PSYCHOSOCIAL FACTORS AT WORK, MUSCULOSKELETAL DISORDERS, AND THE IMPLEMENTATION OF GUIDELINES PRINCIPLES

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"The catalogue of life's certainties is usually limited to death and taxes. A more realistic list would include low back pain" *(Deyo 1998)*

"Statistics are like a lamp-post to a drunken man - more for leaning on than illumination" (David Brent, Office Wisdom,2002).

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ABSTRACT

PSYCHOSOCIAL FACTORS AT WORK, MUSCULOSKELETAL DISORDERS, AND THE IMPLEMENTATION OF GUIDELINES PRINCIPLES

The burden placed on society as a result of musculoskeletal disorders is substantial, requiring effective management especially in an occupational context. Recent occupational health guidelines recommend addressing potentially detrimental psychosocial factors in the management of workers sick-listed with musculoskeletal disorders, but the specific influence on absence from occupational, as well as clinical, psychosocial risk factors (termed 'blue' and 'yellow' flags) remains ill understood. In addition, the related principles of contemporary occupational health guidelines recommendations, seeking to reduce return-to-work times and improve work retention, have not been formally tested.

A four-year study was carried out in two phases:

Phase 1 comprised a workforce survey of a large multi-site company in the UK (n=7,838). Data on clinical and occupational psychosocial factors were collected, along with data on self-reported symptoms. Absence data were collected, both retrospectively and prospectively.
Phase 2 was a quasi-experimental, controlled trial of an occupational guidelines-based intervention for workers with musculoskeletal disorders. Occupational health advisors delivered the experimental intervention over a 12-month period at two sites (n=1,435), with three matched sites acting as controls, delivering management as usual (n=1,483). Absence data were collected for both experimental and control sites over a 12-month follow up period, and psychosocial data were collected from the experimental sites at baseline and follow-up.

The results confirmed an association between the psychosocial work environment and musculoskeletal disorders. Psychosocial risk factors (blue and yellow flags) predicted the likelihood of future absence, but not its duration; routine psychosocial screening to predict return-to-work does not appear to be feasible. Organisational obstacles (black flags) were identified that compromised the experimental intervention, and this precluded reliable conclusions regarding the effects of its specific components. Nevertheless, from a pragmatic perspective, implementation of certain guidelines principles (generating a supportive network with 'all players onside') was a successful strategy for reducing absence due to musculoskeletal disorders.

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CHAPTER 1

EPIDEMIOLOGICAL OVERVIEW

1.1 Introduction

This chapter provides an epidemiological overview of the central concepts explored in the current study in association with musculoskeletal disorders (MSDs). Epidemiology is the study of how often diseases occur in different groups of people and why, and a key feature of epidemiology is the measurement of disease outcomes in relation to a population at risk (Coggon, Rose, & Barker 1997). Therefore, this chapter will report on the epidemiology of MSDs in the general population; the temporal aspects of MSDs (concentrating on the progression into chronicity and disability, with a special note on the concept of pain); the epidemiology of MSDs at work and the documented workplace physical and psychosocial risk factors; and also the epidemiology of sickness absence due to MSDs. Finally, an overview of the management and prevention strategies to date employed to reduce workloss due to MSDs is presented, followed by the introduction of a new occupational approach - the identification of psychosocial obstacles to recovery from MSDs.

Firstly, a glossary of terms and conditions used throughout the present study is provided:

1.1.1 Glossary of terms and conditions

- Musculoskeletal Disorders (MSDs) - The term musculoskeletal disorders refers to "conditions that involve the nerves, tendons, muscles, and supporting structures of the body" (NIOSH 1997). It should be noted here that the causes of MSD symptoms are difficult to determine both clinically and epidemiologically; often there is no unequivocal relationship with physical loading or tissue damage. The present study is concerned only with MSDs that comprise low back pain (LBP) and upper limb disorders (ULDs), excluding MSDs of the lower extremities (in accordance with the remit of the research brief of the Health and Safety Executive).

- Low Back Pain (LBP) - Low back pain refers to the range of disorders characterised by pain in the back/hip/leg areas, and is the most extensively researched of the MSDs.
- Upper Limb Disorders (ULDs) - Upper limb disorders (ULDs) usually relate to the neck, shoulder, elbow, arm, and hand/wrist, with the most common area for pain reporting being in the shoulder/upper arm (MacFarlane 1998). It is recognised that the majority of the literature on MSDs refers to LBP, but existing evidence suggests that ULDs pose the same concerns as LBP in terms of absence from work and disability (National Research Council & Institute of Medicine 2001).
- Incidence and prevalence - are terms that relate to the occurrence of a disease. Prevalence measures the total number of cases of a disease observed in a certain time period, and incidence refers to the number of individuals in a population who become afflicted by a disease for the first time over a defined period of time. In short,

prevalence means all cases of a disease, whereas incidence means all new cases of a disease (Rose & Barker 1979).

- 'Flags' have been defined as risk factors for delayed recovery from MSDs, and different colours of flags represent different concepts:

  Red Flags – is a term used to refer to conditions which denote serious underlying pathology, and come from the Royal College of General Practitioner's Guidelines' (1996) recommendations to screen MSD patients for such conditions before treatment commences. Red flag conditions include:

  - Presentation under age 20 or onset over 55
  - Non-mechanical pain
  - Thoracic pain
  - Past history - carcinoma, steroids, HIV
  - Unwell, weight loss
  - Widespread neurological symptoms or signs
  - Structural deformity

  Yellow Flags - are classified as clinical psychosocial risk factors for MSD disability, and guidance for addressing these factors has come from the Accident Rehabilitation and Compensation Insurance Corporation of New Zealand (Kendall, Linton & Main 1997). This document states that beliefs about pain and disability, fears that physical activity will be injurious, and negative perceptions of work can act as obstacles to recovery from MSDs.

Blue Flags - are classed as occupational psychosocial risk factors, are related specifically to the work environment, and negative perceptions or attributions of such factors have been proposed to be detrimental to recovery from MSDs (Burton & Main 2000).

Black Flags - are organisational policies or procedures that can impede successful rehabilitation efforts for workers with MSDs, and thus can also be classed as obstacles to recovery (Main & Burton 2000).

Epidemiologic data on MSDs are generally obtained from official health registers or by retrospective, prospective, or cross-sectional surveys of general populations or of specific industrial populations. However, it has been acknowledged that care must be taken when interpreting such data, because epidemiologic research of MSDs has been hampered by methodological problems in definition, classification, and diagnosis (Wood & Badley 1980). Further, the intermittent nature of MSDs complicates prevalence studies, and studies of disability due to MSDs are also largely influenced by legal and socio-economic factors.

1.2 Epidemiology of LBP in the general population

In the UK, the annual incidence of LBP in the general population has been reported to be 4.7%, the point prevalence 19%, the prevalence during the last 12 months 39% and the lifetime prevalence 59% (Hillman et al. 1996). The CSAG report (Clinical Standards Advisory Group. 1994b) estimated a population prevalence for back pain of 16.5 million, resulting in 2.4 million outpatient attendances and 12 million GP consultations.

A more recent report found that there were little differences in overall prevalence figures for LBP between men and women in general population studies, but there were some differences when age was considered (Department of Health 1999). This report highlighted that women in the youngest and oldest age groups were more likely to report LBP than their male counterparts, but for those aged between 45 and 54, men reported substantially more LBP than women (51% compared with 43%). Young adults reported the lowest levels of LBP, but even so, one third of those aged 16 to 24 said they had experienced some LBP. The highest prevalence of LBP was reported amongst people in the older working age groups (45-54 and 55-64).

1.3 Epidemiology of ULDs in the general population

Epidemiologic data on ULDs are relatively few compared with that for LBP, but it has been reported that ULDs in the general population over a month affect the shoulder (25%) wrists/hands (15%), elbows (11%) and forearm (8%) (Papageorgiou et al. 1995). A study by Erikson et al (Eriksen et al. 1998) found that 33% of respondents to a survey of the general population complained of pain in their arms and shoulders in the past 30 days, compared to 35% who complained of LBP. Combinations of data from self-report of pain, interview, examination and physician diagnosis are typically used to gain prevalence rates on ULDs, but the varying criteria used by different studies means that classifications of these disorders are hampered (Bamji, Erhardt, & Price 1996). For example, in one population-based study considering shoulder pain lasting at least 24 hours during the past month, prevalence varied between 31% and 48% depending on the precise case definition used (Pope, Croft, & Pritchard 1997).

1.4 Temporal aspects of musculoskeletal disorders

The natural history of MSDs is highly variable, ranging from brief (acute) episodes that resolve without treatment, to chronic or recurrent patterns that lead to prolonged disability despite numerous interventions (Burdorf & Naaktgeboren 1998). Although in most cases individuals make a full recovery from an episode, the recurrence rates for MSDs are very high. Andersson (Andersson 1999a) reported that, in one year, the recurrence rate of LBP was between 20% and 40%, and over a lifetime recurrences of up to 85% are reported. Van den Hoogen et al (van den Hoogen et al. 1997) mention that the reappearance of LBP can even rise to 75% in the first following year.

Although there are high prevalence rates for acute episodes of MSDs, there are low rates of long-term disability resulting from MSDs. However, it is this small number that account for disproportionate costs to industry and the state in terms of lost production and social security benefits

(Waddell 1998). This phenomenon has encouraged numerous investigations into better understanding the factors involved in the transition from an acute episode through to chronicity and disability.

1.4.1 Chronicity and disability

Limited data are available about the prevalence of chronic MSDs, partly because of a lack of agreement about the definition. Chronic LBP has been defined as "back pain that lasts for longer than 7-12 weeks", or it can be defined as "pain that lasts beyond the expected period of healing" (Andersson 1999a), and is largely measured in association with workloss and compensation costs. Pramer et al (Praemer, Furnes, & Rice 1992) found that in the U.S., musculoskeletal chronicity was the most common chronic ailment in people up to age 65, and resulted in over 185 million days of restricted activity, which included 83 million days confined to bed. Rossignol et al (Rossignol, Suissa, & Abenhaim 1988) followed a representative sample of out of 2,341 individuals who had been compensated for occupational back injury in 1981 and found that 6.7% of the sample were still absent from work after 6 months, which accounted for 68% of work days lost and 76% of the total compensation cost for LBP.

The recovery rate after 12 weeks of musculoskeletal pain is likely to be slow and uncertain. Fewer than half of those individuals disabled for longer than 6 months return to work, and after 2 years of absence from work, the return to work rate is close to zero (Spitzer 1987). Additionally, the demands these individuals place on the health-care system is large and costly. However, understanding how to prevent chronicity and disability resulting from MSDs has proven to be complex. Aarts & DeJong (Aarts & De Jong 1992) neatly summarise the focus of recent research into understanding this problem by saying "the road from disease to disability is paved with behavioural elements". Thus, it may be helpful to view MSD-associated disability not as the acquisition of a new syndrome, but as a progressional pathway (Hadler 1997).

Addressing the problem of MSD-associated disability requires an understanding of the concept of pain. Pain differs not only in quality and severity but also in its impact on activities of daily living, quality of life and work. The subjective and individual nature of pain was first conceptualised by The Gate-Control Theory of Pain (GCT) (Melzack & Wall 1965), which importantly suggested that pain-related syndromes have a substantial psychological component. The psychological factors involved in musculoskeletal pain will be explored further in Chapter 2.

1.5 Epidemiology of MSDs at work

The estimated prevalence of self-reported work-related illness in Great Britain in 1995 was 2 million cases, with the main categories being musculoskeletal conditions and an estimated 1.2 million people affected (Jones et al. 1998). Similar estimates have been published from other national assessments of occupational morbidity (Cherry 1999), (NIOSH 1996). A recent survey under the Occupational Physicians' Reporting Activity surveillance scheme reported that over a 4 year period, MSDs made up nearly half of all new cases of work-related disease (Cherry et al. 2000). An update on this study documented that MSDs were probably the most common occupationally related cause of ill-health in the UK today (Cherry et al. 2001).

The significant health concern that MSDs pose in industrialised nations has led to substantial research concentrating upon work-related risk factors. Although very common across all types of industries and jobs, several studies have demonstrated that MSD rates are above average in certain types of industries and within certain occupations. For example, particularly high prevalence rates of MSDs are found for agricultural workers, construction workers, carpenters, drivers (including truck and tractor operators), nurses and nursing assistants, cleaners, orderlies, and domestic assistants (Merllie & Paoli 2001). However, it has been reported that the effect size of the risk factors inherent in these jobs compared with other working populations not exposed to these risk factors may be modest (Carter & Birrell 2000).

1.5.1 Physical workplace risk factors

Although findings appear to be contradictory, it is generally accepted that heavy physical work and exposure to vibration constitute physical workplace risk factors for LBP, and that repetitive and static work are physical workplace risk factors for ULDs (Battié 1989) (Bongers et al. 1990), (Linton 1991), (Skovron et al. 1991), (Svensson, Nemeth, & Ekholm 1997). Other consistently reported physical workplace risk factors for ULDs are postural (notably relating to the shoulder and wrist), force applications at the hand, hand-arm exposure to vibration, direct mechanical pressure on body tissues, and the effects of a cold work environment (Buckle & Devereux 1999).

The relationship between physical workplace factors and MSDs is difficult to determine because level of exposure is sometimes impossible to quantify, and unclear definitions exist for what constitutes 'heavy' and 'light' work. Traditionally, heavy physical work has been defined as jobs with high-energy demand, and light work as jobs with low-energy demand. However, many low energy jobs are static in nature, which in itself may be a physical workplace risk factor for MSDs. Further complicating the issue is that exposure to several occupational risk factors often occurs in the same job. For example, a truck driver may have to load and unload their truck (lifting), sit for many hours in an unchanged posture (static loading), and be exposed to whole-body vibration. Because these risk factors occur together, it is difficult to determine the relative importance of each one on the development of a given MSD.

However, work characterised by heavy physical effort or immediate danger is less common today - there have been enforced regulations to improve the physical working environment, such as The Management of Health and Safety at Work Regulations (1992). Thus, it has recently been suggested that it is the least tangible aspects of work that represent the most common threat to worker ill-health today (Griffiths 1998).

1.5.2 Psychosocial workplace risk factors

Psychosocial workplace risk factors may have a more profound influence on MSDs than was previously recognised (Burton & Main 2000). The detrimental effects of certain clinical psychosocial factors on the course and recovery of MSDs, (such as distress, somatisation, attitudes, beliefs and coping strategies) are well documented (Pincus et al. 2002) (Croft et al. 1995), (Fordyce 1995), but recent review literature has concluded that occupational psychosocial factors (such as job satisfaction, stress, social support and perceived control) also play a significant role in the course and recovery from MSDs (Linton 2001), (Bongers, Kremer, & ter Laak 2002).

A hypothesised explanation of how psychosocial factors influence recovery from MSDs comes from Davis & Heaney (Davis & Heaney 2000), who suggest that differing responses to (perceptions) environmental factors influence how the individual may accept and cope with pain or injury.

This 'biopsychosocial' approach (Waddell 1998) applied to understanding recovery from MSDs at work acknowledges the influence of the psychosocial work environment and recognises that work can place certain subjective constraints on the individual. The psychosocial work environment and its association with MSDs will be explored further in Chapter 3.

1.6 Sickness absence due to MSDs

MSDs represent a significant problem with respect to ill health and associated sickness absence costs in the workplace. A survey conducted by the Health and Safety Executive (HSE 1997b) estimated that each worker experiencing LBP took 11 days off work in 1995 because of their complaint, and that this amounted to 4.8 million working days lost. Another HSE report (HSE 1997a) estimated that LBP costs employers between £315 million and £335 million. In addition, the associated costs of ULDs have been estimated at between 0.5% and 2% of Gross National Product (the Nordic countries and the Netherlands) (Buckle & Devereux 1999).

Sickness absence data are used as an integrated measure of health in the working population (Tellnes & Bjerkedal 1989). However, an early review of sickness absence measurement found 41 outcome measures, highlighting the problem of different quantitative definitions of sick-leave (Gaudet 1963). Further complicating the measurement of health in the workplace is the fact that sick leave is multifactorial and influenced not only by the health status of the individual, but also by the social insurance system, work environment, attitudes and commitment to work as well as other medical, social and psychological factors (Hensing et al. 1998). Thus, several measurements of sickness absence due to MSDs have been employed, depending on the outcome of interest.

- *Measures based on spells*: Spells (also called episodes) can be categorised as new spells, completed spells or spells of different length. This is a popular method used in studies to report on incidence and prevalence of absence due to MSDs.
- *Measures based on individuals:* Measures based on individuals (cases) can be proportions of either those who were sick-listed at a certain point or period in time (prevalence) or those at risk of becoming sick-listed during a specified period of time (cumulative incidence). This method can be of interest in studies on the relation between certain weekdays and sick leave for example, but it can also vary depending on the individual's sick-leave diagnosis, e.g. pregnancy-related.
- *Measures based on days*: The duration of absence due to MSDs is of major interest. Days lost can be defined using calendar days, working days or benefited days. However, the very nature of MSDs means that the distribution of sick-leave days is often skewed, with the majority of durations being fairly short-term. This has implications for statistical analysis and treatment of absence data,

and has been discussed in several studies, with some authors suggesting that the mean number of sick-leave days should be complemented with the median value, whereas others suggest certain statistical procedures (Alexanderson et al. 1994), (Marmot et al. 1995).

- *Return-to-work (RTW).* RTW has usually been defined as the length of time it takes for the individual to return to the workplace, and can be measured using the same categories listed in the previous section. However, there may be other considerations such as whether the individual is on modified work, i.e. have they returned to their *normal* work. Another problem is that *first* RTW is usually the main outcome in studies of this MSDs, but authors such as Butler et al (Butler, Johnson, & Baldwin 1995) have stated that this is not always appropriate, or indeed a measure of, successful RTW if the individual then continues to take recurrent absences.

Hensing et al (Hensing et al. 1998) have suggested five measures of sick leave to be used which indicate the different aspects that are valuable when analysing sick leave within an epidemiological framework. These measures are frequency of sick leave, length of absence, incidence rate, cumulative incidence and duration of a sick-leave spell. Furthermore, the authors suggest that outcomes and aims of research should be decided before collecting sickness absence data, as this will dictate the appropriate analysis methods.

1.7 Management of MSDs at work

Traditionally, occupational interventions aimed at reducing MSDs and the resulting workloss have been based primarily on biomedical or ergonomic principles (Main, Burton, & Battie 1999). Additionally, considerable effort has already been directed at preventing the occurrence of MSDs (primary prevention) but, given the prevalence of MSDs in the population, and the recurrence rates of MSDs, a more realistic target may be aimed at reducing the duration of absence (secondary prevention), with particular effort on the prevention of musculoskeletal symptoms becoming disabling (Burton & Main 2000).

In addition to the type of intervention that should be employed, recent research suggests that the timing of the intervention is important (Smith, McMurray, & Disler 2002). The CSAG report on back pain (Clinical Standards Advisory Group. 1994a) suggests that delayed access to treatment can contribute to create a chronic pain sufferer. Several studies have assessed the advantages of early interventions (Hellsing 1994), (Linton & Warg 1993), (Smith, McMurray, & Disler 2002), and concluded that there should be a critical early time point within which treatment should be initiated in order to prevent delayed recovery. The most promising indications to date are that an integrated secondary prevention approach should be applied as soon as the worker has become symptomatic and entered health care (ACC and the National Health Committee 1997). A more detailed overview of the literature on management of MSDs at work and early intervention can be found in Chapter 4.

1.8 Identifying psychosocial obstacles to recovery - a new approach

Following research documented in this chapter on the nature of MSDs and the resulting disability and workloss, it has been acknowledged that addressing the biomedical needs of the worker alone is not sufficient, and that cognitive and behavioural aspects of the MSD problem also need to be addressed (Kendall 1999). Importantly, an individual's attitude towards their pain and its treatment has been increasingly recognised in rehabilitation efforts. Thus, it is has been proposed that psychosocial risk factors can act as obstacles to recovery from MSDs, and that successful management of MSDs should be aimed at identifying and addressing these obstacles. A more detailed explanation of this approach is provided in Chapter 4.

1.9 Summary

Clearly, MSDs are one of society's most significant medical conditions, and yet the prevalence of MSDs, as one author notes "is perhaps matched in degree only by the lingering mystery accompanying it" (Deyo 1998). Research that indicates the importance of an early psychosocial intervention to reduce the risk of chronicity has suggested that individuals with acute pain and a host of accompanying problems such as work loss, medication overuse, mood disorder, low self-efficacy, perceptions of poor health, and job dissatisfaction are deemed to be at risk of becoming chronically disabled by their pain (Linton & Hallden 1998). Further, many employers are now recognising the importance of tackling this problem in an occupational context, providing a welcome relief from the tremendous burden placed on primary healthcare.

CHAPTER 2

PAIN

2.1 Introduction

Pain is a sensation evoked by harmful stimuli, e.g. cuts, diseases, chemical irritation, and intense heat or cold, and is a message to avoid the source of harm. This message is communicated to the spinal nerves by various sensory nerve endings that enter the spinal cord and pass through the brain (Kalat 2000). A diverse array of cognitive, behavioural, emotional and environmental factors have been recently identified as key components of this process, and it has been summarised that "pain is a sign, not a symptom and is therefore multiply determined" (Main & Watson 1999). This subjective nature of pain has not always been acknowledged, and the present chapter illustrates how theories of the pain process have evolved over time, followed by an exploration of the psychological factors associated with pain; and in particular, musculoskeletal pain.

2.2 Early theories of pain

Early theories of pain considered the sensory system relatively rigid and straightforward. Such theories did not permit an explanation of pain in the absence of tissue damage, or variation in pain across individuals with apparently the same amount of tissue damage. These phenomena led to the development of Specificity Theory (von Frey 1991), whereby pain was considered to be a specific sensation independent of the other sensations. Thus, Specificity Theory introduced the notion that there were individual variations in the perception of pain.

2.3 Gate-Control Theory

In order to further explain these individual variations in pain perception, the Gate-Control Theory (GCT) (Melzack & Wall 1965) proposed that pain perception depends on complex neural interactions in the nervous system, where impulses generated by tissue damage are modified both by ascending pathways to the brain and by descending pain suppressing systems activated by various environmental and psychological factors. According to GCT, certain areas of the spinal cord receive messages not only from pain receptors, but also from other receptors in the skin and from axons descending the brain. If these other inputs to the spinal cord are sufficiently active, they close the 'gates' for the pain messages. In other words, the brain can increase or decrease its own exposure to pain information. The strength of GCT is based on a simple assumption: that various kinds of 'non-pain' stimuli can modify the sensation of pain.

The GCT has generated interest into the role of beliefs about pain, attention to pain, appraisal of its significance, fears about pain and pain-related coping strategies. The theory has encouraged the investigation of the nature of pain-associated disability and has led to the development of biopsychosocial models that have attempted a wider integration of physical, psychological and social perspectives.

2.4 The biopsychosocial approach

The biospsychosocial approach proposes that pain behaviour demonstrated by the individual at any point in time is a product of their beliefs and is an emotional response to their pain. This behaviour may in turn be influenced (reinforced or moderated) by the social environment in which it takes place (Main & Waddell 1998). The biopsychosocial approach offers a radically different way of understanding the nature of pain-associated incapacity, and thus, how to treat it. It also acknowledges that psychological factors are more than mere correlates of a pain problem (Linton & Skevington 1999). Therefore, the biopsychosocial approach suggests that identifying potent psychological mechanisms involved in pain and pain-associated incapacity might provide valuable insight into how it is managed.

2.5 Psychological mechanisms associated with pain

It has been suggested that psychological factors may intervene at several stages in pain perception and behaviour. Some factors may predispose a person to be in pain, whilst others may trigger or initiate the problem, although the evidence for pain predisposition has been limited. More recently, it has been proposed that psychological factors are often involved in maintaining the problem, and that positive mediating factors (such as active coping strategies) may help individuals to withstand their problem (Linton 1994). The following sections outline the most documented psychological mechanisms associated with musculoskeletal pain.

2.5.1 Mood

The initial reaction to a painful episode is usually recognized in terms of certain mood states such as anxiety, shock and fear. Whilst these may be relatively normal reactions, with the passage of time and perhaps the failure of treatment, more abnormal mood states such as depression may become evident (Romano & Turner 1985). Depression has been commonly linked to the non-recovery from MSDs, and recent research has demonstrated that, although a history of depressive illness increases the risk for the development of chronic pain, pain has a stronger influence as a precursor of depression (Magni et al. 1994), (Waxman, Tennant, & Helliwell 1998). Pincus et al (Pincus et al. 2000) have suggested that certain depressive symptoms may be expressed in pain sufferers through 'somatization', which can include fatigue, difficulty in performing everyday activities, listlessness, loss of appetite and sleep disturbances. Such symptoms can hinder adequate treatment for the pain problem, and thus exacerbate the disorder.

However, depression in pain sufferers is not only characterised by somatic symptoms, but is also associated with severe functional decline (Klerman & Weissman 1992). It has been found, for example, that depressed patients report more days in bed than many other patients with chronic disease, and when depression is combined with a major chronic disorder, the effects of disability are additive (Wells, Stewart, & Hays 1989). It has been suggested that if it is possible to control the pain by addressing beliefs and fears about pain, then individuals maybe more unlikely to experience psychological disorders, such as depression, which maintain their problem (Linton & Hallden 1998).

2.5.2 Cognitions

Cognitions can be defined as our thought processes and include mechanisms such as perception, attention and appraisal (Eysenck & Keane 1995), and have been pinpointed by researchers as possible explanations for pain and disability in the absence of further injury (Pincus et al. 1994). Cognitions and the resulting behaviour are greatly influenced by the learning experience, whereby repeated cognitive processes and behaviour employed to adapt to these thought processes becomes learnt through the principles of reinforcement.

A model of pain perception by Linton (Linton 1994) illustrates how pain behaviour may be learnt, and at what particular stage. The model states that the first step is to attend to the stimuli, which is in part controlled by cognitive mechanisms such as attention. In the second step, the model states that an appraisal of the stimulus is made, which can be influenced by a host of psychological factors and previous experiences. The stimulus is given meaning and evaluated to decide whether it is harmful, unusual, or irrelevant and not worth further attention. This in turn influences coping strategies, and behaviours that attempt to cope with a pain problem.

Problems arise however, when the stimulus is given meaning from individual beliefs, (perhaps influenced by previous experience, confusing diagnoses or general negative lay beliefs) which can result in fear of the stimuli, which in turn results in avoidance behaviour. In the first stage of avoidance, a painful stimulus encountered by, for example, heavy lifting at work, elicits responses such as increased anxiety, fear and muscle tension. This stimulus can then be experienced as a threat which sets the stage for an avoidance response (i.e. absence from work) which is then reinforced by the consequences, such as a reduction of the anxiety, tension and pain (Lethem et al. 1983).

Once avoidance is learned, the person may never again come in contact with the threatening situation. If, for example, the threatening situation is perceived to be an aspect of work, and unless this fear is addressed, the result maybe extended absence or even disability. Here, disability may be best viewed as 'learned helplessness' (Seligman 1975), which is often relieved by returning to individuals a measure of control over their pain and pain-associated incapacity. In order to do this, fear of pain often has to be addressed.

2.5.3 Fear

"Fear of pain and what we do about it may be more disabling than pain itself" (Waddell et al. 1993). Pain-related fear and its importance in the role of recovery was highlighted by Fordyce as long ago as 1976 (Fordyce 1976). Since then, pain-related fear has become the focus for much research, and the ways in which pain-related fear mediates disability have been found to be manifold (Vlaeyen et al. 1995). More recently, researchers have proposed that it is fear of *harm* or *reinjury* that promotes disability, and novel treatment approaches for chronic pain sufferers have been devised, by using therapeutical techniques normally used by behavioural psychologists to treat phobias, e.g. aversion therapy, flooding techniques etc. (Vlaeyen et al. 2001). Preliminary results of the effectiveness of these techniques look promising, and by acknowledging that pain is firmly rooted in psychology, this has major implications for the rehabilitative context.

2.6 Summary

There are a tremendous number of studies that implicate psychological variables as risk factors in the onset, development and maintenance of MSDs, and in treatment prognosis (Linton 2000b). This chapter has attempted to illustrate the various psychological mechanisms that may be in operation at any one time. Most of these psychological mechanisms do not result in any ill-effects or long term problems, however it seems that those individuals experiencing distress, depression and/or anxiety in the acute stage fare worse than others, and cognitive factors such as coping and illness beliefs have shown to affect related recovery in chronic MSDs (Weiser & Cedraschi 1992). Thus, the length of suffering may be important in understanding the psychological mechanisms involved.

A more specific review of the psychological factors involved in the transition from acute to chronic pain documented that pain severity at the time of acute onset was found to be a significant predictor of later pain and disability (Turk 1997). Additionally, in a systematic review, Pincus et al (Pincus et al. 2002) reported that distress, depressive mood and somatization are also implicated in the transition to chronicity. Thus, it seems that an understanding of the role of individual and psychological factors involved in the transition to chronicity is critical in order to prevent disability resulting from MSDs. The biopsychosocial perspective states that an understanding of the influences from the social environment is also required to successfully tackle this problem; indeed the epidemic proportions of MSDs and their associated disability in industrialised nations warrants further investigation into examining the importance of the psychosocial work environment.

CHAPTER 3

THE PSYCHOSOCIAL WORK ENVIRONMENT

3.1 Introduction

MSDs have become one of the major medical problems in advanced industrial societies (NIOSH 1997), and it has become clear that attention to the physical hazards of work is not enough to protect workers (Waddell 1998). In one of the most recognized studies on the psychosocial work environment and health - the Whitehall II study - Stansfeld et al (Stansfeld, Head, & Marmot 2000) reported that work factors are as important as non-work influences on health. A major report commenting on ten years of working conditions in the European union found that there were increasing proportions of work-related health problems, such as MSDs, that have strong correlations with stress and features of work organization. The authors concluded that the prevalence of illness that is influenced by psychosocial factors is increasing, whereas that of other occupational diseases is falling (Merllie & Paoli 2001).

The expression 'psychosocial factors' is a non-specific term, and its general usage in occupational health has served as a catch-all in reference to the non-physical elements of the work environment (Sauter & Swanson 1996). To date, research carried out on occupational psychosocial factors and MSDs have found associations with job satisfaction, workload and work pace, working hours, organizational culture, participation and control, interpersonal relationships, feedback and recognition, career development, role-related issues and the home-work interface (Bongers et al. 1993), (Cox & Griffiths 1996), (Theorell & Karasek 1996), (Hoogendoorn et al. 2000), (Linton 2000a), (Windt D.A.W.N.van der et al. 2000), (Ariens et al. 2001), (Bongers, Kremer, & ter Laak 2002). However, these less tangible 'psychosocial hazards' of the working environment have proven to be difficult to quantify compared to physical hazards (Johnson 1996).

Cox (Cox 1993) has argued that risk assessments similar to those used to identify physical hazards can also be used to identify psychosocial hazards in the workplace. The Health and Safety Executive (HSE) define risk assessment as:

- *'nothing more than a careful examination of what, in your work, could cause harm to people, so that you can weigh up whether you have taken enough precautions or should do more to prevent harm. The aim is to make sure that no one gets hurt or becomes ill' (HSE 1998).*

Risk assessment should also, according to Rick et al (Rick et al. 2001) reveal how and why there is a 'hazard-harm' relationship as well as the extent of that relationship. In trying to understand this hazard-harm relationship in relation to occupational psychosocial factors, it is helpful to consider the research carried out on workplace stress and stress management.

3.2 Stress

Stress at work has attracted much interest in recent years, both in government and among employers. It has been acknowledged that the experience of stress at work has undesirable consequences for the health and safety of workers, and for the health of their organizations. However, the term 'stress' is often used to describe both the sources and outcomes of the stress process, leading to a certain amount of confusion (Grimshaw 1999).

Stress seems to be commonly understood as a process involving the interaction of environmental demands and individual attributes, which can lead to acute reactions that affect health (Hurrell & Murphy 1996), (Karasek & Theorell 1990), (Ivancevich et al. 1990), (Smith 2000). Recently, the HSE has defined stress as "the adverse reaction people have to excessive pressure or other types of demand placed on them" (HSE 2003). This definition suggests that, experienced at a certain level, some occupational psychosocial characteristics may have potential for causing ill-health. The remainder of this chapter will examine the occupational psychosocial factors that have been consistently related to MSDs in the literature.

3.3 Job Satisfaction

Job satisfaction is probably one of the most greatly researched areas in organizational psychology, and job *dissatisfaction* has been shown consistently to relate to health and productivity outcomes (Furnham 1997). Job dissatisfaction has also been identified as potentially one of the most significant predictors of LBP and disability. Retrospective and cross-sectional studies have found an association between LBP and job dissatisfaction (Bigos et al. 1986), (Bergenudd & Nilsson 1988); (Linton & Warg 1993), (Skovron et al. 1994), and some prospective investigations also have demonstrated a relationship between reports of LBP and ratings of job dissatisfaction (Cats-Baril & Frymoyer 1991), (Bigos et al. 1991), (Bigos, Battie, & Fisher 1991), (Papageorgiou et al. 1997). However, other prospective studies have failed to identify correlations among job satisfaction ratings and either reports of LBP (Viikari-Juntura et al. 1991), or return-to-work after acute back injury (Lehmann, Spratt, & Lehmann 1993). In a systematic review of the literature, Linton (Linton 2001) documented that 13 out of 14 studies indicated that low job satisfaction was linked to future LBP.

The role that job satisfaction plays in the transition from acute to chronic LBP was explored by Williams et al (Williams et al. 1998). The authors concluded that satisfaction with one's job may protect against the development of chronic pain and disability after acute onset of LBP, and alternatively, dissatisfaction may heighten the risk of chronicity. A specific review of the role of psychosocial factors in the transition from acute to chronic LBP was reported by Turk (Turk 1997), who found that seven out of eight studies reported a predictive relationship between job dissatisfaction and the development of chronicity.

3.4 Demand and Control

Karasek's Job Demand-Control Model (Karasek 1979) has been arguably one of the most influential in occupational psychology research since it was first introduced. The model focuses on two elements of the work-environment - job demands and work control, and the *decision latitude* available to the individual. Specifically, the model predicts that strain results from the interaction of job demands and work control, and that strain exists when there are high levels of job demands and low levels of control over these demands, i.e. low decision latitude. In contrast, when high levels of demand and control exist, the job is described as being 'active', meaning that the demands act as a source of challenge and regeneration, rather than as a source of mental and physical stress - resulting in high levels of decision latitude.

The central tenet of Karasek's model is that positive perceptions of work (such as perceiving high social support, job satisfaction and having control or freedom at work) can moderate the effects on well being that occur from negative aspects of the job. Karasek's model importantly suggests that seldom can the content of work be shown to be solely responsible for adverse health outcomes. Rather, issues that relate to job context are more likely to be the influencing/determining factors. In the 1980's a social support element was added to the original model and it is now known as the Job Demands-Control-Support model (Karasek et al. 1998)

In a recent study, Devereux et al (Devereux, Buckle, & Vlachonikolis 1999) reported a statistically significant interaction between low control and high physical workload and the risk of experiencing MSDs. In another study, it was shown that two demand variables affected MSDs in two different ways. First, higher demands were associated with higher physical workload, and second, higher demands were associated with stronger symptoms of psychological stress. Both these mediators in turn were found to enhance musculoskeletal symptoms (Elovainio & Sinervo 1997). The authors of this study stated that a moderating function of control could enter into the relation between physical workload and musculoskeletal problems for the following reason: if there is more control over how to do the work and over how to schedule it, work activities can be planned in such a way that physically demanding tasks are executed according to individual capacities, so that the resource character of control is exploited. Thus, control should moderate the effects not only of psychological loading factors on MSDs, but also those of physical loading factors.

In support, Nahit et al (Nahit et al. 2001) have suggested that changing the perceptions of demand by altering organisational aspects of the workplace could decrease the risk of MSDs. However, in a study by

Hollmann et al (Hollmann, Heuer, & Schmidt 2001), it was found that control buffered the effects of high psychological demands, but not of high physical workload; the buffering effect of control was observed only when physical workload was low. This mediating or 'buffering' effect of control has been increasingly reported on in the MSD literature, but, to date, there has been limited evidence that demonstrates a positive main effect of control (Bongers et al. 1993), (Hemingway et al. 1997). The potential moderating effects of control on MSDs have yet to be fully explored, but there are theoretical reasons to expect that such effects do exist (Hollmann, Heuer, & Schmidt 2001), (Wall et al. 1996).

