the HPQ self-report instrument to assess presenteeism (Kessler et al., 2003). The HPQ instrument used in this study has been widely used and has been shown to correlate with objective measures of productivity. Second, as reported in the methods section of chapter 7, a number of internal consistency checks were applied during data management to eliminate any potential erroneous or 'protest' responses relating to self-rated job performance. Third, the context of the survey was such that the issue of pressure from social norms and peer or manager expectations was minimised as the survey was anonymous, confidential and (for all but one organisation) conducted wholly electronically (web-based data capture). This context may help reduce respondents unwillingness to reveal their own reduced job performance.

8.3.3 Guidance for economic evaluation

Formalised and comprehensive economic evaluation methodologies have apparently been largely absent from the occupational health setting. Chapter 6 of this thesis has highlighted how the quality of presenting economic information in the context of evaluations of employee health and well-being interventions within organisations could be enhanced by adopting several key aspects of established methods for health economic evaluation. Key methodological issues are identified in the areas of evaluation perspective and timeframe; identification, measurement and valuation of costs and consequences; and specific analytical issues including statistical analyses, sensitivity analyses and discounting techniques.

In addition to the adoption of these economic evaluation methods into the occupational health setting this thesis has also presented more logistical guidance. In chapter 1 of this thesis a simple checklist (Kessler and Stang, 2006) for employers to
make rational economic investment decisions about employee health and well-being was presented as follows:

1. What are the most commonly occurring health problems in my company?
2. What are the effects of these health problems on work performance, sickness absence, industrial accidents, and disability?
3. What is the monetary value of these workplace effects on the company’s bottom line?
4. How effective are available interventions in reducing these effects in my company?
5. What is the return-on-investment (ROI) of these proposed interventions?

The economic framework approach presented in chapter 7 of this thesis may assist organisations with addressing questions 2 and 3 on this checklist. This method provides organisations with information on the relative marginal effects on cost to an organisation of changes in different employee health and well-being measures. This knowledge could help manage the financial impact of workloss and aid resource allocation decisions by providing estimates of the value to an organisation of effects that might subsequently be delivered by a range of interventions or policies. It may also help prioritise the areas that should be considered for a review of interventions.

8.4 Implications for practice

The hypothesis that there is economic information deficiency in this system appears to be supported by the evidence identified in this thesis.

There appears to be a clear development opportunity for organisations to better harness the developing health and productivity literature in order to provide better information about the economics of employee health and well-being decisions. There was support for the notion that more robust empirical business cases may help overcome some of the barriers that were identified, for example where costs are more quantifiable than benefits. However, there appear to be two main factors currently deterring this approach. Firstly, the time and resource costs associated with collecting
more and better data are perceived to be too great. Secondly, there is a perception among the respondents in this survey that the management of their organisations are more likely to be persuaded by intuitive, emotional and ethical arguments than empirical approaches. However, it was also clear that there was widespread dissatisfaction with the way employee health issues are currently communicated to management. Greater understanding of all stakeholders’ information needs and a wider appreciation of the value as opposed to the cost of information may help address these problems.

There is a need to continually work with all stakeholders involved with employee health issues by dissemination of success stories in the form of case studies and literature reviews. Better measurement of relevant parameters such as productivity and reputation risk is likely to have a significant effect on the impact of the business case as also highlighted by Loeppke et al. (2007). Amongst the occupational health and safety profession it is clear that better communication of the employee health business case could substantially improve its impact, especially with focus on increased business relevance, alignment with business culture, language, and systems.

The managers’ survey found that the HR group may have greater or easier access to more information of relevance to employee health and safety management but this may not be fully exploited in cases where HR are not involved in business cases unless this can be communicated to other parties. This study has also found that less than half of reported business cases included empirical data, but this was found to be higher where HR managers were involved in the business case.

Generalist managers’ apparent demand for specific evidence to influence decision-making regarding employee health and safety may not be satisfied by the information that is routinely available to them. Many qualitative comments collected in this survey have pointed towards a reliance on specialist (technical) managers to cascade employee health and safety information to generalist managers. This study has found that whilst specialist managers are clearly better informed on many aspects, this may not be the specific information most required by generalist managers.
Two aspects were found to be common to many respondents in the managers' survey. First, there was considerable importance attached to the need for 'belief' in the employee health and well-being agenda expressed by respondents from all groups. There appears to be a widely held view that decision-makers are unlikely to be influenced by empirical analyses unless they first believe that engaging in these types of activities is the right thing for their organisation to do at this time. Second, there also appears to be some lack of clarity on the precise roles and responsibilities among different stakeholders for the employee health and well-being agenda. Many respondents, from all groups, report that certain aspects are not their responsibility and they assume that someone else within their organisations takes care of this. The implications of these two aspects are that a) some wider context information and communication may be needed in order for empirical analyses to have most impact; and b) better management of employee health and well-being may also include basic project management aspects such as clarity of roles and responsibilities.

The study presented in chapter 7 of this thesis could potentially have several implications for decision-makers within organisations responsible for allocating resources towards employee health and well-being policies. For participating organisations, this study has helped make visible some previously invisible cost implications associated with reduced productivity and workloss. The inclusion of estimates for presenteeism costs demonstrate the magnitude of potential financial loss to organisations. Estimates of the monetary value of workloss equivalent to almost one quarter of an organisations monthly wage bill are material and highlight the necessity of active management of these issues. This study could also have implications on how the business case for specific employee health and well-being interventions is constructed. This study could help facilitate the separation of a) information about intervention effectiveness and b) information about relationships between employee metrics and cost to a specific organisation.

8.4.1 Recommendations for future work

Whilst the economic framework approach developed in this thesis is promising in terms of its potential to provide new information which could impact employers incentives to invest in their employees' health and well-being, further research is
recommended to validate this approach in a wider context. Future research could, for example, widen the types of organisations and in particular test the feasibility of this approach within more small and medium sized enterprises (SMEs) as, for example, Antonelli et al. (2006). Moreover, evaluation of this approach over a longer time period would be required in order to assess just how much impact the availability of better and more appropriate economic information actually has on organisations using this approach and how much better employee health and well-being management can be achieved and sustained.

Whilst this thesis has included a wide range of employee health and well-being measures, further studies could usefully extend this to include other established and indeed more developmental measures as appropriate. Further work incorporating the Work Ability Index (Tuomi et al., 1998) into this economic framework approach, for example, may be particularly relevant in some countries.

The method of this study also only uses cross-sectional data (single-timepoint) due primarily to time and resource constraints, further work in this area may benefit from adopting a longitudinal approach. Analysis of changes in employee health and well-being metrics and indeed their relationship to workloss time and costs over multiple time periods could further enhance this approach.

Further work should also focus on productivity measurement in UK settings. The health and productivity literature has to date been largely confined to U.S. studies. Workplace systems and cultures will inevitably limit the generalisability of this work to some extent. Further development of UK-based instruments and/or further validation of instruments in a UK setting is likely to encourage more UK organisations to utilise these methods and measures. UK-based examples of self-report workloss and productivity instruments that can be shown to be correlated with accepted objective measures, in workplace contexts that may be conducive to this type of comparison, will also strengthen the role of self-report instruments further in this type of research.

Whilst studies presented in this thesis chose to use the HPQ instrument to empirically demonstrate the relationships between employee health and well-being metrics and
employer costs (estimated based on absenteeism and presenteeism workloss time) the effect of using other productivity instruments could also be investigated, to explore the sensitivity of results to instrument selection.

Productivity has been a key focus of this thesis as it was defined as a key employer relevant outcome measure by which to evaluate employee health and well-being activities. The reputation or image of an organisation was also identified as an important and relevant outcome measure for employers. Future research could usefully explore ways of measuring impact on reputation in this context and indeed the value of changes in an organisation's reputation.

In addition to research efforts to enhance the role of self-reported measures in this context, opportunities to develop more useful and appropriate employer archival datasets should also perhaps be the focus of a future research agenda.

Finally, for the economic framework approach developed in this thesis to be most effective, future evaluations of the (cost)-effectiveness of employee health and well-being interventions could be aligned with metrics used within the framework. Hence the application of the economic framework approach within an organisation could inform users of the potential value (cost or workloss avoided) of improving a specific metric, say a 1-point improvement on the GHQ-12 instrument, whilst evaluations of specific interventions could inform of the probability and cost of achieving this 1-point change in a given employee cohort.

8.5 Conclusion

Labour is an essential factor of production, but is also an inseparable characteristic of the person providing it. Firms exchange wages for labour but they employ people and are not just suppliers of labour. Occupational health and more widely employee health and well-being management is inherently an investment in these people and indirectly in their labour. Whilst organisations routinely operate good accounting procedures for evaluating the costs and benefits of investing in non-human resources there is a distinct information deficiency regarding investment in the health and well-being of these human resources. Economic evaluation methodologies are required to
fill this information gap and indeed provide new data channels such as employee self-reported productivity measurement, if organisations are to make rational resource allocation decisions in this area.

The major conclusion from this research is that economic information about employee health and well-being issues are likely to be more effective in creating incentives for organisations to invest in better management of these issues if there is a clearer separation of at least four components:

• First, the studies in this thesis clearly suggest there is demand for the intuitive business case approach. This can create the environment to engage senior managers and decision-makers and this approach may make greater use of management tools such as balanced scorecards and the like (as discussed in chapter 2) that suggest alignment with business strategies, for example. This intuitive approach may be a necessary but not sufficient step in the process of creating incentives for investment, it could provide the context and indeed stimulate the demand for more empirical approaches.

• Second, an empirical economic assessment of the current costs associated with a diverse range of employee health and well-being issues, such as the study method developed by this research and presented in chapter 7 of this thesis, could help provide prioritisation and focus on specific issues. Organisations could be better informed of the relative impact of various employee health and well-being issues and "reveal a blueprint for action" (Loeppke et al., 2007).

• Third, having made evidence-based selections of the areas most suitable for intervention using the empirical economic assessment approach, the interventions that are implemented should be subjected to more rigorous and formalised economic evaluation incorporating the methodological issues highlighted in chapter 6 of this thesis.

• Fourth, providers and purveyors of goods and services relating to employee health and well-being interventions will inevitably use value-for-money
arguments, return-on-investment claims and various types of business cases and economic assessments in order to promote and market their products.