The importance of worker control is now recognized in legislation in several countries. In Sweden, the Work Environment Act 1987 states that work must be "arranged in such a way that the employee himself can influence his work situation". In Britain, the Approved Code of Practice which accompanies the Management of Health and Safety at Work Regulations 1992 states that employers should have a policy "which will take account of the way work is to be organized, working conditions, the working environment and any relevant social factors" (paragraph 27e) (HSE 1998). It is clear that worker participation and involvement, with its implications for positive health outcomes, is now encouraged.

3.5 Social Support

Since the late 1970's, stress theory has been elaborated to incorporate factors which moderate or buffer the effects of stress on physical and mental health, and social support has been the most frequently studied psychosocial resource. Social support has been considered a coping resource, or a "social fund" from which people may draw when handling stressors (Thoits 1995), and is measured in many different ways, referring to many significant persons in people's lives, both at work and at home (Griffiths 1998). When exploring social support at work, research has found that it is perceived support from line managers or from other formal sources within the organization that appears to have a buffering effect on well-being and work attitudes such as job satisfaction, rather than informal support from peers or from home (Leather, Lawrence, & Beale 1998).

In a Canadian national population health survey, it was found that low social support at work was an independent predictor of restricted activity due to MSDs (Cole et al. 2001), and were in support of previous findings (Houtman et al. 1994), (Toomingas et al. 1997). It has also been suggested that low social support may either lead to MSDs (in support of others reporting on this aetiological view of the effects of social support (Bongers et al. 1993), or that it would increase incapacity through lack of social supports to those with chronic musculoskeletal restrictions, consistent with a disability view.

In a systematic review, strong evidence was found for low social support in the workplace as a risk factor for LBP (Hoogendoorn et al. 2000). The review found that several studies evaluated the effect of low social support in the workplace, which included social support of co-workers and supervisors, relationships at work, and problems with workmates and superiors. Two high quality studies in particular showed that low social support had a statistically significant relationship with LBP (Bigos et al. 1991), (Riihimaki et al. 1994).

3.6 Summary

There is now substantial literature that implicates occupational psychosocial factors in the aetiology of MSDs, and an acknowledgement of these factors is paramount in understanding the effects of the psychosocial work environment on the course and recovery from MSDs. There has been some progress in conceptualising psychosocial characteristics, i.e. as part of a continuum, being protective, health promoting and satisfying at one end and unsatisfying and harmful at the other. But there are still many outstanding questions about these factors, such as: how best do we measure them?; how broad a range of effects do they have?; how do they interact with each other?, and what are the causal pathways and mechanisms involved? The present study will attempt to answer some of these questions.

High medical costs and increased absence rates due to MSDs have led employers and health-care providers to seek innovative methods for identifying and modifying factors that contribute to musculoskeletal pain and disability (Shaw, Feuerstein, & Huang 2002). The next chapter will provide an overview of existing treatment approaches and intervention strategies employed to prevent delayed recovery from MSDs.

CHAPTER 4

OCCUPATIONAL MANAGEMENT OF MUSCULOSKELETAL DISORDERS

4.1 Introduction

Given the social and economic implications of sickness absence and disability resulting from MSDs, when and how to intervene in order to prevent this problem has become the subject of much debate. Occupational rehabilitation/prevention programs are well documented in the literature, and various outcome measures are employed, such as: work retention, return to work, changing beliefs about pain and reduction in costs associated with absence. However, because of the variety of methods and concepts in occupational management of MSDs, there are few substantial conclusions of what works, on whom and when (Krause, Dasinger, & Neuhauser 1998). This chapter presents an overview of existing occupational strategies and introduces a proposed new approach for the management of workplace MSDs.

4.2 Back schools

Back schools combine back pain education and strengthening exercises, and are a popular occupational intervention technique because they are cost-effective and relatively easy to carry out in the workplace. Back pain education can include topics related to back care, the structure and function of the spine, safe lifting, ergonomics, pain control and relaxation techniques (Brown et al. 1992). However, demonstration of success may depend on what specific outcome is measured. For example, a study by Daltroy et al (Daltroy et al. 1997) showed that over five and a half years, an educational program designed to prevent low back injury did not reduce the median cost per injury, the time off work per injury, the rate of related musculoskeletal injuries or the rate of repeated injury after return-to-work - only the subjects' knowledge of safe behaviour was increased by the training. A meta-analysis of the efficacy of back school programs concluded that back schools were most efficient when coupled with a comprehensive rehabilitation program, and efficacy was supported for the treatment of pain and physical impairments, and for education/compliance outcomes, but work, vocational and disability outcomes were not improved significantly (Di Fabio 1995).

Back schools and educational programs are, in essence, methods of primary prevention. Primary prevention aims to prevent injury/reinjury, and suggests that musculoskeletal pain can be avoided. However, an episode of musculoskeletal pain may be inevitable and in itself fairly inconsequential; as Hadler states, " a year without at least one episode of backache is unusual for most people. Coping successfully is healthfulness" (Hadler 1999).

4.3 Exercise and physical therapy

Exercise and physical therapy aims to increase the individual's strength, mobility, resilience and capability. Recommendation of specific exercises and engagement in activity offers a less passive approach (as compared to back schools) in that active participation is required. In a comparison of physical therapy, manipulation and the use of an educational booklet for the treatment of LBP, no significant differences amongst the groups were found in terms of number of days of reduced activity, in missed work or in recurrences of LBP (Cherkin et al. 1998). Additionally, in a review of four types of intervention including back and aerobic exercises, Lahad et al (Lahad et al. 1994) concluded that there was limited evidence to recommend exercise to prevent LBP. However, evidence exists suggesting that, when combined with cognitive-behavioural techniques (*see Section 4.9.1*), exercise may be very beneficial (Lindstrom et al. 1992).

In occupational settings, outcomes of physical therapy and exercise programs are frequently evaluated in terms of some sort of functional criterion. However, if recovery from MSDs was determined solely by functional attainment, then results of such specifically focused rehabilitation might be more impressive (Bartys, Main, & Burton 2000). As recent evidence suggests, recovery from MSDs is likely influenced by psychosocial, as well as biomechanical factors - thus, aiming to increase function to perform specific work tasks may not be adequately addressing the entirety of the problem.

4.4 Functional restoration

Functional restoration was proposed as an objective assessment of spine function, and the approach initially used new technology that could measure dynamic trunk function. Using a specially designed machine, the approach attempted to demonstrate a direct relationship between specific functional measures and subsequent injury (Mayer et al. 1985). However, the studies documenting the success of this approach have attracted methodological criticisms, such as lack of proper control groups, and failure to include dropouts in the treatment groups, resulting in an overestimation of the success rate (Haldorsen et al. 1998). Functional restoration makes the claim that its focus on objectivity permits an appraisal of effort and motivation to recover, thus attracting interest from employers and other assessors attempting to identify 'malingerers'. In fact, it has been suggested that all the objective evaluation offers is a description of performance (Main & Spanswick 2000). A comprehensive review of the results of all the major studies of functional restoration was undertaken by Waddell (Waddell 1998) who concluded, "functional restoration for chronic LBP looks promising, but there is a lack of evidence that it does actually return patients to work".

4.5 Modified work

A more recent occupational management strategy, which takes into account the importance of job context as well as content, has been the availability of modified work. Modified work recognizes the individual's perceptions of function and limitation, and reorganizes job duties accordingly. Types of modified work include: light duty, graded work exposure, work trial, supported employment and sheltered employment. This approach acknowledges the psychosocial aspects of work, as well as the physical and financial aspects (Yamamoto 1997).

In a systematic review of modified work and return-to-work literature, it was concluded that modified work programs facilitate return-to-work for both temporarily and permanently disabled workers. The authors also found that injured workers who were offered modified work returned to work about twice as often as those who were not, and that modified work programs cut the number of lost work days in half (Krause, Dasinger, & Neuhauser 1998). Importantly, modified work encourages an early return-to-work, by aiming to accommodate the worker until they feel that they have recovered, or following a specified appropriate length of time. Suggesting a return-to-work only when the individual feels that they have fully recovered leads to longer time away from normal lifestyle and activities, and could promote the false notion that it is dangerous to commence work whilst symptomatic (Carter & Birrell 2000).

4.6 UK Occupational Health Guidelines

The range of preventive strategies employed in the occupational management of MSDs is substantial, and the evaluation of these various approaches has now incorporated the principles of evidence-based medicine, systematic reviews and guidelines. It is therefore appropriate to summarise findings from the recent UK Occupational Health Guidelines for the Management of Low Back Pain at Work (Carter & Birrell 2000) on the efficacy of existing occupational management strategies thus far. The guidelines reported that:

- There is contradictory evidence that various general exercise/physical fitness programs can reduce future LBP and workloss; any effect size appears to be modest;
- There is strong evidence that traditional biomedical education based on an injury models does not reduce future LBP and workloss;
- There is preliminary evidence that educational interventions which specifically address beliefs and attitudes may reduce future workloss due to LBP;
- There is strong evidence to suggest that lumbar belts or supports do not reduce work-related LBP and workloss;
- There is limited evidence but general consensus that joint employer-worker initiatives (generally involving organizational culture and high stakeholder commitment to identify and control occupational risk factors and improve safety, surveillance measures and 'safety culture') can reduce the number of reported back 'injuries' and sickness absences, but there is no clear evidence on the optimum strategies, and inconsistent evidence on the effect size.

Guidelines-based approaches have been championed in previous studies of occupational management of MSDs (Weisel, Boden, & Feffer 1994); (Von Korff et al. 1994), with some researchers suggesting that "preventable disability is brought on by essentially pathogenic patterns of non-accommodative workplace response and substandard primary care" (Frank et al. 1998). In essence, it is now widely acknowledged that only by engaging all those with a common stake in the issue and obtaining their active collaboration can MSD disability be controlled successfully. There has also been a shift towards implementing approaches in the workplace primarily aimed at influencing factors known to be associated with chronicity after initial onset of MSDs, i.e. secondary prevention.

4.7 Secondary prevention

Secondary prevention has been considered to be particularly important in the occupational health arena (Adams et al. 2002). It can be defined as including any effort designed to reduce the likelihood that a given disorder will develop or advance once early signs or symptoms are detected (Frank et al. 1996), and although there are some ambiguities in the term 'secondary prevention', it generally refers to prevention of chronic incapacity in patients who are not yet chronically incapacitated (Linton & van Tulder 2000). The appeal of secondary prevention in the workplace is that it can be offered to fewer individuals for potentially greater effect, thus providing a higher cost-to-benefit ratio.

However, the lack of understanding about the optimal time to intervene and the recurrent and episodic nature of MSDs means that it has been difficult to demonstrate that secondary prevention programs impact on rehabilitation outcome beyond what would be expected from the natural course of recovery from MSDs (Frank et al. 1996). It is now amongst general consensus that a secondary intervention should be delivered in the early or acute stages of musculoskeletal complaint, which is a short time after the onset of symptoms and before a long-term disability has developed (Dasinger et al. 1999). Thus, early intervention is an attempt to reduce the negative, potentially disabling adverse biological and psychosocial consequences compounded by chronic pain.

4.8 Early Intervention

Early intervention in the treatment of MSDs was highlighted by the Clinical Standards Advisory Group (CSAG) report (Clinical Standards Advisory Group. 1994a), who stated that much of the disability resulting from chronic back pain is preventable, given appropriate advice and treatment in the early stages of the condition. Supporters of the early intervention approach maintain that early assessment and timely rehabilitation would prevent further disability, restore optimal work capacity and reduce dependency on compensation benefits (Yassi et al. 1995), (Ryan, Krishna, & Swanson 1995), (Hazard et al. 1997) (Sinclair et al. 1997), (Galvin 1999), (Newton-John, Ashmore, & McDowell 2001). However, other studies have suggested that it has no effect, or in some cases may be counterproductive (Greenwood et al. 1990), (Sinclair et al. 1997), (Cooper et al. 1996). These varying results suggest that is not simply a matter of timing - it also depends very much on the content of the intervention (Waddell 1998).

UK Occupational Health Guidelines (Carter & Birrell 2000) were extended to cover management recommendations for patients having difficulty returning to normal activities, including work, at 4-12 weeks. Their recommendations included

- "ensuring that workers, employers and primary health care professionals understand that the longer anyone is off work with LBP, the greater the risk of chronic pain and disability, and the lower their chances of ever returning to work",
- "addressing the common misconception among workers and employers of the need to be pain-free before return to work",
- "encourage the employer to establish a surveillance system to identify those off work with LBP for over 4 weeks so that appropriate action can be taken, with intervention at this stage being more effective".

4.9 Psychosocial management of musculoskeletal disorders

It has become clear that several individual variables, such as pain catastrophising, fear of movement/reinjury, pain beliefs and depression may be significant barriers to return to work or activity involvement, and that these variables may play a role in maintaining disability beyond the expected recovery time (Sullivan & Stanish 2003). A focus on psychological effects, on adjustment and on enhancement of positive or adaptive coping strategies allows a wider range of therapeutic targets than simply pain itself, and a shift from the concept of cure to optimal adjustment not only offers a much more honest and realistic outcome for many patients with established pain problems, but also introduces the notion that certain aspects of pain-associated dysfunction might be preventable. Most psychosocial interventions are based on the principles of cognitive-behavioural therapy (CBT) - the outcomes of which are predicted on planned and systematic change, and the role of the patient's understanding and active engagement is paramount.

4.9.1 Cognitive-behavioural therapy

Behavioural therapy was developed as an effective treatment initially for specific psychiatric disorders, such as phobias and obsessive-compulsive disorders, but gradually other anxiety-related problems were targeted. A key ingredient of the approach was a careful analysis of the circumstances in which the behaviour was occurring (Holmes 2002). The 'behavioural perspective' was not confined simply to traditional psychosomatic disorders, but was shown to be of relevance in the understanding and management of all sorts of disease. This early behaviourist perspective was later integrated with cognitive perspectives, such as those of Beck (Beck 1976) into cognitive-behavioural therapy (CBT), which has become the dominant paradigm within psychologically oriented pain management programs (Turk & Kearns 1983). The development of the cognitive-behavioural perspective heralded an entirely new approach to prevention, represented by a shift from a primary focus on the prevention of pain per se to a new focus on adjustment and prevention of unnecessary pain-associated disability.

In one of the first randomised controlled trials (RCTs) of the behavioural approach to pain management, Fordyce et al (Fordyce et al. 1986) demonstrated the superiority of behavioural management to traditional medical management for acute LBP. Clinical researchers further demonstrated the powerful influence of psychological factors not only on the development of disease, but also on response to treatment and adjustment to disease-associated incapacity. This approach has since had a profound impact on the management of pain (Pilowsky & Katsikitis 1994), and importantly, an individual's attitude towards their pain and its treatment has been increasingly recognised in rehabilitation efforts.

4.9.2 Psychosocial risk factors ('flags')

Although there has been a move towards acknowledging the influence of psychosocial risk factors on recovery from MSDs, much is still unknown. This is partly because the process by which MSDs develop from the acute to the chronic stage is incompletely understood. In addition, the growing literature documenting the influence of work on recovery from MSDs suggests that, along with individual beliefs and clinical characteristics, recognition of the psychosocial influences that arise as a consequence of being a worker is required. These occupational psychosocial risk factors have been termed 'blue flags' (Burton & Main 2000) and are related specifically to the work environment, e.g. job dissatisfaction, perceptions of low social support and low control over work. However, the detrimental effects of occupational psychosocial risk factors are not as widely documented as those resulting from clinical psychosocial risk factors. The present study will attempt to explore the relationship between occupational psychosocial risk factors and MSDs further.

In order to allocate resources to those most in need and who would most likely benefit from treatment, it has been suggested that identification of individuals at risk of developing long-term problems is needed (Linton & Hallden 1998). To date, clinical guidance for addressing psychosocial risk factors comes from the Accident Rehabilitation and Compensation Insurance Corporation of New Zealand (Kendall, Linton, & Main 1997), where the concept of 'Red Flags' (Royal College of General Practitioners 1996) as signs of serious disease was applied to the identification 'Yellow Flags'. Yellow flags are detrimental psychosocial factors that are consistently related with poor outcome, such as the presence of a belief that back pain is harmful or potentially severely disabling, fear-avoidance behaviour (avoiding a movement or activity due to misplaced anticipation of pain), reduced activity levels, a tendency to low mood and withdrawal from social interaction, and an expectation that passive treatments rather than active participation will help solve the problem (Sanders 1995), (Sanders 1996). The development of the concept of yellow flags represented a significant advance to integrating cognitive and behavioural approaches into the early management of musculoskeletal pain (Kendall 1999).

4.10 Occupational case management

Evidence presented thus far suggests that it is vital to recognize that worker's perceptions and beliefs about their MSDs are important to the successful prevention of disability. However, this view is likely to imply that the responsibility to recover lies solely with the worker, and it has been pointed out that employers need to assume greater responsibility, control and accountability for reducing this problem (Shrey 2000). Identification of the increasing costs of pain-associated disability means that there has been a shift from community-based services to worksite-based disability management. It has been shown that improved working conditions are as important as medical treatment and rehabilitation (Ekberg & Wildhagen 1996), and more important than personality and other individual characteristics (Ekberg et al. 1994), but little scientific knowledge has been accrued on the role of the employer in recovery from MSDs.

An evidence review of the Occupational Health Guidelines suggests that, "high job satisfaction and good industrial relations are the most important organizational characteristics associated with low disability and sickness absence rates attributed to LBP" (Waddell & Burton 2000). In support, a study by Nordqvist et al (Nordqvist, Holmqvist, & Alexanderson 2003) found that workers who had experience of long-term sickness absence due to MSDs spontaneously emphasized the importance of the employer, and specifically stressed the need for a structured back-to-work program at the workplace which should include: contacting absent workers; informing fellow workers of possible work modifications upon return of the absent worker and that work supervisors should promote a "positive emotional atmosphere".

It has been proposed that successful disability management programs in industry require employer involvement from first complaint to successful return-to-work, with the assumption that a failure to return injured workers to work in a timely fashion weakens the psychological bond between workers and the work environment (Shrey 1996). Thus, a collaborative case-management approach, which incorporates the enhancement of resilience and optimisation of the individual's functioning and well-being within the workplace would likely be successful in preventing a delayed return-to-work.

4.11 Summary

Developing healthy organizational cultures in which people "experience greater personal control in how they do their work, are rewarded for developing supportive rather than competitive relationships, are equipped with the skills to communicate effectively and manage differences among employees with high levels of trust and mutual respect" are proposed to be necessary in order to promote optimum worker health and well-being (Peterson & Travis 2001). Thus, successful management of MSDs in workers is likely to require a recognition of psychosocial influences that arise as a consequence of being a worker, along with those which comprise individual experiences and beliefs.

HYPOTHESES

Based on the review of the literature, several hypotheses were proposed. In order to test these hypotheses, a workforce survey was undertaken followed by a controlled trial of an experimental intervention. The hypotheses are listed below, and linked back to the literature review.

WORKFORCE SURVEY

Main Hypothesis

Occupational, as well as clinical, psychosocial risk factors (blue and yellow flags respectively) are significantly associated with previous reports of MSDs, and previous absence due to MSDs across a workforce. *(see page 13-14 for a description of flags, and also Chapter 3 for a review of the evidence to date on the association between psychosocial risk factors and MSDs).*

Sub-hypotheses

1. The extent of the risk posed by blue flags, will be similar to that found for yellow flags.
2. Yellow and blue flags will be predictive of the occurrence of, and longer durations of subsequent absence due to MSDs.

EXPERIMENTAL INTERVENTION

Main Hypotheses

1. The occupational case management of MSDs with an early, psychosocial intervention, along with the availability of modified work, will significantly reduce return-to-work times, compared with usual management (controls)*(see Chapter 4 for a review of the evidence to date on the occupational management of MSDs).*

2. The occupational case management of workers presenting with MSDs with a psychosocial intervention, along with the availability of modified work will significantly improve work retention, compared with usual management (controls).

Sub-hypothesis

Detrimental psychosocial scores at presentation will be risk factors for the occurrence of, and longer durations of subsequent absence due to MSDs

WORKFORCE SURVEY

i. Experimental Design

The specific objective of the workforce survey was to identify clinical and occupational psychosocial factors among a range of industrial workers, and to explore the relationships that such factors have with MSDs (LBP and ULDs). Therefore, a booklet of questionnaires was designed to collect psychosocial data, and also self-reported experience of MSDs. Company recorded sickness absence data was also collected. GlaxoSmithKline (GSK) (formerly SmithKline Beecham) is a multi-task, multi-site company, comprising 8,536 employees in the UK. At the time of the design of the workforce survey (2000), GSK was considered to be a stable, experimental environment

ii. Ethics

The government regulations for Health and Safety Executive-proposed surveys require ethical approval of the study design and methodology. Ethical approval was sought and obtained from the Health and Safety Executive Ethics Committee for the workforce survey (ref no. 3970/R55.084), and the workforce survey commenced in April 2000.

iii. Data collection

All permanent workers of GSK were targeted for the survey (n=7,838), excluding temporary and contract workers (n=698). The decision to use only permanent employees was based on two factors:

1. Permanent employees were entitled to a full sickness pay package, whereas temporary workers were not. It was recognised that financial restriction may be an influencing factor on the decision to take absence, resulting in a confounding variable. This has been supported in previous studies (Latza et al. 2000), (Main & Burton 2000).
2. Permanent staff were more likely to be available for prospective analyses.

Company recorded absence due to MSDs was collected in collaboration with a database co-ordinator at GSK. Company recorded absence data were preferred over self-reports of absence because they were deemed more reliable, and more information on the nature of the absence was available, e.g., actual dates of absence, working days lost and whether the absences were due to LBP or ULDs.

GSK categorises reasons for absence using the ICD-9 system, which was (at the time) the latest version of the International Classification of Diseases, published by the American Medical Association (AMA 1997). The ICD-9 category for musculoskeletal disease is comprised of the following conditions:

- Arthropathies and related disorders, e.g. diffuse diseases of connective tissue, infectious arthropathies, rheumatoid arthritis, oestoarthrosis and osteoarthritis, joint derangement
- Dorsopathies, e.g. ankylosing spondilitis, spondylosis, intervertebral disc disorders and other cervical and back disorders
- Rheumatism, e.g. polymyalgia rheumatica, disorder of synovium, tendon, bursa, muscle, ligament and fasia
- Oestopathies, chondropathies and acquired musculoskeletal deformities, e.g. bone infections, osteitis deformans, osteochondropathies, flat foot, acquired deformities of toe, acquired deformities of limbs

From these classifications, the database co-ordinator at GSK categorised absences due to MSDs into either LBP or ULDs, excluding other MSDs.

iv. Data analysis

Results from the workforce survey were analysed in two phases - *retrospectively* and *prospectively*. In the retrospective phase, cross-sectional relationships were explored between clinical and occupational psychosocial factors, self-reported MSDs in the previous 12 months, and absence due to MSDs in the previous 12 months. The workforce survey data also offered the opportunity to explore the influence that psychosocial factors have on future absence. To facilitate this prospective investigation, company sickness absence data were tracked over the ensuing 15 months, and absence due to MSDs was extracted and mapped onto the baseline workforce survey data using the employee ID number. Absence data were collected for number of spells of future absence, and number of working days lost due to MSDs.

iv.i Retrospective analyses

Cross-sectional relationships were explored using univariate techniques such as the t-test, the chi-squared test and the calculation of odds-ratios.

iv.ii Prospective analyses

Prospective relationships were also explored using univariate methods such as the t-test, Mann-Whitney U test, the chi-squared test and the calculation of odds-ratios.

METHODS 1

Procedure

5.1 Questionnaires

In order to collect data on both clinical and occupational psychosocial factors, and self-reported experience of MSDs, several questionnaires were reviewed, and 10 questionnaires were chosen. Out of the 10 questionnaires included in the booklet, 8 had been previously validated and used on industrial samples, and 2 were adaptations of previously used questionnaires. Workers who had and had not experienced MSDs could answer all the questionnaires chosen. A full description of the 10 questionnaires is provided in the following sections, and a copy of the questionnaire booklet can be found in Appendix 1a.

5.1.1 The General Health Questionnaire

The General Health Questionnaire (GHQ) is a widely used instrument spanning a range of items indicative of psychological distress (Goldberg & Williams 1988), and was used in the present survey because distress has been shown to be associated with MSDs (Croft et al. 1995); (Jorgensen, Fink, & Olesen 2000). There are several versions of the GHQ - but the version used in the present survey was the GHQ-12, being the shortest version available. It is a 'balanced' version, with half the items indicating health and the other half illness. The GHQ can be used to either obtain a dimensional measure of psychological distress, or to express the probability that a respondent might be found to be a 'case' of psychiatric illness at second stage interview. In the present survey, the GHQ was used to indicate psychological distress only. The score was gained using the recommended method of Likert scale 0-3, indicating increasing levels of distress. The score ranges between 0-36, and a higher score indicates a higher level of distress. *(The scoring system for GHQ can be found in Appendix 1a).*

5.1.2 The Psychosocial Aspects of Work questionnaire

The Psychosocial Aspects of Work questionnaire (PAW) was designed for measuring three psychosocial aspects of the work situation - job satisfaction, social support and mental stress. The association between these three factors and MSDs is widely acknowledged (Daltroy et al. 1993;Linton & Warg 1993;Papageorgiou et al. 1997;Unden 1996). PAW has been validated (Symonds et al. 1996) and has been previously used in industrial studies (Burton et al. 1996), (Burton et al. 1997). The questionnaire consists of 15 statements - the sub-scale *Job Satisfaction* (PAWJS) has seven statements (e.g. "I enjoy my work"), whilst the *Mental Stress* (PAWMS) subscale (e.g. "My job causes me to worry") and *Social Support* (PAWSS) subscale (e.g. "I like most of my fellow workers") have four statements each.

The questionnaire uses a five-point Likert scale ranging from 1=strongly disagree to 5=strongly agree for each statement. The score ranges between 7-35 for the job satisfaction subscale, and 4-20 for both the social support and mental stress subscales. A higher score on each subscale would indicate that the respondent is more satisfied at work, feels to have more social support from colleagues and perceives higher levels of mental stress at work. *(The scoring system for PAW can be found in Appendix 1a).*

5.1.3 The Nordic Musculoskeletal Questionnaire

The Nordic Musculoskeletal Questionnaire (NMQ) is a widely used instrument which measures various prevalence rates of self-reported MSDs in several anatomical sites (Kuorinka et al. 1987). It has been recognised by the Health and Safety Executive that the NMQ is suitable for application in a wide diversity of workplaces and can readily accommodate very large numbers (Dickinson et al. 1992). Because the current study was concerned only with MSDs of the low back and upper limbs, the NMQ was shortened to comprise seven body areas of specific concern. MSDs in these body areas were self-reported for the last 12 months and 7 days, where respondents were asked to answer yes or no to all questions.

5.1.4 Additional self-report items

There is evidence to suggest that when surveys of MSDs use only a few categories of prevalence, the results can be subject to incorrect symptom recall or non-response bias (Papageorgiou et al. 1995). Therefore, because the NMQ does not include questions concerning lifetime prevalence of LBP, an item was added to this section that asked whether the respondent had ever experienced LBP.

Another four-part self-report item was also added in order to gain a profile of the care-seeking behaviour of the respondent. Respondents were asked to indicate whether they had received treatment from a GP, Occupational Health Advisor, Osteopath/Physiotherapist/Chiropractor, etc, or hospital specialist for their MSD. The response to this item would not be used for anything other than descriptive purposes.

5.1.5 The Back Beliefs Questionnaire

The Back Beliefs Questionnaire (BBQ) was originally developed to measure beliefs about the consequences of LBP irrespective of whether an individual had previously experienced LBP. The original authors described two subscales: (a) the inevitability of future life with LBP (e.g. "Back trouble means long periods of time off work"), and (b) treatments for LBP (e.g. "Doctors cannot do anything for back trouble"). This instrument has been widely used in occupational and clinical studies, where it has been demonstrated to be sensitive to change, and it has shown that negative inevitability beliefs regarding the course and consequences of LBP have a detrimental effect on outcomes (Symonds et al. 1996),(Burton et al. 1996), (Burton et al. 1997).

Although the treatment subscale was not shown to be a reliable subscale by the original authors, it was retained in the current study for consistency purposes, but in all analyses only the inevitability subscale was used. The measurement of inevitability beliefs uses a standard five-point Likert scale ranging from 1=strongly disagree to 5=strongly agree. The score ranges from 9-45, and a lower score would indicate stronger negative beliefs about the inevitable consequences of LBP. *(The scoring system for BBQ can be found in Appendix 1a).*

5.1.6 Attribution questionnaire

An attribution questionnaire was developed by (Linton & Warg 1993) in order to investigate possible differences between management and workers in attribution about the cause and prevention of LBP. The rationale behind the development of this questionnaire came from attribution theory (Jones et al. 1972), which is mainly concerned with the ways in which people interpret the causes of certain events. This theory states that such causal attributions play an instrumental role in determining reactions to these events. Thus, Linton & Warg hypothesised that attributions may play a central role in understanding people's beliefs about LBP, and consequently that these attributions would have an effect on recovery. Further, they also hypothesised that management would be more likely to attribute causation of LBP to the individual, and shop-floor workers would attribute causation to work. This concept was of interest to the current study as previous research has indicated that most workers attribute the cause of their pain to work (Jones et al. 1998).

Following an extensive literature search, the attribution questionnaire discussed here was the only one specifically related to workplace LBP.

However, the original questionnaire was used to measure the difference of opinion about the causation and prevention of back pain between management and shop-floor workers, and because the current study was interested in focussing on the causal attributions made by *all* workers, only the 20 items that investigated beliefs about causation of LBP, and not its prevention, were used. Also excluded from the original questionnaire was the item that asked respondents to rate how much they attributed a "lack of interest from unions" as a cause of LBP, as this was considered too politically sensitive. This section was made up of two subscales - attributions of cause relating to work (ATTRIBW) and attributions of cause relating to the individual (ATTRIBI).

The scoring system in the original instrument used a 10-point Likert scale where respondents rated attributions ranging from 1=never a cause to 10=always a cause. The scale was changed into a 5-point scale in order to maintain similarity with the other instruments in the workforce survey. The score ranges from 12-60 on the ATTRIBW subscale, and 8-40 on the ATTRIBI subscale, and a higher score on either subscale would indicate the strength of the causal attributions. *(The scoring system for ATTRIB can be found in Appendix 1a, and a full description of the validation procedures for the attribution questionnaire is provided in Methods 2)*.

5.1.7 Rating of Perceived Exertion Scale

The Rating of Perceived Exertion (RPE) scale was developed to enable reliable and valid estimations of perceived exertion (Borg 1970). The RPE scale was constructed based on the assumption that physiological strain grows linearly with exercise intensity, but that perception does not necessarily follow the same linear increase. The scale was used in the current study because there is evidence to show that individuals who have experienced MSDs perceive that their work is more strenuous than those who have not, even when job types are matched (Hultman, Nordin, & Saraste 1995). This increase in perceived exertion has been associated with detrimental behaviours such as fear-avoidance, or guarded movements, which in turn have been associated with delayed recovery from MSDs (Waddell et al. 1993).

The RPE is a ratio scale that allows the use of verbal anchors to permit level determinations, and has been used in previous industrial studies of MSDs (Elders & Burdorf 2001), (Kerr et al. 2001). The instrument consists of 16 'ratings', ranging from 6=no exertion at all, to 20=maximal exertion, and a higher score indicates higher levels of perceived exertion.

5.1.8 The Upper Limb Disorders Questionnaire

In addition to LBP, the association that psychosocial factors had with upper limb disorders (ULDs) was also explored in the present study. Therefore, it was deemed necessary to include a questionnaire in the workforce survey that addressed beliefs about ULDs, but following an extensive literature search, it was concluded that such an instrument was not available. In order to include an appropriate questionnaire, the items comprising the Back Beliefs Questionnaire (BBQ) were modified in order to relate to ULDs, and presented as a separate questionnaire. For example, instead of referring to LBP (i.e. "Back trouble means long periods of time off work") the items in ULDQ would refer to ULDs (i.e. "ULDs will eventually stop you from working"). All 14 statements from BBQ were modified to form ULDQ, and the same 5-point Likert scale from BBQ was used (see Section 5.1.5). In order to avoid recall bias from BBQ, an extra inevitability statement was added to ULDQ ("ULDs mean you will never be able to use your arm properly"), making the score range 10-50 (compared with 9-45 for BBQ). A lower score indicates stronger negative beliefs about the inevitable consequences of ULDs. (*The scoring system for ULDQ can be found in Appendix 1a, and a full description of the validation procedures for the questionnaire is provided in Methods 2*).

5.1.9 The Pressure Management Indicator

The Pressure Management Indicator (PMI) is a 120-item self-report questionnaire developed from the Occupational Stress Indicator (OSI) (Cooper, Sloan, & Williams 1988), and was designed to measure occupational stress (Williams & Cooper 1998). Stress at work has become an increasingly common feature of working life, and has been linked with non-recovery from MSDs (Svensson & Andersson 1989). The PMI is primarily a management tool that has been distributed extensively by Resource Systems, Harrogate, UK. The sections from the PMI that were used in the current study were those that measured (1) job satisfaction, (2) control and personal influence at work, and (3) sources of pressure at work.

(1) The PMI job satisfaction questionnaire was chosen in addition to the PAW job satisfaction subscale (see Section 1.1.2) in acknowledgement of criticism that job satisfaction, as a concept, has been left largely undefined (Rick & Briner 2000). Thus, it was recognised that the job satisfaction subscale of the PAW questionnaire may not fully capture the dimension. Following analysis of the pilot study data, the most appropriate job satisfaction questionnaire would be chosen for inclusion in the main workforce survey. The PMI job satisfaction questionnaire comprises 2 subscales - job satisfaction (e.g. "the degree to which you feel extended in your job") and organisational satisfaction (e.g. "the way changes and innovations are implemented"). Respondents are asked to rate each statement, ranging from 1='very much dissatisfaction' to 6='very much satisfaction'. Scores range from 6-36 for each of the subscales, with a higher score indicating higher levels of job and organisational satisfaction.
(2) The PMI control and personal influence at work questionnaire was chosen in recognition of Karasek's theory of perceived control and demand at work (Karasek 1979). This theory has been shown to have consequences for worker health, and in particular, research findings have

shown that the content of work and the perception of autonomy over work have detrimental outcomes concerning MSDs (Mackay et al. 1998). The PMI control and personal influence at work comprises 2 subscales making a total of 8 statements. The subscale measuring control (PMICONTR) comprises 5 statements (e.g. "I have little influence over what happens to me at work") and the subscale measuring personal influence (PMIINFL) comprises 3 statements (e.g. "I think that my job gives me a lot of influence"). The responses are rated using a six-point Likert scale, ranging from 1=very strongly disagree to 6=very strongly agree, and the scores for each sub-scale are summed. The scores range from 5-30 and 3-18 on the PMICONTR and PMIINFL subscales respectively, and a higher score on each of the subscales indicates that the individual perceives they have high control and personal influence at work. *(The scoring system for the PMI control and personal influence at work can be found in Appendix 1a).*

(3) The PMI sources of pressure questionnaire is comprised of 8 subscales: Relationships at Work (e.g. "feeling isolated"); Home/Work Balance (e.g. "absence of emotional support from others outside work"); Organisational Climate (e.g. "factors not under your direct control"); Workload (e.g. "taking my work home"); Recognition (e.g. "unclear promotion prospects"); Personal Responsibility (e.g. "making important decisions"); Managerial Role (e.g. "managing or supervising the work of other people"); and Daily Hassles (e.g. "attending meetings"), making a

total of 40 items. Sources of pressure at work have been found to be important psychosocial influences on work-related MSDs (Kuorinka & Forcier 1995).

The PMI sources of pressure questionnaire measures responses using a 6-point Likert scale, ranging from 1=very definitely not a source to 6=very definitely is a source. Scores range from 8-48 on the Relationships subscale; 6-36 on the Home/Work Balance subscale; 4-24 on the Organisational Climate subscale; 6-36 on the Workload subscale; 4-24 on the Recognition subscale; 4-24 on the Personal Responsibility subscale; 4-24 on the Managerial Role subscale; and 4-24 on the Daily Hassles subscale. A higher score on each of the subscales would indicate a higher perceived source of pressure. *(The scoring system for the PMI sources of pressure questionnaire can be found in Appendix 1a).*

5.2 Questionnaire booklet presentation

The questionnaires were compiled in the form of a booklet, which was constructed using Teleform©, Cardiff Software, Inc., San Marcos, CA. Teleform© is a software application that consists of three main components which enable the user to create forms for collecting data, read the data using a scanner, and interpret the data using a verifier. Teleform© can then automatically export the data to a specified database for use by other software applications, e.g. Microsoft Excel. Teleform© is ideal for collecting data from many locations quickly and inexpensively.