If these four types of 'economic' information can be kept distinctly separate from each other within the decision-making processes of organisations each element is likely to be more effective and combine to create stronger incentives for organisations to invest.

Contrary to all corporate strategies claiming 'our people are our greatest asset' employers patently do not have property rights over employees, hence whilst their labour may be internal to the firm (to some extent under the control of the organisation) their human- (health and well-being) capital is essentially external to the firm. This thesis has put the case for why organisations may wish to reach out and attempt to enhance their employees’ human- (health and well-being) capital to the mutual benefit of their organisation and the employee.
9 REFERENCES


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### Appendix 2-1: Literature review search terms used (MEDLINE, EMBASE)

1. occupational medicine.mp.
2. occupational health.mp.
3. organisational health.mp.
4. industrial hygiene.mp.
5. industrial medicine.mp.
6. employee health.mp.
7. worker health.mp.
8. sickness absence.mp.
9. absenteeism.mp.
10. presenteeism.mp.
11. work injury.mp.
12. work illness.mp.
13. health promotion.mp.
14. preemployment.mp.
15. ill health retirement.mp.
16. early retirement.mp.
17. 1 and 2 and 3 and 4 and 5 and 6 and 7 and 8 and 9 and 10 and 11 and 12 and 13 and 14 and 15 and 16
18. 1 or 2 or 3 or 4 or 5 or 6 or 7 or 8 or 9 or 10 or 11 or 12 or 13 or 14 or 15 or 16
19. economics.mp.
20. cost effective.mp.
21. cost-effectiveness.mp.
22. cost benefit analysis.mp.
23. cost benefit.mp.
24. cost of illness.mp.
25. burden of illness.mp.
26. cost.mp.
27. productivity.mp.
28. health productivity.mp.
29. health productivity management.mp.
30. performance.mp.
31. workplace.mp.
32. employer.mp.
33. 19 or 20 or 21 or 22 or 23 or 24 or 25 or 26 or 27 or 28 or 29 or 30 or 31 or 32
34. 18 and 33
35. workplace!
36. workplace? .mp.
37. work?environment?.mp.
38. work environment?.mp.
39. work-environment?.mp.
40. work/
41. worker?.mp.
42. employ$.mp.
43. company.mp.
44. companies.mp.
45. employer?.mp.
46. organizations/
47. organisation?.mp.
48. firm?.mp.
49. plant?.mp.
50. factory.mp.
51. factories.mp.
52. restaurant?.mp.
53. agricultur$.mp.
54. office?.mp.
175. bursitis.mp.
176. shoulder dislocation/
177. shoulder dislocation.mp.
178. tennis elbow/
179. tennis elbow.mp.
180. tendinitis.mp.
181. tendinitis/
182. tenosynovitis/
183. tenosynovitis.mp.
184. hip/
185. hip.mp.
186. exp leg/
187. lower limb.mp.
188. exp musculoskeletal diseases/
189. cumulative trauma disorders/
190. exp respiratory tract diseases/
191. ACCIDENTS/
192. illness$.mp.
193. disorder?.mp.
194. Accidents, Occupational/
195. re?employment.mp.
196. injur$.mp.
197. occupational diseases/
198. functional limitation.mp.
199. physical capacity.mp.
200. depression.mp.
201. stress.mp.
202. RSI.mp.
203. repetitive strain.mp.
204. migraine.mp.
205. child/
206. pregnancy/
207. sports/
208. or/205-207
209. or/35-56
210. or/57-83
211. or/84-148
212. or/149-204
213. 212 and 211 and 209 and 210
214. 213 not 208
215. limit 214 to (humans and english language)
Appendix 2-2: Literature review search terms used
(PsycINFO)

{Employee Absenteeism} OR
{Employee Turnover} OR
{Costs and Cost Analysis} AND
{Health} OR
{Job Satisfaction} OR
{Organizational Commitment} OR
{Well Being} OR
{Working Conditions}

Index Terms Empirical Study: Methodology AND
Journal Article: Document Type AND
Human: Population Group AND
Adulthood (18 yrs & older): Age Group AND
Peer-Reviewed: Publication Type AND
Employee Absenteeism: Index Term
Appendix 5-1: Sample of manager survey
This survey asks for your views and experience of employee health and safety issues within your organisation.

There are 6 brief sections. The survey should take around 15 to 20 minutes.

In section 5 you will be asked about your knowledge of sickness absence and injury data. If you have this data easily available in your organisation you may want to refer to this when giving your responses to this section.

All responses are of course in confidence.

We would like to thank you for your support to this important research project.

For any questions about this research please contact Paul Miller, Department of Human Sciences, University of Loughborough. E-mail: P.S.J.Miller@lboro.ac.uk
1. Which of the following statements do you believe best describes your organisation's current attitude to employee health and safety related issues?

- Yet to be fully engaged - employee health and safety issues not prominent in your organisation
- Complier - your organisation ensures it is legally compliant in this area, and no more
- Advocate - your organisation actively promotes employee health and safety issues
- Other (please specify in comment box)

Comment on why you gave this response:

2. Which of the following statements do you believe best describes your organisation’s current perception of the balance between the costs and benefits of managing employee health and safety related issues?

- Costs greatly outweigh benefits
- Costs slightly outweigh benefits
- Costs and benefits are about equal
- Benefits slightly outweigh costs
- Benefits greatly outweigh costs
- Other (please specify in comment box)

Comment on why you gave this response:

3. How satisfied are you with current arrangements for employee health and safety in your organisation? (please tick one)

- We could do more
- Current arrangements are sufficient
- I am proud of what we do
- Other (please specify in comment box)

Comment on why you gave this response: 
4. How would you rate your current level of awareness about the following health and safety aspects for your organisation?

<table>
<thead>
<tr>
<th>Awareness</th>
<th>1) No awareness</th>
<th>2) Very limited awareness</th>
<th>3) Limited awareness</th>
<th>4) Modest awareness</th>
<th>5) Detailed awareness</th>
<th>Don't know</th>
</tr>
</thead>
<tbody>
<tr>
<td>Awareness of what the key health and safety issues are for your organisation (e.g. stress, musculoskeletal issues etc.)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Awareness of the overall cost impact of health and safety issues for your organisation</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Awareness of what health and safety interventions are currently in place</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Awareness of how effective your current health and safety interventions are</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Awareness of the cost of your current health and safety interventions</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Awareness of options to change the mix of health and safety interventions</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Awareness of options to change the current balance of costs and benefits of health and safety issues for your organisation</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Comment on why you gave this response
5. How satisfied are you with your current overall level of awareness about health and safety aspects within your organisation?

- Completely unsatisfied - I don't know nearly enough
- Unsatisfied - I need to know more
- Satisfied - I know enough
- Fully satisfied - I clearly know enough
- Other (please specify in comment box)

Comment on why you gave this response

6. What does your organisation currently spend (approx.) on all items related to employee health and safety? (please tick one)

- less than £50 per employee, per year
- between £50 and £99 per employee, per year
- between £100 and £149 per employee, per year
- between £150 and £199 per employee, per year
- between £200 and £299 per employee, per year
- between £300 and £349 per employee, per year
- between £350 and £399 per employee, per year
- between £400 and £449 per employee, per year
- between £450 and £499 per employee, per year
- more than £500 per employee, per year
- I don't know

If don't know, please indicate why (e.g data not routinely available).
7. How do you think the level of spend on all items related to employee health and safety in your organisation compares to other organisations in your peer group (similar size and type)? (please tick one)

- My organisation spends significantly less than our peers
- My organisation spends less than our peers
- My organisation spends about the same as our peers
- My organisation spends more than our peers
- My organisation spends significantly more than our peers
- I don’t know

8. Do you think your organisation would benefit from changing the current total level of spend on items related to employee health and safety? (Please tick one)

- Yes, spend should be increased
- No, spend should stay about the same
- Yes, spend should be decreased
- Other (Please specify in comment box)

Comment on why you gave this response

9. Which of the following statements describes your experience of business cases relating to employee health and safety? (tick most relevant)

- I have provided input / support / advice to a business case relating to employee health and safety
- I have reviewed / evaluated a business case relating to employee health and safety
- I have used a business case to inform decision-making about employee health and safety issues
- I have not been involved with a business case relating to employee health and safety
- Other (Please specify in comment box)

Add any further comment here
10. For your most recent experience of a business case relating to a health and safety issue, was empirical data provided on the current burden of the health and safety issue on your organisation in terms of the following aspects?

<table>
<thead>
<tr>
<th>Aspect</th>
<th>Yes, empirical data included</th>
<th>No, descriptive information only</th>
<th>No, not included</th>
<th>Don't know</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sickness absence</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>Injury rates</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>Staff turnover</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>Productivity</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>Insurance premiums</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>Legal costs</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
</tbody>
</table>

Other (please specify)

11. For your most recent experience of a business case relating to a health and safety issue, was empirical data provided on the expected benefits of the proposed health and safety intervention in terms of the following aspects?

<table>
<thead>
<tr>
<th>Aspect</th>
<th>Yes, empirical data included</th>
<th>No, descriptive information only</th>
<th>No, not included</th>
<th>Don't know</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sickness absence</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>Injury rates</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>Staff turnover</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>Productivity</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>Insurance premiums</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>Legal costs</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
</tbody>
</table>

Other (please specify)
12. For your most recent experience of a business case relating to a health and safety issue, how was impact of the intervention on your organisation's reputation assessed?

- Not included
- Mentioned, but with little detail
- Description of expected impact
- Costed estimate of expected impact
- Don't know
- Other (please specify in comment box)

Comment on why you gave this response

13. For your most recent experience of a business case relating to a health and safety issue, was a credible return-on-investment (ROI) calculation included?

- ROI not included
- ROI included, but I did not consider this credible
- Credible ROI was included
- Don't know
- Other (Please specify in comment box)

Comment on why you gave this response
14. For your most recent experience of a business case relating to a health and safety issue, what other professional groups did you work with and how would you describe their role? (please tick one for each row)

<table>
<thead>
<tr>
<th>Professional Groups</th>
<th>Not involved</th>
<th>Technical advisor</th>
<th>Part of a mixed team</th>
<th>Budget authorising decision-maker</th>
<th>Driver of change</th>
</tr>
</thead>
<tbody>
<tr>
<td>Occupational Health &amp; Safety</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>Human Resources (Personnel)</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>Finance</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>Legal</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>General Management</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>Leadership</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>Other (please specify)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

15. For your most recent experience of a business case relating to a health and safety issue, how satisfied were you with this process overall?