5.2.1 *Booklet design using Teleform©*

In order to create the questionnaire booklet, each questionnaire was manually transferred onto Teleform© using the same wording as the originals. Written instructions were placed on the front of the booklet that asked respondents to enter their name and ID number, and then for every other response, to shade a circle that corresponded to their choice. For example, items on the GHQ have responses ranging from 0 to 3 on a Likert scale. Therefore, the respondent would shade the circle that corresponds to the number on the Likert scale that they chose, and this would be then interpreted by the 'verifier' component of Teleform© as a number, from 0 to 3. It was important to include instructions on how to complete the form alongside each questionnaire in the booklet, because the 'reader' component of Teleform© would only recognise circles that have been shaded, and not ticked or crossed.

The verifier was programmed to recognise numbers and letters, and was set to an optimal character recognition level whereby confidence is given to the programme to make the correct choice, rather than refer it to the user for manual correction. Because there were large numbers of questionnaires to process, this option was useful, but in order to check the accuracy of certain confidence level settings, five dummy forms were completed by members of the research team, and then processed by Teleform©. The accuracy of Teleform© was found to be 100% at the 80%

level of optimal character recognition, and therefore this level was used. Additionally, the optimal mark recognition level for the responses was set at 25% (the lowest level), in order that the verifier would accept circles that had only been part- or lightly shaded.

A shortened name of the questionnaire (e.g. GHQ) followed by the number of the item as it appeared in the questionnaire booklet was assigned to each item (see Appendix 1a). This would then be the variable name on the spreadsheet once the data had been automatically exported. The data would be automatically exported to Microsoft Excel files, each labelled with the corresponding GSK site name. Microsoft Excel was chosen because this format could be easily transferred to the Statistical Package for Social Sciences (SPSS) program for more complex analyses.

Finally, Health and Safety Executive and company logos, along with a short description of the study were assigned to the front cover of the booklet. This information was included in order to convey to the respondents that this was an external, government project, in collaboration with their employer, and that their participation was extremely important.

5.3 Pilot study procedure

The booklet of questionnaires was piloted on a clinical laboratories site of GSK (Quest Diagnostics), which consisted of 160 workers. The type of work carried out on this site is mainly based on research and clinical trials, but there is also automated and distribution work. Questionnaires would not then be distributed to this site in the main workforce survey.

A questionnaire booklet was sent to the Occupational Health Advisor (OHA) on the pilot site, who then reproduced and distributed it. The OHA also compiled a covering letter explaining the study and gave details of how and when to return the questionnaires. Completed questionnaires were returned to the occupational health department in a supplied re-sealable envelope, and the sealed questionnaires were then sent to the research unit. Questionnaire data were processed using Teleform©, and following any manual corrections, the data were then exported to the site spreadsheet.

The initial response rate to the pilot study was 41% (n=66). A follow-up letter and another questionnaire was sent to workers who did not respond to the questionnaire, and this yielded a further 14 responses, making a total response rate of 50% (n=80). In order to gain feedback about reasons for non-response, the OHA chose a random group of non-respondents (n=25) and asked them for their reasons for non-response. The most common reason given was that the questionnaire was 'too long', and therefore took up too much of their time. Another reason was that the questionnaire was felt to be 'irrelevant' to those workers who had not experienced MSDs.

5.3.1 Changes to questionnaire booklet

Following the pilot study, it was decided that the PMI job satisfaction questionnaire would be discarded, and the job satisfaction subscale from PAW would be used for the main survey. Additionally, it was decided that the PMI sources of pressure questionnaire would be shortened to measure just three workplace factors - Relationships at Work (PMIREL), Home/Work Balance (PMIHOME), and Organisational Climate (PMIORG). These changes were made in order to reduce the length of the questionnaire, and to still accurately reflect the most recent evidence of important occupational psychosocial factors associated with MSDs.

Mean scores on the psychosocial instruments were found to be comparable with those of previous studies, and it was therefore concluded from the pilot study that the questionnaires were being completed appropriately. The final questionnaire booklet comprised 108 items over 9 pages. Following the feedback from the non-respondents in the pilot study, it was decided that one way to maximise the response rate would be to involve a 'trusted neutral' on-site individual - the OHA. Therefore, the OHA would place their signature on the covering letter that accompanied the questionnaire booklet, and would collect the booklets. The covering letter stated that OHAs would also offer to answer any queries personally regarding the study or completion of the questionnaire

booklet. A prize draw would also be offered to all workers who completed their questionnaire by the return date specified (4 weeks time).
(*A copy of the covering letter can be found in Appendix 1b*)

In order to reduce the non-response bias found in the pilot study, a paragraph on the front of the booklet, and in the covering letter that accompanied the questionnaire, emphasised that opinions of those who had *not* experienced MSDs were equally important as those who had. Arrangements were made to reproduce the questionnaire booklets to a professional standard, which included a title - *Working Backs*.

5.4 Survey preparation

A series of preparatory meetings were conducted over a 2-day period with the OHAs from each site to be targeted for the workforce survey. The aim of these meetings was to explain the study, to fully inform the OHAs of their involvement in the workforce survey, and to answer any queries from the OHAs. Table 5.1 documents the sites targeted in the workforce survey, and the number of permanent staff on each of these sites who would receive a questionnaire booklet.

Table 5.1: GlaxoSmithKline sites targeted in the workforce survey, and the number of permanent staff on each site

Site	No. of permanent staff
Coleford	446
Crawley	486
Frythe	361
Irvine	706
Maidenhead	331
Mundells	597
Harlow	1773
New Horizons Court	580
SB House	1021
Slough	244
Tonbridge	132
Weybridge	212
Worthing	949
Total	***7,838***

5.5 Survey distribution

A questionnaire booklet was produced for each of the sites in Table 5.1. The booklets were identical in content except for a unique ID assigned by Teleform© that corresponded to each different site. This meant that if the questionnaires became mixed up during return, they could be scanned in any order and the data would only be placed on the correct spreadsheet for that particular site. A blank form for each site was then sent to an in-house reproduction company for the required number of copies.

The names, departments and employee numbers for all permanent employees on each site were provided by the central Human Resources department of GSK. The questionnaire, along with a covering letter, was placed in a resealable envelope that was printed with instructions for return on the outside. The sealed questionnaires were then couriered to each site for distribution by the OHA. Questionnaires were completed, resealed and returned to the OHA, who in turn returned all sealed questionnaires to the research unit.

5.6 Handling of returned questionnaires

All the questionnaires were opened, scanned and any uncertainties were verified and corrected manually by the candidate only. In order to check that Teleform© was interpreting the data correctly, a random sample of questionnaires were manually checked, and data input by Teleform© was found to be correct.

METHODS 2

Questionnaire development and validation

The attribution questionnaire

The upper limb disorders questionnaire

6.1 The attribution questionnaire

The 'attribution' questionnaire was originally developed in an attempt to investigate the differences between management and shop-floor workers about the causes and prevention of industrial LBP (Linton & Warg 1993). The questionnaire used in the present study consisted of two subscales - ATTRIBW and ATTRIBI. ATTRIBW related to the attribution of workplace factors (i.e. heavy lifts at work) as the cause of LBP, and ATTRIBI related to the attribution of individual factors (i.e. poor physical condition) as the causes of LBP (*see Methods 1, section 5.1.6 for full description of questionnaire*).

6.2 Use of attribution questionnaire in present study

The questionnaire was used in the present study to gain information on workers' attributions about the causes LBP at work, and responses from those workers who had experienced LBP in the previous 12 months would be compared with those from workers who had not. This exploration was based upon findings from a large study of self-reported LBP, whereby 80% of workers attributed the cause of their LBP to workplace factors (Jones et al. 1998). Following an extensive search of the literature, the attribution questionnaire by Linton & Warg emerged as the only instrument designed to measure such specific attributions. However, because the questionnaire would not be used to explore the original design hypotheses, an analysis of the questionnaire in terms of its psychometric properties was appropriate. Validity tests on the original attribution questionnaire were performed using data from the workforce survey, and as a result of these tests, a new attribution questionnaire was formed.

6.3 Initial exploration of attribution questionnaire

Mean scores and standard deviations (SD) for the two subscales of the attribution questionnaire (ATTRIBW and ATTRIBI) were compared between respondents who had (n=2958) and had not (n=1639) reported LBP in the previous 12 months. LBP was categorised by comprising the lower back, upper back and hips/thighs/buttocks sections from the NMQ (Mackay et al. 1998). Differences in score between these two groups were found to be statistically significant, both on the ATTRIBW subscale ($P<.05$) and the ATTRIBI subscale ($P<.001$) - see Table 6.1

Table 6.1: Mean scores and standard deviations (SD) on the attribution questionnaire for workers who did and did not report LBP in the last 12 months.

Subscale	Mean score LBP 12m yes	Mean score LBP 12m no
ATTRIBW	34.79 (6.47)	35.38 (5.89)
ATTRIBI	29.20 (4.90)	29.87 (4.30)

The results displayed in Table 6.1 indicated that those workers who *had not* reported LBP in the last 12 months had significantly stronger causal attributions on both subscales, compared to those who had reported LBP in the last 12 months. This result did not support the previous findings of Jones et al (Jones et al. 1998), who found that 80% of workers reporting LBP attributed the cause to workplace factors. However, the actual differences between the mean scores of each group are relatively small, and the large sample may have led to an over-emphasis of the strength of the effect. Alternatively, small differences in score may also suggest that the original subscales of the attribution questionnaire may not be suitable for exploring the aims of the current study. Therefore, further investigations of the instrument's validity were warranted.

6.4 Validity testing of attribution questionnaire

The construct validity of the original attribution questionnaire was analysed using Principal Components Analysis (PCA). Construct validity is a measure of how well the theoretical constructs of the questionnaire are supported.

6.4.1 Principal Components Analysis

Principal Components Analysis (PCA) investigates correlations between questionnaire items, and subscales (or constructs) are then eventually derived based on their correlation strength. These subscales initially appear as components (or factors) in the output of a PCA, and are a summary of the variation in scores for each questionnaire item. Components are selected during analysis on the basis of the magnitude of their eigenvalues (*calculation of latent roots of the covariance or correlation matrix*). In the present analysis, the criterion was set to exclude a component if its eigenvalue was below 1 - this being no better than a single questionnaire item as a component. Single questionnaire items are not deemed adequate enough to represent a distinct construct (Armitage & Berry 1998).

Across the components selected by PCA, high loadings (coefficients) may occur on more than one item, meaning that the item could be included in multiple components (and eventually, subscales). Varimax rotation was used in the present analysis to rotate the set of components until the component loading for a variable was higher on one or the other of the components. A lower limit of <.03 was set for a component loading, in order that anything below this would not be retained as its contribution could be ascribed to chance alone.

PCA was performed on the original attribution using the data gained from the workforce survey, and four components were extracted explaining a total of 54% of the variance. The original questionnaire items were randomly distributed across these components, and did not form the two distinct subscales as described by Linton & Warg (ATTRIBW and ATTRIBI). Further, the third and fourth components explained only 7% and 6% of the variance respectively, and a few items appeared in more than one of the components. This suggested that the respondents might have perceived the items as ambiguous. Therefore, these items were removed from the analysis, and PCA eventually extracted three components, explaining 58% of the variance (see Appendix 2a)

For the development of a new attribution questionnaire, the interpretation of any of the potential subscales extracted by PCA involved the consideration of the relative values of the loadings for that component with the intended use for the original questionnaire. This was useful for reducing the data into some meaningful characteristics, and eliminating unnecessary surplus. Thus, the interpretation of PCA is, to some extent subjective, and involves knowledge of the field of application. There is also no universally accepted method for choosing the number of components to include, although it is seldom worth including an extra component if that component cannot be given a meaningful interpretation (Armitage & Berry 1998).

The three components selected by PCA made conceptual sense and were classified as: attributions of psychosocial workplace factors (ATTPSYCH), attributions of physical workplace factors (ATTPHYS), and attributions of organisational factors (ATTORG) as the causes of LBP - see Table 6.2.

Table 6.2: Items included in the new subscales for the attribution questionnaire

Attributions to psychosocial workplace factors (att.psych)	**Attributions to physical workplace factors (att.phys)**	**Attributions to organisational factors (att.org)**
Long working hours	Poor work technique	Lack of information about how work is to be done
Rapid work pace	Safety and assistance devices not used	Lack of safety and assistance devices
Dissatisfaction with the work	Poor work posture	Lack of proper work organisation
Too few breaks	Heavy lifts at work	Lack of interest from company's management
Monotonous work		

A random split was then performed on the sample to check whether the same results would be produced on the two halves of the data. A PCA was performed on each half, and the results were replicated (see Appendix 2b).

6.5 Reliability of new attribution questionnaire

Reliability analysis of the new attribution questionnaire was measured using three procedures - Cronbach's 'alpha'; test-retest; and the intra-class correlation coefficient.

6.5.1 Cronbach's Alpha

Internal consistency of the new questionnaire was measured using Cronbach's 'alpha' (Cronbach 1951), and this entailed calculating an alpha score for each new subscale (performed using SPSS). The alpha scores for the three subscales were all 0.8, this being sufficiently high to ensure that the subscales were internally consistent (McKennell 1970) *(see Appendix 2a).*

6.5.2 Test-retest

Test-retest is an analysis whereby respondents are asked to complete the same questionnaire twice, usually with a time lapse of about two weeks. This was carried out for the new attribution questionnaire to check that it would yield consistent responses over time. It has been reported that two weeks in between repeating the questionnaire is the ideal time frame for a test-retest analysis, in order that attitudes will not have changed sufficiently and that enough time has lapsed so that participants would be unable to use memory recall to answer the questions (Armitage & Berry 1998).

Thus, in order to check that the new attribution questionnaire would be reliable for use in another industrial sample, it was necessary to perform a test-retest analysis using a similar workforce. A sample of workers from a local company, Sellers Engineering, Huddersfield (n=100), were asked to complete the new questionnaire, and this yielded a response of 54% (n=54). Following a two-week period, questionnaires were re-distributed at Sellers Engineering to the same individuals who had completed the previous one, yielding a response rate of 52% (n=28). The mean shift between these two sets of scores was calculated (shift being the difference in score between first completion of the attribution questionnaire and second completion for each individual), and it was found that the test and retest mean scores did not significantly change over this period (see Table 6.3). The small shifts in mean scores (less than 1 point) suggested that the new attribution subscales elicited consistent answers from respondents in a comparable industrial sample.

Table 6.3: Test and retest mean scores, mean shift scores and standard deviations (SD) for Sellers Engineering sample.

Subscale	Test mean score	Retest mean score	Mean shift
ATTPSYCH	11.92(3.78)	11.71 (3.39)	-0.21 (3.20)
ATTPHYS	15.37(3.61)	14.93 (3.47)	-0.44 (3.11)
ATTORG	9.88 (3.64)	10.08 (3.29)	0.20 (2.63)

Mean scores for the three new subscales were then calculated for the GSK sample (n=4605), and compared to those found for the Sellers Engineering sample at baseline (n=54). No significant differences in score were found between the two samples, indicating that the new attribution questionnaire would be reliable for use in industrial samples - see Table 6.4.

Table 6.4: Mean scores and standard deviations (SD) for new attribution subscales from the GSK and Sellers Engineering samples.

Subscale	GSK	Sellers Engineering
ATTPSYCH	13.64 (3.76)	11.65 (3.91)
ATTPHYS	15.87 (2.51)	15.15 (3.52)
ATTORG	12.43 (3.05)	9.55 (3.92)

6.5.3 Intra-class correlation coefficient

In order to check the consistency of the responses between the GSK and Sellers Engineering samples, an analysis was carried out using the intra-class correlation coefficient. The coefficients obtained for the three subscales of the new attribution questionnaire between the two samples were 0.75, 0.76 and 0.83 respectively (calculated using SPSS). A score above 0.75 is said to represent excellent reliability (Fleiss 1986), and thus it can be concluded that the new questionnaire is likely to yield similar results in different studies.

There have been some criticisms of using the intra-class correlation coefficient as a measure of reliability, notably by Bland & Altman (Bland & Altman 1986) who suggest that even data which seem to be in poor agreement can produce quite high correlations. However, their recommendations for using alternative reliability testing were based on findings from repeated measures tests (i.e. comparing scores within the *same* sample), and thus their criticisms were not relevant for the present analysis.

6.6 The Upper Limb Disorders Questionnaire

The Upper Limb Disorders Questionnaire (ULDQ) was developed in order to measure beliefs about the inevitable consequences of ULDs. ULDs pose the same concerns as LBP in terms of absence from work and disability, and although the ULD literature is less well developed than the LBP literature, an analogous set of themes emerges, lending further support to the influence of psychosocial factors on outcome (National Research Council & Institute of Medicine 2001). Following an extensive search of the literature, an instrument that measured beliefs about ULDs was not available. Therefore the Back Beliefs Questionnaire (BBQ) was modified in order to produce the Upper Limb Disorders Questionnaire (ULDQ) (*see Methods 1, section 5.1.8 for a full description of ULDQ*).

6.7 Validity testing of the Upper Limb Disorders Questionnaire

The Upper Limb Disorders Questionnaire (ULDQ) was devised using an instrument that has already undergone extensive validation, and has also been widely used in industrial studies (BBQ). Therefore, extensive validity testing was not required.

6.7.1 Principal Components Analysis

Principal Components Analysis was performed to analyse the component structure of ULDQ using the responses from the workforce survey at GSK (n=4554). Three components were formed, explaining 46% of the variability between the items. These three components did not map clearly onto the two conceptual ideas designed into the BBQ measure, i.e. inevitability beliefs and treatment beliefs, rather the components were a mix of statements from both sub-scales. This result was also found in the initial construct analysis of BBQ (Symonds 1995).

PCA was then set to select two components, but the items still did not form the subscales originally designed into the BBQ instrument. However, similar to BBQ's structure, when only the 10 inevitability statements were used in a PCA without any restrictions, all 10 statements were extracted into a one-component solution. The selected component accounted for 39% of the variance, with an eigenvalue of 3.9 (see Appendix 2c). This led to the decision to discard the treatment subscale in analysis procedures, but to include it in the questionnaire for consistency purposes.

6.7.2 Cronbach's Alpha

In order to test the inevitability beliefs subscale of ULDQ for internal consistency, Cronbach's Alpha was used. The alpha score was 0.8, this being sufficiently high to ensure that the sub-scale was internally consistent (McKennell 1970) *(see Appendix 2c).*

It was concluded that ULDQ was a reliable instrument for the measurement of beliefs about the inevitable consequences of ULDs.

RESULTS 1

Profile of workforce survey respondents

7.1 Total response rate

From the 7,838 booklets of questionnaires administered to the permanent workers of GSK, the initial response rate was 40.6% (n=3,180). Reminder letters were sent out along with another questionnaire booklet to all non-respondents (n=4,658), and this yielded a further 1,457 replies, making the total response rate 59.2% (n=4,637).

7.1.1 Site response rate

Each GSK site targeted in the survey had in excess of a 50% response rate, with the exception of two manufacturing sites (Maidenhead and Coleford) - see Table 7.1.

Table 7.1: GSK sites targeted in workforce survey, site type, number of employees on each site, number of respondents from each site, and the response rate at each site, expressed as a percentage of whole site.

Site name	Site type	Employees (n)	Respondents (n)	Response rate (%)
Worthing	Manufacturing	949	639	67.3%
Crawley	Manufacturing	486	263	54.1%
Maidenhead	Manufacturing	331	149	45.0%
Irvine	Manufacturing	706	441	62.5%
Coleford	Manufacturing	446	175	39.2%
Slough	Manufacturing	244	123	50.4%
Harlow	R & D	1773	1124	63.4%
SB House	Management	1021	624	61.1%
New Horizons Court	Management	580	328	56.6%
Mundells	Sales	597	362	60.6%
Weybridge	R & D	212	151	71.2%
Tonbridge	R & D	132	73	55.3%
The Frythe	R & D	361	185	51.2%
Average response rate		***(7838)***	***(4637)***	***59.2%***

7.2 Demographic representation

Summary demographic information for all employees at GSK was provided by a central human resources facility. This information included the proportions of males and females, and the proportions of manual and non-manual workers (*GSK classification*). Missing data for gender accounted for 1.2 % (n=54) of the respondents.

7.2.1 Gender and job-type

It was found that the proportions of gender and job-type for the workforce survey respondents were not significantly different from the actual proportions of gender and job-type found within GSK as a whole, suggesting that the respondent sample was representative of the GSK workforce in terms of gender and job-type -see Table 7.2. There were somewhat more males than females among the respondents and the whole workforce, but given the high number of non-manual workers it was not clear why this should be so.

Table 7.2: Numbers of respondents, and numbers of GSK workforce based on gender and job-type, expressed as a percentage of total number of respondents and total number of workers at GSK

	Survey respondents	%	GSK workforce	%
Male	2614	57%	4232	54%
Female	1969	43%	3606	46%
Manual	995	21.5%	2430	31%
Non-manual	3642	71.5%	5408	69%

7.2.2 Age

Data on the age of all GSK workers were not available, therefore a representative comparison with the age of the survey respondents could not be made. The average age of respondents was found to be 40 years, ranging from 19-65 years, with missing data accounting for 3.8% of the respondents (n=175).

The sample was then split at the mean age, and younger (19-40 years) and older (41-65 years) age group categories were constructed. It was found that the majority of the survey population came from the younger age group (n=2466). The age of the survey population was then explored in terms of gender and job-type distribution, and it was found that the younger age group consisted of mostly females (50.8%) and non-manual workers (83.6%), and that the older age group consisted of mostly males (67.5%) and non-manual workers (70.5%) - see Table 7.3.

Table 7.3: Proportions of gender and job type of respondents, expressed as a percentage of age categories

	Younger (n=2466)	**Older (n=1996)**
Males (n)	49.2% (1214)	67.5% (1347)
Females (n)	50.8% (1251)	32.5% (649)
Manual (n)	16.4% (405)	29.5% (588)
Non-manual (n)	83.6% (2061)	70.5% (1408)

7.3 Prevalence of self-reported MSDs

Self-report data for 12-month prevalence of MSDs were gained from the Nordic Musculoskeletal Questionnaire (NMQ). The data were categorised into LBP (by comprising the lower back, upper back and hips/thighs/buttocks sections from the NMQ), and ULDs (by comprising the neck, shoulders, elbows and wrists/hands sections of the NMQ) (Mackay et al. 1998). Lifetime LBP prevalence data were gained using a self-report question additional to the NMQ (*see Methods 1, section 5.1.4).*

Categories for self-reported LBP and ULDs in the previous 12 months were constructed by combining the 12-months and 7-days prevalence data, with the assumption being that those respondents who had reported LBP or ULDs in the previous 7 days should also have reported them for the previous 12 months. The data were checked and it was found that for those respondents who had answered 'yes' to any of the LBP categories for previous 7-day prevalence, only 0.5% (n=22) did not answer 'yes' to the same LBP categories for the previous 12-month prevalence. Similarly, for those respondents who had answered 'yes' to any of the ULD categories for the previous 7-day prevalence, only 0.5% (n=21) did not answer 'yes' to the same ULD categories for the previous 12-month prevalence. These proportions of missing data accounted for less than 1% of the sample, and therefore it was decided that combining the categories would not have any significant confounding effects on analyses.

Self-reported LBP lifetime prevalence was 59.2% (n=2744), with missing data accounting for 2.8% (n=128). It was found that 64.3% (n=2982) of respondents reported LBP in the previous 12 months, and that 66.8% (n=3099) of respondents reported a ULD in the previous 12 months. Although the percentage of respondents who reported ULDs in the previous 12 months was slightly higher than that of LBP, the percentage of respondents who reported an accompanying level of disability in the previous 12 months was higher for those reporting LBP at 40.7% (n=1214) compared with ULDs at 27.8% (n=861) - see Figure 7.1.

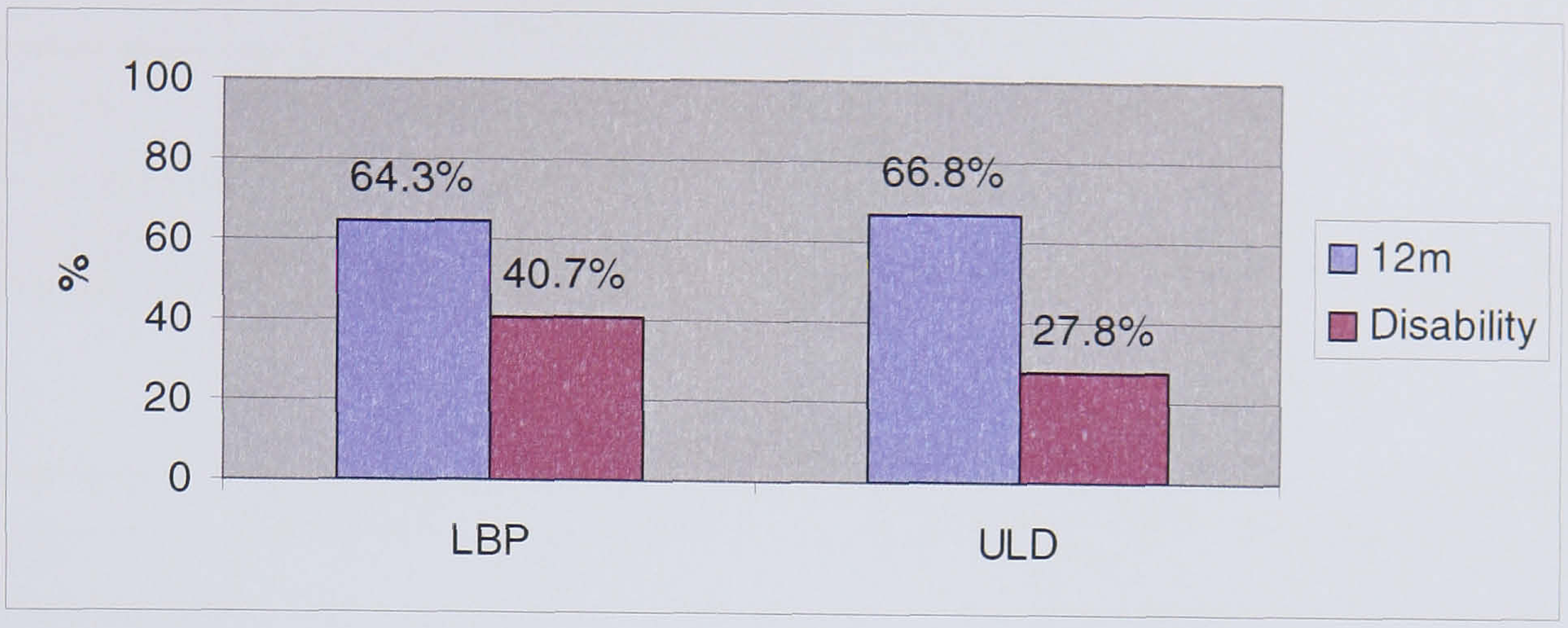

Figure 7.1: Percentage of survey respondents who reported LBP and ULDs in the past 12 months, along with those who reported associated disability

7.4 Patterns of mean psychosocial scores

For each psychosocial questionnaire, missing values were found to account for less than 3.5% of the total response rate. Therefore the data were deemed reliable for analysis without replacing missing values. The mean scores on the psychosocial instruments were shown to be similar to those reported by comparable studies (Tables 7.4.1-7.4.14), indicating that the questionnaires were being answered reliably by the respondents at GSK *(no comparable data were available for the attribution and upper limb disorders questionnaires)*. Each table below reports the mean score and standard deviation (SD) for the survey population, along with the mean score and standard deviation (SD) for comparable studies.

Table 7.4.1: Psychological Distress

Sample	Mean Score (SD)
GSK	11.4 (5.01)
HSE Supermarket Cashiers[3]	10.7 (4.60)
RUC Police[4]	11.0 (5.20)
Manchester Police[4]	10.7 (5.10)

[3]*(Mackay et al. 1998)*
[4]*(Burton et al. 1996)*

Table 7.4.2: Job Satisfaction

Sample	Mean Score (SD)
GSK	25.3 (6.14)
Fox's Biscuits[1]	23.9 (8.36)
KP Foods[1]	26.5 (7.81)

[1]Extracted from T.L. Symonds PhD thesis (1995)

Table 7.4.3: Social Support

Sample	Mean Score (SD)
GSK	15.1 (2.94)
Fox's Biscuits[1]	14.9 (3.65)
KP Foods[1]	15.5 (3.66)

[1]Extracted from T.L. Symonds PhD thesis (1995)

Table 7.4.4: Mental Stress

Sample	Mean Score (SD)
GSK	13.8 (3.16)
Fox's Biscuits[1]	12.3 (4.62)
KP Foods[1]	13.0 (4.66)

[1]Extracted from T.L. Symonds PhD thesis (1995)

Table 7.4.5: Inevitability beliefs about LBP

Sample	Mean Score (SD)
GSK	27.8 (5.86)
Fox's Biscuits[1]	25.4 (7.87)
KP Foods[1]	26.4 (7.98)

[1]Extracted from T.L. Symonds PhD thesis (1995)

Table 7.4.6: Inevitability beliefs about ULDs

Sample	Mean Score (SD)
GSK	32.6 (5.80)

Table 7.4.7: Attributions to work as cause of LBP

Sample	Mean Score (SD)
GSK	35.0 (6.27)

Table 7.4.8: Attributions to individual as causes of LBP

Sample	Mean Score (SD)
GSK	29.4 (4.71)

Table 7.4.9: Control

Sample	Mean Score (SD)
GSK	17.0 (4.13)
Resource Systems[2]	17.2 (3.31)

[2]Resource Systems

Table 7.4.10: Personal Influence

Sample	Mean Score (SD)
GSK	11.9 (2.51)
Resource Systems[2]	12.1 (2.37)

[2]Resource Systems

Table 7.4.11: Organisational Climate

Sample	Mean Score (SD)
GSK	12.8 (3.87)
Resource Systems[2]	13.0 (3.80)

[2]Resource Systems

Table 7.4.12: Relationships at Work

Sample	Mean Score (SD)
GSK	24.4 (7.97)
Resource Systems[2]	25.5 (7.66)

[2]Resource Systems

Table 7.4.13: Home/Work Balance

Sample	Mean Score (SD)
GSK	12.9 (5.52)
Resource Systems[2]	13.9 (5.72)

[2]Resource Systems

Table 7.4.14: Perceived Exertion

Sample	Mean Score (SD)
GSK	10.17 (2.67)
Genaidy et al[5]	6.7-12.6 (1.1-3.6)

[5] (Genaidy et al. 1990) reported a range of scores in a review of studies

7.5 Absence rates due to MSDs

Company records showed that the occurrence of absence due to MSDs (LBP and ULDs only) in the 12 months preceding the survey accounted for 5% of the workforce (4% due to LBP, 1% due to ULDs).

There was a 48.9% (n=135) response rate to the workforce survey from those workers who had taken absence due to MSDs in the previous 12 months. This meant that the majority of workers who took absence during this period did not respond to the survey (n=141) (see Appendix 3). However, a further investigation of the association between previous absence and non-response was not possible within the realms of the present study.

7.6 Results summary

- The workforce survey population was representative of GSK in terms of gender and job type.
- The majority of the workforce survey population was comprised of males, non-manual workers and those of a younger-age.
- Self-reported ULDs in the previous 12 months were slightly more prevalent amongst the respondents, compared to LBP. However, the prevalence of associated disability was greater for those reporting LBP compared with ULDs.
- The pattern of mean psychosocial scores for the respondents were shown to be similar to those reported by comparable studies, concluding that the questionnaires were being answered reliably by the respondents at GSK.
- There was an under-representation of respondents who had taken absence due to MSDs in the 12 months preceding the workforce survey

RESULTS 2

Psychosocial factors and previous MSDs

8.1 Self-reported MSDs and psychosocial scores

Using self-report data gained from the NMQ, mean psychosocial scores were calculated for those respondents who did and did not report MSDs for three previous instances: lifetime prevalence, 12-month prevalence, and 7-day prevalence. T-tests were performed to analyse statistically significant differences in mean psychosocial score between these groups, and the significant mean score difference was reported. (*The actual mean scores and standard deviations for these analyses can be found in Appendix 4a).*

8.1.1 Lifetime prevalence of LBP

Mean psychosocial scores for those respondents who did (n=2744) and did not report (n=1893) lifetime prevalence of LBP were significantly different ($P<.001$), with the exception of those for mental stress and personal influence at work. Further, for those respondents who reported LBP, the significant mean differences were in a 'detrimental' direction (indicated by the arrow in Table 8.1), with the exception of those for beliefs about the inevitable consequences of LBP and attributions of LBP to work (displayed in italics).

Table 8.1: Mean psychosocial score difference between respondents who did and did not report lifetime prevalence of LBP

Psychosocial measure	**Mean score difference Lifetime LBP (yes/no)**
Psychological Distress	1.35 ↑
Job Satisfaction	0.88 ↓
Social Support	0.41 ↓
Mental Stress	ns
Inevitability beliefs about LBP	*0.59 ↑*
Attribution (work)	*0.71 ↓*
Attribution (individual)	0.73 ↓
Control	0.57 ↓
Personal influence	ns
Organisational climate	0.78 ↑
Relationships at work	0.86 ↑
Home/work balance	0.58 ↑
Perceived Exertion	0.26 ↑

8.1.2 12-month prevalence of LBP and ULDs

Mean psychosocial scores for those respondents who did (n=2982) and did not (n=1655) report LBP in the previous 12 months were significantly different ($P<.001$), with the exception of those for mental stress. Further, for those respondents who reported LBP, the significant mean differences were in a 'detrimental' direction (indicated by the arrow in Table 8.2), with the exception of those for inevitability beliefs about LBP and attribution of LBP to work (displayed in italics).

Mean psychosocial scores for those respondents who did (n=3099) and did not (n=1538) report ULDs in the previous 12 months were significantly different ($P<.001$), with the exception of those for mental stress, inevitability beliefs about ULDs, personal influence at work and perceived exertion. Further, for those respondents who reported ULDs, the significant mean differences were in a 'detrimental' direction (indicated by the arrow in Table 8.2). There were no significant differences in mean psychosocial scores between those respondents reporting LBP or ULDs.

Table 8.2: Mean psychosocial score difference between those respondents who did and did not report LBP and ULDs in previous 12 months

Psychosocial measure	**Mean score difference 12m LBP (yes/no)**	**Mean score difference 12m ULD (yes/no)**
Psychological Distress	1.56 ↑	1.65 ↑
Job Satisfaction	1.06 ↓	1.24 ↓
Social Support	0.38 ↓	0.30 ↓
Mental Stress	ns	ns
Inevitability beliefs about LBP/ULD	*0.37 ↑**	ns
Attribution (work)	*1.59 ↓**	-
Attribution (individual)	0.67 ↓	-
Control	0.75 ↓	0.49 ↓
Personal influence at work	0.22 ↓*	ns
Organisational climate	0.93 ↑	0.73 ↑
Relationships at work	1.42 ↑	0.92 ↑
Home/work balance	0.74 ↑	0.64↑
Perceived Exertion	0.19 ↑*	ns

[Mean score difference statistically significant at 5% level]*

8.1.3 7-day prevalence of LBP and ULDs

Mean psychosocial scores for those respondents who did (n=1672) and did not (n=2965) report LBP in the previous 7 days were significantly different (*P*<.001) with the exception of those for mental stress and attribution of LBP to work. Further, for those respondents who reported LBP the significant mean differences were in a 'detrimental' direction (indicated by the arrow in Table 8.3), with the exception of those for inevitability beliefs about LBP (displayed in italics).

Mean psychosocial scores for those respondents who did (n=1743) and did not (n=2894) report ULDs in the previous 7 days were significant different (*P*<.001), with the exception of those for mental stress and home/work balance. Further, for those respondents who reported ULDs the significant mean differences were in a 'detrimental' direction (indicated by the arrow in Table 8.3). There were no significant differences in mean psychosocial scores between those respondents reporting LBP or ULDs.

Table 8.3: Mean psychosocial score difference between those respondents who did and did not report LBP and ULDs in previous 7 days

Psychosocial measure	Mean score difference 7d LBP (yes/no)	Mean score difference 7d ULD (yes/no)
Psychological Distress	1.79 ↑	1.65 ↑
Job Satisfaction	1.29 ↓	1.32 ↓
Social Support	0.53 ↓	0.41 ↓
Mental Stress	ns	ns
Inevitability beliefs about LBP/ULD	*0.39↑**	0.34↓
Attribution (work)	ns	-
Attribution (individual)	0.50↓	-
Control	0.88 ↓	0.60 ↓
Personal influence at work	0.19 ↓*	0.19 ↓*
Organisational climate	0.89 ↑	0.53 ↑
Relationships at work	1.54 ↑	0.89 ↑
Home/work balance	0.74 ↑	ns
Perceived Exertion	0.40 ↑	0.19 ↑*

[Mean score difference statistically significant at 5% level]*

8.1.4 12-month LBP and ULD disability prevalence

Mean psychosocial scores for those respondents who did (n=1214) and did not (n=3423) report disability due to LBP in the previous 12 months were significantly different (*P*<.001), with the exception of those for mental stress. Further, for those respondents who reported disability due to LBP the significant mean differences were in a 'detrimental' direction (indicated by the arrow in Table 8.4), with the exception of those for attribution of LBP to work (displayed in italics).

Mean psychosocial scores for those respondents who did (n=861) and did not (n=3776) report disability due to ULDs in the previous 12 months were significantly different ($P<.001$), with the exception of those for mental stress, beliefs about the inevitable consequences of ULDs, and home/work balance. Further, for those respondents who reported disability due to ULDs, the significant mean differences were in a 'detrimental' direction (indicated by the arrow in Table 8.4). There were no significant differences in mean psychosocial scores between those respondents reporting LBP or ULDs.

Table 8.4: Mean psychosocial score difference between respondents who did and did not reported disability due to LBP and ULDs in the previous 12 months

Psychosocial Factor	**Mean score difference LBPdis 12m (yes/no)**	**Mean score difference ULDdis 12m (yes/no)**
Psychological Distress	1.70 ↑	1.65 ↑
Job Satisfaction	1.35 ↓	1.86 ↓
Social Support	0.51 ↓	0.57 ↓
Mental Stress	ns	ns
Inevitability beliefs about LBP/ULD	0.42↑*	ns
Attribution (work)	*0.53 ↓**	-
Attribution (individual)	0.70↓	-
Control	0.64↓	0.78 ↓
Personal influence at work	0.26 ↓*	0.39 ↓
Organisational climate	0.75 ↑	0.72 ↑
Relationships at work	0.97 ↑	1.30 ↑
Home/work balance	0.60 ↑*	ns
Perceived Exertion	0.59 ↑	0.50 ↑

[Mean score difference statistically significant at 5% level]*

8.1.5 Key points

- The majority of psychosocial scores from respondents who had reported a previous MSD differed significantly in a 'detrimental' direction, compared to those for respondents who had not reported a previous MSD. There were no significant differences in mean psychosocial scores between respondents reporting LBP and ULDs.

- Overall, the significant differences in mean psychosocial scores between those respondents who had and had not reported a previous MSD were relatively small (between 0.19 and 1.86) compared to the range of possible scores. The fact that such small differences in score were found to be statistically significant was likely due to the large sample size (n=4,637), where a small difference was represented by a large number of workers, possibly over-emphasising the strength of the effect.

8.2 Psychosocial scores and previous absence

Using company-recorded absence data, mean psychosocial scores were calculated for those respondents who did and did not take any spells of absence due to MSDs in the previous 12 months. (Absence from work in this analysis was defined as having taken 1 or more spell of absence). T-tests were performed to analyse statistically significant differences in mean psychosocial score between these groups, and the significant mean score difference was reported for previous absence due to both LBP and ULDs separately. A small number of respondents took absence due to both LBP and ULDs in the previous 12 months (n=12), but were not included in these analyses. (*The actual mean scores and standard deviations for these analyses can be found in Appendix 4b).*

8.2.1 Absence due to LBP and ULDs

Mean psychosocial scores for those respondents who did (n=98) and did not (n=4527) take absence due to LBP in the previous 12 months were significantly different (*P*<.05), with the exception of those for social support, attribution of LBP to work, attribution of LBP to the individual, personal influence at work and home/work balance. Further, for those respondents who had taken absence, the significant mean differences were in a 'detrimental' direction (indicated by the arrow in table 8.5), with the exception of those for mental stress (displayed in italics).

Mean psychosocial scores for those respondents who did (n=25) and did not (n=4600) take absence due to ULDs in the previous 12 months were significantly different (*P*<.05), with the exception of those for psychological distress, beliefs about the inevitable consequences of ULDs, control, organisational climate and home/work balance. Further, for those respondents who had taken absence, the significant mean differences were in a 'detrimental' direction (indicated by the arrow in table 8.5), with the exception of those for mental stress (displayed in italics). There were no significant differences in mean psychosocial scores between those respondents who had taken absence due to LBP or ULDs.

Table 8.5: Mean psychosocial score difference between respondents who did and did not take absence due to LBP and ULDs in the previous 12 months

Psychosocial measure	**Mean score difference LBP absence (yes/no)**	**Mean score difference ULD absence (yes/no)**
Psychological Distress	1.79 ↑	ns
Job Satisfaction	2.96 ↓**	2.78 ↓
Social Support	ns	2.77 ↓
Mental Stress	*1.10 ↓*	*1.63 ↓*
Inevitability beliefs about LBP/ULD	2.04 ↓	ns
Attribution (work)	ns	-
Attribution (individual)	ns	-
Control	1.11 ↓	ns
Personal influence over work	ns	1.96 ↓
Organisational climate	1.02 ↑	ns
Relationships at work	2.76 ↑	5.44 ↑
Home/work balance	ns	ns
Perceived Exertion	1.63 ↑**	1.46 ↑

*[**Mean psychosocial score difference statistically significant at 1% level]*

8.2.2 Key points

- The majority of psychosocial scores from respondents who had taken absence due to MSDs were found to differ significantly in a 'detrimental' direction, compared to those respondents who had not taken absence in the previous 12 months. There were no significant differences in the mean psychosocial scores between respondents who took absence due to LBP or ULDs.
- Overall, the significant differences in mean psychosocial scores between those respondents who did and did not take absence were relatively small (between 1.02 and 5.37) compared with the range of possible scores. However, these differences were larger than those found for self-reported MSDs, indicating that absence may

have had a stronger association with detrimental psychosocial scores. However, the number of respondents who had taken absence in the previous 12 months was relatively small, and results should be interpreted with caution.

8.3 Psychosocial risk factors and LBP

The data presented in this section were obtained from a cross-sectional survey, and therefore could not be used in a predictive manner. However, the calculation of 'risk' was interesting in order to explore the hypotheses of the present study and to examine the relative association between certain clinical and occupational psychosocial risk factors (yellow and blue flags) and LBP *(data for ULDs were not used in this analysis because of small numbers)*.

Five occupational psychosocial factors that were deemed representative of the psychosocial work environment were chosen for analysis:

- job satisfaction, social support, attribution of LBP to work, control, and organisational climate.

For comparison purposes, the token clinical psychosocial factor was represented by psychological distress, measured by the GHQ.

Cut-off points for each of the psychosocial factors were established by considering each value of the variable as a potential cut-off point, and using 2 x 2 tables, determining statistically significant relationships with self reports of, and absence due to, LBP in the last 12 months.

Cut-off points were chosen which gave a stable, maximum odds-ratio (OR) and with no cell in the 2 x 2 table consisting of a count of less than 50. These cut-off points then defined the detrimental level for each psychosocial factor, and were labelled as 'flags'. It was hypothesised that any respondent who scored above or below these detrimental levels (depending on the scale direction), would have their 'flags flying', and have a stronger association with self-reported LBP and absence due to LBP, compared to those respondents who did not have their 'flags flying'. In the current study, detrimental scores on the clinical psychosocial factor was classed as a 'yellow flag', and detrimental scores on occupational psychosocial factors were classed as 'blue flags'.

Using the established cut-off points, ORs were calculated for the outcomes of self-reported LBP in the previous 12 months and previous 7 days, self-reported disability in the previous 12 months, and occurrence of absence in the previous 12 months. It was found that all but one of the blue flags (attribution of LBP to work) reported similar statistically significant relationships with LBP as the yellow flag ($P<.05$). The cut-off point for each psychosocial factor, along with an indication that this score (or a score above or below it, depending on the scale direction indicated by the arrow) was associated with self-reports of, and absence due to, LBP is displayed in Table 8.6.

Table 8.6. Yellow and blue flags and their association with self-reported LBP and occurrence of absence due to LBP in the previous 12 months, expressed as odds-ratios (OR), with 95% confidence intervals (CI).

Psychosocial flag	**Cut-off point**	**LBP 12m OR (CI)**	**LBP 7d (OR) (CI)**	**LBP disability 12m (OR) (CI)**	**LBP absence 12m (OR) (CI)**
Psychological distress	14↑	2.1 (1.8 to 2.5)	1.9 (1.7 to 2.2)	1.9 (1.6 to 2.1)	2.1 (1.4 to 3.1)
Job satisfaction	16↓	1.3 (1.0 to 1.6)	1.6 (1.3 to 1.9)	1.6 (1.3 to 2.0)	3.1 (1.9 to 4.9)
Social support	11↓	1.4 (1.2 to 1.7)	1.7 (1.4 to 2.1)	1.5 (1.3 to 1.8)	2.4 (1.5 to 3.9)
Attribution (of LBP to work)	41↑	ns	1.3 (1.1 to 1.5)	ns	1.7 (1.1 to 2.7)
Perceived control over work	11↓	1.4 (1.2 to 1.8)	1.7 (1.4 to 2.1)	1.4 (1.1 to 1.7)	1.9 (1.1 to 3.3)
Pressures of organisational climate	13↑	1.6 (1.4 to 1.9)	1.5 (1.3 to 1.7)	1.5 (1.3 to 1.7)	1.4 (1.0 to 2.1)

Table 8.6 documents the associations that these *single* psychosocial flags had with LBP and absence, but it was also interesting to examine the effect of *multiple* psychosocial flags. Therefore, considering only those respondents who reported LBP in the past 12 months (n=98) and using the established cut-off points from the previous analysis, odds-ratios for zero, one, and two or more blue flags flying, along with that for the yellow flag were calculated for their association with the occurrence of absence due to LBP. It was found that associations were incremental, that is, an increasing number of psychosocial flags were associated with a greater proportion of workers taking absence (see Table 8.7). Furthermore, the

effect of any one blue flag alone was similar to the effect of the yellow flag alone. However, no single flag was found to be dominant; rather the pattern of psychosocial flags varied from individual to individual.

Table 8.7: The percentage of workers that reported LBP in the previous 12 months who also took absence (n=98), categorised by the yellow flag and by the number of blue flags.

	0 blue flags flying	**1 blue flag flying**	**2 or more blue flags flying**
Yellow flag not flying	2.5%	3.5%	7.8%
Yellow flag flying	4.0%	5.8%	9.8%

8.4 Results summary

- The majority of respondents with previous experience of MSDs had detrimental psychosocial scores compared to those respondents without previous experience of MSDs. However, differences between these two groups were relatively small compared with the range of possible scores, suggesting that a large sample size may have led to statistical significance.
- Blue flags were statistically significantly associated with self-reported LBP and associated absence. Further, their 'strength' of association was similar to that of the more established yellow flag (psychological distress). However, the cross-sectional nature of the data meant that these results could not be used for predictive purposes.
- The 'cumulative' influence that yellow and blue flags had with LBP indicates they may have equally detrimental influences on MSDs.

RESULTS 3

Psychosocial factors and subsequent absence

9.1 Introduction

The results discussed in previous sections were based on cross-sectional data yielded from the workforce survey. Whilst these results highlighted interesting associations and relationships between psychosocial factors and previous experience of MSDs, these cross-sectional data could not be used to explore the predictive influence of psychosocial factors on future absence. Therefore, company-recorded absence data were collected over a 15-month period (Apr00-Jul01) following the completion of the workforce survey, and the survey psychosocial data were explored in order to establish their predictive influences on the future absence of the respondents.

9.2 Occurrence of subsequent absence

In the 15 months following the completion of the workforce survey, 219 respondents took absence due to MSDs (LBP and ULDs only), which resulted in 267 spells of absence, and 2,461 working days lost. The majority of absence was due to LBP (79.5%), occurred mostly at the manufacturing sites (86.8%), and was self-certified (56.2%), therefore lasting less than 1 week.

Chi-squared analyses showed that, compared to the non-absentee respondents, there were significantly more males than females, significantly more manual than non-manual workers, and significantly more older than younger respondents who had taken absence in the ensuing 15 months (see Table 9.1).

Table 9.1: Distribution of respondents who did and did not take in the ensuing 15 months, categorised by gender, job type and age

	Absentees (n)	Non-absentees (n)	*P*
Gender	Male (n=147) Female (n=72)	Male (n=2467) Female (n=1897)	<0.05
Job-type	Manual (n=129) Non-manual (n=90)	Manual (n=866) Non-manual (n=3552)	<0.001
Age group	19-40 yrs (n=81) 41-65 yrs (n=135)	19-40 yrs (n=2385) 41-65 yrs (n=1860)	<0.001

There was found to an over-representation of manual workers who had taken future absence due to MSDs (59%), compared to the actual proportions of manual workers in the whole survey population (31%) *(see Results 1, Table 7.2).*

9.3 Psychosocial scores and subsequent absence

Using company-record absence data, mean psychosocial scores were calculated for those respondents who did and did not take absence due to MSDs in the ensuing 15 months. T-tests were performed to analyse statistically significant differences in psychosocial score between these groups, and the results were reported for absence due to LBP and ULDs separately. A small number of respondents took absence due to both LBP and ULDs in the ensuing 15 months (n=5), but were not included in these analyses. (*The actual mean scores and standard deviations for these analyses can be found in Appendix 5a).*

9.3.1 Absence due to LBP

Mean psychosocial scores for those respondents who did (n=174) and did not (n=4458) take absence due to LBP in the ensuing 15 months were significantly different (*P*<.001), with the exception of those for home/work balance. Further, for those respondents who had taken subsequent absence, the significant mean differences were in a 'detrimental' direction (indicated by the arrow in Table 9.2), with the exception of those for mental stress and attribution of LBP to individual factors (displayed in italics).

Table 9.2: Mean psychosocial score difference between respondents who did and did not take absence due to LBP in the ensuing 15 months

Psychosocial measure	**Mean score difference LBP absence (yes/no)**
Psychological Distress	1.08 ↑*
Job Satisfaction	2.84 ↓
Social Support	1.01 ↓
Mental Stress	*0.88 ↓*
Inevitability beliefs about LBP	2.32 ↓
Attribution (work)	1.79 ↑
Attribution (individual)	*0.79 ↑**
Control	1.57 ↓
Personal influence at work	1.05 ↓
Organisational climate	1.05 ↑*
Relationships at work	3.37 ↑
Home/work balance	ns
Perceived Exertion	1.95 ↑

*[*Difference statistically significant at 5% level]*

9.3.2 Absence due to ULDs

The majority of mean psychosocial scores for those respondents who did (n=40) and did not (n=4592) take absence due to ULDs in the ensuing 15 months were <u>not</u> significantly different, with the exception of those for mental stress, control at, personal influence at work and perceived exertion (*P*<.05). For those respondents who had taken absence due to

ULDs, and had scores that were significantly different, the significant mean differences were in a 'detrimental' direction (indicated by the arrow in Table 9.3), with the exception of those for mental stress (displayed in italics).

Table 9.3: Mean psychosocial score difference between respondents who did and did not take absence due to ULDs in the ensuing 15 months

Psychosocial measure	**Mean score difference ULD absence (yes/no)**
Psychological Distress	ns
Job Satisfaction	ns
Social Support	ns
Mental Stress	*1.43 ↓*
Inevitability beliefs about ULDs	ns
Control	1.42 ↓
Personal influence over work	1.23 ↓
Organisational climate	ns
Relationships at work	ns ↑
Home/work balance	ns
Perceived Exertion	2.02 ↑

9.3.3 Key points

- The majority of psychosocial scores for respondents who had taken subsequent absence due to LBP were found to differ significantly in a 'detrimental' direction, compared to those respondents who had not taken absence in the ensuing 15 months. However, this finding was reversed for those respondents who had taken absence due to ULDs.
- Overall, the significant differences in mean psychosocial scores between those respondents who did and did not take absence were relatively small (between 0.79 and 3.37) compared with the range of possible scores. In addition, the number of respondents who took subsequent absence was relatively small compared to those

that did not take absence, and any results should be interpreted with caution.

9.4 Yellow and blue flags and subsequent MSD absence

It was interesting to examine whether previously reported associations between certain psychosocial risk factors (yellow and blue flags) (*see Results 2, Table 8.6*) and previous absence due to LBP (n=98) would also emerge from the data in respect of subsequent absence due to LBP (n=174). (*Absence due to ULDs was not included in this analysis because the original odds-ratios were devised using LBP data).*

9.4.1 Occurrence of absence

Odds-ratios (ORs) were calculated to explore the association between previously defined yellow and blue flags and the likelihood of subsequent absence due to LBP. Broadly similar statistically significant risks were found - see Table 9.4.

Table 9.4: The association between yellow and blue flags and the occurrence of previous and subsequent absence due to LBP, expressed as odds-ratios (OR), with 95% confidence intervals (CI).

Psychosocial flag	**Previous absence OR (CI)**	**Subsequent absence OR (CI)**
Psychological distress	2.1 (1.4 to 3.1)	1.5 (1.1 to 2.0)
Job satisfaction	3.1 (1.9 to 4.9)	2.9 (2.0 to 4.2)
Social support	2.4 (1.5 to 3.9)	2.3 (1.6 to 3.3)
Attribution (work)	1.7 (1.1 to 2.7)	2.0 (1.4 to 2.8)
Control	1.9 (1.1 to 3.3)	1.9 (1.3 to 2.9)
Organisational climate	1.4 (1.0 to 2.1)	2.3 (1.3 to 3.9)

9.4.2 Duration of absence

The workforce survey data also offered the opportunity to explore the influence that yellow and blue flags have on the *duration* of subsequent absence. The mean duration of absence was examined for those respondents who took absence due to LBP in the ensuing 15 months (n=174), and it was found to be 9.43 working days. However, the nature of MSD absence means that there was a wide range of durations (between 1 and 119 working days), and therefore it was more appropriate to report the median duration of absence (5 working days) and the mode of that duration (2 working days).

Median durations of subsequent absence were compared between respondents who had no flags 'flying' (n=110), and those who had up to five flags 'flying' (n=64). It was found that the median durations of subsequent absence for those respondents who had one or more flags flying, and for those respondents who had no flags flying were not significantly different - see Table 9.5.

Table 9.5: Median durations of absence in the subsequent 15 months for respondents with zero and up to five yellow and blue flags

	Median duration future absence	**z-score**	***P***
0 flags	5.00 working days	-.353	.724
1-5 flags	5.00 working days		

The relative influence of all the psychosocial factors studied (not just the ones used in previous analyses) on the duration of all subsequent MSD absence (LBP and ULDs) was then explored (n=219). Because the sickness absence data was skewed with the majority of absence lasting less than one week, the sickness absence data were dichotomised into self-certified absences (lasting up to 7 days, n=123) and medically certified absences (over 7 days, n=96). Univariate analyses were performed between the dichotomised sickness absence variable and the psychosocial factors (e.g. Mann-Whitney *U* test), and it was found higher levels of perceived control at work were significantly associated with longer durations of absence ($P<.05$) - but this was against the expected direction of the questionnaire. No other statistically significant relationships were found.

Further exploration comprised splitting the score for each psychosocial factor at the median and establishing 'detrimental' and 'non-detrimental' scores. Chi-squared tests were then performed, and again the only statistically significant relationships were found between high levels of perceived control at work and long absence durations ($P<.05$) - against the expected direction of the questionnaire. These findings indicated that further regression analyses were unnecessary and would be unhelpful (*results can be found in Appendix 5b).*

Whilst the range of psychosocial factors surveyed did not indicate any significant relationships with duration of subsequent absence, other factors known to influence the likelihood of absence might also influence the duration of absence. Therefore, chi-squared analyses were performed exploring the effects of gender, age (younger and older groups) and previous absence due to MSDs (yes/no) on the different durations of future absence, but no significant associations were found (*see Appendix 5b*).

9.5 Results summary

- Yellow and blue 'flags' were predictive of the *likelihood* of future absence due to LBP. However, it was not possible to determine the predictive influence of any particular psychosocial flag (or indeed any 'detrimental' psychosocial factor) on the *duration* of subsequent absence.
- Demographic factors, such as age and gender were not significantly associated with duration of subsequent absence, nor was previous absence due to MSDs.
- These results indicate that the use of routine psychosocial screening in the workplace to predict return-to-work time may be unhelpful.

WORKFORCE SURVEY - SUMMARY OF RESULTS

Respondents who experienced MSDs in the previous 12 months had more 'detrimental' psychosocial scores, compared to those respondents who did not experience MSDs in the previous 12 months. However, the significant differences in psychosocial score were relatively small compared to the range of possible scores, and it was possible that statistical significance occurred as a result of the large sample size. Further, there was an under-representation of respondents who had taken absence due to MSDs in the previous 12 months, compromising robust analyses of this group.

The psychosocial profile of the workforce survey respondents did not differ significantly between respondents who had experienced LBP or ULDs.

It was shown that in addition to clinical psychosocial risk factors, occupational psychosocial risk factors (yellow and blue flags) were also significantly associated with self-reported MSDs, and absence due to MSDs in the previous 12 months. Further, the yellow and blue flags were also found to be predictive of the likelihood of absence due to MSDs in the subsequent 15 months. However, the yellow and blue flags (or any of the psychosocial factors studied) were not predictive of the duration of subsequent absence.

It was shown that the extent of the 'risk' posed by blue flags was similar to that found for yellow flags. These results suggest that, along with clinical psychosocial risk factors, the effects of the psychosocial work environment on the course of MSDs should be acknowledged.

EXPERIMENTAL INTERVENTION

v. Experimental design

A non-randomised controlled trial of a psychosocial intervention was conducted using a quasi-experimental design (employing baseline and follow up procedures) at five manufacturing sites of GSK. Two sites acted as the experimental sites (n=1,435), and three as the control sites (n=1,483). The decision to use manufacturing sites for the trial was reached using the following criteria:

- the manufacturing sites were broadly matched for job type and demographic data,
- the manufacturing sites reported occurrence of absence due to MSDs as being approximately 12% of the workforce, compared to approximately 5% at other sites of GSK,
- at all manufacturing sites, ostensibly, the occupational health advisors (OHAs) would be notified at the start of absence, facilitating an early intervention.

The experimental intervention was delivered using a case-management approach, whereby the participant was assessed and monitored over a period of 4 weeks by the OHA. The OHAs at GSK were generally familiar with a case-management approach, and the present study utilised their usual practices and supplemented them with an individual, psychosocial approach. A 12-month follow up period was used to explore changes in psychosocial scores at the experimental sites only, and absence due to

MSDs in the subsequent 12 months was monitored at both the experimental and control sites.

vi. Ethics

Ethical approval for the experimental intervention was sought and obtained from the ethics committee within GSK. (External ethics committees were approached but it was felt that the present study was not within their remit). Participants agreeing to the experimental intervention were required to sign a consent form (*see Appendix 6a*), which supplied study information, and facilitated access to individual data and follow-up contact after a 12-month period.

vii. Data collection

Psychosocial data was obtained from participants who agreed to receive the intervention at baseline (n=133) and then again at 12-month follow up (n=103). Company recorded absence due to MSDs (LBP and ULDs only) was collected for a 4-year period for both the experimental and control sites. This 4-year period comprised the 2-year period before the intervention, the 12-month intervention period, and the 12-month follow up period. An additional 6 months of absence data was made available for the experimental sites only, allowing experimental participants to be followed-up for a total of 18 months.

viii. Data analysis

Results from the experimental intervention phase were explored in three stages:

viii.i Intervention delivery

Recruitment rates and timing of the delivery of the experimental intervention were documented at the experimental sites. For these analyses, t-tests and chi-squared tests were performed.

viii.ii Psychosocial scores

Mean baseline psychosocial scores for the experimental participants were explored in terms of differences between gender, age (younger/older), job-type (manual/non-manual), the experimental site (Worthing/Crawley), timing of intervention delivery (early/late); presenting musculoskeletal complaint (LBP/ULD), and duration of onset for index spell (shorter/longer than 1 week). Changes in mean psychosocial scores between baseline and follow-up were then analysed (experimental sites only). For all these analyses, the t-test (independent and repeated measures) was performed.

viii.iii Absence due to MSDs

Absence data from both experimental and control sites were compared in terms of occurrence rates and duration of absence due to MSDs over a 4-year period. Return-to-work times and work retention (duration of subsequent absence) were then compared between the experimental participants and absent workers from the control sites over a 12-month follow-up period. Absence data for the experimental participants were then tracked for an additional 6-months to the 12-month follow-up period, and baseline psychosocial scores were examined in terms of their association with occurrence and duration of subsequent absence due to MSDs. For these analyses, the chi-squared and Mann-Whitney *U* tests were performed.

METHODS 3

Procedure

10.1 Background to experimental intervention

The rationale behind the experimental intervention was based on the biopsychosocial approach (see Chapter 2, section 2.4), and the most recent research which recommends identifying psychosocial factors which may act as obstacles to recovery (Kendall, Linton, & Main 1997). Further incorporated into the design of the experimental intervention was evidence on the merits of early intervention (see Chapter 4, section 4.8), an acknowledgement of the growing evidence that documents the importance of the psychosocial work environment (see Chapter 3) and the recommendations of the Faculty of Occupational Medicine's most recent guidelines which stated that "there is limited evidence but general consensus that joint employer-worker initiatives (generally involving organizational culture and high stakeholder commitment to identify and control occupational risk factors and improve safety, surveillance measures and 'safety culture') can reduce the number of reported back 'injuries' and sickness absences, but there is no clear evidence on the optimum strategies, and inconsistent evidence on the effect size" (Carter & Birrell 2000).

In line with recent research which specifies the need for a structured back-to-work program involving a collaboration with all the key players (Frank et al. 1998), the experimental protocol required the Occupational Health Advisors (OHAs) to contact absent workers early (within first few days), or alternatively, to deliver the intervention to workers presenting with musculoskeletal complaints who did not take absence. In order to generate a supportive network, the experimental intervention required that OHAs also liase with Team Leaders and General Practitioners; offer modified work; and 'case-manage' the worker over a 4-week period which entailed a contact each week and further intervention if necessary - see Figure 10.1.

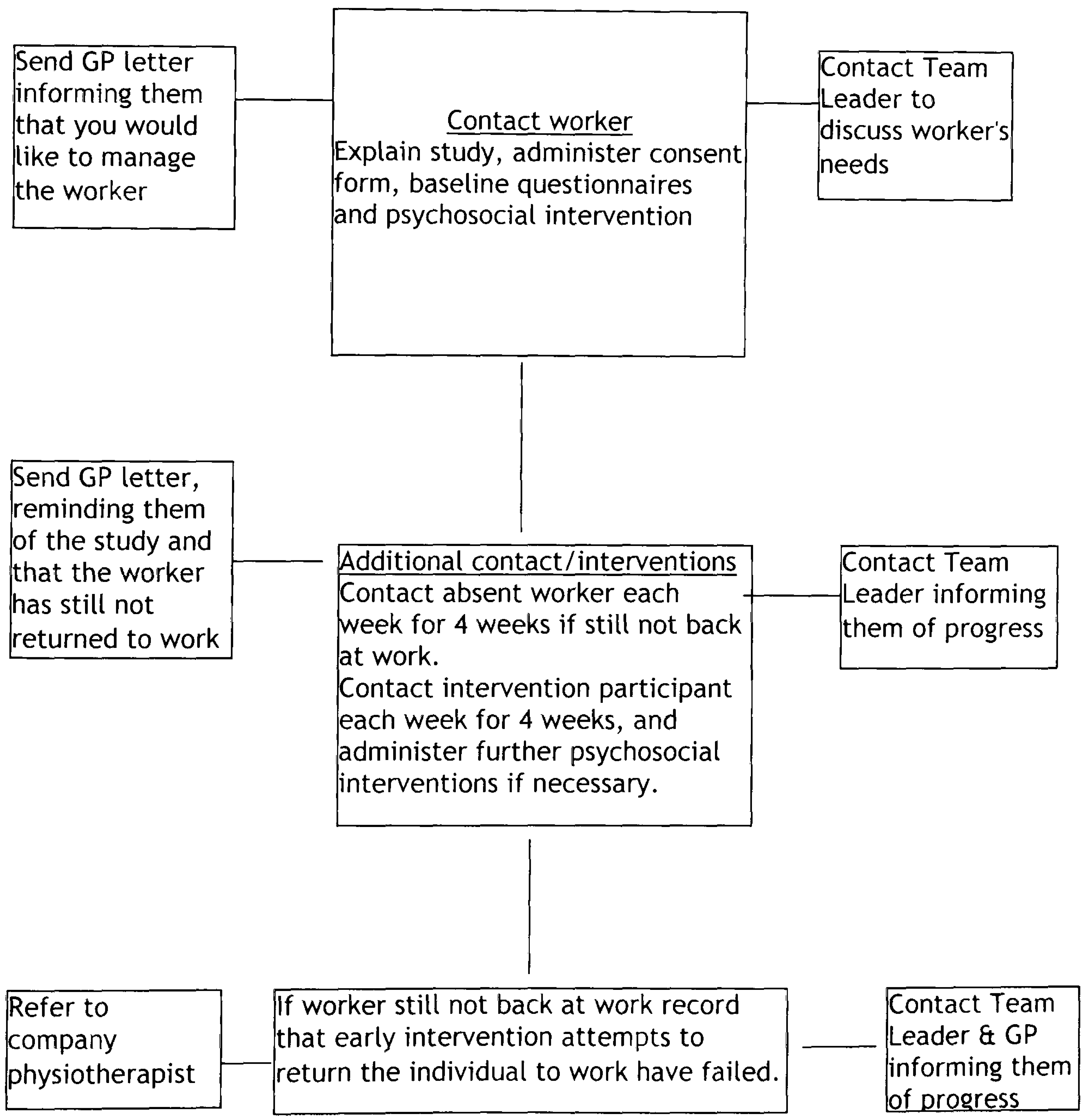

Figure 10.1: Experimental intervention protocol

10.2 Inclusion/exclusion criteria

Workers would be assessed for clinical 'red flags', which are conditions denoting serious underlying pathology (Royal College of General Practitioners 1995), before proceeding. Additionally, workers would not be given the intervention if they had been diagnosed with conditions that had more serious implications (e.g. resulting from serious trauma) or were as a result of another primary illness (i.e. non-MSDs). *(A full list of the inclusion/exclusion criteria can be found in the OHA Manual, Appendix 6a).*

10.3 Experimental intervention

The experimental intervention comprised several procedures, and the Occupational Health Advisors (OHAs) were trained to deliver the following:

10.3.1 Psychosocial assessment

The psychosocial assessment comprised of several sections where specific "stem questions" were asked in order to elicit responses that were indicative of psychosocial flags. Yellow and blue flags were addressed using a technique widely based on cognitive-behavioural pain management strategies, such as those illustrated by Williams & Erskine (Williams & Erskine 1995), and the OHA training included education about pain and pain mechanisms, tackling negative beliefs and attitudes, and reinforcing evidence-based messages and advice (e.g. importance of keeping active and early return to work). It was recognised that the OHAs did not have specific expertise in pain management or psychosocial intervention, and therefore the assessment booklet documented all the necessary advice to be administered *(A copy of the psychosocial assessment booklet can be found in the OHA Manual, Appendix 6a).* In addition to the advice administered as part of the psychosocial assessment, educational booklets for LBP (*The Back Book*) (Roland et al. 1998) and ULDs (*ULDs - don't suffer needlessly - based on a previous successful LBP pamphlet)* (Symonds, Burton, & Tillotson 1993) were also administered (see Appendix 6b).

10.3.2 Modified work

The potential value of modified work has been widely acknowledged (Krause, Dasinger, & Neuhauser 1998), and thus was made available as part of the experimental intervention if the participant specifically requested it, or if the OHAs ascertained that modified work was needed in order to facilitate return-to-work/work retention. The intention was to be able to accommodate the symptomatic worker at any level. Following guideline recommendations (Waddell & Burton 2000), the availability of modified work was restricted to a 2-week period, with assessment at 1 week. If it was not possible to remove modified work after 2 weeks, the participant was referred out of the study.

10.3.3 General Practitioner liaison

Attempts were made to involve General Practitioners (GPs) in order to co-ordinate the case-management of the participant in a supportive network, and to covertly discourage sickness certification. Therefore, a letter was sent to GPs informing them of the study, and of the participant's progress. A letter was also sent to the GP regarding workers who did not agree to take part in the study, in the hope that the GP would discourage sickness absence if they happened to be consulted. Letters were sent to GPs regarding participants who failed to return-to-work after 4 weeks, or regarding those workers who had remained on modified work for the longer-than-specified period *(A copy of the GP letter can be found in the OHA Manual, Appendix 6a).*

10.3.4 Team Leader liaison

The Team Leaders were considered to be a potentially helpful link between the OHA and the worker. Therefore OHAs were required to communicate with Team Leaders in order to discuss return-to-work/work retention plans decided in the course of the experimental intervention. This communication highlighted problems with colleagues or job aspects that the participant had revealed to the OHA, and to discuss possible modifications to the work. The aim of the Team Leader liaison was to facilitate a supportive network for the participant.

10.4 Occupational Health Advisor manual

In order that OHAs followed procedures consistently and systematically, a manual was devised. This manual included scripts for each communication that the OHA would be required to engage in (e.g.

GP/Team Leader) and outlined procedures for each scenario (e.g. psychosocial assessment, modified work). This was done in order to ensure that OHAs conveyed the correct information at the correct time to participants and colleagues, and that procedures were consistent at the two experimental sites *(A copy of the OHA manual can be found in Appendix 6a).*

10.5 Occupational Health Advisor database

A Microsoft Access© database was custom-designed for use by the OHAs to record data for each participant. Recording information electronically meant that participant data could easily be transferred via email for regular monitoring purposes. These data were then used to produce an individual report for each participant. (*A copy of an individual report can be found in Appendix 6c*).

10.6 Questionnaires

In order to collect data on both clinical and occupational psychosocial factors, 8 instruments were chosen. All the questionnaires in the booklet had been previously validated, with the exception of the attribution questionnaire (see Methods 2). A full description of the questionnaires is provided in the following sections, and a copy of the questionnaire booklet along with the scoring systems can be found in Appendix 6d.

10.6.1 Tampa Scale of Kinisiophobia

The Tampa Scale of Kinisiophobia (TSK) was devised by Kori et al (Kori, Miller, & Todd 1990) who suggested that, in many cases, chronic pain behaviour has more to do with phobic processes than neurologic ones - and that treating chronic pain may be largely a matter of treating fear. The term 'kinisiophobia' refers to an irrational and debilitating fear of physical movement resulting from a feeling of vulnerability to painful injury or reinjury. Linton (Linton 1985) found that chronic back pain patients avoided activities because they expected increased pain, even when actual participation in those activities did not increase pain.

The questionnaire consists of 17 items, using a four-point Likert scale ranging from 1=strongly disagree to 4=strongly agree. A high score would indicate a high level of kinisiophobia, with a low score indicating the opposite. *(The scoring system for TSK can be found in Appendix 6d).*

10.6.2 Short Form-36 Health Survey

The Short Form-36 Health Survey (SF-36) (Medical Outcomes Trust, Boston, MA) is a multipurpose, short-form health survey with 36 questions and has been widely used and documented in more than 1000 publications (Shiely, Bayliss, & Keller 1996). The eight sub-scales in the questionnaire were selected to represent the most frequently measured concepts in widely used health surveys and those most affected by disease and treatment (Stewart & Ware 1992). These concepts include physical and social functioning, role limitation (both physical and emotional), mental health, vitality, pain and general health. The SF-36 has been shown to be valid, reliable and responsive to change in health for people presenting with musculoskeletal disorders (Garratt et al. 1994), (Garratt et al. 1993), (Ruta et al. 1994).

The sub-scales aggregate between 2 and 10 items each, and have Likert-style scales, ranging from 3 points to 5 points. In accordance with changes made to the SF-36 by Garratt et al(Garratt et al. 1994), (Garratt et al. 1993), (Ruta et al. 1994), the modified version was used in the present study. The eight scales are hypothesised to form two distinct higher-order clusters due to the physical and mental health variance that they have in common. Scores on both these physical and mental components range from 0-100, with a low score indicating a negative outcome for the respondent, and a high score indicating a positive outcome. The standardised norm score for each of these two subscales was reported as 50 (Ware 2000). *(The scoring system for SF-36 can be found in Appendix 6d).*

10.6.3 Psychosocial Aspects of Work questionnaire

The Psychosocial Aspects of Work (PAW) questionnaire was previously used in the workforce survey phase of the present study (see Methods 1, section 5.1.2). For use in the experimental intervention, only the subscales of job satisfaction and social support were used, as the subscale of mental stress was not found to be a useful measure following analysis of the workforce survey data (see Results 2 & 3).

10.6.4 Attribution questionnaire

The attribution questionnaire was also used in the workforce survey (see Methods 1, section 5.1.6). For use in the experimental intervention, it was decided to use only the attributions of cause relating to work factors subscale (ATTRIBW) from the original questionnaire. This was because a major section of the psychosocial assessment was aimed at addressing fear-avoidance beliefs regarding work. The wording at the beginning of the questionnaire was changed to relate to all MSDs (not just LBP), because participants would be experiencing both LBP and ULDs. Only 11 items out of 12 included in the original subscale were used, because the item "dissatisfaction with the work" was considered to be redundant in addition to the job satisfaction subscale of PAW.