O 1) Completely unsatisfied - this did not add anything
O 2) Unsatisfied - it could have been done better
O 3) Satisfied - this business case was useful
O 4) Fully satisfied - this business case was pivotal
O Other (Please specify in comment box)

Comment on why you gave this response
16. How important do you think are the following factors in terms of influencing your organisation to invest in employee health and safety management?

<table>
<thead>
<tr>
<th>Factor</th>
<th>1) No influence</th>
<th>2) Relevant (but other factors more important)</th>
<th>3) Considered (alongside other factors)</th>
<th>4) Considered important (supported by other issues)</th>
<th>5) Drives decisions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Shareholder pressure</td>
<td>○</td>
<td>○</td>
<td></td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>Evidence of adverse commercial impact of poor employee health and safety</td>
<td>○</td>
<td>○</td>
<td></td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>Experience of a high profile incident</td>
<td>○</td>
<td>○</td>
<td></td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>Insurance premium discounts for good employee health and safety record</td>
<td>○</td>
<td>○</td>
<td></td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>Other (please specify)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Customer demands</td>
<td>○</td>
<td>○</td>
<td></td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>Public pressure</td>
<td>○</td>
<td>○</td>
<td></td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>Evidence of how to reduce costs by improved employee health and safety</td>
<td>○</td>
<td>○</td>
<td></td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>management</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bad publicity, damage to reputation</td>
<td>○</td>
<td>○</td>
<td></td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>Extended legal requirement to pay for full rehabilitation of employees</td>
<td>○</td>
<td>○</td>
<td></td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>with work-related illness</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Better understanding of how to improve employee health and safety</td>
<td>○</td>
<td>○</td>
<td></td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>management</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other (please specify)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
17. How influential do you believe is the business case in decisions relating to employee health and safety within your organisation?

Please tick one

- [ ] 1) No influence
- [ ] 2) Relevant (but other factors more important)
- [ ] 3) Considered (alongside other factors)
- [ ] 4) Considered important (supported by other factors)
- [ ] 5) Drives decisions

Comment on why you gave this response:

18. To what extent do you believe that better employee health and safety management could reduce costs to your organisation?

- [ ] Not at all, it adds costs
- [ ] Unlikely to be a significant reduction
- [ ] Significant reduction
- [ ] Other (Please specify in comment box)

Comment on why you gave this response:

19. Do you believe that improving the health and safety of the people in your organisation can have a meaningful impact on the performance of your organisation?

- [ ] Yes
- [ ] No
- [ ] Other (Please specify in comment box)

Comment on why you gave this response:
20. What do you perceive are the biggest costs to your organisation arising from employee health and safety related issues? Please rate each aspect.

<table>
<thead>
<tr>
<th>Cost Impact</th>
<th>1) Trivial cost impact</th>
<th>2) Managable cost impact</th>
<th>3) Significant cost impact</th>
<th>4) Impacts financial performance of your organisation</th>
<th>5) Potential to threaten viability of your organisation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lost production</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Loss of contracts / customers / revenue</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Health Insurance premiums</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Greater use of temporary contract workers</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Impact on product / service quality</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ill health retirement</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Employee liability insurance premiums</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Material damage</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Compensation / legal claims</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sick pay</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Impact on reputation / image</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Direct treatment costs</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Staff turnover (recruitment &amp; training)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other (please specify)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
21. What level of quantifiable information about these cost items arising from employee health and safety related issues is available to you? Please rate each aspect.

<table>
<thead>
<tr>
<th>Cost Item</th>
<th>1) Unlikely to be available in my organisation</th>
<th>2) Could be available with a lot of effort</th>
<th>3) Could be available by special request</th>
<th>4) Available from routine systems</th>
<th>5) I have this information</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sick pay</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>Loss of contracts / customers / revenue</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>Staff turnover (recruitment &amp; training)</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>Greater use of temporary contract workers</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>Health insurance premiums</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>Direct treatment costs</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>Employee liability insurance premiums</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>Material damage</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>Lost production</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>Compensation / legal claims</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>Ill health retirement</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>Impact on product / service quality</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>Impact on reputation / image</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>Other (please specify)</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
</tbody>
</table>

22. Do you currently feel that you have a good understanding of the full costs arising from employee health and safety related issues in your organisation?

☐ Yes
☐ No
☐ Don't know

Comment on why you gave this response:
23. Do you believe your organisation currently has a good understanding of the full costs arising from employee health and safety related issues?

- Yes
- No
- Don't know

Comment on why you gave this response:

24. What are the barriers for your organisation understanding the full cost impact arising from employee health and safety issues? (tick as many as apply)

- Measurement issues
- Time
- Cost
- Incentive
- Lack of awareness
- Lack of skills
- Not core to the business
- These costs are unlikely to be big enough to matter

Other (please specify)
Sickness Absence

Please answer questions in this section with your most recent best estimate information.

25. Do you know on average how many days were lost due to overall sickness absence per employee in your organisation over the last 12 month period?
   - Yes
   - No

   If YES, how many overall sick days per employee or group of employees - please specify denominator (e.g. 5 days per employee or 150 days per 10,000 employees etc.)

26. Do you know on average how many days were lost due to work-related ill-health per employee in your organisation over the last 12 month period?
   - Yes
   - No

   If YES, how many work-related sick days per employee or group of employees - please specify denominator (e.g. 5 per employee or 150 per 10,000 employees etc.)

27. Do you know how many employees you currently have on long-term sickness absence (more than 20 days)?
   - Yes
   - No

   If YES, how many employees on long-term sick? (please specify metric used - e.g actual number of employees; percentage (%) or rate per group of employees etc.)
28. Do you believe that your organisation's sickness absence data is sufficiently accurate?
   - Yes
   - No
   - Don't Know

Any comment on the response that you gave:

29. Do you know how many reportable accidents (over 3 days absence) your organisation experienced over the past 12 months?
   - Yes
   - No

If YES, how many reportable accidents per employee or group of employees - please specify denominator (e.g. 5 per employee or 150 per 10,000 employees etc.)?

30. Do you know how many injury accidents (under 3 days absence) your organisation experienced over the past 12 months?
   - Yes
   - No

If YES, how many injury accidents per employee or group of employees - please specify denominator (e.g. 5 per employee or 150 per 10,000 employees etc.)?

31. Do you know how many minor accidents (under 1 days absence) your organisation experienced over the past 12 months?
   - Yes
   - No

If YES, how many minor accidents per employee or group of employees - please specify denominator (e.g. 5 per employee or 150 per 10,000 employees etc.)?
32. Do you know how many non-injury (damage / loss only) accidents your organisation experienced over the past 12 months?

- Yes
- No

If YES, how many non-injury accidents per employee or group of employees - please specify denominator (e.g. 5 per employee or 150 per 10,000 employees etc.)?

33. Does your organisation have in place any way to assess lost productivity due to employee illness and injury?

- Yes
- No
- Don't know

If YES, how is lost productivity measured?

34. Do you know how many staff left your organisation over the past 12 months?

- Yes
- No

If YES, how many? (please specify whether absolute number, rate or % per group of employees etc.)
35. Which of the following best describes the area you predominantly work in?

- [ ] Health, Safety, Environment
- [ ] Human Resources, Personnel Management
- [ ] General Management
- [ ] Other (please specify in comment box)

Other (please specify):

36. Are you a member of any of the following professional bodies?

- [ ] CBI
- [ ] CIPD
- [ ] IOD
- [ ] SOM
- [ ] IOSH

Other (please specify):

Other (please specify):
37. What type of industry does your organisation predominantly operate in?

A. Agriculture, Forestry & Fishing  
B. Mining & quarrying  
C. Manufacturing  
D. Electricity, gas, steam and air conditioning  
E. Water supply, sewage, waste management and remediation activities  
F. Construction  
G. Wholesale & retail trade; repair of motor vehicles and motorcycles  
H. Transportation & storage  
I. Accommodation & food service activities  
J. Information & communication  
K. Financial & insurance activities  
L. Real estate activities  
M. Professional, scientific & technical activities  
N. Administrative & support service activities  
O. Public administration and defence; compulsory social security  
P. Education  
Q. Human health and social work activities  
R. Arts, entertainment and recreation  
S. Other service activities  
T. Activities of households as employers  
U. Activities of extraterritorial organisations and bodies  
 Multiple sectors (please specify in comment box)

Please Tick One
38. What sector is your organisation in?
- Private sector
- Public sector
- Public and private sectors
- Private sector (not-for-profit)

39. What is the total number (approx.) of employees in your organisation (full-time equivalent)? (Please specify whether this refers to a subset of a wider organisation)

40. What proportion (%) of employees in your organisation are predominantly engaged in manual-work?

41. If you would like to receive feedback on this survey please enter your e-mail address here (optional):
Appendix 7-1: Sample of employee questionnaire
This survey will ask you about your health, wellbeing and working conditions and how this impacts you and your job.

The purpose of the survey is to provide your organisation with information to help improve the health, wellbeing and working conditions of all its' employees.

There are 7 sections after this page to complete.

Please answer all questions as accurately as you can.

The survey usually takes around 30 to 40 minutes to complete.

All your responses are anonymous and confidential.

We thank you for your time and support to this important research.

Paul Miller
P.S.J.Miller@lboro.ac.uk
Before starting the survey please provide the following background information

1. What is the name of the organisation that employs you?

2. What is the name of the business unit that you work in?
   - Noble Metals
   - Metal Joining
   - Precious Metals Marketing (PMM)
   - Security
   - Other (please specify in comment box)

3. How old are you?
   (please enter a whole number only, in years e.g 21)

4. Are you male or female?
   - Male
   - Female

5. What is your current marital status?
   - Married or Cohabiting
   - Separated
   - Divorced
   - Widowed
   - Never Married
6. How many children do you have?
- None
- One
- Two
- Three
- Four
- More than Four

7. How long have you worked for this organisation? (Please enter a number only, in years. e.g. 3.5 for 3 years 6 months)

8. How long have you worked in your current job? (please enter a number only, in years. e.g. 3.5 for 3 years 6 months)

9. Is your job: (please tick)
- Permanent Full-Time
- Permanent Part-Time
- Permanent Job-Share
- Fixed-term Contract / Casual

10. Please describe your ethnic / national origin:

11. Where do you live? -please enter town/city or postal code
12. What is the highest educational qualification you hold?