10.6.5 The Pressure Management Indicator

The Pressure Management Indicator (PMI) was also used in the workforce survey (see Methods 1, section 5.1.9. Only those sections of the PMI relating to control at work and personal influence at work were used for the experimental intervention.

10.6.6 Psychological Demands

The Psychological Demands questionnaire was adapted from The Job Content Questionnaire (JCQ) (Karasek et al. 1998). The JCQ is a self-administered instrument designed to measure social and psychological characteristics of work. The most widely used scales of the questionnaire are (a) decision latitude, (b) psychological demands, and (c) social support. For the present study, it was decided to use only the psychological demands subscale.

The psychological demand component of the JCQ relates to "how hard workers work" (Meshkati, Hancock, & Rahami 1990), and although the scale has been criticised by researchers for several deficiencies (Kristensen 1996), (Johnson et al. 1996), the interaction between perceived control over demands at work has been consistently identified in the literature as a predictor for MSDs (Hollmann, Heuer, & Schmidt 2001), (Linton 2001). Therefore, it was decided that it was an important psychosocial factor to be explored in the present study.

The psychological demands subscale consists of five items using a four-point Likert scale, ranging from; 1=strongly disagree to 4=strongly agree, producing a score between 25 and 50. A higher score indicates high psychological strain, which is said to result from "a very unmotivating job setting leading to negative job learning or gradual loss of previously acquired skills"(Karasek et al. 1998). A lower score, in contrast, relates to 'good stress' and involves active behaviour development, which is said to predict motivation, new learning behaviours, and coping pattern development. *(The scoring system for the Psychological Demands questionnaire can be found in Appendix 6d).*

10.6.7 The Visual Analog Scale

The Visual Analog Scale (VAS) is one of the most widely used measures of recording pain intensity (Carlsson 1983), (Huskisson 1974). Pain is a common presenting symptom of most musculoskeletal conditions (Jadad & McQuay 1993), and is important to measure because a spectrum of syndromes associated with pain can differ as to aetiology, clinical presentation, and interactions with psychological, social, and economic status of the individual (Zanoli, Strömqvist, & Jönsson 2001). The utility of VAS in assessing pain intensity can be directed at different goals: 1) to describe differences between individuals or groups of people, 2) to predict outcomes, and 3) to evaluate change over time.

The VAS consists of a horizontal line measuring 100mm, and the respondent is asked to represent their level of pain by marking the line. The score ranges between 0-100, whereby 0 represents "no pain at all" and 100 represents "the worst pain imaginable".

10.6.8 Pain Drawing

The Pain Drawing consists of front and back outlines of a body on which the respondent is required to indicate different sensations (usually ache, pain, pins and needles, and numbness) by drawing symbols (Parker, Wood, & Main 1995). The Pain Drawing has been described as an aid to psychological evaluation of patients with MSDs and that "it can be used to screen out 93% of chronic back pain patients with poor psychometrics" (Ransford, Cairns, & Mooney 1976).

However, further attempts to replicate these findings have failed, and criticisms of the Pain Drawing have emerged, with confusion as to what it actually measures. A study by Parker et al (Parker, Wood, & Main 1995) concluded that the Pain Drawing has high face validity for respondents, and could act as an introduction to further psychometric assessment, but its predictive power was poor.

There has been no firm consensus on the scoring method to be used for the Pain Drawing (Ohlund et al. 1996), but following analysis of three methods of scoring, Parker et al (Parker, Wood, & Main 1995) concluded that the Pain Sites system was a reliable method. Using this system, a score is calculated ranging between 0-38, whereby a higher score would indicate a poorer psychometric profile. *(The Pain Sites scoring system for the Pain Drawing can be found in Appendix 6d).*

10.7 Follow-up procedure

After a period of 12-months, each participant was then contacted by the OHAs on the intervention sites and invited to complete a follow-up questionnaire. The follow-up questionnaire booklet comprised of the same questionnaires as the baseline questionnaire booklet, with the exception of the Pain Drawing. A questionnaire was added in order to evaluate the participants' levels of satisfaction with the various aspects of the intervention. (*A copy of the follow-up questionnaire booklet can be found in Appendix 6e).*

In the event that participants did not attend appointments with the OHA to complete the follow up questionnaires, a reminder letter emphasising the importance of completing the questionnaires, along with another copy of the booklet and a stamped-addressed envelope for return were sent to the participant. *(A copy of the reminder letter can be found in Appendix 6f).*

RESULTS 4

Experimental intervention recruitment

11.1 Feasibility of experimental intervention

Preceding the main trial of the experimental intervention, a feasibility stage was implemented at the proposed experimental sites. Here, the OHAs delivered the experimental intervention as per protocol (see Figure 10.1), and collected baseline questionnaire data. Following careful monitoring, it was decided that data collected from participants recruited during this feasibility stage (n=20) would be incorporated into the main experimental intervention data. Thus, in total, participants were contacted and invited to receive the experimental intervention over a period of 12 months, commencing at the beginning of the feasibility stage (Aug00-Jul01).

During this 12-month period, 196 workers were contacted across both experimental sites. In total, 67.9% (n=133) of workers contacted agreed to receive the experimental intervention. Figure 11.1 is a flow-chart illustrating the breakdown of participants recruited into the experimental intervention.

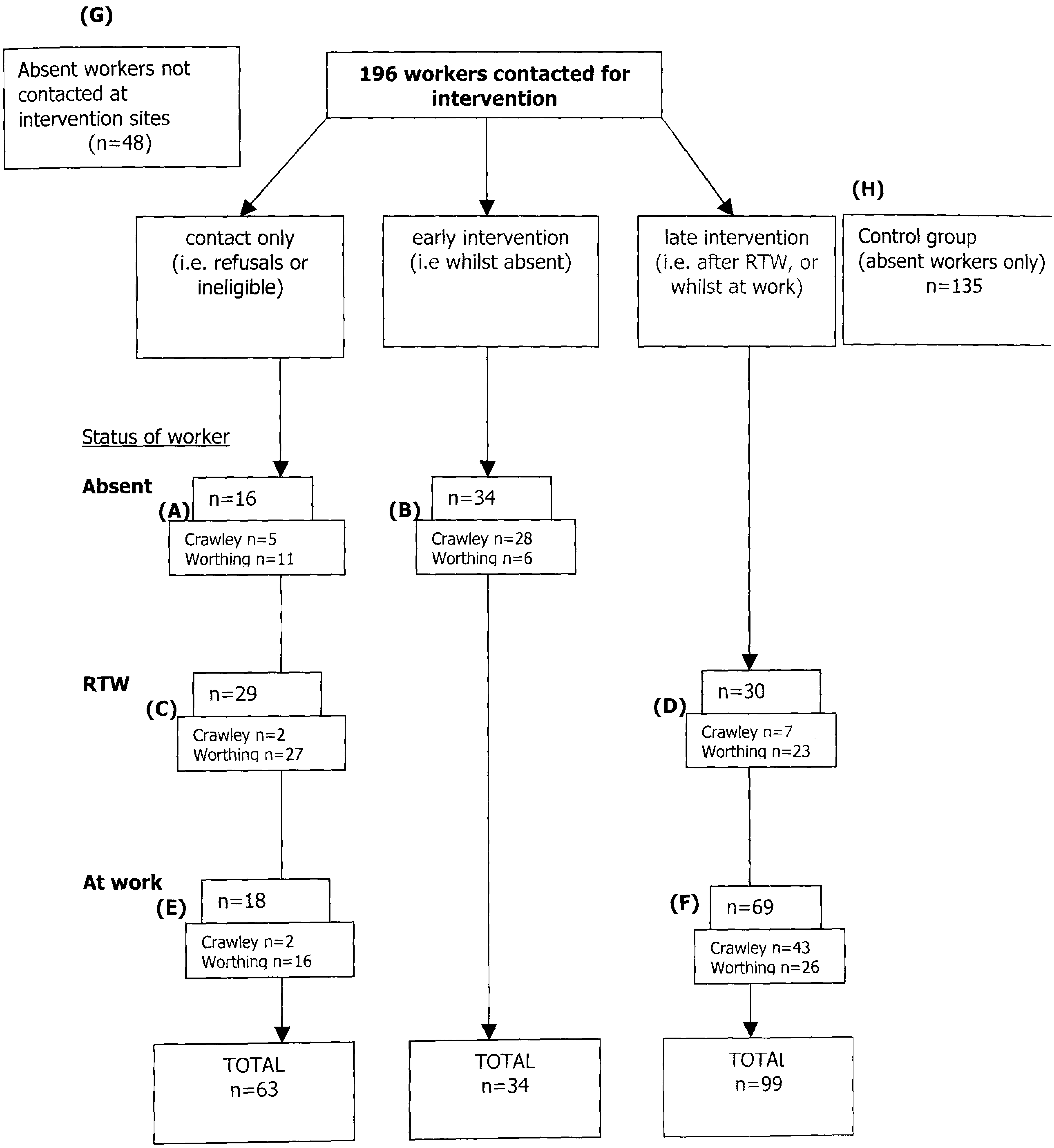

Figure 11.1: Breakdown of participants contacted and recruited for experimental intervention

11.2 Discrepancies in delivery of experimental intervention

Over the course of the recruitment period, it became apparent that the majority of absent workers were not contacted early (see Figure 11.1). It was found that 44.4% (n=87) of workers were contacted and invited to receive the intervention whilst at work, 30.1% (n=59) were contacted after they had returned to work, and just 25.5% were contacted whilst they were absent, i.e. early. Therefore, delivery of the intervention was not carried out as per protocol, with only 31.8% (n=50) of absent workers being contacted early, out of the total number of workers who took absence during this period (n=157, Figure 11.1, Boxes A-D & G).

However, this total number of absent workers included temporary workers, who were not eligible for the experimental intervention. Therefore, the total number of workers who had taken absence due to MSDs at the experimental sites was reduced by 8% (the percentage of temporary workers at GSK). This increased the percentage of absent workers being contacted early to 34.7% - see Figure 11.2.

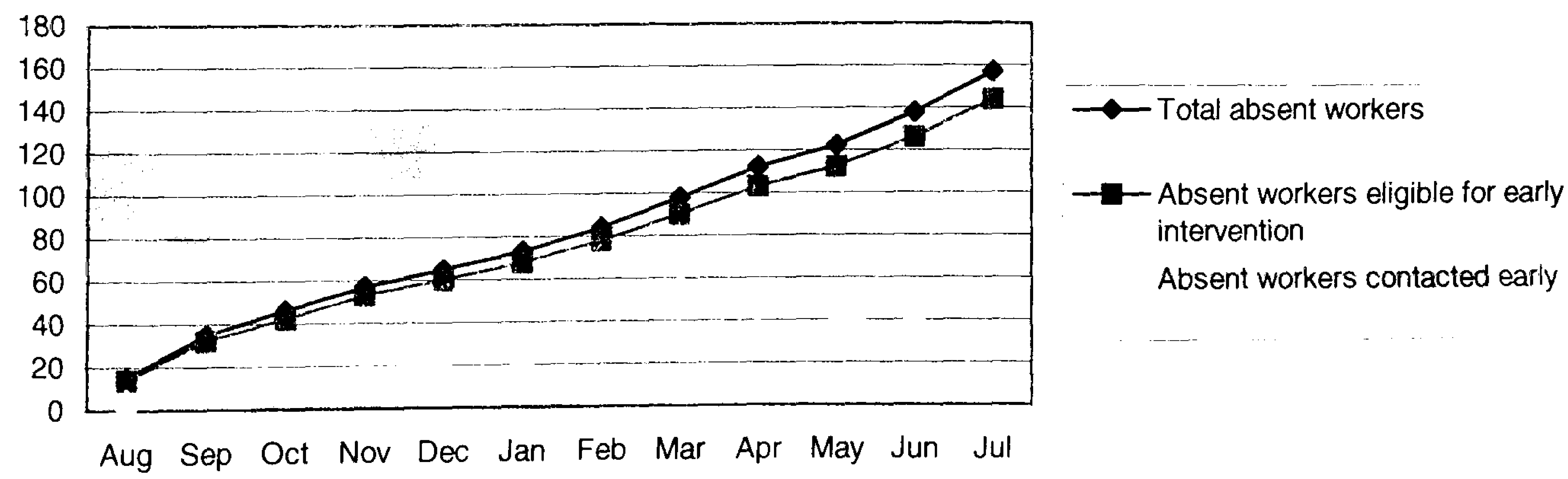

Figure 11.2: Number of workers who had taken absence due to MSDs across the experimental sites, the number of absent workers eligible to receive the early intervention, and the actual number of workers contacted for the early intervention.

11.2.1 Notification of absence

In order to try and establish why there was an under-representation of workers contacted for the early intervention, the method of absence notification to the OHAs was examined. It was found that a substantial proportion of notifications came from sickness certificates, which were routinely produced *after* return-to-work. Further exploration found this phenomenon to exist mostly at one experimental site (Worthing), and not the other (Crawley) - see Table 11.1.

Table 11.1: Method of absence notification for workers contacted at experimental sites

Notification Method	**Worthing**	**Crawley**	***Notification method totals***
Team Leader	43.3% (n=29)	31.0% (n=13)	74.3% (n=42)
Self-referral	16.4% (n=11)	57.1% (n=24)	73.5% (n=35)
Certificate	35.8% (n=24)	9.5% (n=4)	45.3% (n=28)
No method reported	4.5% (n=3)	2.4% (n=1)	6.9% (n=4)
Site Totals	100.0% (n=67)	100.0% (n=42)	(n=109)

Further consultation with the OHAs revealed that the proposed early notification culture was indeed in place at Crawley, but not at Worthing. This early notification culture at Crawley meant that in addition to Team Leaders notifying OHAs of absent workers early, absent workers themselves contacted the OHA directly (see Table 11.1).

In contrast, an early notification culture was not found to be in place at Worthing, whereby absent workers did not routinely notify the OHAs of their absence (see Table 11.1). At Worthing, it was found that often the OHAs first notification of absence was via a sickness certificate (often incurring a delay of up to 4 weeks), and although the majority of absence notifications came from Team Leaders, this was mostly after return-to-work. Therefore, in order to acknowledge these differences between the experimental sites, it was decided to compare the sites in terms of intervention delivery.

11.3 Intervention delivery between experimental sites

From the total number of workers contacted for the experimental intervention (n=196), 67.9% (n=133) actually received the intervention (Figure 11.1, Boxes B, D & F). The remaining workers either declined the intervention or were deemed ineligible by the OHA (Figure 11.1, Boxes A, C & E). However, this number of workers (n=63) was not distributed equally across both experimental sites - only 4.6% (n=9) of workers contacted at Crawley were deemed ineligible for, or declined the experimental intervention, compared with 27.6% (n=54) at Worthing. Therefore, the majority of experimental intervention participants came from Crawley (n=78) compared to Worthing (n=55), despite the size of the population at Worthing being approximately twice the size of that at Crawley. - see Table 11.2.

Table 11.2: Number of workers contacted for intervention, and number who did and did not receive the intervention across experimental sites

Site	Contacted (n)	Received intervention (n)	Ineligible (n)	Declined (n)
Worthing	109	55	20	34
Crawley	87	78	1	8
Totals	196	133	21	42

11.3.1 Non-eligibility

There was found to be a disproportionate number of workers who were deemed ineligible at Worthing (n=20) as compared to Crawley (n=1). In order to understand this further, OHAs at Worthing were asked to define their eligibility criteria further. In response to this, the OHAs stated that reasons for ineligibility were due "confidential medical information", suggesting that workers were being excluded on medical grounds. There were no *a priori* reasons to suppose that Worthing and Crawley should be different in this respect, but it was decided that it was not appropriate to question the OHAs further on this subject.

11.3.2 Declining

There was also found to be a disproportionate number of workers who declined the intervention at Worthing (n=34) compared to Crawley (n=8). In order to understand this further, a questionnaire was sent to all workers who declined the experimental intervention (n=42). The response rate to this questionnaire was 33.3% (n=14). The most common reason given for declining the intervention by the respondents was that they "felt better" at the time of contact, and that the intervention "would not be useful at this time". Although the response rate to this questionnaire meant that answers were not representative of the target population, the themes of the responses were quite consistent. *(A copy of the refusal questionnaire can be found in Appendix 7a).*

11.3.3 Timing of contact

In acknowledgement of the responses from the refusals questionnaire, and in terms of the different absence notification procedures between the experimental sites (see section 11.2.1), the association between timing of contact and receipt of the experimental intervention was examined. First, the two experimental sites were compared in terms of how long it took OHAs to contact absent workers. It was found that the average time taken to contact absent workers was significantly longer at Worthing at 14.64 working days, compared to 3.40 working days at Crawley ($P<.001$) - see Table 11.3.

Table 11.3: Mean number of working days taken to contact absent workers at experimental sites, along with standard deviations (SD) and the range of working days

Site	Mean contact time	Range
Worthing (n=67)	14.64 working days (11.81)	0-53 working days
Crawley (n=42)	3.40 working days (5.43)	0-26 working days

Then, in order to examine whether the timing of contact had any association with receipt of the experimental intervention, contact times were categorised as either early (< 1 week) or late (> 1 week), and absent workers were categorised by those declining or agreeing to receive the experimental intervention (n=92). It was found that a significantly greater number of absent workers contacted early agreed to receive the intervention compared to workers who were contacted late ($P<.001$) - see Table 11.4.

Table 11.4: Early vs late contact and number of absent workers agreeing or declining to receive intervention (n=92)

	Early contact	Late contact
Workers agreeing to intervention	35	28
Workers declining intervention	6	23

11.4 Results Summary

- It can be summarised that, the sickness absence procedures precluded the delivery of an early intervention at Worthing. In contrast, the sickness absence procedures in place at Crawley facilitated the delivery of an early intervention.
- Late contact (of absent workers) significantly increased the likelihood of participants declining the experimental intervention, with the majority of late contact occurring at Worthing.
- The differing sickness absence procedures between the two experimental sites led to a third class of 'flag' being proposed - black flags. These were defined as organisational policies or procedures that can impede intervention efforts.

RESULTS 5

Psychosocial scores at baseline & follow-up

12.1 Breakdown of experimental sample

During the 12-month recruitment period (Aug00 to Jul01), 133 workers received the experimental intervention and completed baseline questionnaires. Figure 12.1 is a flow chart illustrating how the breakdown of the experimental sample.

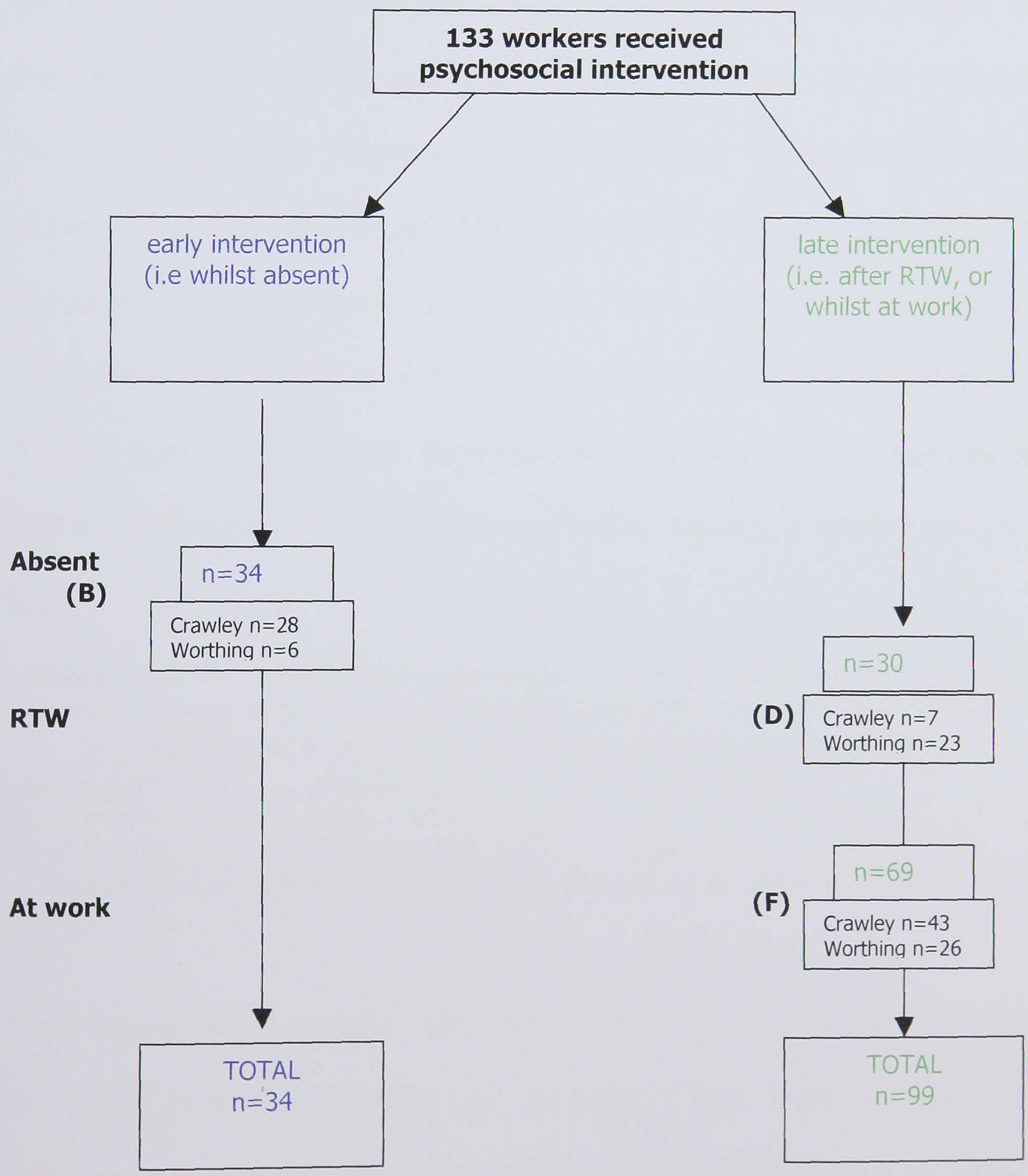

Figure 12.1: Breakdown of experimental sample

12.2 Representativeness of experimental sample

In order to examine whether the experimental sample was representative of the actual experimental site population (n=1,435), the proportions of the experimental sample were categorised by gender and job-type (manual/non-manual), and then compared to those same proportions of the experimental sites (see Table 12.1). It was found that the majority of the experimental sample was male (n=89) and were manual workers (n=92); similarly, the majority of the experimental site populations as a whole were males (n=933) and manual workers (n=947). The majority of the experimental sample came from the 41-65 age group (n=68), but comparable data for the experimental sites as a whole were not available. Thus, it was concluded that the experimental sample was representative of the experimental site population as a whole in terms of gender and job-type.

Table 12.1: Proportions of experimental sample based on age, gender and job-type, expressed as a percentage and compared with actual experimental site proportions (percentage in brackets).

Age group*	Gender	Job Type
19-40 = 49%	Male = 67% (65%)	Manual = 69% (66%)
41-61 = 51%	Female = 33% (35%)	Non-manual = 31% (34%)

**Category was compiled by splitting the intervention sample by the mean age of 40 years.*

The experimental sample was then compared to the control sites (n=1,483) in terms of gender and job-type. There were no significant differences between the experimental and control sites in terms of gender and job-type proportions, indicating that these factors would not confound any comparable analyses between the experimental sample and control sites - see Table 12.2.

Table 12.2: Proportions of experimental sample based on gender and job-type, expressed as a percentage and compared with control site proportions.

	Intervention sites (n=1,435)	Control sites (n=1,483)
Gender	Male = 65% Female = 35%	Male = 67% Female = 33%
Job-type	Manual = 69% Non-manual = 31%	Manual = 70% Non-manual = 30%

12.3 Early and late intervention

It was found that the majority of participants received the late intervention (n=69, Figure 12.1, Boxes D & F), with the remainder receiving the early intervention (n=34, Figure 12.1, Box B). Acknowledging that there were procedural differences between the two experimental sites in terms of absence notification (see Results 4, section 11.2.1), the intervention delivery was examined for each site. It was found that significantly more participants received an early intervention at Crawley, compared with Worthing ($P<.05$) - see Table 12.3.

Table 12.3: Number of participants who received early and late intervention at each experimental site

Site	Early intervention	Late intervention	Site Totals
Worthing	6	49	55
Crawley	28	50	78
Intervention Totals	34	99	133

12.4 Mean baseline psychosocial scores

For each psychosocial questionnaire, missing values were found to account for less than 4.5% of the total response rate. Therefore the data were deemed reliable for analysis without replacing missing values. In order to examine the distribution of psychosocial scores across the experimental sample, mean baseline psychosocial scores were explored in terms of differences between gender, age (younger/older), job-type (manual/non-manual), experimental site (Worthing/Crawley), timing of intervention (early/late); presenting musculoskeletal complaint (LBP/ULD), and duration of onset for index spell (shorter/longer than 1 week) see Tables 12.4-12.10. (The mean baseline psychosocial scores for the experimental sample as a whole can be found in Appendix 8a).

12.4.1 Gender

Female participants (n=44) perceived higher psychological demands at work (*P*<.05), and had a higher score on the pain drawing (*P*<.05) compared to male participants (Table 12.4). Male participants (n=89), on the other hand, perceived less social support at work (*P*<.05) compared with female participants. There were no other significant differences in mean baseline psychosocial scores between male and female participants.

Table 12.4: Mean baseline psychosocial scores, along with standard deviations (SD) for male and female participants

Psychosocial Factor	Males	Females	*P*
TSK	37.35 (6.65)	37.21 (6.60)	ns
SF36-Physical Component	42.13 (8.03)	40.57 (7.97)	ns
SF36-Mental Component	51.41 (8.84)	49.18 (9.71)	ns
Job Satisfaction	24.01 (6.32)	25.73 (6.23)	ns
Social Support	15.32 (3.03)	16.61 (3.08)	<.05
Attribution (work)	34.74 (9.23)	36.98 (8.79)	ns
Control	16.23 (4.77)	16.26 (4.23)	ns
Personal Influence at work	11.45 (2.58)	11.21 (2.50)	ns
Psychological Demand	36.02 (4.72)	39.09 (6.25)	<.05
VAS	52.46 (2.31)	50.05 (2.27)	ns
Pain Drawing	3.66 (2.54)	4.86 (3.41)	<.05

12.4.2 *Age*

The younger age group (n=65) reported less job satisfaction (*P*<.05) than the older age group (n=68) - see Table 12.5. There were no other significant differences in mean baseline psychosocial scores between the younger and older participants.

Table 12.5: Mean baseline psychosocial scores, along with standard deviations (SD) for younger and older age participants

Psychosocial Factor	19-40 years	41-61 years	*P*
TSK	36.66 (5.63)	38.17 (6.76)	ns
SF36-Physical Component	43.46 (7.03)	40.82 (7.80)	ns
SF36-Mental Component	49.98 (9.75)	50.28 (8.81)	ns
Job Satisfaction	23.60 (6.33)	26.19 (6.09)	<.05
Social Support	15.53 (3.28)	16.07 (2.69)	ns
Attribution (work)	34.75 (8.08)	35.53 (9.82)	ns
Control	16.83 (4.31)	15.98 (4.62)	ns
Personal Influence	11.44 (2.63)	11.61 (2.22)	ns
Psychological Demand	37.66 (5.43)	36.80 (5.30)	ns
VAS	50.05 (2.26)	51.81 (2.41)	ns
Pain Drawing	4.18 (3.21)	4.07 (2.68)	ns

12.4.3 *Job-type*

Manual workers (n=92) had a higher score on the VAS (*P*<.05), and perceived less personal influence at work (*P*<.05), compared with non-manual workers (Table 12.6). Non-manual workers (n=42) on the other hand, perceived less social support at work (*P*<.05) compared with manual workers. There were no other significant differences in mean baseline psychosocial scores between manual and non-manual workers.

Table 12.6: Mean baseline psychosocial scores, along with standard deviations (SD) for manual and non-manual workers

Psychosocial Factor	Manual workers	Non-manual workers	*P*
TSK	37.77 (6.58)	36.36 (6.66)	ns
SF36-Physical Component	41.81 (8.28)	43.27 (7.61)	ns
SF36-Mental Component	50.28 (9.40)	51.50 (8.68)	ns
Job Satisfaction	25.26 (6.21	23.12 (6.38)	ns
Social Support	16.22 (2.97)	14.76 (3.15)	<.05
Attribution (work)	35.51 (9.56)	35.34 (8.21)	ns
Control	15.78 (4.82)	17.21 (3.80)	ns
Personal Influence	10.98 (2.62)	12.21 (2.18)	<.05
Psychological Demand	37.10 (5.74)	36.88 (4.81)	ns
VAS	55.79 (2.06)	42.79 (2.52)	<.05
Pain Drawing	4.25 (3.07)	3.65 (2.47)	ns

12.4.4 Experimental sites

Participants at Crawley (n=79) had a higher score on the pain drawing ($P<.05$), and perceived higher psychological demands at work ($P<.05$), compared to those participants at Worthing (n=54) - see Table 12.7. There were no other significant differences in mean baseline psychosocial scores between participants at Worthing and Crawley.

Table 12.7: Mean baseline psychosocial scores, along with standard deviations (SD) for intervention participants at Worthing and Crawley

Psychosocial Factor	Worthing	Crawley	*P*
TSK	37.35 (7.64)	37.28 (5.88)	ns
SF36-Physical Component	41.25 (8.52)	42.99 (9.40)	ns
SF36-Mental Component	51.97 (8.73)	49.78 (9.33)	ns
Job Satisfaction	23.61 (6.19)	25.27 (6.36)	ns
Social Support	15.39 (3.02)	16.01 (3.14)	ns
Attribution (work)	36.25 (9.75)	34.91 (8.68)	ns
Control	16.42 (4.56)	16.12 (4.58)	ns
Personal Influence	11.56 (2.77)	11.25 (2.39)	ns
Psychological Demand	35.81 (5.10)	37.88 (5.55)	<.05
VAS	47.94 (2.44)	54.22 (2.17)	ns
Pain Drawing	3.48 (2.25)	4.45 (3.22)	<.05

12.4.5 Early and late intervention

Those participants who received an early intervention (n=34) had a higher score on the VAS (*P*<.001) compared to those participants who received a late intervention (n=99) - see Table 12.8. There were no other significant differences in mean baseline psychosocial scores between those participants who received an early or late intervention.

Table 12.8: Mean baseline psychosocial scores, along with standard deviations (SD) for participants who received an early or late intervention

Psychosocial Factor	Early intervention	Late intervention	*P*
TSK	38.23 (6.83)	36.99 (6.54)	ns
SF36-Physical Component	40.13 (9.31)	43.02 (7.52)	ns
SF36-Mental Component	49.38 (9.46)	51.12 (9.06)	ns
Job Satisfaction	24.74 (6.01)	24.54 (6.45)	ns
Social Support	16.21 (2.98)	15.60 (3.13)	ns
Attribution (work)	36.43 (8.34)	35.09 (9.41)	ns
Control	15.57 (4.89)	16.48 (4.43)	ns
Personal Influence	11.21 (2.63)	11.43 (2.53)	ns
Psychological Demand	39.05 (5.62)	36.67 (5.35)	ns
VAS	63.24 (2.20)	47.63 (2.20)	<.001
Pain Drawing	4.65 (3.45)	3.85 (2.67)	ns

12.4.6 Presenting musculoskeletal complaint

Participants were asked to document their main musculoskeletal complaint - back, neck or arm - at the time of entry into the study. The majority of complaints were due to LBP (n=86), followed by ULDs (n=36), whilst few had complaints due to both LBP and ULDs (n=11). The latter group were not included in this analysis due to the small number.

Those participants who presented with LBP had a higher score on the TSK (*P*<.05) compared to those participants who presented with ULDs (Table 12.9). Those participants who presented with ULDs on the other hand, had a lower score on the SF36 physical health summary component

(P<.001) compared to those participants who presented with LBP. There were no other significant differences in mean baseline psychosocial scores between those participants who presented with LBP or ULD.

Table 12.9: Mean baseline psychosocial scores, along with standard deviations (SD) for participants who presented with LBP or ULDs

Psychosocial Factor	LBP	ULD	P
TSK	37.96 (6.95)	34.68 (5.08)	<.05
SF36-Physical Component	40.92 (8.18)	46.05 (6.68)	<.001
SF36-Mental Component	50.99 (8.83)	50.17 (10.36)	ns
Job Satisfaction	25.03 (5.87)	22.55 (7.38)	ns
Social Support	15.86 (3.03)	15.21 (3.22)	ns
Attribution (work)	35.42 (9.43)	35.50 (8.64)	ns
Control	16.78 (4.29)	15.76 (4.81)	ns
Personal Influence	11.50 (2.52)	11.03 (2.68)	ns
Psychological Demand	36.49 (5.08)	37.41 (5.64)	ns
VAS	51.16 (2.41)	51.62 (2.03)	ns
Pain Drawing	3.63 (2.28)	4.38 (3.46)	ns

12.4.7 Duration of onset for index spell

It was found that the majority of participants reported that they had experienced symptoms for their index spell for up to 1 week prior to the intervention (n=78). This finding illustrates that the experimental intervention was generally being administered to participants in the acute stages - see Figure 12.2.

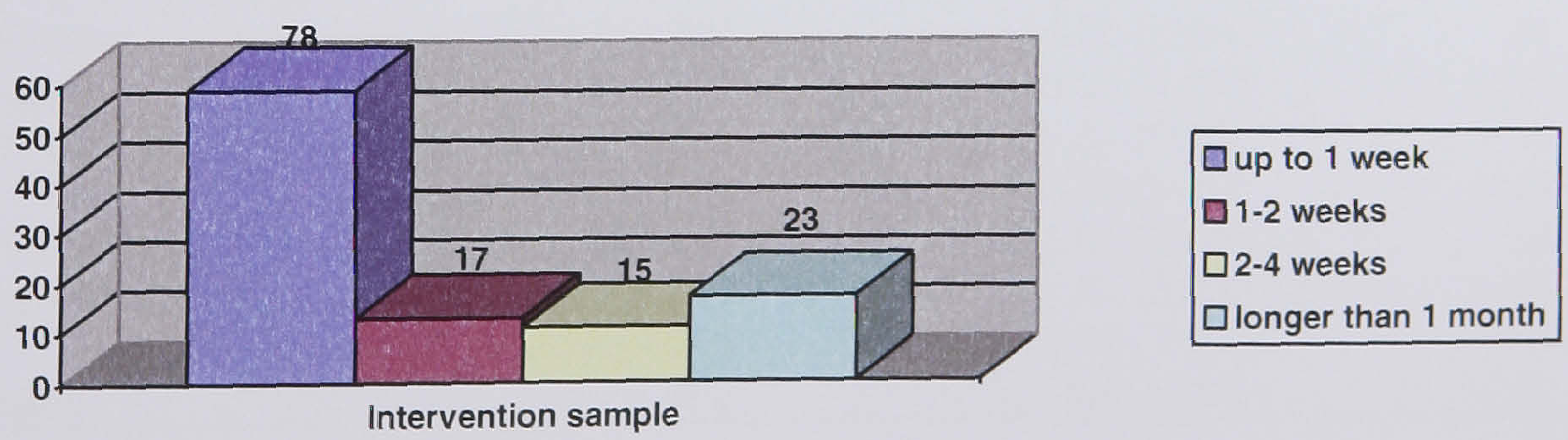

Figure 12.2: Participants who reported duration of symptoms lasting up to 1 week, 1-2 weeks, 2-4 weeks and longer than 1 month for presenting complaint

In order compare these participants in terms of mean baseline psychosocial scores, categories were combined to make durations of up to 1 week (n=78) and durations of longer than 1 week (n=55). It was found that those participants who reported duration of symptoms lasting longer than 1 week had a higher score on the TSK ($P<.001$) compared to those participants who reported duration of symptoms lasting less than 1 week. Those participants who reported durations of symptoms lasting less than 1 week, on the other hand, had a higher score on the VAS ($P<.05$) compared to those participants who had reported duration of symptoms lasting longer than 1 week - see Table 12.10. There were no other significant differences in mean baseline psychosocial scores between those participants who reported duration of symptoms lasting less than and longer than 1 week for their index spell.