- CSE or equivalent / GCSE (Grades D-G)
- O-Level or equivalent / GCSE (Grades A-C)
- A-Level or equivalent
- Degree or equivalent
- Post-graduate degree or equivalent
- Vocational qualifications
- No formal qualifications

Other (please specify)

13. What is your annual income from your job, before taxes?

- £1 - £4,999
- £5,000 - £9,999
- £10,000 - £14,999
- £15,000 - £19,999
- £20,000 - £24,999
- £25,000 - £29,999
- £30,000 - £34,999
- £35,000 - £39,999
- £40,000 - £44,999
- £45,000 - £49,999
- £50,000 - £54,999
- £55,000 - £59,999
- £60,000 - £64,999
- £65,000 - £69,999
- £70,000 - £74,999
- more than £75,000
The next section asks about your work activities.

It uses questions from the Health and Work Survey which was developed by the World Health Organization (WHO) as part of the WHO Composite International Diagnostic Interview (copyright 2001 by WHO) and is used here with the permission of the WHO.

1. Please choose a category that best describes your main job. If none of the categories fits you exactly, please respond with the closest category to your experience.
   - Executive or Senior Manager (e.g. CEO, VP)
   - Professional (e.g. engineer, accountant)
   - Technical support (e.g. lab technician, legal assistant)
   - Sales (e.g. Sales rep)
   - Clerical and administrative support (e.g. Secretary)
   - Service Occupation (e.g. Security Officer, Caretaker)
   - Precision production and crafts worker (e.g. mechanic)
   - Operator or Labourer (e.g. Assembly line worker, Truck Driver)

2. How many people do you personally supervise in your job?
   - please enter a number only
   - if none please enter 0

3. About how many hours altogether did you work in the past 7-days?
   - round to nearest hour
   - please enter a whole number only

4. How many hours does your employer expect you to work in a typical 7-day week?
   - round to nearest hour
   - please enter a whole number only
   - if it varies, estimate the average...
5. In the past 4 weeks (28 days), how many days did you miss an entire work day because of problems with your physical or mental health?
-please include only days missed for your own health, not someone else's health
-please enter a whole number only
-if none enter 0

6. In the past 4 weeks (28 days), how many days did you miss an entire work day for any other reason (including holiday)?
-please enter a whole number only
-if none enter 0

7. In the past 4 weeks (28 days), how many days did you miss part of a work day because of problems with your physical or mental health?
-please include only days missed for your own health, not someone else's health
-please enter a number only in decimal format e.g. 1.5 for a day and a half
-if none enter 0

8. In the past 4 weeks (28 days), how many days did you miss part of a work day for any other reason (including holiday)?
-please enter a number only in decimal format e.g. 1.5 for a day and a half
-if none enter 0

9. In the past 4 weeks (28 days), how many days did you come in early, go home late, or work on your day off?
-please enter a whole number only
-if none enter 0
10. About how many hours altogether did you work in the past 4 weeks (28 days)?
(For example, 40 hours per week for 4 weeks = 160 hours; 35 hours per week for 4 weeks = 140 hours.)
-round to the nearest hour
-please enter a whole number only

11. Did you have any of the following experiences at work in the past 4 weeks (28 days)?

Any special work success or achievement?  Yes  No
Any special work failure?  Yes  No
An accident that caused either damage, work delay, a near miss, or a safety risk?  Yes  No

If YES, please describe what happened
12. The next questions are about the time you spent during your hours at work in the past 4 weeks (28 days). Select the one response for each question that comes closest to your experience.

<table>
<thead>
<tr>
<th>Question</th>
<th>All of the time</th>
<th>Most of the time</th>
<th>Some of the time</th>
<th>A little of the time</th>
<th>None of the time</th>
</tr>
</thead>
<tbody>
<tr>
<td>1) How often was your performance higher than most workers on your job?</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>2) How often was your performance lower than most workers on your job?</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>3) How often did you do no work at times when you were supposed to be working?</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>4) How often did you find yourself not working as carefully as you should?</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>5) How often was the quality of your work lower than it should have been?</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>6) How often did you not concentrate enough on your work?</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>7) How often did health problems limit the kind or amount of work you could do?</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
</tbody>
</table>

13. On a scale from 0 to 10 where 0 is the worst job performance anyone could have at your job and 10 is the performance of a top worker, how would you rate:

<table>
<thead>
<tr>
<th>Performance</th>
<th>Worst performance</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
<th>Top performance</th>
</tr>
</thead>
<tbody>
<tr>
<td>1) The usual performance of most workers in a job similar to yours?</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td></td>
</tr>
<tr>
<td>2) Your usual job performance over the past year or two?</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td></td>
</tr>
<tr>
<td>3) Your overall job performance on the days you worked during the past 4 weeks (28 days)?</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td></td>
</tr>
</tbody>
</table>
14. How would you compare your overall job performance on the days you worked during the past 4 weeks (28 days) with the performance of most other workers who have a similar type of job?

- You were a lot better than other workers
- You were somewhat better than other workers
- You were a little better than other workers
- You were about average
- You were a little worse than other workers
- You were somewhat worse than other workers
- You were a lot worse than other workers
What happens at work if you are sick?

This brief section asks about what typically might happen if you are unwell and/or absent from work.

1. Please indicate what happened to your workload in any period you were absent from your job? (If it varies, please indicate a typical situation).

- [ ] I caught up when I returned (within normal hours)
- [ ] I did unpaid overtime to catch up
- [ ] I did paid overtime to catch up
- [ ] Other members of my team covered my work (within normal hours)
- [ ] Other members of my team covered my work (paid overtime)
- [ ] I have not been absent

Other (please specify)

2. How easy is it to get help from colleagues to do your job if you were at work but less than well?

<table>
<thead>
<tr>
<th>How easy is it to have a colleague or an outside temp worker pick up the most important responsibilities of your job if you were at work but less than well? (please rate on 1 to 5 scale)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1) Easy to pick up responsibilities with similar quality</td>
</tr>
<tr>
<td>[ ] 1</td>
</tr>
</tbody>
</table>
3. How easy is it to get help from colleagues to do your job if you were absent from work due to illness?

<table>
<thead>
<tr>
<th>1) Easy to pick up responsibilities with similar quality</th>
<th>2) Responsibilities could be picked up with some quality but with difficulty</th>
<th>3) Responsibilities could be picked up but likely with lower quality</th>
<th>4) Responsibilities unlikely to be picked up</th>
<th>5) Impossible to pick up responsibilities</th>
</tr>
</thead>
<tbody>
<tr>
<td>How easy is it to have a colleague or an outside temp worker pick up the most important responsibilities of your job if you were absent from work for the entire day due to illness? (please rate on 1 to 5 scale)</td>
<td>(Choice selected)</td>
<td>(Choice selected)</td>
<td>(Choice selected)</td>
<td>(Choice selected)</td>
</tr>
</tbody>
</table>

4. How time sensitive is your work?

<table>
<thead>
<tr>
<th>1) work can be postponed easily (no lost sales and/or missed deadlines)</th>
<th>2) work is a little time sensitive, possible to postpone</th>
<th>3) work is somewhat time sensitive, some elements may be postponed</th>
<th>4) work is mostly time sensitive, mostly cannot be postponed</th>
<th>5) work cannot be postponed without severe consequences (lost sales and/or missed deadlines)</th>
</tr>
</thead>
<tbody>
<tr>
<td>If you miss time from work due to illness to what extent are sales lost or important deadlines missed?</td>
<td>(Choice selected)</td>
<td>(Choice selected)</td>
<td>(Choice selected)</td>
<td>(Choice selected)</td>
</tr>
</tbody>
</table>

5. What happens to the function of any team you are part of if you are absent due to illness?

<table>
<thead>
<tr>
<th>1) the team / colleagues can function as usual</th>
<th>2) the team / colleagues can function almost as usual</th>
<th>3) the team / colleagues can function with some difficulty</th>
<th>4) the team / colleagues can function with much difficulty</th>
<th>5) the team / colleagues cannot function at all</th>
</tr>
</thead>
<tbody>
<tr>
<td>To what extent can your team / colleagues function if you are absent due to illness?</td>
<td>(Choice selected)</td>
<td>(Choice selected)</td>
<td>(Choice selected)</td>
<td>(Choice selected)</td>
</tr>
</tbody>
</table>
This next section asks about how you feel about your job and the place you work.

### 1. How satisfied are you with your job? Please rate the following questions:

<table>
<thead>
<tr>
<th>How satisfied are you with the chances you have to learn new things?</th>
<th>1) Very dissatisfied</th>
<th>2) Dissatisfied</th>
<th>3) Neutral</th>
<th>4) Satisfied</th>
<th>5) Very satisfied</th>
</tr>
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<tbody>
<tr>
<td></td>
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<tr>
<td>How satisfied are you with the chances you have to accomplish something worthwhile?</td>
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<tr>
<td>How satisfied are you with the chances you have to do something that makes you feel good about yourself as a person?</td>
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<tr>
<td>How satisfied are you with the amount of pay you get?</td>
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<tr>
<td>How satisfied are you with the fringe benefits you receive?</td>
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<tr>
<td>How satisfied are you with the amount of job security you have?</td>
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<tr>
<td>How satisfied are you with the way you are treated by the people you work with?</td>
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</tr>
<tr>
<td>How satisfied are you with the respect you receive from the people you work with?</td>
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<tr>
<td>How satisfied are you with the friendliness of the people you work with?</td>
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</tbody>
</table>
2. To what extent do you agree with the following?

<table>
<thead>
<tr>
<th></th>
<th>1) Strongly disagree</th>
<th>2) Disagree</th>
<th>3) Slightly disagree</th>
<th>4) Neither agree nor disagree</th>
<th>5) Slightly agree</th>
<th>6) Agree</th>
<th>7) Strongly agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>I am proud to be able to tell people who it is I work for</td>
<td></td>
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<tr>
<td>2</td>
<td>I sometimes feel like leaving this employment for good</td>
<td></td>
<td></td>
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<tr>
<td>3</td>
<td>I'm not willing to put myself out just to help the organisation</td>
<td></td>
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<tr>
<td>4</td>
<td>Even if the organisation were not doing well financially, I would be reluctant to change to another employer</td>
<td></td>
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<tr>
<td>5</td>
<td>I feel myself to be part of the organisation</td>
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<tr>
<td>6</td>
<td>In my work I like to feel I am making some effort, not just for myself but for the organisation as well</td>
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<tr>
<td>7</td>
<td>The offer of a bit more money with another employer would not seriously make me think of changing my job</td>
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<tr>
<td>8</td>
<td>I would not recommend a close friend to join our staff</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>9</td>
<td>To know that my own work had a contribution to the good of the organisation would please me</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>I often think about quitting</td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>I will probably look for a new job in the next year</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
3. How likely is it that you will actively look for a new job in the next year?

- 1) Not at all likely
- 2) Possibly
- 3) Somewhat likely
- 4) Likely
- 5) Quite likely
- 6) Probably
- 7) Extremely likely
How are you?

Please consider the last four weeks and answer the following questions by selecting one of the four answer options.

1. Over the past 4 weeks to what extent have you been able to do the following?

<table>
<thead>
<tr>
<th>Question</th>
<th>Options</th>
</tr>
</thead>
<tbody>
<tr>
<td>Have you been able to concentrate on what you're doing?</td>
<td>1) More than usual, 2) Same as usual, 3) Less than usual, 4) Much less than usual</td>
</tr>
<tr>
<td>Have you felt you were playing a useful part in things?</td>
<td></td>
</tr>
<tr>
<td>Have you felt capable of making decisions about things?</td>
<td></td>
</tr>
<tr>
<td>Have you been able to enjoy your normal day-to-day activities?</td>
<td></td>
</tr>
<tr>
<td>Have you been able to face up to your problems?</td>
<td></td>
</tr>
<tr>
<td>Have you been feeling reasonably happy, all things considered?</td>
<td></td>
</tr>
</tbody>
</table>

2. Over the past 4 weeks to what extent have you felt the following?

<table>
<thead>
<tr>
<th>Question</th>
<th>Options</th>
</tr>
</thead>
<tbody>
<tr>
<td>Have you lost much sleep over worry?</td>
<td>1) Not at all, 2) No more than usual, 3) Rather more than usual, 4) Much more than usual</td>
</tr>
<tr>
<td>Have you felt constantly under strain?</td>
<td></td>
</tr>
<tr>
<td>Have you felt you couldn't overcome your difficulties?</td>
<td></td>
</tr>
<tr>
<td>Have you been feeling unhappy and depressed?</td>
<td></td>
</tr>
<tr>
<td>Have you been losing confidence in yourself?</td>
<td></td>
</tr>
<tr>
<td>Have you been thinking of yourself as a worthless person?</td>
<td></td>
</tr>
</tbody>
</table>
This next section uses the HSE Management Standards Indicator Tool

1. Please answer the following thinking of your work in the last 6 months:

<table>
<thead>
<tr>
<th>Statement</th>
<th>Never</th>
<th>Seldom</th>
<th>Sometimes</th>
<th>Often</th>
<th>Always</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. I am clear what is expected of me at work</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. I can decide when to take a break</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. Different groups at work demand things from me that are hard to combine</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. I know how to go about getting my job done</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. I am subject to personal harassment in the form of unkind words or behaviour</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6. I have unachievable deadlines</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7. If work gets difficult, my colleagues will help me</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8. I am given supportive feedback on the work I do</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9. I have to work very intensively</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10. I have a say in my own work speed</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>11. I am clear what my duties and responsibilities are</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>12. I have to neglect some tasks because I have too much to do</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>13. I am clear about the goals and objectives for my department</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>14. There is friction or anger between colleagues</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>15. I have a choice in deciding how I do my work</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>16. I am unable to take sufficient breaks</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>17. I understand how my work fits into the overall aim of the organisation</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Question</td>
<td>Strongly Disagree</td>
<td>Disagree</td>
<td>Neutral</td>
<td>Agree</td>
<td>Strongly Agree</td>
</tr>
<tr>
<td>-------------------------------------------------------------------------</td>
<td>-------------------</td>
<td>----------</td>
<td>----------</td>
<td>-------</td>
<td>---------------</td>
</tr>
<tr>
<td>18. I am pressured to work long hours</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>19. I have a choice in deciding what I do at work</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>20. I have to work very fast</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>21. I am subject to bullying at work</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>22. I have unrealistic time pressures</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>23. I can rely on my line manager to help me out with a work problem</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

2. Please answer the following thinking of your work in the last 6 months:

1. I get help and support I need from colleagues                        |                   |          |          |       |               |
2. I have some say over the way I work                                   |                   |          |          |       |               |
3. I have sufficient opportunities to question managers about change at work |                   |          |          |       |               |
4. I receive the respect at work I deserve from my colleagues           |                   |          |          |       |               |
5. Staff are always consulted about change at work                       |                   |          |          |       |               |
6. I can talk to my line manager about something that has upset or annoyed me about work |                   |          |          |       |               |
7. My working time can be flexible                                       |                   |          |          |       |               |
8. My colleagues are willing to listen to my work-related problems      |                   |          |          |       |               |
9. When changes are made at work, I am clear how they will work out in practice |                   |          |          |       |               |
10. I am supported through emotionally demanding work                    |                   |          |          |       |               |
11. Relationships at work are strained                                   |                   |          |          |       |               |
12. My line manager encourages me at work                                |                   |          |          |       |               |
The questions in this final section ask about any health conditions and their treatment.

1. Do you have any of the following conditions? If your answer is YES, tick whether you never, previously or currently receive professional treatment. (Professional treatment is any treatment supervised by a health professional).

If you are unsure if you have a condition, please tick the NO option.

<table>
<thead>
<tr>
<th>Condition</th>
<th>NO, I don't have this condition</th>
<th>YES, but never received professional treatment</th>
<th>YES, previously received (but don't currently receive) professional treatment</th>
<th>YES, and I currently receive professional treatment</th>
</tr>
</thead>
<tbody>
<tr>
<td>1) Arthritis or rheumatism?</td>
<td>[ ]</td>
<td>[ ]</td>
<td>[ ]</td>
<td>[ ]</td>
</tr>
<tr>
<td>2) Chronic back/neck pain?</td>
<td>[ ]</td>
<td>[ ]</td>
<td>[ ]</td>
<td>[ ]</td>
</tr>
<tr>
<td>3) Migraine headaches?</td>
<td>[ ]</td>
<td>[ ]</td>
<td>[ ]</td>
<td>[ ]</td>
</tr>
<tr>
<td>4) Other frequent or severe headaches?</td>
<td>[ ]</td>
<td>[ ]</td>
<td>[ ]</td>
<td>[ ]</td>
</tr>
<tr>
<td>5) Any other chronic pain?</td>
<td>[ ]</td>
<td>[ ]</td>
<td>[ ]</td>
<td>[ ]</td>
</tr>
<tr>
<td>6) High blood pressure or hypertension?</td>
<td>[ ]</td>
<td>[ ]</td>
<td>[ ]</td>
<td>[ ]</td>
</tr>
<tr>
<td>7) Congestive heart failure?</td>
<td>[ ]</td>
<td>[ ]</td>
<td>[ ]</td>
<td>[ ]</td>
</tr>
<tr>
<td>8) Coronary heart disease?</td>
<td>[ ]</td>
<td>[ ]</td>
<td>[ ]</td>
<td>[ ]</td>
</tr>
<tr>
<td>9) High blood cholesterol?</td>
<td>[ ]</td>
<td>[ ]</td>
<td>[ ]</td>
<td>[ ]</td>
</tr>
</tbody>
</table>
2. Do you have any of the following conditions? If your answer is YES, tick whether you never, previously or currently receive professional treatment. (Professional treatment is any treatment supervised by a health professional).

If you are unsure if you have a condition, please tick the NO option.

<table>
<thead>
<tr>
<th>Condition</th>
<th>NO, I don't have this condition</th>
<th>YES, but never received professional treatment</th>
<th>YES, previously received (but don't currently receive) professional treatment</th>
<th>YES, and I currently receive professional treatment</th>
</tr>
</thead>
<tbody>
<tr>
<td>1) An ulcer in your stomach or intestine?</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>2) Irritable bowel disorder?</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>3) Chronic heartburn or GERD?</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>4) Seasonal allergies or hay fever?</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>5) Asthma?</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>6) Chronic bronchitis or emphysema?</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>7) Chronic Obstructive Pulmonary Disease?</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>8) Urinary or bladder problems?</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>9) Diabetes?</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>10) Obesity?</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>11) Chronic sleeping problems?</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>12) Chronic fatigue or low energy?</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>13) Osteoporosis?</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>14) Skin cancer?</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>15) Any other kind of cancer?</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>16) Anxiety disorder?</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>17) depression?</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>18) Any other emotional problem?</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>19) Substance problems (drugs or alcohol)</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
</tbody>
</table>
3. During the past 4 weeks (28 days, how much were you bothered by each of the following conditions?)

<table>
<thead>
<tr>
<th>Condition</th>
<th>Not at all</th>
<th>A little</th>
<th>Some</th>
<th>A lot</th>
</tr>
</thead>
<tbody>
<tr>
<td>1) Feeling tired or having low energy?</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2) Trouble sleeping?</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3) Headaches?</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4) Back or neck pain?</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5) Pain in your arms, legs, or joints</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(knees, hips, etc.)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6) Muscle soreness?</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7) Water eyes, runny nose, stuffy head?</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8) Cough or sore throat?</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9) Fever, chills, or other cold/flu symptoms?</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10) Constipation, loose bowels, or diarrhea?</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>11) Nausea, gas, or indigestion?</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

4. During the past 4 weeks (28 days), how much of the time did you feel:

<table>
<thead>
<tr>
<th>Feeling</th>
<th>All of the time</th>
<th>Most of the time</th>
<th>Some of the time</th>
<th>A little of the time</th>
<th>None of the time</th>
</tr>
</thead>
<tbody>
<tr>
<td>1) so sad nothing could cheer you up?</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2) nervous?</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3) restless or fidgety?</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4) hopeless?</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5) that everything was an effort?</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6) worthless?</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

5. (Women Only) Are you pregnant?