Table 12.10: Mean baseline psychosocial scores, along with standard deviations (SD) for durations of symptoms lasting less than and longer than 1 week for index spell

Psychosocial Factor	Onset up to 1 wk	Onset longer than 1 wk	*P*
TSK	35.44 (6.73)	39.31 (5.90)	<.001
SF36-Physical Component	43.25 (8.21)	41.32 (7.87)	ns
SF36-Mental Component	51.29 (9.41)	50.06 (8.94)	ns
Job Satisfaction	24.67 (6.08)	24.50 (6.60)	ns
Social Support	15.96 (3.23)	15.55 (2.95)	ns
Attribution (work)	35.30 (9.13)	35.62 (9.16)	ns
Control	16.66 (5.15)	15.78 (3.80)	ns
Personal Influence	11.15 (2.68)	11.61 (2.40)	ns
Psychological Demand	36.67 (5.58)	37.41 (5.31)	ns
VAS	56.34 (2.20)	46.82 (2.30)	<.05
Pain Drawing	4.21 (2.91)	3.90 (2.90)	ns

12.5 Psychosocial scores at follow-up

Each participant was contacted 12 months after initial presentation and invited to complete the same psychosocial questionnaires as at baseline.

The response rate to the follow-up questionnaire was 77.4% (n=103). The reasons given for non-response were that participants had since left the company (Crawley n=10; Worthing n=3), and declining to complete the questionnaire (Crawley n=1, Worthing n=16).

12.5.1 Mean shifts in psychosocial scores

Although some significant differences were found between each experimental site in terms of mean psychosocial scores at baseline, they were relatively small. In terms of mean psychosocial scores at follow-up, the only significant differences between the experimental sites were higher psychological demands and higher levels of perceived social support at Crawley, but the differences in score were relatively small (see Appendix 8b). Therefore, data from the two experimental sites were combined for the following analyses.

Mean shifts on the psychosocial scores from baseline to follow up for the participants were calculated - a shift in score is the difference between a participant's first and second score on the same psychosocial measure. There were significant mean shifts for TSK, the SF36 physical health summary component, job satisfaction, and the VAS following the psychosocial intervention (P<.001). Further, the significant mean shifts were all in a 'positive' direction (indicated by the arrow in Table 12.11), with the exception of the shifts in job satisfaction scores (displayed in italics).

Table 12.11: Mean shifts in baseline psychosocial score, and standard deviations (SD), along with the 95% confidence interval (CI) after a 12-month follow-up period

Psychosocial Factor	Mean shift	95% CI
TSK	1.90 (7.26)↓	0.31 to 3.50*
SF36-Physical Component	8.38 (9.95)↑	-10.41 to -6.36
SF36-Mental Component	ns	-
Job Satisfaction	*1.24 (5.88)↓*	0.07 to 2.41*
Social Support	ns	-
Attribution (work)	ns	-
Control	ns	-
Personal Influence	ns	-
Psychological Demand	ns	-
VAS↓	38.08 (2.80)↓	3.26 to 4.36

**difference is statistically significant at 5% level*

12.6 Results Summary

- The experimental sample was representative of the experimental and control site populations as a whole in terms of gender and job-type. This indicated that any comparable analyses between intervention and control sites would not be confounded by these factors.
- Relatively few significant differences in mean psychosocial scores at baseline were found between gender, age group, job-type, intervention delivery, presenting complaint, and durations of onset for index spell. However, the majority of psychosocial scores were not significantly different which indicates that any future analyses of the association between psychosocial factors and absence for the experimental sample would likely not be confounded by the above factors.

- Several significant mean shifts in psychosocial score at 12-month follow up were observed. Further, the significant mean shifts were mostly in a 'positive' direction, indicating that the experimental intervention may have been successful in promoting positive attitudes and beliefs. However, psychosocial data from the control sites were not collected, and therefore an association between the experimental intervention and changes in psychosocial score could not be suitably established.

RESULTS 6

Experimental intervention and absence due to MSDs

13.1 Introduction

This section provides an overview of the patterns of sickness absence due to MSDs at the experimental and control sites over a 4-year period (2 years prior to the implementation of the experimental intervention and the 2-year period comprising (a) the 12-month experimental intervention and (b) the 12-month follow-up stages. Absence patterns were also explored more specifically in association with the experimental intervention.

13.2 Annual occurrence rate of absence due to MSDs

During the 2-year period prior to the implementation of the experimental intervention (Years 1 and 2), the proportions of sickness absence due to MSDs were broadly similar at both the control and experimental sites (see Tables 13.1 and 13.2). It then appears that during the experimental intervention phase (Years 3 and 4), the proportions of sickness absence due to MSDs were lower at the experimental sites.

Table 13.1: Annual occurrence of all absence and absence due to MSDs at the control sites, and proportion of all absence due to MSDs

Year	Spells of absence	Spells due to MSDs	%
Year 1*	947	105	11.1
Year 2	1668	213	13.8
Year 3	1417	205	14.5
Year 4*	1198	148	12.4

* Absence data were not available for one of the control sites for this period, therefore calculations were based on figures from two instead of three control sites.

Table 13.2: Annual occurrence of all absence and absence due to MSDs at the experimental sites, and proportion of all absence due to MSDs

Year	Spells of absence	Spells due to MSDs	%
Year 1	1390	166	11.9
Year 2	1673	204	12.2
Year 3	2421	218	9.0
Year 4	2477	232	9.4

On closer inspection it was observed that the occurrence of absence due to MSDs at the control sites was seemingly fluctuating in-line with the occurrence of non-MSD absence over the 4-year period. However, this fluctuation was not observed at the experimental sites; rather there was a substantial increase in the annual occurrence rate of non-MSD absence at the experimental sites during Years 3 and 4 (experimental intervention phase), compared to Years 1 and 2. However, there was not a corresponding substantial increase in the sickness absence rate due to MSDs; rather, a more moderate increase was observed at the experimental sites over the 4-year period.

Whilst this finding looks promising in terms of the possible beneficial effects of the experimental intervention, the proportion statistic reported in Table 13.2 is unhelpful. It gives the impression that the occurrence of absence due to MSDs decreased at the experimental sites, whereas what actually occurred was a substantial confounding increase in non-MSD absence. Therefore, further exploration of the annual occurrence rate of absence due to MSDs relative to the study workforce was undertaken.

13.2.1 Occurrence rate and proportion of study workforce

In order to further explore sickness absence due to MSDs at the experimental and control sites, absence data were standardised for each site and reported as the annual occurrence rate of absence due to MSDs for every 1000 working hours. The annual number of hours worked at each site was calculated by reducing the number of days in a year to account for weekends and standard holiday time (124 days), giving a 241 working-day year. This standardisation allowed for varying numbers of employees at each site.

It was found that the annual occurrence rate of absence due to MSDs per 1000 working hours had remained relatively stable at the control sites (Irvine, Maidenhead and Coleford) over the 4-year period. However, a general decline in absence due to MSDs was found at one of the experimental sites (Crawley), and an increase at the other (Worthing) - see Table 13.3. Thus, the overall occurrence rate of absence due to MSDs for the experimental sites (reported in Table 13.2) was confounded with the differing rates *between* the experimental sites. It should be noted that the data on the number of employees at each site were provided only for Year 3, but there were no reasons to suppose that these numbers changed substantially over the 4 -year period.

Table 13.3: Annual occurrence rate of absence due to MSDs at each site, expressed as spells per 1000 working hours

Year	Worthing (n=949)	Crawley (n=486)	Irvine (n=706)	Coleford (n=446)	Maidenhead (n=331)
Year 1	0.4	0.7	0.2	-*	0.7
Year 2	0.5	0.7	0.3	0.8	0.5
Year 3	0.7	0.6	0.2	0.8	0.7
Year 4	0.8	0.4	-*	0.7	0.8

* Absence data were not available

Plotting these data illustrates the differences between each experimental site and the control sites in terms of the annual occurrence of absence due to MSDs per 1000 hours worked (see Figure 13.1). The pattern of the increase in the annual occurrence rate of absence due to MSDs during the experimental intervention phase (Years 3 and 4) is similar between Worthing and the control sites. This increase at Worthing confounds the decrease in the occurrence of MSD absence at Crawley, resulting in a more moderate decrease at the experimental sites.

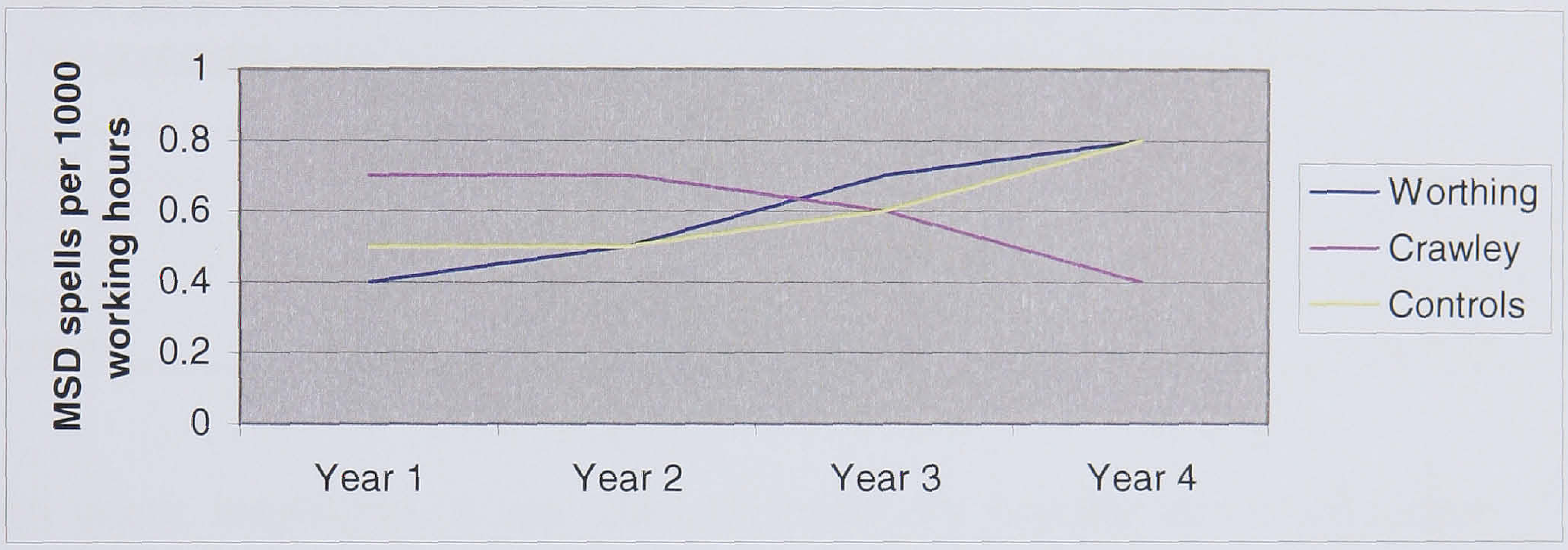

Figure 13.1: Annual average occurrence of MSDs at Worthing, Crawley and control sites, expressed as spells per 1000 working hours

13.3 Annual duration of absence due to MSDs

The annual number of working days lost due to MSDs was also explored for the experimental and control sites over the 4-year period. During the 2-year period prior to the implementation of the experimental intervention (Years 1 and 2), the annual proportion of working days lost due to MSDs was broadly similar between the control and experimental sites (Tables 13.3 and 13.5). It then appears that during the experimental intervention phase (Years 3 and 4), the annual proportion of working days lost due to MSDs was lower at the experimental sites.

Table 13.4: Annual working days lost, working days lost due to MSDs at the control sites, and proportion of all working days lost due to MSDs

Year	Total working days lost	Days lost due to MSDs	%
Year 1*	8099	1430	17.7
Year 2	14030	3047	21.7
Year 3	10437	2554	24.5
Year 4*	6247	1321	21.1

* Absence data were not available for one of the control sites for this period, therefore calculations were based on figures from two instead of three control sites.

Table 13.5: Annual working days lost, working days lost due to MSDs at the experimental sites, and proportion of all working days lost due to MSDs

Year	Total working days lost	Days lost due to MSDs	%
Year 1	11958	2424	20.3
Year 2	12965	2665	20.6
Year 3	12856	2194	17.1
Year 4	12403	1791	14.4

On closer inspection, it was observed that the number of working days lost due to MSDs at the control sites was seemingly fluctuating in-line with the number of working days lost due to non-MSDs. However, it appeared that the number of working days lost due to non-MSDs was steadily increasing at the experimental sites, but that the number of working days lost due to MSDs was decreasing. However, because of differences noted in the previous section between the experimental sites, further exploration of the number of working days lost due to MSDs relative to the study workforce was undertaken.

13.3.1 Average duration of absence for study workforce

In order to further explore working days lost due to MSDs at the experimental and control sites, the number of working days lost due to MSDs at each site was calculated for every 1000 days worked. As before, the data on the number of employees at each site were provided only for

Year 3, but there were no reasons to suppose that these numbers changed substantially over the 4 -year period.

It was found that the annual duration of absence due to MSDs decreased over the 4-year period for both the control sites and the experimental sites. However, the decrease was more marked at one experimental site (Crawley) compared to the other (Worthing) - see Table 13.6. Thus, the overall duration of absence due to MSDs reported for the experimental sites (reported in Table 13.5) was confounded with the differing durations *between* each site.

Table 13.6: Average annual duration of absence due to MSDs at each site, expressed as number of days lost per 1000 days worked

Year	Worthing (n=949)	Crawley (n=486)	Irvine (n=706)	Coleford (n=446)	Maidenhead (n=331)
Year 1	7.7 days	5.6 days	5.9 days	-*	5.4 days
Year 2	8.6 days	6.0 days	7.5 days	11.1 days	7.2 days
Year 3	7.1 days	4.9 days	5.7 days	11.7 days	4.0 days
Year 4	6.3 days	3.0 days	-*	7.9 days	5.1 days

* Absence data were not available

Plotting these data illustrates the differences between each experimental site and the control sites in terms of annual working days lost due MSDs per 1000 hours worked. Although both experimental sites reported shorter durations of absence over the 4-year period compared to that of the control sites, the pattern of the decrease is similar between Worthing and the control sites (Figure 13.2). The greatest decrease in duration of absence during the 4-year period was found at Crawley.

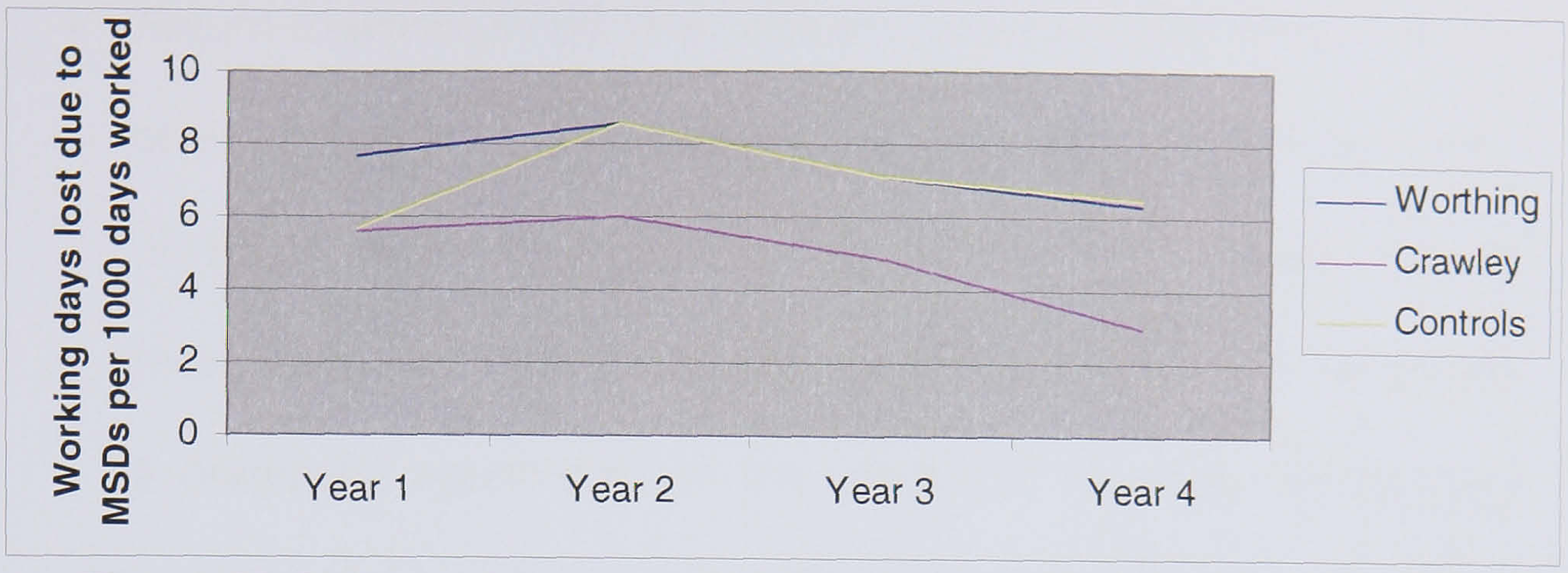

Figure 13.2: Annual average duration of absence due to MSDs at experimental and control sites, expressed as days lost per 1000 working days

13.4 Key Points

- The differences in the annual occurrence of absence due to MSDs, and the annual number of working days lost due to MSD between the experimental and control sites during the experimental intervention phase was confounded with differences between each experimental site. There was a decrease in both the annual occurrence of absence due to MSDs, and the annual number of working days lost due to MSDs at Crawley, whilst the patterns of absence at Worthing were similar to those at the control sites.

13.5 Experimental intervention and absence due to MSDs

In order to examine the individual patterns of absence associated with the experimental intervention. Two main outcomes were explored: return-to-work time (defined as the duration of the index spell of absence) and work-retention (defined as the number of days of absence over a 12-month follow-up period). Figure 13.3 is a flow chart illustrating the breakdown of individuals included in the following analyses.

- *Return-to-work (RTW)* time was the outcome associated with an early intervention. However, due to procedural differences noted previously (see Results 4), the majority of absent workers did not receive an early intervention (see Figure 13.3). In order to provide a pragmatic assessment of the effects of an early intervention, analyses were performed in order to explore RTW for all absent workers who were potentially eligible to receive the early intervention (Figure 13.3 Boxes A-D & G). RTW time was then explored in a more explanatory fashion by examining the effects of early contact-only (Figure 13.3, Box A) and early intervention (Figure 13.3, Box B). Contact-only was of interest because initial OHA contact at the experimental sites included various educational and supportive messages that were not routinely administered as part of 'management as usual' at the control sites *(see OHA Manual, Appendix 6a)*.
- *Work retention (WR)* was measured by calculating the median duration of absence due to MSDs over a 12-month follow-up period. Median durations were reported due to the skewed distribution of the absence data (see Results 3). This outcome was explored for all workers who received the experimental intervention (early and late), but a pragmatic assessment was also performed in order to explore WR for all workers who were potentially eligible to receive the experimental intervention (Figure 13.3, Boxes A-G).

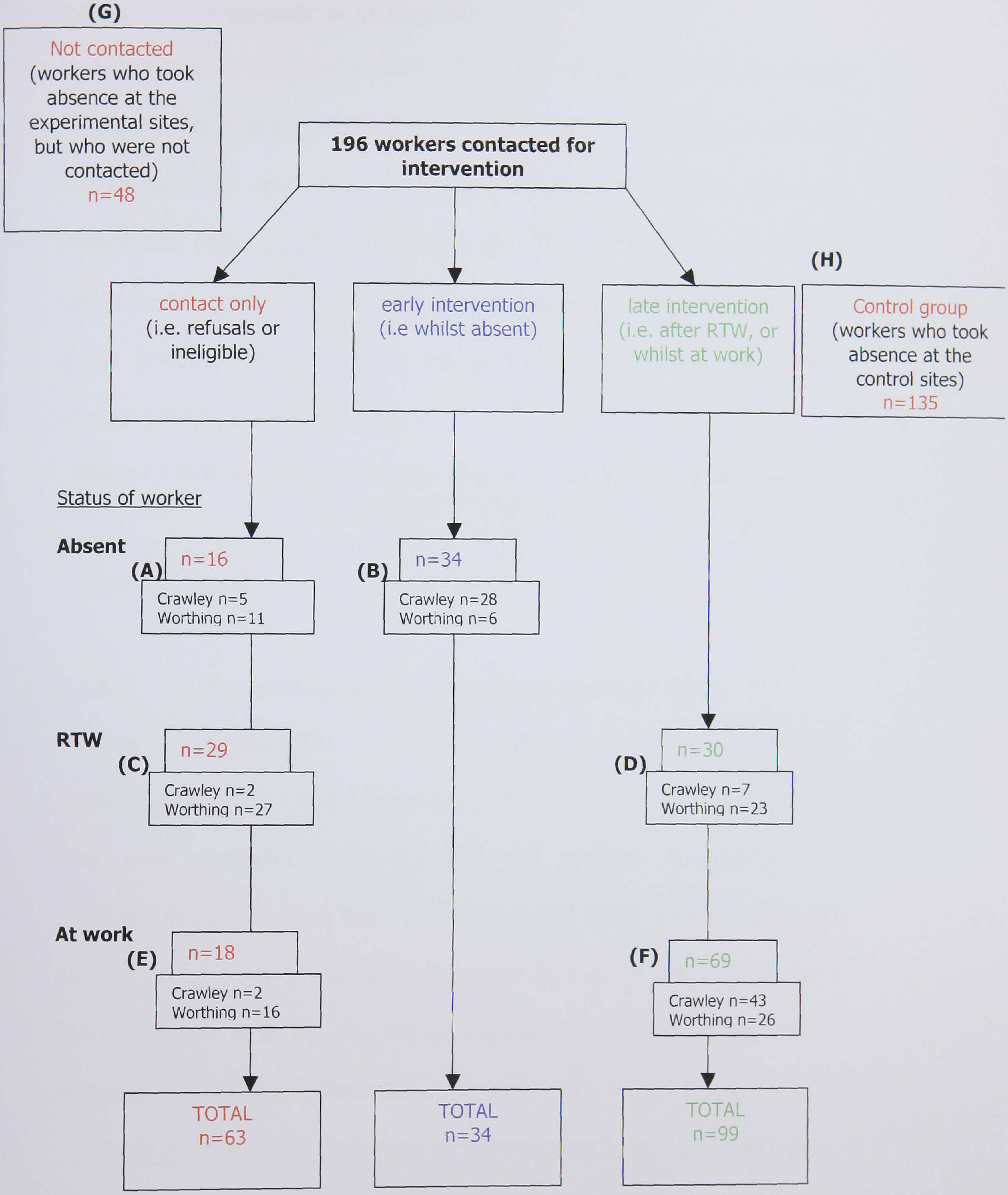

Figure 13.3: Breakdown of experimental and control groups

13.5.1 Pragmatic assessment of RTW

In order to explore return-to-work (RTW) time in a pragmatic fashion, the median duration of absence was calculated for the index spell of absence for all workers who were potentially eligible to receive the early intervention (Figure 13.3 Boxes A-D & G). The median RTW time for the experimental group (n=157) was then compared to that of the control group (n=135, Figure 13.3 Box H), and was found to be significantly shorter ($P<.05$) - see Table 13.7.

Table 13.7: Median RTW time for absent workers at experimental and control sites

	Median RTW time	z-score	*P*
Experimental group (n=157)	4.00 working days	-2.05	.041
Control group (n=135)	5.00 working days		

13.5.2 Explanatory analysis of early contact and RTW

In order to measure RTW time in a more explanatory fashion, the median duration of absence for the index spell was calculated for absent workers who were contacted early but did not receive the experimental intervention (Figure 13.3 Box A). The median RTW time for the early contact group (n=16) was then compared to that of the control group (n=135, Figure 13.3, Box H), and was actually found to be longer but no statistically significant differences were found - see Table 13.8.

Table 13.8: Median RTW time for contact only and control groups

	Median RTW time	z-score	*P*
Early contact group (n=16)	14.00 working days	-1.83	.067
Control group (n=135)	5.00 working days		

13.5.3 Explanatory analysis of early intervention and RTW

In order to measure RTW time in a more explanatory fashion, the median duration of absence for the index spell was calculated for workers who received the early intervention (Figure 13.3 Box B). The median RTW time for the early intervention group (n=34) was then compared to that of the controls (n=135, Figure 13.3, Box H) and was found to be shorter, but no statistically significant differences were found - see Table 13.9.

Table 13.9: Median RTW time for early intervention and controls

	Median RTW time	z-score	*P*
Early intervention (n=34)	4.00 working days	-1.31	.189
Controls (n=135)	5.00 working days		

13.5.4 Pragmatic assessment of work retention

In order to explore work retention (WR) in a pragmatic fashion, the median duration of absence in the subsequent 12 months was calculated for all workers who were potentially eligible to receive the experimental intervention (Figure 13.3 Boxes A-G). The median duration of subsequent absence for the experimental group (n=53) was then compared to that of the control group (n=27) and was found to be shorter, but no statistically significant differences were found - see Table 13.10.

Table 13.10: Median duration of subsequent absence for experimental and control groups

	Median duration future absence	z-score	*P*
Experimental group (n=53)	5.00 working days	-1.91	.056
Control group (n=27)	11.00 working days		

13.5.5 Explanatory analysis of contact only and WR

In order to measure WR in a more explanatory fashion, the median duration of absence in the subsequent 12 months was calculated for all workers who were contacted but who did not receive the experimental intervention (Figure 13.3, Boxes A-C). The median duration of absence in the subsequent 12 months for this group (n=14) was compared to that of the control group (n=27) and was found to be longer, but no statistically significant differences were found - see Table 13.11.

Table 13.11: Median durations of subsequent absence for contact only and control groups

	Median duration future absence	z-score	*P*
Contact only (n=14)	11.50 working days	-.606	.545
Controls (n=27)	11.00 working days		

13.5.6 Explanatory analysis of early intervention and WR

In order to measure WR in a more explanatory fashion, the median duration of absence in the subsequent 12 months was calculated for workers who received the early intervention (Figure 13.3, Box B). The median duration of absence in the subsequent 12 months for the early intervention group (n=8) was then compared to that of the control group (n=27) and was found to be shorter, but no statistically significant differences were found - see Table 13.12.

Table 13.12: Median durations of subsequent absence for early intervention and control groups

	Median duration of future absence	z-score	*P*
Early intervention (n=8)	5.00 working days	-1.24	.216
Controls (n=27)	11.00 working days		

13.5.7 Explanatory analysis of late intervention and WR

In order to measure WR in a more explanatory fashion, the median duration of absence in the subsequent 12 months was calculated for workers who received the experimental intervention at return to work, or whilst at work (Figure 13.3, Boxes D & F). The median duration of absence in the subsequent 12 months for the late intervention group (n=18) was compared to that of the control group (n=27), and it was found that the late intervention group had a significant improvement in WR (P<05) - see Table 13.13.

Table 13.13: Median durations of absence in the subsequent 12 months for late intervention and control groups

	Median duration future absence	**z-score**	***P***
Late intervention (n=18)	4.00 working days	-2.39	.017
Controls (n=27)	11.00 working days		

13.5.8 Key points

- Pragmatic explorations of the data suggested that introducing the experimental intervention would be successful in reducing return-to-work times due to MSDs, but would not be sufficient to improve work retention over the subsequent 12 months.
- However, more explanatory analyses of the experimental intervention revealed return-to-work times were not significantly reduced, but that work retention was significantly improved (late intervention only).
- It was not possible to establish any beneficial effects of OHA contact-only on return-to-work times and work retention.

- An observation of the median durations of absence suggested that an early intervention may be beneficial in reducing return-to-work times and improving work retention, but due to procedural differences noted earlier (see Results 4) the small number of absent workers recruited into the study meant that any explanatory analyses were compromised.

13.6 Psychosocial factors and subsequent absence

It was not possible to establish a relationship between the psychosocial scores of workforce survey respondents who may or may not have been experiencing musculoskeletal symptoms, and duration of subsequent absence. Therefore, the following section examined whether psychosocial factors at presentation (i.e. once pain was reported/absence had commenced) had a more pertinent association with subsequent absence. Baseline psychosocial data for experimental participants was examined in association with MSD absence over an ensuing 18-month period (details of baseline psychosocial questionnaires can be found in Methods 3). Absence data were available at the experimental sites for an additional 6-months to the 12-month follow up data, and therefore this increased the number of participants who took subsequent absence by 42.3% (n=37).

13.6.1 Occurrence of subsequent absence

In order to establish whether baseline psychosocial scores were predictive of the likelihood of subsequent absence, the mean baseline psychosocial scores for those participants who did (n=37) and did not (n=96) take future absence were compared. However, no statistically significant differences were found (*see Appendix 9a*).

13.6.2 Duration of subsequent absence

In order to establish whether baseline psychosocial scores were predictive of the duration of subsequent absence, the sickness absence data were categorised into self-certified absences (< one week, n=25), and medically-certified absences (> one week, n=12). Univariate analyses were then performed between the sickness absence durations and the baseline psychosocial scores, and it was found that longer durations of absence were significantly associated with higher levels of perceived social support - against the expected direction of the questionnaire ($P<.05$). No other significant differences were found between baseline psychosocial scores and duration of absence.

The baseline psychosocial scores were then split at the median to establish potentially 'detrimental' and 'non-detrimental' scores. Chi-squared tests were performed, but no statistically significant relationships were found between 'detrimental'/'non-detrimental' psychosocial scores and short/long absence durations. It was therefore concluded that multivariate regression analyses were not necessary or appropriate *(all analyses can be found in Appendix 9b).*

13.7 Results summary

- Results indicate that only one of the experimental sites (Crawley) had a substantial reduction both in the occurrence of absence due to MSDs, and the number of working days lost due to MSDs during the experimental intervention phase. This was in comparison with the other experimental site (Worthing), where patterns of absence were found to be similar to those of the controls.
- Return-to-work times were not significantly reduced following the experimental intervention, compared with controls. However, work retention in the subsequent 12 months was significantly improved for the experimental group (late intervention only). An observation of median durations of absence indicated that an early intervention would be beneficial in terms of reducing return-to-work times and improving work retention, but small numbers may have precluded robust analyses.
- A predictive relationship between psychosocial factors at presentation and absence due to MSDs in the subsequent 18 months was not found.

EXPERIMENTAL INTERVENTION - SUMMARY OF RESULTS

An examination of the differences between the experimental and control sites in terms of sickness absence due to MSDs was confounded by differences between the experimental sites. Further investigation indicated that only one of the experimental sites (Crawley) had a substantial reduction in absence due to MSDs during the experimental period, whereby absence rates at the other experimental site (Worthing) were similar to that observed at the controls.

Work retention was significantly improved for participants who received a late intervention (i.e. after return-to-work/whilst at work), compared with controls. However, an early intervention did not significantly improve work retention. Trends in the data indicated that an early intervention was successful in reducing RTW times, but the small number of workers who received an early intervention (due to the effects of 'black flags') may have precluded statistical significance. The present study offered evidence that a general case-management approach incorporating the principles of occupational guidelines and with "all players onside" was successful for improving work retention due to MSDs.

Detrimental psychosocial scores at presentation with MSDs were not predictive of the occurrence of, or duration of absence due to MSDs in the subsequent 18 months.

DISCUSSION

14.1 Aims of the study

The aims of the present study were: (1) to identify clinical and occupational psychosocial risk factors (yellow and blue flags) that may act as obstacles to recovery from MSDs; and (2) to assess whether an evidence-based psychosocial intervention for workers presenting with MSDs was effective in reducing return-to-work time and improving work retention. The discussion of the present study will comprise two separate, but sometimes overlapping sections: a discussion of the methodology, followed by a discussion of the results.

14.2 Discussion of the methodology

Discussion of the methodology in the present study covers five main areas: (1) the ability of the psychosocial instruments to reliably measure clinical and occupational psychosocial factors; (2) the samples obtained (sample size, compliance, and representativeness); (3) the conceptual framework and design of the experimental intervention; (4) the utility of the experimental intervention to prevent workloss due to MSDs; and (5) the collection of accurate sickness absence data.

14.2.1 Reliability and validity of the data collection instruments

In the workforce survey, six previously validated instruments were used to measure the psychosocial profile of a large workforce, and one previously validated instrument was used to collect self-report data on MSDs. Following a comparison between the sample mean scores and published mean scores, and an examination of the pattern of responses, it was considered that the psychosocial instruments were answered reliably by the workforce survey sample (see Results 1, section 7.4).

For the experimental intervention, 8 previously validated instruments were used to measure the psychosocial profile of the participants at baseline. However, mean scores from comparable study samples (occupational health settings) were not available, and therefore comparisons between the experimental sample and published mean scores were not possible.

In addition to the previously validated instruments, two other instruments were used: the Attribution Questionnaire (ATTRIB), which had been used in previous studies of workplace LBP, but had not undergone comprehensive validation procedures; and the Beliefs about Upper Limb Disorders Questionnaire (ULDQ), which was a modification of a previously validated questionnaire for LBP (BBQ). Therefore, an opportunity was presented to further validate these instruments in the course of the present study.

The work carried out on ATTRIB resulted in an instrument that can reliably measure three components of workers' causal attributions of LBP - psychosocial workplace factors (att.psych), physical workplace factors (att.phys) and organisational factors (att.org) - see Methods 2. These three subscales were more reliable and made more conceptual sense (in the present context) than the two original subscales. The relevance of understanding attributions may be apparent in practical programs initiated to promote return-to-work, and recent studies have reported that "occupationally-attributed low back pain" is distinct from similar disorders not attributed to work, in that a sudden onset is usually reported and disability outcomes are less favourable despite more intensive treatments (Hall et al. 1998;Shaw, Pransky, & Fitzgerald 2001), (Johnson, Baldwin, & Burton 1996). Thus, the successful management of MSDs would likely need to recognise the importance of workers' causal attributions. Further investigation into the utility of the new attribution questionnaire in the workplace is required.

The work carried out on ULDQ resulted in a newly validated instrument that can reliably measure beliefs about the inevitable consequences of ULDs (see Methods 2). To date, ULDQ is the first instrument of its kind. The structure of the ULDQ instrument was a modified version of another widely used instrument (BBQ), which measures beliefs about the inevitable consequences of LBP. Negative inevitability beliefs regarding the course and consequences of LBP have been shown to have a detrimental effect on outcome (Symonds et al. 1996),(Burton et al. 1996), (Burton et al. 1997), but the concept of inevitability has previously not been measured in respect of ULDs. A Principal Component Analysis (PCA) confirmed that the structure of the inevitability subscale of ULDQ was the same as that of BBQ, and as previously reported for BBQ, the second component relating to beliefs about treatments for ULDs was not reliably extracted by the PCA. This indicates that more work is required to interpret fully the complex nature of individual's beliefs relating to treatments for ULDs (Symonds 1995).

14.2.2 Sample size, compliance and representativeness

This section discusses three areas in relation to the samples obtained (both workforce survey and experimental intervention samples). Firstly, the prediction of appropriate sample sizes and then actual sample sizes obtained; secondly, problems of compliance and possible sources of non-response bias; and thirdly, representativeness of the samples when compared with the workforce as a whole, and with the experimental sites as a whole.

Workforce survey sample

GSK is a large, multi-task company, and by targeting the whole company for the workforce survey it was assumed that the respondents would be representative of an industrial workforce. An initial sample size of 7,838 employees was thought to be adequate to provide sufficient numbers of respondents for statistical analysis of the workforce survey data. In recognition that the questionnaire booklet was lengthy, a generous prize-draw was offered to all respondents in order to try and maximise the response rate. The resulting response rate (after one reminder) was 59.2% (n=4,637), and was deemed an adequate sample size for reliable statistical analyses. The survey sample was found to be representative of the workforce as a whole in terms of gender and job-type (manual/non-manual). Data on the age of the workforce as a whole were not available, but the pattern of responses did not suggest an age bias.

There were no previous estimates available for the rate of self-reported MSDs for the workforce, but the MSD absence rate (according to company records) was previously reported as approximately 5% of the workforce (n~390). Therefore, the response rate to the workforce survey should have resulted in data from approximately 230 workers who had taken previous absence due to MSDs. However, in actual fact there was an under-representation of respondents who had taken previous absence due to MSDs, amounting to 2.9% of the sample (n=135).

The reasons for this non-response bias were revealed in feedback from the Occupational Health Advisors (OHAs) as being due to concerns that responses from workers who had taken previous absence due to MSDs, particularly to the work perception questionnaires (e.g. job satisfaction), would be passed onto management. It should be pointed out here that the company was in the process of a merger, whereby downsizing was expected (by the workers), and therefore this reaction to the workforce survey was understandable. These concerns arose despite the information on the covering letter and questionnaire (see Appendix 1), which stressed that all responses were strictly confidential and would not be seen by management.

In order to enhance compliance further, it may have been reasonable to ensure that the identity of the respondents should have remained anonymous. However, being able to identify the employee was important in order that company-recorded absence data could be related to the individual. The employee ID number was also used in order to track the absence of the respondents in an ensuing 15-month period, which in turn facilitated a prospective analysis. Prospective studies are more robust than cross-sectional studies, and were a key feature of the present study, particularly when trying to establish the relationship between certain psychosocial factors and absence. So, rather than keep the identity of the respondent anonymous, every attempt was made to convey confidentiality.