- Yes
- No
- Not sure
- I am male
6. In the past 12 months, did you have a work related accident, injury or poisoning that required medical attention?

- [ ] Yes
- [ ] No

If YES, how many days work did you miss in the past 12 months because of a work related accident, injury or poisoning (please enter whole number only)

7. Do you smoke? Please tick the category that best describes your current status:

- [ ] Smoker - e.g. you have smoked on average of 10 or more cigarettes per day for the last year and have not quit for greater than three months during the previous year.
- [ ] Occasional smoker - e.g. you do not always smoke everyday, but smoke a few cigarettes on some days
- [ ] Former smoker - e.g. you have quit smoking.
- [ ] Never smoker - e.g. you have never smoked or not smoked > 100 cigarettes in your lifetime.
We would like to thank you for taking the time to complete this survey.

Should you wish to add any further comments about any issue please do so below:

1. Please enter any further comments you have:
### Appendix 7-2: Bivariate analysis results

Table 7-2-1 Bivariate Correlation (Pooled Dataset)

<table>
<thead>
<tr>
<th>Variable</th>
<th>Pearson Correlation</th>
<th>Sig. (2-tailed)</th>
<th>N</th>
</tr>
</thead>
<tbody>
<tr>
<td>comorbid</td>
<td>1.000</td>
<td></td>
<td></td>
</tr>
<tr>
<td>existingcondition</td>
<td>0.556</td>
<td>1.000</td>
<td></td>
</tr>
<tr>
<td>age</td>
<td>-0.028</td>
<td>-0.008</td>
<td>1.000</td>
</tr>
<tr>
<td>gender2</td>
<td>0.928</td>
<td>0.930</td>
<td></td>
</tr>
<tr>
<td>children</td>
<td>0.104</td>
<td>0.138</td>
<td></td>
</tr>
<tr>
<td>timeinorg</td>
<td>-0.008</td>
<td>0.138</td>
<td></td>
</tr>
<tr>
<td>timeinjob</td>
<td>0.048</td>
<td>0.186</td>
<td></td>
</tr>
<tr>
<td>supervisors</td>
<td>0.064</td>
<td>0.070</td>
<td></td>
</tr>
<tr>
<td></td>
<td>correlation</td>
<td>existing</td>
<td>fam</td>
</tr>
<tr>
<td>--------------------------------</td>
<td>-------------</td>
<td>----------</td>
<td>-----</td>
</tr>
<tr>
<td><strong>Intrinsic</strong></td>
<td>Pearson</td>
<td>.170</td>
<td>103</td>
</tr>
<tr>
<td>Sig. (2-tailed)</td>
<td>.000</td>
<td>.001</td>
<td>.000</td>
</tr>
<tr>
<td>N</td>
<td>1113</td>
<td>1113</td>
<td>1122</td>
</tr>
<tr>
<td><strong>Extrinsic</strong></td>
<td>Pearson</td>
<td>.100</td>
<td>.100</td>
</tr>
<tr>
<td>Sig. (2-tailed)</td>
<td>.000</td>
<td>.001</td>
<td>.001</td>
</tr>
<tr>
<td>N</td>
<td>1113</td>
<td>1113</td>
<td>1121</td>
</tr>
<tr>
<td><strong>Social</strong></td>
<td>Pearson</td>
<td>.148</td>
<td>.148</td>
</tr>
<tr>
<td>Sig. (2-tailed)</td>
<td>.000</td>
<td>.001</td>
<td>.154</td>
</tr>
<tr>
<td>N</td>
<td>1113</td>
<td>1113</td>
<td>1121</td>
</tr>
<tr>
<td><strong>Job Satisfaction</strong></td>
<td>Pearson</td>
<td>.180</td>
<td></td>
</tr>
<tr>
<td>Sig. (2-tailed)</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
</tr>
<tr>
<td>N</td>
<td>1113</td>
<td>1113</td>
<td>1121</td>
</tr>
<tr>
<td><strong>Orgidentity</strong></td>
<td>Pearson</td>
<td>.167</td>
<td></td>
</tr>
<tr>
<td>Sig. (2-tailed)</td>
<td>.000</td>
<td>.001</td>
<td>.154</td>
</tr>
<tr>
<td>N</td>
<td>1095</td>
<td>1095</td>
<td>1102</td>
</tr>
<tr>
<td><strong>Orginvolvement</strong></td>
<td>Pearson</td>
<td>.180</td>
<td></td>
</tr>
<tr>
<td>Sig. (2-tailed)</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
</tr>
<tr>
<td>N</td>
<td>1095</td>
<td>1095</td>
<td>1102</td>
</tr>
<tr>
<td><strong>Orgloyalty</strong></td>
<td>Pearson</td>
<td>.246</td>
<td></td>
</tr>
<tr>
<td>Sig. (2-tailed)</td>
<td>.000</td>
<td>.006</td>
<td>.000</td>
</tr>
<tr>
<td>N</td>
<td>1095</td>
<td>1095</td>
<td>1102</td>
</tr>
<tr>
<td><strong>OrgCommitment</strong></td>
<td>Pearson</td>
<td>.230</td>
<td></td>
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<td>-.004</td>
</tr>
<tr>
<td>Income</td>
<td>.153**</td>
<td>.156**</td>
<td>-.049</td>
</tr>
<tr>
<td>sickhours</td>
<td>.233**</td>
<td>.220**</td>
<td>.331**</td>
</tr>
<tr>
<td>preshours</td>
<td>.639**</td>
<td>.586**</td>
<td>.741**</td>
</tr>
<tr>
<td>GHQ</td>
<td>.146**</td>
<td>.140**</td>
<td>.172**</td>
</tr>
<tr>
<td>Likert (GHQ)</td>
<td>.225**</td>
<td>.201**</td>
<td>.248**</td>
</tr>
<tr>
<td>HPQmhs4w</td>
<td>-.085</td>
<td>-.072</td>
<td>-.110</td>
</tr>
<tr>
<td>headaches</td>
<td>.117*</td>
<td>.097*</td>
<td>.131**</td>
</tr>
<tr>
<td>depression</td>
<td>.110</td>
<td>.123**</td>
<td>.144**</td>
</tr>
</tbody>
</table>

**. Pearson correlation is significant at the 0.01 level. *. Pearson correlation is significant at the 0.05 level.
### Table 7-2-3 Bivariate Correlation – Organisation B (n=426)

<table>
<thead>
<tr>
<th></th>
<th>Ln(uncostworkloss)</th>
<th>Ln(adjustedcostworkloss)</th>
<th>Ln(worklosshours)</th>
</tr>
</thead>
<tbody>
<tr>
<td>income</td>
<td>0.105</td>
<td>0.103</td>
<td>0.036</td>
</tr>
<tr>
<td>sickhours</td>
<td>0.192*</td>
<td>0.191</td>
<td>0.265*</td>
</tr>
<tr>
<td>preshours</td>
<td>0.622*</td>
<td>0.614</td>
<td>0.756</td>
</tr>
<tr>
<td>Intrinsic job satisfaction</td>
<td>-0.100</td>
<td>-0.106</td>
<td>-0.125*</td>
</tr>
<tr>
<td>Orginvolveement</td>
<td>-0.092</td>
<td>-0.090</td>
<td>-0.112*</td>
</tr>
<tr>
<td>OrgCommitment</td>
<td>-0.095</td>
<td>-0.100</td>
<td>-0.121*</td>
</tr>
<tr>
<td>HSEdemands</td>
<td>-0.058</td>
<td>-0.069</td>
<td>-0.114*</td>
</tr>
<tr>
<td>HSEcontrol</td>
<td>-0.108*</td>
<td>-0.113</td>
<td>-0.121*</td>
</tr>
<tr>
<td>HSEpeersupp</td>
<td>-0.099</td>
<td>-0.108</td>
<td>-0.135*</td>
</tr>
<tr>
<td>HSERelations</td>
<td>-0.059</td>
<td>-0.068</td>
<td>-0.109</td>
</tr>
<tr>
<td>HSERole</td>
<td>-0.198**</td>
<td>-0.202**</td>
<td>-0.219**</td>
</tr>
<tr>
<td>HSEoverall</td>
<td>-0.124*</td>
<td>-0.134*</td>
<td>-0.177**</td>
</tr>
<tr>
<td>GHQ</td>
<td>0.155</td>
<td>0.157</td>
<td>0.217</td>
</tr>
<tr>
<td>Likert (GHQ)</td>
<td>0.226**</td>
<td>0.228**</td>
<td>0.289**</td>
</tr>
<tr>
<td>HPQphs4w</td>
<td>0.136*</td>
<td>0.142*</td>
<td>0.182*</td>
</tr>
</tbody>
</table>

**. Pearson correlation is significant at the 0.01 level. * Pearson correlation is significant at the 0.05 level.

### Table 7-2-4 Bivariate Correlation – Organisation C (n=177)

<table>
<thead>
<tr>
<th></th>
<th>Ln(uncostworkloss)</th>
<th>Ln(adjustedcostworkloss)</th>
<th>Ln(worklosshours)</th>
</tr>
</thead>
<tbody>
<tr>
<td>income</td>
<td>0.334*</td>
<td>0.334**</td>
<td>0.136</td>
</tr>
<tr>
<td>sickhours</td>
<td>0.164</td>
<td>0.163</td>
<td>0.274</td>
</tr>
<tr>
<td>preshours</td>
<td>0.671*</td>
<td>0.670**</td>
<td>0.791</td>
</tr>
<tr>
<td>Extrinsic job satisfaction</td>
<td>0.254**</td>
<td>0.246**</td>
<td>0.206</td>
</tr>
<tr>
<td>Social job satisfaction</td>
<td>0.202*</td>
<td>0.193</td>
<td>0.174</td>
</tr>
<tr>
<td>Job satisfaction (overall)</td>
<td>0.228</td>
<td>0.217</td>
<td>0.174</td>
</tr>
<tr>
<td>intentttoquit</td>
<td>0.112</td>
<td>0.122</td>
<td>0.197</td>
</tr>
<tr>
<td>GHQ</td>
<td>0.136</td>
<td>0.141</td>
<td>0.200</td>
</tr>
<tr>
<td>Likert (GHQ)</td>
<td>0.169</td>
<td>0.176</td>
<td>0.209</td>
</tr>
</tbody>
</table>

**. Pearson correlation is significant at the 0.01 level. * Pearson correlation is significant at the 0.05 level.
### Table 7-2-5 Bivariate Correlation – Organisation D (n=148)

<table>
<thead>
<tr>
<th></th>
<th>Lncostworkloss</th>
<th>Lnadjustedcostworkloss</th>
<th>Lnworklosshours</th>
</tr>
</thead>
<tbody>
<tr>
<td>sickhours</td>
<td>.259**</td>
<td>.262**</td>
<td>.347**</td>
</tr>
<tr>
<td>preshours</td>
<td>.637**</td>
<td>.630**</td>
<td>.746**</td>
</tr>
<tr>
<td>Extrinsic job satisfaction</td>
<td>-.146</td>
<td>-.147</td>
<td>-.184**</td>
</tr>
<tr>
<td>Orgidentity</td>
<td>-.199**</td>
<td>-.203**</td>
<td>-.276**</td>
</tr>
<tr>
<td>Orginvolvement</td>
<td>-.128</td>
<td>-.126</td>
<td>-.195**</td>
</tr>
<tr>
<td>OrgCommitment</td>
<td>-.173**</td>
<td>-.175**</td>
<td>-.243**</td>
</tr>
<tr>
<td>HSErole</td>
<td>-.355**</td>
<td>-.357**</td>
<td>-.393**</td>
</tr>
<tr>
<td>intenttoquit</td>
<td>.199**</td>
<td>.205</td>
<td>.232**</td>
</tr>
<tr>
<td>Likert (GHQ)</td>
<td>.186**</td>
<td>.192</td>
<td>.228**</td>
</tr>
<tr>
<td>HPQphs4w</td>
<td>.149</td>
<td>.155</td>
<td>.215</td>
</tr>
<tr>
<td>chronic back pain</td>
<td>.144</td>
<td>.142</td>
<td>.187</td>
</tr>
</tbody>
</table>

** Pearson correlation is significant at the 0.01 level. * Pearson correlation is significant at the 0.05 level.

### Table 7-2-6 Bivariate Correlation – Organisation E (n=77)

<table>
<thead>
<tr>
<th></th>
<th>Lncostworkloss</th>
<th>Lnadjustedcostworkloss</th>
<th>Lnworklosshours</th>
</tr>
</thead>
<tbody>
<tr>
<td>sickhours</td>
<td>.230**</td>
<td>.236</td>
<td>.384**</td>
</tr>
<tr>
<td>preshours</td>
<td>.615**</td>
<td>.598**</td>
<td>.732**</td>
</tr>
<tr>
<td>Intrinsic job satisfaction</td>
<td>-.256</td>
<td>-.252</td>
<td>-.282**</td>
</tr>
<tr>
<td>Orgidentity</td>
<td>-.254</td>
<td>-.254</td>
<td>-.393**</td>
</tr>
<tr>
<td>Orginvolvement</td>
<td>-.241</td>
<td>-.247</td>
<td>-.351**</td>
</tr>
<tr>
<td>OrgCommitment</td>
<td>-.160</td>
<td>-.166</td>
<td>-.298**</td>
</tr>
<tr>
<td>HSErelations</td>
<td>-.154</td>
<td>-.145</td>
<td>-.268**</td>
</tr>
<tr>
<td>GHQ</td>
<td>.183</td>
<td>.170</td>
<td>.372**</td>
</tr>
<tr>
<td>Likert (GHQ)</td>
<td>.136</td>
<td>.125</td>
<td>.274</td>
</tr>
</tbody>
</table>

** Pearson correlation is significant at the 0.01 level. * Pearson correlation is significant at the 0.05 level.
### Table 7-2-7 Bivariate Correlation – Organisation F (n=77)

<table>
<thead>
<tr>
<th></th>
<th>Ln(costworkloss)</th>
<th>Ln(adjustedcostworkloss)</th>
<th>Ln(worklosshours)</th>
</tr>
</thead>
<tbody>
<tr>
<td>gender2</td>
<td>-.298*</td>
<td>-.204</td>
<td>-.324*</td>
</tr>
<tr>
<td>income</td>
<td>.328*</td>
<td>.309*</td>
<td>.137</td>
</tr>
<tr>
<td>sickhours</td>
<td>.232</td>
<td>.241</td>
<td>.342*</td>
</tr>
<tr>
<td>preshours</td>
<td>.690**</td>
<td>.627**</td>
<td>.805**</td>
</tr>
<tr>
<td>Orginvolvement</td>
<td>-.198</td>
<td>-.200</td>
<td>-.282*</td>
</tr>
<tr>
<td>Orgloyalty</td>
<td>-.273*</td>
<td>-.266</td>
<td>-.302*</td>
</tr>
<tr>
<td>OrgCommitment</td>
<td>-.222</td>
<td>-.221</td>
<td>-.295*</td>
</tr>
<tr>
<td>HSErole</td>
<td>-.220</td>
<td>-.222</td>
<td>-.274*</td>
</tr>
<tr>
<td>igs</td>
<td>-.269</td>
<td>-.270</td>
<td>-.275*</td>
</tr>
</tbody>
</table>

**. Pearson correlation is significant at the 0.01 level. *. Pearson correlation is significant at the 0.05 level.

### Table 7-2-8 Bivariate Correlation – Organisation G (n=14)

<table>
<thead>
<tr>
<th></th>
<th>Ln(costworkloss)</th>
<th>Ln(adjustedcostworkloss)</th>
<th>Ln(worklosshours)</th>
</tr>
</thead>
<tbody>
<tr>
<td>HSErelations</td>
<td>-.714*</td>
<td>-.692*</td>
<td>-.771*</td>
</tr>
<tr>
<td>HSEpeersupp</td>
<td>-.725*</td>
<td>-.752**</td>
<td>-.636*</td>
</tr>
<tr>
<td>preshours</td>
<td>.648*</td>
<td>.636*</td>
<td>.917**</td>
</tr>
<tr>
<td>social</td>
<td>-.619*</td>
<td>-.614*</td>
<td>-.710*</td>
</tr>
</tbody>
</table>

**. Pearson correlation is significant at the 0.01 level. *. Pearson correlation is significant at the 0.05 level.
Appendix 7-3: Log-linear Regression Models

Table 7-3-1 Log-linear Regression Models - Pooled Dataset (N=1490)

<table>
<thead>
<tr>
<th>Model</th>
<th>Dependent Variable: lnadjustedcostworkloss (dummy variables for org)</th>
<th>Dependent Variable: lnadjustedcostworkloss (dummy variables for org)</th>
<th>Dependent Variable: lnworklosshours (dummy variables for org)</th>
<th>Dependent Variable: lnadjustedcostworkloss (no control for org)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Significant variables:</td>
<td>Significant variables:</td>
<td>Significant variables:</td>
<td>Significant variables:</td>
</tr>
<tr>
<td></td>
<td>Timeinorg</td>
<td>NS</td>
<td>0.022</td>
<td>NS</td>
</tr>
<tr>
<td></td>
<td>Supervisees</td>
<td>0.022</td>
<td>0.024</td>
<td>0.009</td>
</tr>
<tr>
<td></td>
<td>Extrinsic</td>
<td>0.371</td>
<td>0.360</td>
<td>0.210</td>
</tr>
<tr>
<td></td>
<td>Social</td>
<td>0.183</td>
<td>0.205</td>
<td>NS</td>
</tr>
<tr>
<td></td>
<td>Orginvolvement</td>
<td>-0.093</td>
<td>-0.088</td>
<td>-0.070</td>
</tr>
<tr>
<td></td>
<td>Likert (GHQ)</td>
<td>0.063</td>
<td>0.068</td>
<td>0.047</td>
</tr>
<tr>
<td></td>
<td>HSEDemands</td>
<td>NS</td>
<td>NS</td>
<td>0.125</td>
</tr>
<tr>
<td></td>
<td>HSERole</td>
<td>-0.382</td>
<td>-0.379</td>
<td>-0.235</td>
</tr>
<tr>
<td></td>
<td>HPQPHs4w</td>
<td>NS</td>
<td>NS</td>
<td>0.163</td>
</tr>
</tbody>
</table>

Model Summary:

- R squared: 0.161, 0.162, 0.166, 0.130
- Durban-Watson: 1.975, 1.974, 1.957, 1.930
- F-ratio: 5.707, 5.774, 5.942, 5.369
- Sig.: 0.000, 0.000, 0.000, 0.000

NS = not significant **. Significant at the 0.01 level, *. Significant at the 0.05 level
<table>
<thead>
<tr>
<th>Model 1 Dependent Variable: Ln(cost)workloss (dummy variables for org)</th>
<th>Model 5 Dependent Variable: Ln(cost)workloss, Independent variables as model 1 + sick hours, pres hours (dummy variables for org)</th>
<th>Model 6 Dependent Variable: Ln(cost)workloss, Independent variables as model 2 + income (dummy variables for org)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Significant variables:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Timeinorg</td>
<td>NS</td>
<td>0.021*</td>
</tr>
<tr>
<td>Supervisees</td>
<td>0.022*</td>
<td>0.016*</td>
</tr>
<tr>
<td>Extrinsic</td>
<td>0.371**</td>
<td>0.172**</td>
</tr>
<tr>
<td>Social</td>
<td>0.183*</td>
<td>NS</td>
</tr>
<tr>
<td>Orginvolvement</td>
<td>-0.093**</td>
<td>NS</td>
</tr>
<tr>
<td>Orgidentity</td>
<td>NS</td>
<td>0.045*</td>
</tr>
<tr>
<td>Likert (GHQ)</td>
<td>0.063**</td>
<td>NS</td>
</tr>
<tr>
<td>HSEPeersupp</td>
<td>NS</td>
<td>-0.185*</td>
</tr>
<tr>
<td>HSERole</td>
<td>-0.382**</td>
<td>-0.185*</td>
</tr>
<tr>
<td>Sickhours</td>
<td>N/A</td>
<td>0.018**</td>
</tr>
<tr>
<td>Preshours</td>
<td>N/A</td>
<td>0.051**</td>
</tr>
<tr>
<td>Income</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td><strong>Model Summary:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>R squared</td>
<td>0.161</td>
<td>0.487</td>
</tr>
<tr>
<td>Durban-Watson</td>
<td>1.975</td>
<td>1.933</td>
</tr>
<tr>
<td>F -ratio</td>
<td>5.707</td>
<td>27.326</td>
</tr>
<tr>
<td>Sig.</td>
<td>0.000</td>
<td>0.000</td>
</tr>
</tbody>
</table>