In view of the non-response bias that under-represented absent workers, it was tempting to pursue those non-respondents who had taken previous absence due to MSDs in order to encourage completion of the workforce survey. However, discussions with the host institution (GSK) came to the conclusion that such steps would lead to ethical conflict, and it was (regrettably) decided that no further persuasion should be attempted. It was therefore acknowledged that analyses exploring the association between psychosocial factors and absence would be compromised (see section 14.3.2).

Experimental intervention sample

Targets for the experimental intervention sample were estimated using the previous year's absence rate due to MSDs at the experimental sites (12%, compared to 5% as a whole company average). The experimental intervention was also administered to workers who were not absent; data were not available as to how many workers presented to the occupational health department whilst at work, and therefore a target number for this group could not be estimated. Nevertheless, it was recognised that this group of potential participants would inflate the number available for the experimental intervention.

It was estimated that approximately 160 absent workers (excluding temporary workers) would be identified for the experimental intervention. The actual number of workers who took absence during the experimental period was 157, but only 109 (69.4%) were contacted for the experimental intervention. Furthermore, the majority of these workers were not contacted in the first few days of absence, but were contacted after they had returned to work. Therefore the number of absent workers contacted for the early intervention was 50 (31.8%).

This low number was unexpected because preparatory investigations indicated that OHAs were routinely notified of absence immediately. Whilst the two experimental sites were chosen carefully to match all appropriate variables, it later transpired that the two sites differed in terms of their organisational policies for absence reporting. The OHAs at Worthing were not notified of absence early, though an early reporting culture was in place at Crawley. The organisational policies at Worthing meant that, generally, early intervention was precluded.

Thus, organisational policies were found to inhibit early reporting to the OHAs, and could represent obstacles to recovery in the present study, which have been termed "black flags" (Main & Burton 2000). Many practical challenges accompany the implementation of an integrated approach to secondary prevention in occupational settings, and it would appear necessary that not only are "all the players onside" (Frank et al. 1998), but that fundamental procedures within the organisation are in place to help optimise return-to-work. This sentiment was echoed in a recent study, where the authors concluded that "if early return to work is effective, implementing it may require interventions targeted at identified barriers" (Scheel, Hagen, & Oxman 2002). The identified barriers were described as lack of information, lack of time, and work-flow barriers such as poor communication and co-ordination of activities between the 'players'. The present study found empirical evidence of the detrimental effects that black flags can have on the implementation of a return-to-work program, and supports the findings of Scheel et al (see section 14.3.5).

The experimental sample was found to be representative of the experimental sites as a whole, in terms of gender and job-type (whilst age data for the whole experimental sites were not available, the pattern of response did not indicate an age bias). Further, the experimental sample was also representative of the control sites in terms of gender and job-type, indicating that any future comparisons between these groups would not be confounded by these factors. However, due to the 'black flags' mentioned above, there was an under-representation of workers from Worthing in the experimental sample. The majority of experimental participants came from Crawley, despite the size of the population at Worthing being twice as large.

Further, there were disproportionate numbers of workers from Worthing who were deemed ineligible for the experimental intervention, who declined the experimental intervention, and who were simply not contacted. Further investigations indicated possible incorrect applications of the non-eligibility criteria at Worthing, and late contact of absent workers at Worthing increased the likelihood of these workers declining the experimental intervention. The reasons for non-contact of absent workers were unclear, but this was largely confined to Worthing. Therefore, such discrepancies were again assumed to be due to 'black flags' - a failure of notification of absence and a lack of strict monitoring procedures at Worthing.

In conclusion, even when large populations were used, and sufficient target rates were calculated, the effects of organisational climate and company policies seriously compromised the main outcomes of the present study. Such factors are not uncommon problems when working in the real world as opposed to the laboratory, and controlling for such confounding factors is usually outside the reasonable practicalities of research studies. Discrepancies between intervention theory and practice have been noted by Nielsen et al (Nielsen, Kristensen, & Smith-Hansen 2002), who found that a number of 'very real' considerations prevented their ideal design plans for a intervention to improve the psychosocial work environment from being implemented. Whilst 'real world research' is unquestionably valuable, 'real world research limits' should also be acknowledged in future studies, and have been suggested by some as legitimate research topics in their own right (Griffiths 1999).

14.2.3 Conceptual framework of the experimental intervention

This section will discuss the conceptual framework of the experimental intervention, and whether advocating early return to work and stressing the importance of keeping active is necessarily beneficial to those individuals experiencing MSDs. This will be followed by a discussion about the design of the experimental intervention, and its utility to reduce workloss due to MSDs.

The recommendations of an early return to work and the importance of keeping active are intuitively appealing. Often-cited studies have pointed out that long periods away from normal duties are associated with less favourable outcomes (Andersson, Svensson, & Oden 1983), and that recommending lengthy (bed) rest as a treatment for MSDs is unhelpful, and in some cases, potentially detrimental (Deyo, Diehl, & Rosenthal 1986), (Nachemson 1983), (Waddell 1987) (Waddell, Feder, & Lewis 1997). Such evidence has now been incorporated into guidelines recommending how best to manage MSDs (notably LBP), both in a clinical setting (Royal College of General Practitioners 1995) (Ellis 1995), (van Tulder 2002) and in the workplace (Carter & Birrell 2000), (Staal et al. 2003).

The evidence for the efficacy of early intervention has been, to date, contradictory. There have been those who advocate the use of early intervention to reduce workloss and compensation costs (Weisel, Feffer, & Rothman 1984), (Miller et al. 1995), (Haig, Linton, & McIntosh 1990), (Ryan, Krishna, & Swanson 1995), (van Doorn 1995), and others who suggest that it has no effect, or in some cases may be counterproductive (Greenwood et al. 1990), (Sinclair et al. 1997), (Cooper et al. 1996). These varying results suggest that is not simply a matter of early intervention - it may also depend very much on the content of the intervention (Waddell 1998).

It has become clear that several individual variables, such as pain catastrophising, fear of movement/reinjury, pain beliefs, and depression may be significant obstacles to return to work or activity involvement, and that these variables may play a role in maintaining disability beyond the expected recovery time (Sullivan & Stanish 2003), (Waddell, Burton, & Main 2003). Thus, the main philosophy of the present experimental intervention was an attempt to incorporate the most up-to-date evidence on psychosocial intervention, and intended to help the individual cope with their pain, and help them understand the importance of returning to/remaining at work.

The experimental intervention also incorporated recent evidence on the efficacy of secondary prevention programs, which suggests that the focus should be on achieving work re-entry, rather than a reduction in pain (Loisel et al. 2003), (van den Hout et al. 2003). This evidence importantly suggests that pain itself may not be the most important obstacle to recovery/return-to-work, and that a certain amount of emphasis should be placed on the identification of workplace factors that contribute to the development of disability (Sullivan 2003). This paradigm shift has been in response to evidence from outcomes studies which revealed secondary prevention programs initiated to date have yielded few benefits over those that would be expected from the natural course of recovery (Linton & van Tulder 2001), possibly because such factors were not addressed.

The experimental intervention was delivered using a case-management approach in the occupational setting, with the availability of modified work. The benefits of a case-management approach that makes every effort to accommodate the injured worker have been noted in recent studies (Feuerstein & Zastowny 1999), (Shrey 2000), and are in line with recommendations that delivery should be connected with the workplace, and the notion that workers experiencing MSDs need clear, unambiguous advice, preferably from one or a limited number of health professionals (Waddell & Burton 2000). In conclusion, there was no reason to believe that the conceptual framework of the experimental intervention would be detrimental; rather it fitted contemporary recommendations.

14.2.4 Design and utility of the intervention to prevent workloss

The experimental design of the study was pre/post intervention, but randomisation of participants to experimental and control arms. When testing clinical interventions, a randomised control design is preferred (Sackett et al. 2000), but there are significant difficulties with the use of such a design in occupational settings, where it becomes difficult (if not impossible) to eliminate sources of potential bias. Foremost among those would be blinding the OHAs to the intervention they were giving (experimental vs control), along with issues of possible contamination from workers on the same site receiving different interventions. The alternative, used here, is to use separate sites for experimental and control. Whilst overcoming some biases, there is the risk of introducing others (e.g. inadequate matching between experimental and control sites).

The design of the intervention, then, was chosen to be quasi-experimental (separate, pre-determined experimental and control sites). In using a quasi-experimental design, there are various factors which could compromise the internal and external validity of the results obtained, such as instrumentation, selection and history threats (Cook & Campbell 1979). Using the same instruments to measure the psychosocial profile of workers before and after the intervention minimised the threat of instrumentation bias. However, because psychosocial data could not be collected at the control sites, any changes in psychosocial profile could not be directly attributed to the experimental intervention.

Selection and history threats were seemingly controlled for, in that the experimental sites were both manufacturing sites, and were in similar locations, therefore assuming that any changes over time (maturation) would be similar. Events were monitored at all sites (experimental and control) over the experimental period, and there were no particular campaigns or policy changes during this time that would confound the results from the experimental intervention.

As far as was possible, the experimental and control sites were appropriately matched. However, it was not possible to select who would deliver the experimental intervention, rather this was pre-determined by the actual OHAs on site. It was recognised that the OHAs would not be skilled as psychosocial consultants, but their level of skill as practitioners meant that they should be capable of delivering all the components of the experimental intervention (once trained), and this level of skill would be further complemented by the use of a comprehensive training manual. A manual was devised for use by the OHAs, which outlined all procedures involved in the delivery of the experimental intervention, and gave clear instructions on how to carry out the psychosocial assessment (see Appendix 6a). The purpose of devising this manual was to try and ensure that the delivery of the experimental intervention would be comprehensive and consistent. However, it was not possible to implement auditing of actual clinical procedures during the experimental period (due to confidentiality aspects), but the data received from the OHAs was regularly monitored.

The experimental intervention was designed with advice from various health professionals about the content and underlying philosophy of its messages. The psychosocial assessment component of the experimental intervention was designed with reference to previous recommendations on how to address psychosocial factors (Kendall, Linton, & Main 1997), but was modified to be used in a manner conducive with the usual management practised by the OHAs at the experimental sites. The experimental intervention was delivered in one-on-one sessions, which had the most potential to allow individuals to express their opinions. This one-on-one approach also facilitated a more accurate assessment of the severity of the individual's problems and allowed the identification of workers with more serious underlying pathology, for whom the experimental intervention would not be appropriate. Fundamentally, this approach was believed to be a practicable means of conveying the specific messages central to the experimental intervention, and it allowed the OHAs to motivate individuals to take personal control of their problem in what was intended to be a supportive environment. There has been significant evidence to date which suggests that a supportive workplace is crucial in the return-to-work process (Amick III et al. 2000), (Habeck, Leahy, & Hunt 1991;Habeck, Hunt, & Van Tol 1998).

In addition to the one-on-one advice offered as part of the experimental intervention, educational booklets were also distributed. *The Back Book* (Roland et al. 1998) was given to workers presenting with LBP, and a pamphlet entitled *"Upper Limb Disorders - don't suffer needlessly"* was given to workers presenting with ULDs, which was a modification of a previous pamphlet (Symonds, Burton, & Tillotson 1993). Both sets of educational material have been shown to be useful in changing detrimental attitudes and beliefs about MSDs (Burton et al. 2001), (Symonds 1995). The educational material was intended to supplement the individualised intervention.

In summary, the experimental intervention tested in the present study was envisaged and devised as one possible means of implementing key features of the Faculty of Occupational Medicine's guidelines for the management of LBP at work (Carter & Birrell 2000). There is no evidence that these principles cannot apply to MSDs in general, so there were no reasons to suggest that the utility of the experimental intervention as a tool to prevent workloss due to MSDs would be inappropriate.

14.2.5 Collection of sickness absence data

Company-recorded absence data were collected in order (1) to explore absence due to MSDs in the previous 12 months, and subsequent 15 months for workforce survey respondents; (2) to explore patterns of absence between experimental and control sites over a 4-year period; and (3) to explore absence due to MSDs in association with the experimental intervention. All absence data were collected from a central facility at GSK, and all instances of MSD absence were recorded (i.e. from day 1 onwards). To make sure that this was kept consistent throughout the duration of the present study, preparatory meetings were held with OHAs at GSK to explain the study and outline the necessary requirements for consistent recording.

In the event, what was intended did not transpire. Despite attempts to maintain consistent absence recording, unavailability of absence data from two of the control sites (Coleford & Irvine) occurred in two separate years (see Results 6, Tables 13.1, 13.3, 13.4 & 13.6). One of the periods preceded the implementation of the experimental intervention, and therefore was outside the control of the present study. However, unavailability of MSD data also occurred in the 12-month follow up period for the experimental intervention. Further investigation uncovered a breakdown in communication about data collection, whereby the OHA concerned thought that collection of MSD absence data was no longer necessary; MSD absence data was collected during this period using a different procedure, so the data were not accessible for use in the present study.

In conclusion, the collection of company-recorded sickness absence data was largely accurate, but the unavailability of data resulting from changes in company recording systems were outside the control of the present study. This limitation would somewhat compromise the analyses between experimental and control sites in terms of exploring the patterns of absence due to MSDs over the 4-year period (see section 14.3.4).

14.3 Discussion of the results

The discussion of the results covers four broad areas: (1) a consideration of the psychosocial data collected in the workforce survey in association with self-reported MSDs, absence due to MSDs in the previous 12 months, and absence due to MSDs in the subsequent 15 months; (2) a consideration of the absence rates for the experimental and control sites over a 4-year period; (3) a consideration of return-to-work times and work retention rates in association with the experimental intervention; and (4) a consideration of the baseline psychosocial data collected at presentation for the experimental intervention in association with MSD absence in the subsequent 18 months.

14.3.1 Psychosocial data and self-reported MSDs

The lifetime prevalence rate for self-reported LBP for the workforce survey respondents was found to be similar to previously reported rates for the general population (Hillman et al. 1996). However, the 12-month prevalence rate for self-reported MSDs was higher for the workforce survey respondents, compared to that previously reported for the general population, but the rate closely matched those reported in previous cross-sectional studies of MSDs at work (Andersson 1986), (NIOSH 1997), (Mackay et al. 1998), (Andersson 1999b). This suggests that there was nothing unusual with the GSK sample in terms of these prevalence rates.

The percentage of workforce survey respondents who reported ULDs in the previous 12 months was slightly higher than that for LBP. This finding may have been due to the majority of the sample being non-manual workers, whereby there may have been high levels of office/VDU workers in the sample. This type of work has been associated with symptoms of ULDs in numerous studies (Aarås et al. 2001), (Bergqvist et al. 1995), (Jensen 2003), (Szeto, Straker, & Raine 2002). Interestingly, the percentage of the workforce survey respondents who reported an accompanying level of disability in the previous 12 months was higher for those reporting LBP compared with ULDs. This finding corresponds with that shown by other epidemiologic data whereby LBP has been found to be the most frequent cause of activity limitation of working age adults (Praemer, Furnes, & Rice 1992), (Andersson 1997).

The scores on most of the psychosocial instruments from respondents who had reported a previous MSD (12-month and 7-day prevalences) differed significantly in a 'detrimental' direction, compared to those for respondents who had not reported a previous MSD. Despite setting the statistical significance level at 1%, small differences in psychosocial scores (between 0.19 and 1.86 compared to the range of possible scores), achieved statistical significance. A small mean change over a large sample can readily achieve statistical significance, and can possibly over-emphasise the strength of the effect. Whilst large sample sizes are usually more desirable in order to carry out reliable and robust analyses, it was acknowledged in the present study that large numbers may lead to Type 1 errors, when it is concluded that there is an effect, where really there is not (Bryman & Cramer 1997).

14.3.2 Psychosocial data and previous MSD absence

The majority of psychosocial scores from respondents to the workforce survey who had taken absence due to MSDs in the previous 12 months also differed significantly in a 'detrimental' direction, compared to those for respondents who had not taken previous absence. As with self-reported symptoms, the significant mean differences were small, but the same issues surrounding a large sample size were not applicable here, because these analyses were concerned with much smaller numbers. It would be tempting to conclude that psychosocial factors have stronger associations with absence than self-reported symptoms, but the results were interpreted with caution due to the substantially larger size of the comparison group (i.e. those who had not taken previous absence).

Although data from the workforce survey were cross-sectional, cut-off points were established in order to explore the 'risk' that clinical and occupational psychosocial risk factors (yellow and blue flags) had on self-reported LBP and previous absence due to LBP. The nature of cross-sectional data meant that any results could not be used in a predictive manner, but these analyses were performed to draw inferential conclusions about the risk between psychosocial (particularly occupational) factors and MSDs. The present study offered evidence that occupational psychosocial risk factors (blue flags) were equally detrimental in terms of their association with self-reported LBP and associated absence, compared to the risk posed by the more established clinical psychosocial risk factors. In addition, the present study illustrated that the effect of the yellow and blue flags on MSDs was cumulative, but no-one psychosocial risk factor dominated.

However, it is acknowledged that the distinction between clinical and occupational psychosocial risk factors (yellow and blue flags) is not precise. For example, in the above-mentioned analyses, the clinical psychosocial factor was represented by GHQ which is a general measure of distress, but because it was administered in an occupational setting, the score may also have been a reflection of distress experienced in the workplace. The interactions between yellow and blue flags was not explored in the present study, but until they are further understood, caution should be applied in the choice of measurement instruments and in interpretation of results. Broadly speaking, the results in the present study suggest that in addition to clinical psychosocial risk factors, it will also be necessary to focus attention on the influence that occupational psychosocial risk factors have on the course and recovery from MSDs.

Whilst the associations between yellow and blue flags and absence were statistically significant, it was acknowledged that the odds-ratios (ORs) for these 'risks' were relatively small. Whilst this finding may have been a reflection of the choice of 'risk' measurement, the OR was used in the present study to take into account that both short and long durations of exposure (in this case, work) are purported risk factors (Thompson, Myers, & Kriebel 1998), and therefore this measure best seemed to reflect the highly variable nature of MSDs. ORs were more appropriate than measures which only take into account the risk posed by long durations of exposure (e.g. relative risks), which might, in fact, only be measuring the healthy worker survivor effect (Eisen 1995).

The cut-off points used in the OR analyses were not devised in an attempt to develop a screening tool, but for the purposes of the present study only. The nature of these analyses were in response to the growing interest in the development of a screening tool in order to identify those individuals who are likely to become disabled due to MSDs. Research into yellow flags was amongst the first that advocated the need to screen for clinical psychosocial factors that predict disability, and various instruments have been developed following this philosophy (Linton & Hallden 1998), (Hurley et al. 2001), (Marhold, Linton, & Melin 2002). The present study aimed to expand on this concept and illustrated that blue flags (occupational psychosocial factors) should also be incorporated into a screening tool. However, it can be said that most screening instruments to date have only been able to identify those psychosocial factors that are associated with disability in a clinical sense, and have not explored the relationship that psychosocial factors have with absence from work.

Research exploring the predictive power of psychosocial factors on return-to-work outcomes has been hampered by the use of cross-sectional data, short follow up times and inconsistent definitions of psychosocial factors (Linton 2001), (Schultz et al. 2002). In recognition that results from prospective studies are more robust and reliable than those yielded from cross-sectional studies, the present study used a prospective design to examine the relationship between psychosocial factors and subsequent absence.

14.3.3 Psychosocial data and subsequent absence due to MSDs

Company-recorded absence data for the workforce survey respondents were tracked over an ensuing 15-month period and, using the previously devised cut-off points, similar ORs were identified for the likelihood of subsequent absence. Whilst these findings correspond with those found in other prospective studies examining the influence of psychosocial factors and the occurrence of absence (Bigos et al. 1991), there was found to be a surprisingly few prospective studies that examined the influence of psychosocial factors on the duration of subsequent absence. The present study aimed to redress this imbalance, because duration of absence, or return-to-work time, is arguably the most appropriate target for intervention.

In accordance with the nature of MSD absence, a wide range of absence durations was found, with the majority of workers taking absence lasting less than one week. Whilst this was not an unusual finding in relation to MSD absence, a skewed distribution meant that certain statistical tests that assume a normal distribution (e.g. t-tests, linear regression) were unhelpful. It has been suggested that, to overcome the problem of skewed distribution of sickness absence data, the median number of sick-leave days should be reported (Alexanderson et al. 1994), (Marmot et al. 1995), or that sickness absence data should be categorised (North et al. 1993).

These recommendations were incorporated into the analyses performed in the present study, but a predictive relationship between the previously established yellow and blue flags, or indeed any of the psychosocial factors studied in the workforce survey, on the duration of subsequent absence was not revealed. It may be that the psychosocial factors that influence absence duration are more pertinent once absence has commenced, or pain is reported. This notion was explored, amongst others, more specifically in association with the experimental intervention.

14.3.4 Patterns of MSD absence at experimental and control sites

In order to explore the pattern of MSD absence in the experimental intervention phase, company-recorded absence data were collected over a 4-year period. This 4-year period covered the 2 years prior to the implementation of the experimental intervention and the following 2-year period comprising (a) the 12-month experimental intervention and (b) the 12-month follow-up period. The experimental and control sites were chosen because they were believed to be very similar, not least in terms of absence rates. An examination of the patterns of MSD absence at the experimental and control sites confirmed that rates were broadly similar in the 2-year period prior to the experimental intervention, suggesting that differing MSD absence rates would not confound any future comparisons between the experimental and control sites. However, the unavailability of MSD absence data from two of the control sites precluded more robust statistical analyses of the differences in MSD absence between the experimental and control sites over the 4-year period (see section 14.2.5).

Looking just at the experimental sites, further examination of the data revealed that the two sites did not have similar MSD absence rates. At Worthing, the number of spells of MSD absence increased over the 4-year period, and workers had longer durations of absence. Conversely, at Crawley the occurrence rate of MSD absence decreased over the 4-year period, and workers had shorter durations of absence. There were no reasons to suggest that Crawley and Worthing would differ in terms of absence due to MSDs, so these differences may possibly be a reflection of different sickness absence recording procedures. For example, more effective monitoring and notification of absence at Crawley could have resulted in a higher absence rate. In addition, the implementation of the experimental intervention could then have encouraged stricter recording procedures at Worthing, which could explain the increase in MSD absence rates observed at this site during the experimental period.

Acknowledging that patterns of MSD absence at the experimental sites were confounded with the differing rates between the sites, it was found that only one of the experimental sites (Crawley) had a substantial reduction in both the occurrence and duration of absence due to MSDs during the intervention period. This was in contrast to Worthing, where patterns of absence were found to be similar to that of the controls over the 4-year period. The reduction in absence at Crawley may have been as a result of the experimental intervention, because to all intents and purposes, it was delivered as per protocol at Crawley. In order to provide further conclusions, explanatory analyses of the effects of the experimental intervention were necessary.

14.3.5 Return-to-work and work retention

In order to implement an evidence-based intervention following guidelines principles, the experimental intervention consisted of several components. One of these was an early contact and intervention for absent workers, with the aim of reducing return-to-work (RTW) times. Specific analyses of the effects of an early intervention revealed that RTW times were not significantly reduced, compared with controls. However, there were trends in the data indicating that an early intervention was successful in reducing RTW times, but the small number of workers who actually received the early intervention may have precluded statistical significance. Specific evidence was presented here of the detrimental influence that black flags had, on what promised to be, a successful intervention effort.

Whilst an early intervention was aimed at specifically reducing RTW times, the effects of an early intervention on work retention was also of interest. Work retention was defined in the present study as total duration of absence due to MSDs in the subsequent 12 months. Specific analyses revealed than an early intervention was not successful in improving work retention, compared to controls. However, yet again, the trend of the data suggested that an early intervention was beneficial for improving work retention, but due to the small number of workers who received the early intervention (a consequence of black flags) statistical significance may have been precluded.

The only group where numbers were not compromised as a result of black flags consisted of those workers who received the intervention late (i.e. after return-to-work, or whilst at work). The same intervention was made available to these workers and comprised the same fundamental components recommended by guideline principles (e.g. liaison with GPs and Team Leaders, psychosocial assessment, and the availability of modified work). Analyses revealed that, in fact, this method of intervention significantly improved work retention in the subsequent 12 months, compared with controls.

In order to establish whether any findings were perhaps due to the effect of a supportive contact only, specific analyses were also performed to establish the effects of contact only on RTW/work retention. However, it was revealed that contact alone was not sufficient to reduce RTW times or improve work retention. It should be noted that the effects of contact only were measured using workers that had either declined the intervention, or who were deemed ineligible. Therefore, this result may have been a reflection of influences from other factors. It was concluded that more comprehensive studies are needed in order to establish the effect (if any) of supportive contact on absence due to MSDs.

The experimental intervention comprised several concepts, and trying to establish the specific effects associated with each of these components was complex. A systematic review of RCTs of return-to-work interventions concluded that here is still some confusion about what type of intervention works on whom, and some of this confusion may have arisen from a lack of clarity in procedure and outcome measures. Overall, the return-to-work interventions were considered heterogeneous in concept and in execution. Further, only a minority of studies adequately described the scientific concepts that served as the basis for the interventions, and some provided no explanation at all. The authors concluded that, in future, it will be important for studies of return-to-work programs to describe their concepts in comprehensive detail if clinicians, medical institutions, and workplaces are to attempt to duplicate successful programs (Staal et al. 2002).

The present study attempted to address such shortcomings by clearly defining the operational components of the experimental intervention, and the scientific concepts that served as the basis for the specific components, whilst explanatory analyses were performed in a further attempt to establish which particular components (if any) were associated with specified outcomes. Importantly, the present study also acknowledged that there were organisational barriers (black flags) in place that compromised both the implementation and outcomes. Due to the effects of black flags, it was not possible to draw reliable conclusions regarding the effects of the specific components of the intervention package, but overall, it can be said that a general psychosocial intervention conveying a supportive network, and one whereby "all players are onside", was an effective strategy for reducing absence due to MSDs. This overall package not only reflects recommendations from occupational guidelines, but has also been advocated by recent research (Hogg-Johnson & Cole 2003).

14.3.6 Psychosocial factors at presentation and future absence

Whilst it was not possible to establish a predictive relationship between the psychosocial factors measured in the workforce survey and subsequent absence due to MSDs (see section 14.3.3), it may be that psychosocial factors would be more strongly associated with subsequent absence once pain was reported/absence taken. Detrimental levels of psychosocial factors at presentation were arbitrarily considered to be scores exceeding or falling below the median (depending on scale direction). This approach of establishing psychosocial risk factors was chosen because it would be difficult to establish meaningful and robust statistically-derived cut-off points that would adequately satisfy sensitivity and specificity requirements, due to the relatively small number of workers in the experimental sample who went on to take absence in the subsequent 18 months.

In order to construct the most parsimonious regression model, exploratory univariate analyses should initially be performed, but preliminary univariate analyses failed to reveal any statistically significant relationships between detrimental psychosocial scores at baseline and subsequent absence. As a result, a statistical link between the psychosocial factors addressed in the experimental intervention and recovery from MSDs could not be established. Nevertheless, there was a trend in the data: several significant mean shifts in psychosocial score were observed between baseline and the follow-up period, and further, the significant mean shifts were mostly in a 'positive' direction, indicating that the experimental intervention may have been successful in promoting positive attitudes and beliefs. That said, because the same psychosocial data were not available from the control sites, a more explanatory conclusion about the changes in psychosocial score and the resulting influences on absence was not possible.

Stated simply, the present study was not able to provide a robust explanation of the interactions between psychosocial factors and absence. This is unfortunate because there have been few studies to date which attempt to explain the mechanisms of these psychosocial influences on absence due to MSDs. However, recent research suggests that such explanatory mechanisms may not necessarily be very helpful in isolation (Linton & Boersma 2003). This is because it has been suggested that other factors (e.g. financial aspects, other health problems) may override the influence of psychosocial factors by mediating the relations between employees' perceptions of their psychosocial environment and sickness absence (Karasek & Theorell 1990), (Stansfeld, Head, & Marmot 2000). That is not to say that psychosocial factors are unimportant, they may still act as obstacles to recovery from MSDs – yet they may be elicited relatively simply.

14.4 Conclusions, 'lessons learnt' and recommendations for further research

The present study attempted to implement the most up-to-date recommendations for the occupational management of MSDs. Up until now, investigations which explore the effects of specific guideline principles employed in an attempt to reduce absence due to MSDs, and those which explore the utility of such principles in the workplace, have not been presented. In addition, the present study also provided evidence of the unique contribution of the psychosocial work environment in association with MSDs.

Most recently, there has been a general consensus of agreement that issues fundamental to the occupational management of MSDs should consist of screening for 'red flags', along with the identification of potential psychosocial and workplace barriers for recovery (Staal et al. 2003). Evidence has been presented here which suggested that although psychosocial risk factors can predict the likelihood of future absence, routine psychosocial screening employed in an attempt to predict return-to-work may not be helpful. A recent review of biopsychosocial determinants of non-return to work following MSDs concluded that the role of psychosocial variables is emerging, but further investigation is required to specify the nature of the inter-relationships among them (Truchon & Fillion 2000). The present study was not able to define the inter-relationships between psychosocial factors, but the results provided a preliminary explanation of those relationships (see section 14.3.2).

In order to further understand the role of psychosocial factors, the most appropriate methodological design needs to be established. Employed workers mostly comprise a relatively healthy subset of the total population. Whilst most employees do not face high levels of adverse work conditions, some may face day-to-day work conditions that are tolerable on a given day, but not necessarily every day. This assumption implies that neither the average work nor the average health of a large group of employees will change much over a particular time period. Therefore, potentially interesting subgroups for future research would include workers whose psychosocial work environment has changed, workers reporting a change in health status or a change in job. Other interesting subgroups would include workers reporting long-term exposure to unfavourable job conditions or workers reporting high levels of strain. More recent research suggests that in order to accurately reflect the health of working populations, focus should be on medically-certified (or long term) absences rather than self-certified absences (Kivimäki et al. 2003), (Andrea et al. 2003). However, in order to more specifically investigate the factors that influence long-term MSD absence, different methodological and statistical approaches may need to be devised in order to take into account the small number of individuals that would fall into this category.

One of the most important 'lessons learnt' during the present study was how unpredictable, and to some extent, uncontrollable the nature of research within industry can be. Certain obstacles encountered were virtually impossible to anticipate, and attempts to negate these obstacles were largely beyond the realm of research. These obstacles undoubtedly compromised the outcomes of the present study, and in other circumstances, may have even halted proceedings. Whilst these are potential threats to any research, it was shown that extensive preparation and continued collaboration between all the members of the research team will be necessary requirements when undertaking research in industry.

Whilst it was acknowledged that certain outcomes were compromised in the present study, findings also suggest that it will be important for future research to investigate the influence of other health factors that may override the effect of psychosocial factors, particularly in an occupational context. This is because one of the most striking findings in public health epidemiology to date is of health inequalities by social class - people of lower socio-economic status have higher rates of morbidity and mortality than people of higher socio-economic status in most industrialized countries (Townsend, Davidson, & Whitehead 1988). Recent research has shown that inequalities in health by social class are still of predominant concern for workers (Waddell, Burton, & Main 2003). However, an understanding of how factors outside the workplace may mediate the influence of the psychosocial environment in relation to MSDs is likely to require complex exploration (Marmot 1999), (Voss, Floderus, & Diderichsen 2001), (Briner 1996), (Whitaker 2001). What does seem likely though, is that prevention of delayed recovery from MSDs will require a more thorough understanding of the factors that dictate absence behaviour.

14.5 Discussion of the hypotheses

The following section refers back to the hypotheses that the study was designed to test, and determines whether they are supported by the results obtained.

Workforce survey – main hypothesis

Occupational, as well as clinical, psychosocial risk factors (blue and yellow flags respectively) are significantly associated with previous reports of MSDs, and previous absence due to MSDs across a workforce.

This hypothesis was supported. It was shown that both occupational and clinical psychosocial risk factors (blue and yellow flags) were significantly associated with self-reported MSDs, and absence due to MSDs in the previous 12 months for the respondents to a large workforce survey. These findings support numerous studies that have previously documented a relationship between clinical psychosocial risk factors and MSDs, but in addition, provide a further understanding of the unique contribution of the psychosocial work environment in association with MSDs.

Workforce survey - sub-hypothesis 1

The extent of the risk posed by blue flags, will be similar to that found for yellow flags.

This hypothesis was supported. It was shown that the extent of the 'risk' posed by a range of blue flags deemed to be representative of the psychosocial work environment, was similar to that found for the token yellow flag. The data indicated that, in addition to the much-reported adverse influence of clinical psychosocial risk factors (such as depression, distress and somatisation) on recovery from MSDs, a number of occupational psychosocial risk factors (such as job dissatisfaction and low social support) were found to be consistently adverse to the same extent. That is, all the blue flags were associated with self-reported musculoskeletal symptoms and associated absence, and the size of the effect was similar to that of the token yellow flag.

Workforce survey - sub-hypothesis 2

Yellow and blue flags will be predictive of the occurrence of, and longer durations of subsequent absence due to MSDs.

This hypothesis was partly supported. It was found that the yellow and blue flags were predictive of the likelihood of absence due to MSDs during a 15-month follow up period. However, the yellow and blue flags were not predictive of the duration of absence due to MSDs during the follow up period. There has been a lack of prospective studies investigating the influence of psychosocial factors on the duration of absence due to MSDs, as opposed to whether absence ensued or not. The present study intended to redress this balance, and specifically explore the potential for yellow and blue flags as predictors of absence duration. The fact that a significant relationship could not be established casts doubt on the value of routine psychosocial screening in the workplace for identification of those individuals likely to take lengthy absence due to MSDs.

Experimental intervention - main hypothesis 1

The occupational case management of MSDs with an early, psychosocial intervention, along with the availability of modified work, will significantly reduce return-to-work times, compared with usual management (controls).

This hypothesis was not supported by the available data. An early intervention did not reduce return-to-work times other than was observed with usual management (controls). However, the trends that emerged from the data suggested an early intervention was more successful at reducing return-to-work times than usual management, but organisational barriers (black flags) meant that a relatively small number of workers actually received an early intervention, and therefore statistical significance was possibly precluded. Numerous studies have documented the beneficial effects of early intervention to prevent delayed recovery from MSDs, but evidence was presented which suggested that unless systems are in place to facilitate an early intervention, any potentially beneficial effects would be compromised.

Experimental intervention - main hypothesis 2

The occupational case-management of MSDs with a psychosocial intervention, along with the availability of modified work, will significantly improve work retention, compared with usual management (controls).

This hypothesis was partly supported. It was found that the experimental intervention significantly improved work retention in the subsequent 12 months, compared to usual management. However, these findings were as a result of a late intervention (i.e. after return to work/whilst at work). There were no significant improvements in work retention found for the early intervention group, compared with usual management. Whilst a trend in the data suggested that an early intervention was beneficial in improving subsequent work retention, small numbers in the early intervention group (as a result of black flags) meant that statistical significance was possibly precluded. It was concluded, in a pragmatic sense, a guidelines-based approach (generating a supportive network, with 'all players onside') was a successful strategy for reducing absence due to MSDs.

Experimental intervention - sub-hypothesis

Detrimental psychosocial scores at presentation will be risk factors for the occurrence of, and longer durations of subsequent absence due to MSDs.

This hypothesis was not supported. A predictive relationship between baseline psychosocial scores and absence due to MSDs following the experimental intervention was not established. It was possible that psychosocial factors may reveal a more pertinent relationship with MSDs once pain was reported/absence was taken, but any associations between detrimental baseline psychosocial scores and subsequent absence due to MSDs were not identified. Therefore, a link between the psychosocial factors addressed in the experimental intervention and absence due to MSDs was not established. This finding broadly matched that found from prospective analyses of the workforce survey, but it was acknowledged that substantially fewer experimental participants went on to take absence in relation to the workforce survey sample, and that small numbers may have compromised analyses. However, no clear trends emerged from the data, leading to a conclusion that the influence of psychosocial factors on absence behaviour is limited.

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APPENDICES

APPENDIX 1:
WORKFORCE SURVEY INSTRUMENTS

Appendix 1a. Workforce Survey Questionnaire Booklet

The layout and scoring for the instruments used in the workforce survey is as follows:

- Life in General (The General Health Questionnaire - see section 5.1.1). Each item consists of a 4-point likert scale, ranging from 0-3. Scores are then summed to give an overall total score.
- Your General Work Situation (Psychosocial Aspects of Work questionnaire – see section 5.1.2). Questions 13,14, 16, 19, 22, 24 & 26 comprise the Job Satisfaction subscale; questions 15, 17, 20 & 27 comprise the Social Support subscale; and questions 18, 21, 23 & 25 comprise the Mental Stress subscale. Each items ranges between 1 and 5, and scores are summed to give the total score for that subscale.
- Your Experiences of Musculoskeletal Disorders (Nordic Musculoskeletal Questionnaire and other self-report items – see section 5.1.3). This section comprises questions 28-32 of the booklet, and were yes/no responses.