NS = not significant  
N/A = not applicable as not included in this model  
**. Significant at the 0.01 level, *. Significant at the 0.05 level
Table 7-3-3 Log-linear Regression Models – Organisation A (n=586)

<table>
<thead>
<tr>
<th>Significant variables:</th>
<th>Model 1 Dependent Variable: Incostworkloss</th>
<th>Model 2 Dependent Variable: Inadjustedcostworkloss</th>
<th>Model 3 Dependent Variable: Inworklosshours</th>
</tr>
</thead>
<tbody>
<tr>
<td>Timeinorg</td>
<td>0.037*</td>
<td>0.048*</td>
<td>NS</td>
</tr>
<tr>
<td>Timeinjob</td>
<td>-0.110*</td>
<td>-0.111*</td>
<td>-0.078*</td>
</tr>
<tr>
<td>Supervisees</td>
<td>0.018</td>
<td>0.019*</td>
<td>NS</td>
</tr>
<tr>
<td>Intrinsic</td>
<td>-0.259*</td>
<td>NS</td>
<td>-0.175*</td>
</tr>
<tr>
<td>Extrinsic</td>
<td>0.335**</td>
<td>0.302*</td>
<td>0.226**</td>
</tr>
<tr>
<td>Social</td>
<td>0.311**</td>
<td>0.344*</td>
<td>0.203**</td>
</tr>
<tr>
<td>Orginvolvement</td>
<td>-0.110**</td>
<td>-0.103**</td>
<td>-0.080**</td>
</tr>
<tr>
<td>Likert (GHQ)</td>
<td>0.091**</td>
<td>0.094**</td>
<td>0.069**</td>
</tr>
<tr>
<td>Depression</td>
<td>0.739**</td>
<td>0.77**</td>
<td>0.469**</td>
</tr>
</tbody>
</table>

Model Summary:

- R squared
  - Model 1: 0.240
  - Model 2: 0.224
  - Model 3: 0.259
- Durban-Watson
  - Model 1: 2.081
  - Model 2: 2.099
  - Model 3: 2.035
- F-ratio
  - Model 1: 3.039
  - Model 2: 2.773
  - Model 3: 3.361
- Sig.
  - Model 1: 0.000
  - Model 2: 0.000
  - Model 3: 0.000

NS = not significant

**. significant at the 0.01 level

*. significant at the 0.05 level
Table 7-3-4 Log-linear Regression Models – Organisation B (n=426)

<table>
<thead>
<tr>
<th>Significant variables:</th>
<th>Model 1</th>
<th>Model 2</th>
<th>Model 3</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Dependent Variable: Incostworkloss</td>
<td>Dependent Variable: Inadjustedcostworkloss</td>
<td>Dependent Variable: Inworkloshours</td>
</tr>
<tr>
<td>Extrinsic</td>
<td>0.397*</td>
<td>0.403*</td>
<td>NS</td>
</tr>
<tr>
<td>Likert (GHQ)</td>
<td>0.181**</td>
<td>0.184**</td>
<td>0.112*</td>
</tr>
<tr>
<td>chronicsleepproblems</td>
<td>-0.943</td>
<td>-0.981*</td>
<td>-0.573*</td>
</tr>
</tbody>
</table>

Model Summary:

<table>
<thead>
<tr>
<th></th>
<th>R squared</th>
<th>Durban-Watson</th>
<th>F-ratio</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>0.225</td>
<td>1.948</td>
<td>1.939</td>
<td>0.002</td>
</tr>
<tr>
<td>Durban-Watson</td>
<td>0.225</td>
<td>1.994</td>
<td>1.936</td>
<td>0.002</td>
</tr>
<tr>
<td>F-ratio</td>
<td>0.254</td>
<td>1.953</td>
<td>2.280</td>
<td>0.000</td>
</tr>
<tr>
<td>Sig.</td>
<td>0.002</td>
<td>0.002</td>
<td>0.000</td>
<td></td>
</tr>
</tbody>
</table>

NS = not significant

**. significant at the 0.01 level

*. significant at the 0.05 level
Table 7-3-5 Log-linear Regression Model – Organisation C (n=177)

<table>
<thead>
<tr>
<th>Significant variables:</th>
<th>Model 1 Dependent Variable: Incostworkloss</th>
<th>Model 2 Dependent Variable: Inadjustedcostworkloss</th>
<th>Model 3 Dependent Variable: Inworklosshours</th>
</tr>
</thead>
<tbody>
<tr>
<td>Extrinsic</td>
<td>0.669*</td>
<td>0.689*</td>
<td>0.343*</td>
</tr>
<tr>
<td>Likert (GHQ)</td>
<td>0.14*</td>
<td>0.144*</td>
<td>NS</td>
</tr>
<tr>
<td>HSEMansupport</td>
<td>-0.961*</td>
<td>-0.993*</td>
<td>-0.484*</td>
</tr>
<tr>
<td>HSEPeersupport</td>
<td>0.841*</td>
<td>0.814*</td>
<td>0.480*</td>
</tr>
</tbody>
</table>

Model Summary:

<table>
<thead>
<tr>
<th></th>
<th>Model 1</th>
<th>Model 2</th>
<th>Model 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>R squared</td>
<td>0.387</td>
<td>0.383</td>
<td>0.363</td>
</tr>
<tr>
<td>Durban-Watson</td>
<td>2.035</td>
<td>2.023</td>
<td>1.983</td>
</tr>
<tr>
<td>F-ratio</td>
<td>1.997</td>
<td>1.966</td>
<td>1.807</td>
</tr>
<tr>
<td>Sig.</td>
<td>0.012</td>
<td>0.014</td>
<td>0.027</td>
</tr>
</tbody>
</table>

NS = not significant
**. significant at the 0.01 level
*. significant at the 0.05 level
### Table 7-3-6 Log-linear Regression Models - Organisation D (n=148)

<table>
<thead>
<tr>
<th></th>
<th>Model 1 Dependent Variable: Incostworkloss</th>
<th>Model 2 Dependent Variable: lnadjustedcostworkloss</th>
<th>Model 3 Dependent Variable: lnworklosshours</th>
</tr>
</thead>
<tbody>
<tr>
<td>Significant variables:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>HSERole</td>
<td>-2.656**</td>
<td>-2.814**</td>
<td>NS</td>
</tr>
<tr>
<td>HSEPeersupport</td>
<td>-3.309**</td>
<td>-3.444**</td>
<td>-1.686**</td>
</tr>
<tr>
<td>Model Summary:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>R squared</td>
<td>0.414</td>
<td>0.421</td>
<td>0.398</td>
</tr>
<tr>
<td>Durban-Watson</td>
<td>1.975</td>
<td>1.958</td>
<td>1.980</td>
</tr>
<tr>
<td>F-ratio</td>
<td>1.595</td>
<td>1.639</td>
<td>1.494</td>
</tr>
<tr>
<td>Sig.</td>
<td>0.045</td>
<td>0.036</td>
<td>0.072</td>
</tr>
</tbody>
</table>

**NS = not significant**

**. significant at the 0.05 level**

**. significant at the 0.01 level**
Table 7-3-7 Log-linear Regression Models – Organisation E (n=77)

<table>
<thead>
<tr>
<th>Significant variables:</th>
<th>Model 1 Dependent Variable: Incostworkloss</th>
<th>Model 2 Dependent Variable: lnadjustedcostworkloss</th>
<th>Model 3 Dependent Variable: Inworklesshours</th>
</tr>
</thead>
<tbody>
<tr>
<td>Timeinorg</td>
<td>-0.053 *</td>
<td>-0.054</td>
<td>-0.035 *</td>
</tr>
<tr>
<td>Orginvolvement</td>
<td>-0.163 *</td>
<td>-0.174</td>
<td>-0.111 *</td>
</tr>
</tbody>
</table>

Model Summary:

<table>
<thead>
<tr>
<th>R squared</th>
<th>Durban-Watson</th>
<th>F-ratio</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Model 1</td>
<td>Model 2</td>
<td>Model 3</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>.528</td>
<td>.509</td>
<td>.574</td>
<td></td>
</tr>
<tr>
<td>2.254</td>
<td>2.244</td>
<td>2.193</td>
<td></td>
</tr>
<tr>
<td>1.604</td>
<td>1.485</td>
<td>1.931</td>
<td></td>
</tr>
<tr>
<td>0.105</td>
<td>0.146</td>
<td>0.041</td>
<td></td>
</tr>
</tbody>
</table>

NS = not significant

**. significant at the 0.01 level

*. significant at the 0.05 level
Table 7-3-8 Log-linear Regression Models – Organisation F (n=77)

<table>
<thead>
<tr>
<th>Significant variables:</th>
<th>Model 1 (Dependent Variable: Incostworkloss)</th>
<th>Model 2 (Dependent Variable: Inadjustedcostworkloss)</th>
<th>Model 3 (Dependent Variable: Inworkloss hours)</th>
</tr>
</thead>
<tbody>
<tr>
<td>chronic fatigue</td>
<td>-8.206'</td>
<td>-8.432'</td>
<td>NS</td>
</tr>
<tr>
<td>IBS</td>
<td>-6.876'</td>
<td>-7.151'</td>
<td>-4.417'</td>
</tr>
<tr>
<td>Anxiety</td>
<td>5.375'</td>
<td>5.486'</td>
<td>NS</td>
</tr>
<tr>
<td>chronic pain</td>
<td>14.115'</td>
<td>14.535'</td>
<td>8.079'</td>
</tr>
</tbody>
</table>

Model Summary:
- R squared: 0.912, 0.912, 0.891
- Durban-Watson: 2.346, 2.360, 2.159
- F-ratio: 2.068, 2.071, 1.629
- Sig.: 0.160, 0.160, 0.260

NS = not significant
** significant at the 0.01 level
* significant at the 0.05 level