- Your Views about Back Trouble (Back Beliefs Questionnaire – see section 5.1.5). Questions 33-35, 38, 40, 42, 44 & 46 comprise the inevitability beliefs subscale. Questions 36, 37, 39, 41 & 43 comprise the treatment beliefs subscale. Each item ranges from 1-5, and scores for items in the inevitability beliefs subscale are reversed then summed to give a total score. The scores are summed only to provide a total score for the treatment beliefs subscale.
- The Causes of Back Pain (The Attribution Questionnaire – see section 5.1.6). Questions 47, 50-54, 56, 57, 60, 63, 64 & 66 comprise the ATTRIBW subscale, and questions 48, 49, 55, 58, 59, 61, 62 & 65 comprise the ATTRIBI subscale. Scores on each item range between 1-5, and are summed to give a total score for each subscale.
- Physical Exertion in Your Job (Borg Scale – see section 5.1.7). The total score ranges between 6-20, and this is obtained by responding to one item on the scale.
- Your views about Upper Limb Disorders (The Upper Limb Disorders Questionnaire – see section 5.1.8). Questions 68, 71-74, 76-80 comprise the inevitability beliefs subscale. Questions 69, 70, 75, 81 & 82 comprise the treatment beliefs subscale. Each item ranges from 1-5, and scores for items in the inevitability beliefs subscale are reversed then summed to give a total score. The scores are summed only to provide a total score for the treatment beliefs subscale.
- The degree to which you can or cannot influence situations at work (The Pressure Management Indicator – see section 5.1.9). Questions 83-87 comprise the control at work subscale, and questions 88-90 comprise the personal influence at work subscale. Each item ranges from 1-6, and all items are summed to give a total score. For the control at work subscale, 35 is subtracted from the total score.
- Sources of pressure in your job (The Pressure Management Indicator – see section 5.1.9). Questions 91-93 & 95-99 comprise the relationships at work subscale; questions 94, 100, 102, 104, 106 & 107 comprise the home/work balance subscale; and questions 101, 103, 105 & 108 comprise the organisational climate subscale. Each item ranges from 1-6, and scores are summed to give a total subscale score.

1b. Covering letter to questionnaire booklet

A covering letter was provided with each questionnaire in order to explain the study and to give instructions for return.

30226

SmithKline Beecham

HSE
Health & Safety
Executive

Corporate Health Management

WORKING BACKS

ALTHOUGH THIS QUESTIONNAIRE IS CONCERNED WITH MUSCULOSKELETAL DISORDERS, THE HEALTH AND SAFETY EXECUTIVE ARE EQUALLY INTERESTED IN THE OPINIONS OF THOSE WHO HAVE NOT EXPERIENCED ANY SUCH PROBLEMS.

Please read the following instructions carefully:

1. **Do not fold, staple or paper clip this form.** Keep the pages together and return the questionnaire in the envelope provided.

2. Use a blue or black pen only to fill in this questionnaire - **not pencil**

3. Do not mark the form anywhere other than indicated, and follow the instructions given at the start of each section.

4. Answer ALL questions

Surname

Initials

Employee ID No

LIFE IN GENERAL

We should like to know if you have had any medical complaints and how your health has been in general, over the last few weeks.

Please answer all the questions with the answer which you think most nearly applies to you.

Remember that we want to know about your present and recent complaints, not those you had in the past. It is important that you try to answer ALL the questions.

Please shade the appropriately numbered circle, using the scale provided under each question.

Shade circles like this: ●
Not like this: ⊗

1. Been able to concentrate on whatever you're doing? ⓪ ① ② ③
(0=better than usual, 1=same as usual, 2=less than usual, 3=much less than usual)

2. Lost much sleep over worry? ⓪ ① ② ③
(0=not at all, 1=no more than usual, 2=rather more than usual, 3=much more than usual)

3. Felt that you are playing a useful part in things? ⓪ ① ② ③
(0=more so than usual, 1=same as usual, 2=less useful than usual, 3=much less useful)

4. Felt capable of making decisions about things? ⓪ ① ② ③
(0=more so than usual, 1=same as usual, 2=less so than usual, 3=much less capable)

5. Felt constantly under strain? ⓪ ① ② ③
(0=not at all, 1=no more than usual, 2=rather more than usual, 3=much more than usual)

6. Felt you couldn't overcome your difficulties? ⓪ ① ② ③
(0=not at all, 1=no more than usual, 2=rather more than usual, 3=much more than usual)

7. Been able to enjoy your normal day-to-day activities? ⓪ ① ② ③
(0=more so than usual, 1=same as usual, 2=less so than usual, 3=much less than usual)

8. Been able to face up to your problems? ⓪ ① ② ③
(0=more so than usual, 1=same as usual, 2=less able than usual, 3=much less able)

9. Been feeling unhappy and depressed? ⓪ ① ② ③
(0=not at all, 1=no more than usual, 2=rather more than usual, 3=much more than usual)

10. Been losing confidence in yourself? ⓪ ① ② ③
(0=not at all, 1=no more than usual, 2=rather more than usual, 3=much more than usual)

11. Been thinking of yourself as a worthless person? ⓪ ① ② ③
(0=not at all, 1=no more than usual, 2=rather more than usual, 3=much more than usual)

12. Been feeling reasonably happy, all things considered? ⓪ ① ② ③
(0=more so than usual, 1=about same as usual, 2=less so than usual, 3=much less than usual)

YOUR GENERAL WORK SITUATION

Please answer ALL statements and indicate whether you agree or disagree with each statement by shading the appropriately numbered circle from the scale below:

1	2	3	4	5
Completely Disagree				*Completely Agree*

Shade circles like this: ●
Not like this: ⊗ ✓

13. I enjoy my work	①②③④⑤
14. My job meets my expectations	①②③④⑤
15. I can turn to a fellow worker for help when I have problems	①②③④⑤
16. I get satisfaction from my job	①②③④⑤
17. I like most of my fellow workers	①②③④⑤
18. My job is mentally demanding	①②③④⑤
19. I enjoy the tasks involved in my job	①②③④⑤
20. My fellow workers talk things over with me	①②③④⑤
21. My job involves a great deal of mental concentration	①②③④⑤
22. I am happy with my job	①②③④⑤
23. My job involves a great deal of responsibility	①②③④⑤
24. I would recommend my place of work to a friend	①②③④⑤
25. My job causes me to worry	①②③④⑤
26. I would choose the same job, in the same place, again	①②③④⑤
27. My fellow workers accept and support my new ideas	①②③④⑤

YOUR EXPERIENCES OF MUSCULOSKELETAL DISORDERS

Musculoskeletal disorders are problems that affect muscles, ligaments, and joints (e.g. sprains, strains, trappped nerves, etc) and are experienced at work and away from work; we are interested in both.

Please answer ALL these questions, even if you have never had trouble in any parts of your body, by shading either the "yes" or "no" circle.

	yes/no
28. Have you ever experienced pain or trouble from your lower back (other than period pain or normal aches and stiffness after, say, gardening)	ⓨⓝ

(Cont.)

29. Have you at any time during the last 12 months had trouble (such as ache, pain, discomfort, numbness, *excluding things like period pain or migraine)* in: (answer yes <u>or</u> no to all of the questions)

Shade circles like this: ● Not like this: ⊗

	yes/no
neck	⊙ ⊙
shoulder(s)	⊙ ⊙
elbow(s)	⊙ ⊙
wrist(s)/hand(s)	⊙ ⊙
upper back	⊙ ⊙
lower back (small of the back)	⊙ ⊙
hips(s)/thigh(s)/buttock(s)	⊙ ⊙

30. Have you had any trouble during the last 7 days: (answer yes <u>or</u> no to all of the questions).

	yes/no
neck	⊙ ⊙
shoulder(s)	⊙ ⊙
elbow(s)	⊙ ⊙
wrist(s)/hand(s)	⊙ ⊙
upper back	⊙ ⊙
lower back (small of the back)	⊙ ⊙
hip(s)/thigh(s)/buttock(s)	⊙ ⊙

31. During the last 12 months, have you been <u>prevented</u> from carrying out normal activities (e.g. job, housework, hobbies) because of this trouble: (answer yes <u>or</u> no to all of the questions)

	yes/no
neck	⊙ ⊙
shoulder(s)	⊙ ⊙
elbow(s)	⊙ ⊙

(Cont.)

	yes/no
wrist(s)/hand(s)	Y N
upper back	Y N
lower back (small of the back)	Y N
hip(s)/thigh(s)/buttock(s)	Y N

32. In the last 12 months, have you consulted any of the following for any of the above mentioned problems: (answer yes or no to all of the questions)

	yes/no
G.P.	Y N
Occupational Health Practitioner	Y N
Osteopath/physiotherapist/chiropractor,etc.	Y N
Hospital Specialist	Y N

YOUR VIEWS ABOUT BACK TROUBLE

Please indicate your general views towards back trouble, even if you have never had any.

Answer ALL statements indicating the extent to which you agree or disagree with each statement by shading the appropriately numbered circle from the scale below:

1	2	3	4	5
Completely Disagree				*Completely Agree*

Shade circles like this: ●
Not like this: ⊗ ✓

33. There is no real treatment for back trouble	1	2	3	4	5
34. Back trouble will eventually stop you from working	1	2	3	4	5
35. Back trouble means periods of pain for the rest of one's life	1	2	3	4	5
36. Doctors cannot do anything for back trouble	1	2	3	4	5
37. A bad back should be exercised	1	2	3	4	5
38. Back trouble makes everything in life worse	1	2	3	4	5
39. Surgery is the most effective way to treat back trouble	1	2	3	4	5
40. Back trouble may mean you end up in a wheelchair	1	2	3	4	5
41. Alternative treatments are the answer to back trouble	1	2	3	4	5

42. Back trouble means long periods of time off work ① ② ③ ④ ⑤
43. Medication is the only way of relieving back trouble ① ② ③ ④ ⑤
44. Once you have had back trouble, there is always a weakness ① ② ③ ④ ⑤
45. Back trouble must be rested ① ② ③ ④ ⑤
46. Later in life, back trouble gets progressively worse ① ② ③ ④ ⑤

THE CAUSES OF BACK PAIN

Please could you rate the following items in order of how important you believe they are in causing back pain by shading the appropriately numbered circle from the scale below:

1	2	3	4	5
Never a Cause				*Always a Cause*

Shade circles like this: ●
Not like this:

47. Heavy lifts at work ① ② ③ ④ ⑤
48. Poor work technique ① ② ③ ④ ⑤
49. Safety and assistance devices not used ① ② ③ ④ ⑤
50. Long working hours ① ② ③ ④ ⑤
51. Rapid work pace ① ② ③ ④ ⑤
52. Dissatisfaction with the work ① ② ③ ④ ⑤
53. Too few breaks ① ② ③ ④ ⑤
54. Poor work posture ① ② ③ ④ ⑤
55. Unwilling to change work pattern ① ② ③ ④ ⑤
56. Lack of safety and assistance devices ① ② ③ ④ ⑤
57. Lack of information about how work is to be done ① ② ③ ④ ⑤
58. Taking risks to work fast ① ② ③ ④ ⑤
59. Poor physical condition ① ② ③ ④ ⑤
60. Monotonous work ① ② ③ ④ ⑤
61. Activities outside the workplace ① ② ③ ④ ⑤
62. Individual lacks the physique for the work ① ② ③ ④ ⑤
63. Workplace's physical environment ① ② ③ ④ ⑤
64. Lack of interest from company's management ① ② ③ ④ ⑤
65. Private problems ① ② ③ ④ ⑤
66. Lack of proper work organisation ① ② ③ ④ ⑤

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PHYSICAL EXERTION IN YOUR JOB

We would like you to rate the overall level of physical-exertion you feel is required in your job. Try to appraise your feeling of exertion as honestly as possible, without thinking about what the actual physical load is. Do not underestimate it, but do not overestimate it either. It's your own feeling of effort and exertion that is important, not how it compares to other people's.

Please look at the scale and verbal expressions first on the scale below, and then shade the appropriately numbered circle on the left (even if it does not have a corresponding verbal expression). Please shade only one circle.

O 6 No exertion at all

O 7

O 7.5 Extremely light

O 8

O 9 Very light

O 10

O 11 Light

O 12

O 13 Somewhat hard

O 14

O 15 Hard (heavy)

O 16

O 17

O 18

O 19 Extremely hard

O 20 Maximal exertion

Shade circles like this: ●
Not like this:

YOUR VIEWS ABOUT UPPER LIMB DISORDERS

Upper limb disorders (or ULDs) refer to pain or discomfort affecting hands/arms/wrists/shoulders.

hese conditions include things like RSI, tenosynovitis, carpal tunnel syndrome, tennis elbow and frozen shoulder. Please note: this questionnaire is not addressing neck trouble/pain.

Please indicate your general views towards ULDs, even if you have never had any.

Answer ALL statements and indicate whether you agree or disagree by shading the appropriately numbered circle from the scale below.

1	2	3	4	5
Completely Disagree				*Completely Agree*

68. ULDs mean long periods of time off work ① ② ③ ④ ⑤

69. Doctors cannot do anything for ULDs ① ② ③ ④ ⑤

(Cont.)

Shade circles like this: ●
Not like this: ⊗ ✓

70. A ULD should be exercised ① ② ③ ④ ⑤
71. Once you have had a ULD, there is always a weakness ① ② ③ ④ ⑤
72. ULDs are always related to work ① ② ③ ④ ⑤
73. Later in life, ULDs get progressively worse ① ② ③ ④ ⑤
74. ULDs must be rested ① ② ③ ④ ⑤
75. Surgery is the most effective way to treat ULDs ① ② ③ ④ ⑤
76. ULDs will eventually stop you from working ① ② ③ ④ ⑤
77. There is no real treatment for ULDs ① ② ③ ④ ⑤
78. ULDs mean periods of pain for the rest of one's life ① ② ③ ④ ⑤
79. ULDs mean you will never be able to use your arm properly ① ② ③ ④ ⑤
80. ULDs make everything in life worse ① ② ③ ④ ⑤
81. Alternative treatments are the answer to ULDs ① ② ③ ④ ⑤
82. Medication is the only way of relieving ULDs ① ② ③ ④ ⑤

THE DEGREE TO WHICH YOU CAN OR CANNOT INFLUENCE SITUATIONS AT WORK

Please indicate the extent to which you agree or disagree with the following statments by shading the appropriately numbered circle from the scale below:

1=very strongly disagree, 2=strongly disagree, 3=disagree, 4=agree, 5=strongly agree, 6=very strongly agree

Shade circles like this: ●
Not like this: ⊗ ✓

83. Assessments of performance do not reflect the way and how hard individuals work ① ② ③ ④ ⑤ ⑥
84. Even though some people try to control company events by taking part in social affairs or office politics, most of us are subject to influences we can neither comprehend nor control ① ② ③ ④ ⑤ ⑥
85. Management can be unfair when appraising subordinates since their performance is often influenced by accidental events ① ② ③ ④ ⑤ ⑥
86. Most of us are subject to events we cannot influence or control ① ② ③ ④ ⑤ ⑥
87. I have little influence over what happens to me at work ① ② ③ ④ ⑤ ⑥
88. I have a lot of discretion in my work ① ② ③ ④ ⑤ ⑥
89. I enjoy the freedom to manage my own work ① ② ③ ④ ⑤ ⑥
90. I think that my job gives me a lot of influence ① ② ③ ④ ⑤ ⑥

SOURCES OF PRESSURE IN YOUR JOB

The following items are all potential sources of pressure. Please rate them according to the amount of pressure you think they have placed on you during the last 3 months. Answer the questions as they apply to you in your job. If they do not apply to you do not make up the answers. For example, if a question asks about pressure from managing staff and you do not manage any staff, you should answer -1-, i.e. no pressure.

Please shade the appropriately numbered circle from the scale below:

1=very definitely not a source, 2=definitely not a source, 3=generally is not a source, 4=generally is a source, 5=definitely is a source, 6=very definitely is a source

Shade circles like this: ●
Not like this: ⊗ ✓

91. Inadequate guidance from my superiors	① ② ③ ④ ⑤ ⑥
92. Lack of consultation and communication	① ② ③ ④ ⑤ ⑥
93. Inadequate or poor quality of training/management development	① ② ③ ④ ⑤ ⑥
94. My partner's attitude towards my job and career	① ② ③ ④ ⑤ ⑥
95. Discrimination and favouritism	① ② ③ ④ ⑤ ⑥
96. Feeling isolated	① ② ③ ④ ⑤ ⑥
97. A lack of encouragement from my superiors	① ② ③ ④ ⑤ ⑥
98. Being undervalued	① ② ③ ④ ⑤ ⑥
99. Indadequate feedback about my own performance	① ② ③ ④ ⑤ ⑥
100. Absence of emotional support from others outside work	① ② ③ ④ ⑤ ⑥
101. Changes in the way you are asked to do your job	① ② ③ ④ ⑤ ⑥
102. Lack of practical support from others outside work	① ② ③ ④ ⑤ ⑥
103. Factors not under your direct control	① ② ③ ④ ⑤ ⑥
104. Home life with a partner who is also pursuing a career	① ② ③ ④ ⑤ ⑥
105. Morale and organisational climate	① ② ③ ④ ⑤ ⑥
106. Absence of stability or dependability in home life	① ② ③ ④ ⑤ ⑥
107. Pursuing a career at the expense of home life	① ② ③ ④ ⑤ ⑥
108. Characteristics of the organisation's structure and design	① ② ③ ④ ⑤ ⑥

REMEMBER - DO NOT FOLD, STAPLE OR PAPER CLIP THE PAGES OF THIS QUESTIONNAIRE - RETURN THE QUESTIONNAIRE USING THE RE-SEALABLE ENVELOPE.

Thank you for completing this questionnaire.

Name
Address
Address
Address

Dear Colleague

Working Backs Questionnaire

I am writing to you with regard to the above questionnaire. Unfortunately, I do not seem to have had your questionnaire returned, and therefore would be very grateful if you could complete the enclosed one. *(If you have since returned your questionnaire, please ignore this letter and thank you for your participation).*

This is an extremely important study which SmithKline Beecham are undertaking in collaboration with the Health and Safety Executive and the University of Manchester, in order that an innovate approach can be developed which will alleviate the suffering and working time lost due to back pain and other musculoskeletal disorders.

It is appreciated that you may not have suffered with any of these problems, and therefore do not feel that this questionnaire is relevant to you. On the contrary, the opinions and beliefs of those people who have *not* suffered with such problems are vital, as they will contribute to a more comprehensive understanding of this problem.

Additionally, there may be some hesitation regarding certain questions asked about general work and life situations. These questions are important to this research, as it is now being acknowledged that physical factors alone do not dictate the course and progression of musculoskeletal disorders. The fact that incidence rates of musculoskeletal disorders are rising among employed adults leads us to investigate the work and individual situation also. Can I also remind you again that the information you provide will be treated with the strictest confidence, and will not be seen by HR groups.

Remember that your answers will contribute towards a nation-wide understanding of the health problems faced by working adults.

Returning the questionnaire

Once you have completed the questionnaire following the instructions given, please turn over this letter, put it on top of the completed questionnaire and slip it all back into the envelope it was delivered in. Please make sure the return address is visible through the window on the envelope. The envelope can then be returned to me via the internal post by 26th May 2000. **Please do not fold or staple this questionnaire, as this will interfere with the processing of the form.**

Yours sincerely

Senior Nurse Advisor

11 Feb GSK 4 A13-A1

Rotated Component Matrix[a]

	Component		
	1	2	3
SL50WORK	.761	.257	
SL51WORK	.749	.220	
SL52IND	.706		.219
SL53WORK	.697		.189
SL60WORK	.645		.244
SL48IND		.784	.188
SL49IND		.720	.381
SL54WORK	.123	.684	
SL47WORK	.106	.635	
SL57WORK		~~.335~~	.737
SL56WORK		.422	.697
SL66WORK	.371		.687
SL64WORK	.370		.681

Extraction Method: Principal Component Analysis.
Rotation Method: Varimax with Kaiser Normalization.
a. Rotation converged in 7 iterations.

: Lack of safety & assistance devices ambiguous

Component Transformation Matrix

Component	1	2	3
1	.631	.519	.577
2	-.711	.684	.163
3	.310	.513	-.800

Extraction Method: Principal Component Analysis.
Rotation Method: Varimax with Kaiser Normalization.

Factor 1 atpsych

- Long working hours ✓
- Rapid work pace ✓
- Dissatisfaction with work ✓
- Too few breaks ✓
- Monotonous work ✓

Factor 2 atphys

- Poor work technique ✓
- Safety & assistance devices not used ✓
- Poor work posture ✓
- Heavy lifts at work ✓

factor 3 atmgt

- Lack of information about how work is to be done ✓
- Lack of safety & assistance devices ✓
- Lack of proper work organisation
- Lack of interest from company's management ✓

Total Variance Explained

Component	Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	4.422	34.017	34.017	2.857	21.977	21.977
2	1.937	14.897	48.914	2.416	18.586	40.563
3	1.221	9.389	58.304	2.306	17.741	58.304
4						
5						
6						
7						
8						
9						
10						
11						
12						
13						

Extraction Method: Principal Component Analysis.

Component Matrix[a]

	Component		
	1	2	3
SL66WORK	.648	-.129	-.417
SL56WORK	.642	.379	-.332
SL51WORK	.636	-.368	.276
SL49IND	.631	.512	
SL57WORK	.630	.314	-.403
SL64WORK	.615	-.167	-.441
SL50WORK	.585	-.374	.408
SL53WORK	.582	-.422	
SL48IND	.570	.504	.279
SL60WORK	.566	-.395	
SL52IND	.553	-.491	
SL47WORK	.443	.372	.294
SL54WORK	.430	.379	.393

Extraction Method: Principal Component Analysis.

a. 3 components extracted.

Factor Analysis

Communalities

	Initial	Extraction
SL47WORK	1.000	.421
SL48IND	1.000	.657
SL49IND	1.000	.667
SL50WORK	1.000	.648
SL51WORK	1.000	.616
SL52IND	1.000	.548
SL53WORK	1.000	.526
SL54WORK	1.000	.483
SL56WORK	1.000	.665
SL57WORK	1.000	.658
SL60WORK	1.000	.477
SL64WORK	1.000	.601
SL66WORK	1.000	.611

Extraction Method: Principal Component Analysis.

Total Variance Explained

	Initial Eigenvalues		
Component	Total	% of Variance	Cumulative %
1	4.422	34.017	34.017
2	1.937	14.897	48.914
3	1.221	9.389	58.304
4	.821	6.312	64.616
5	.744	5.727	70.343
6	.659	5.073	75.415
7	.589	4.533	79.948
8	.566	4.354	84.302
9	.483	3.719	88.022
10	.458	3.519	91.541
11	.412	3.170	94.711
12	.361	2.780	97.491
13	.326	2.509	100.000

Extraction Method: Principal Component Analysis.

4

factor 1

Reliability

****** Method 2 (covariance matrix) will be used for this analysis ******

R E L I A B I L I T Y   A N A L Y S I S   -   S C A L E   (A L P H A)

		Mean	Std Dev	Cases
1.	SL50WORK	3.0085	1.0286	4574.0
2.	SL51WORK	2.8918	.9954	4574.0
3.	SL52IND	2.2313	.9930	4574.0
4.	SL53WORK	2.6898	1.0327	4574.0
5.	SL60WORK	2.8181	1.0482	4574.0

N of Cases = 4574.0

Statistics for Scale	Mean	Variance	Std Dev	N of Variables
	13.6395	14.1720	3.7646	5

Item Means	Mean	Minimum	Maximum	Range	Max/Min	Variance
	2.7279	2.2313	3.0085	.7772	1.3483	.0905

Item-total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Alpha if Item Deleted
SL50WORK	10.6310	9.3788	.5928	.4202	.7445
SL51WORK	10.7477	9.4417	.6113	.4311	.7389
SL52IND	11.4082	9.6866	.5661	.3371	.7533
SL53WORK	10.9497	9.4963	.5671	.3343	.7529
SL60WORK	10.8214	9.7129	.5143	.2705	.7703

Reliability Coefficients   5 items

Alpha = .7913   Standardized item alpha = .7919

④ factor 2

Reliability

****** Method 2 (covariance matrix) will be used for this analysis ******

R E L I A B I L I T Y   A N A L Y S I S   -   S C A L E   (A L P H A)

		Mean	Std Dev	Cases
1.	SL48IND	4.0582	.8190	4602.0
2.	SL49IND	3.7918	.9259	4602.0
3.	SL54WORK	4.2473	.7378	4602.0
4.	SL47WORK	3.7736	.8855	4602.0

N of Cases = 4602.0

Statistics for Scale	Mean	Variance	Std Dev	N of Variables
	15.8709	6.3246	2.5149	4

Item Means	Mean	Minimum	Maximum	Range	Max/Min	Variance
	3.9677	3.7736	4.2473	.4737	1.1255	.0517

Item-total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Alpha if Item Deleted
SL48IND	11.8127	3.6341	.6468	.4362	.5978
SL49IND	12.0791	3.4300	.5940	.3842	.6256
SL54WORK	11.6236	4.4312	.4343	.2250	.7173
SL47WORK	12.0973	4.0105	.4313	.2010	.7249

Reliability Coefficients 4 items

Alpha = .7311 Standardized item alpha = .7317

Factor 3 (4)

Reliability

****** Method 2 (covariance matrix) will be used for this analysis ******

R E L I A B I L I T Y   A N A L Y S I S   -   S C A L E   (A L P H A)

		Mean	Std Dev	Cases
1.	SL57WORK	3.3755	1.0069	4605.0
2.	SL56WORK	3.4026	1.0231	4605.0
3.	SL66WORK	2.8777	.9289	4605.0
4.	SL64WORK	2.7705	1.0361	4605.0

N of Cases = 4605.0

Statistics for Scale	Mean	Variance	Std Dev	N of Variables
	12.4263	9.3280	3.0542	4

Item Means	Mean	Minimum	Maximum	Range	Max/Min	Variance
	3.1066	2.7705	3.4026	.6321	1.2282	.1084

Item-total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Alpha if Item Deleted
SL57WORK	9.0508	5.5013	.5955	.4309	.6866
SL56WORK	9.0237	5.5305	.5716	.4156	.6999
SL66WORK	9.5485	5.9449	.5564	.3546	.7092
SL64WORK	9.6558	5.6763	.5222	.3349	.7275

Reliability Coefficients 4 items

Alpha = .7620 Standardized item alpha = .7629

4 Mar (3)

Factor Analysis

Random split

confirmed same.

(Appendix)

Communalities

	Initial	Extraction
SL47WORK	1.000	.402
SL48IND	1.000	.656
SL49IND	1.000	.666
SL50WORK	1.000	.647
SL51WORK	1.000	.597
SL52IND	1.000	.549
SL53WORK	1.000	.527
SL56WORK	1.000	.667
SL57WORK	1.000	.669
SL60WORK	1.000	.474
SL64WORK	1.000	.616
SL66WORK	1.000	.600
SL54WORK	1.000	.472

Extraction Method: Principal Component Analysis.

Total Variance Explained

Component	Initial Eigenvalues		
	Total	% of Variance	Cumulative %
1	4.370	33.617	33.617
2	1.979	15.221	48.838
3	1.193	9.173	58.011
4	.861	6.624	64.635
5	.750	5.766	70.401
6	.658	5.060	75.462
7	.585	4.501	79.962
8	.567	4.361	84.323
9	.492	3.788	88.111
10	.437	3.361	91.473
11	.421	3.240	94.713
12	.366	2.817	97.529
13	.321	2.471	100.000

Extraction Method: Principal Component Analysis.

Total Variance Explained

Component	Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	4.370	33.617	33.617	2.906	22.352	22.352
2	1.979	15.221	48.838	2.367	18.205	40.557
3	1.193	9.173	58.011	2.269	17.454	58.011
4						
5						
6						
7						
8						
9						
10						
11						
12						
13						

Extraction Method: Principal Component Analysis.

Component Matrix[a]

	Component		
	1	2	3
SL66WORK	.654	-.136	-.393
SL64WORK	.639	-.150	-.430
SL56WORK	.631	.406	-.322
SL51WORK	.628	-.354	.278
SL57WORK	.623	.329	-.415
SL49IND	.605	.537	.106
SL50WORK	.599	-.379	.379
SL53WORK	.578	-.431	8.047E-02
SL52IND	.565	-.477	4.675E-02
SL60WORK	.558	-.403	2.002E-02
SL48IND	.550	.513	.301
SL47WORK	.460	.365	.240
SL54WORK	.388	.366	.433

Extraction Method: Principal Component Analysis.

a. 3 components extracted.

Rotated Component Matrix[a]

	Component		
	1	2	3
SL50WORK	.765	.246	-3.178E-02
SL51WORK	.736	.223	7.009E-02
SL52IND	.715	-1.505E-02	.194
SL53WORK	.701	4.136E-02	.184
SL60WORK	.650	1.756E-02	.226
SL48IND	8.001E-02	.786	.176
SL49IND	4.135E-02	.727	.368
SL54WORK	.119	.675	-5.058E-02
SL47WORK	.109	.608	.144
SL57WORK	4.813E-02	.318	.752
SL56WORK	2.599E-02	.424	.697
SL64WORK	.392	-7.802E-03	.680
SL66WORK	.403	2.913E-02	.661

Extraction Method: Principal Component Analysis.
Rotation Method: Varimax with Kaiser Normalization.

a. Rotation converged in 6 iterations.

Component Transformation Matrix

Component	1	2	3
1	.645	.505	.574
2	-.706	.681	.195
3	.292	.531	-.795

Extraction Method: Principal Component Analysis.
Rotation Method: Varimax with Kaiser Normalization.

12 Feb 02

1 component extracted
39% variance
Eigenvalue of 3.9

Factor Analysis

Communalities

	Initial	Extraction
ULDQ77IN	1.000	.389
ULDQ72IN	1.000	.278
ULDQ74IN	1.000	.136
ULDQ78IN	1.000	.582
ULDQ73IN	1.000	.438
ULDQ71IN	1.000	.345
ULDQ76IN	1.000	.522
ULDQ79IN	1.000	.555
ULDQ80IN	1.000	.381
ULDQ68IN	1.000	.242

Extraction Method: Principal Component Analysis.

Total Variance Explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	3.867	38.674	38.674	3.867	38.674	38.674
2	.978	9.781	48.455			
3	.931	9.313	57.768			
4	.846	8.457	66.226			
5	.772	7.719	73.944			
6	.672	6.723	80.668			
7	.554	5.536	86.204			
8	.500	4.998	91.202			
9	.481	4.808	96.010			
10	.399	3.990	100.000			

Extraction Method: Principal Component Analysis.

Component Matrix[a]

	Component
	1
ULDQ78IN	.763
ULDQ79IN	.745
ULDQ76IN	.723
ULDQ73IN	.662
ULDQ77IN	.623
ULDQ80IN	.618
ULDQ71IN	.588
ULDQ72IN	.527
ULDQ68IN	.492
ULDQ74IN	.368

Extraction Method: Principal Component Analysis.

a. 1 components extracted.

R E L I A B I L I T Y   A N A L Y S I S   -   S C A L E   (A L P H A)

		Mean	Std Dev	Cases
1.	ULDQ76IN	3.4436	.9680	4554.0
2.	ULDQ77IN	3.5068	.9150	4554.0
3.	ULDQ78IN	3.1678	.9290	4554.0
4.	ULDQ79IN	3.6717	.9343	4554.0
5.	ULDQ80IN	3.3408	1.0305	4554.0
6.	ULDQ72IN	3.8314	.9982	4554.0
7.	ULDQ73IN	2.9194	.8926	4554.0
8.	ULDQ74IN	2.8704	.9026	4554.0
9.	ULDQ71IN	2.7782	.9480	4554.0
10.	ULDQ68IN	3.0942	.9420	4554.0

N of Cases = 4554.0

Statistics for	Mean	Variance	Std Dev	N of Variables
Scale	32.6243	33.6719	5.8027	10

Item Means	Mean	Minimum	Maximum	Range	Max/Min	Variance
	3.2624	2.7782	3.8314	1.0531	1.3791	.1259

Item-total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Alpha if Item Deleted
ULDQ76IN	29.1807	26.6137	.6129	.4000	.7856
ULDQ77IN	29.1175	27.9987	.4994	.2863	.7984
ULDQ78IN	29.4565	26.6220	.6453	.4685	.7826
ULDQ79IN	28.9526	26.7344	.6277	.4568	.7844
ULDQ80IN	29.2835	27.3409	.4889	.2926	.7998
ULDQ72IN	28.7929	28.2881	.4132	.1943	.8080
ULDQ73IN	29.7049	27.7583	.5440	.3438	.7939
ULDQ74IN	29.7538	30.0442	.2843	.0915	.8198
ULDQ71IN	29.8461	28.0964	.4653	.2898	.8020
ULDQ68IN	29.5301	28.8448	.3893	.1905	.8099

R E L I A B I L I T Y   A N A L Y S I S   -   S C A L E   (A L P H A)

Reliability Coefficients   10 items

Alpha =   .8152   Standardized item alpha =   .8156

APPENDIX 3:
Absence rate of non-respondents to workforce survey

There was a non-response bias to the workforce survey from workers who had taken previous absence due to MSDs (see Results 1). This is illustrated in the following table, whereby the proportions of absentees are calculated for the respondent and non-respondent groups.

Appendix 3a: Number of respondents and non-respondents who took absence due to MSDs in previous 12 months, and the proportion of absentees who did and did not respond to workforce survey

	Population (n)	**Absentees (n)**	**Proportion of absentees**
Respondents	4637	135	2.91%
Non-respondents	3201	145	4.53%

APPENDIX 4: MEAN PSYCHOSOCIAL SCORES (WORKFORCE SURVEY - CROSS-SECTIONAL ANALYSES)

4a. Mean psychosocial scores for self-reported MSDs

4b. Mean psychosocial scores for MSD absence in previous 12 months

The cross sectional analyses reported in Results 2 document the difference in mean psychosocial score for those respondents who did and did not report or take absence due to MSDs in the previous 12 months. The following tables show the actual mean psychosocial scores and standard deviations for the two groups.

Table 4a.1: Mean psychosocial scores, along with standard deviations (SD) for respondents who did and did not report lifetime LBP

Psychosocial measure	Lifetime LBP yes	Lifetime LBP no
Psychological Distress	11.88 (5.09)	10.53 (4.66)
Job Satisfaction	25.05 (6.18)	25.93 (5.90)
Social Support	14.99 (2.95)	15.40 (2.84)
Mental Stress	13.82 (3.17)	13.75 (3.13)
Inevitability beliefs about LBP	28.11 (5.83)	27.52 (5.81)
Attribution (work)	34.71 (6.54)	35.42 (5.75)
Attribution (individual)	29.15 (4.93)	29.88 (4.25)
Control	16.74 (4.16)	17.31 (4.03)
Personal influence	11.91 (2.57)	12.03 (2.41)
Organisational climate	13.08 (3.88)	12.30 (3.81)
Relationships at work	24.76 (7.94)	23.90 (8.02)
Home/work balance	13.14 (5.54)	12.56 (5.44)
Perceived Exertion	10.23 (2.70)	9.97 (2.59)

Table 4a.2: Mean psychosocial scores, along with standard deviations (SD) for respondents who did and did not report LBP in previous 12 months

Psychosocial measure	12-month LBP yes	12-month LBP no
Psychological Distress	12.08 (5.15)	10.52 (4.58)
Job Satisfaction	24.84 (6.17)	25.90 (6.01)
Social Support	14.98 (2.96)	15.36 (2.89)
Mental Stress	13.85 (3.16)	13.63 (3.17)
Inevitability beliefs about LBP	27.94 (5.80)	27.57 (5.96)
Attribution (work)	34.81 (6.46)	36.40 (5.90)
Attribution (individual)	29.20 (4.90)	29.87 (4.31)
Control	16.69 (4.15)	17.44 (4.05)
Personal influence	11.86 (2.58)	12.08 (2.37)
Organisational climate	13.10 (3.81)	12.17 (3.91)
Relationships at work	24.94 (7.89)	23.52 (8.05)
Home/work balance	13.19 (5.53)	12.45 (5.48)
Perceived Exertion	10.23 (2.69)	10.04 (2.65)

Table 4a.3: Mean psychosocial scores, along with standard deviations (SD) for respondents who did and did not report ULDs in previous 12 months

Psychosocial measure	12-month ULDs yes	12-month ULDs no
Psychological Distress	11.93 (5.07)	10.28 (4.59)
Job Satisfaction	24.91 (6.18)	26.15 (5.97)
Social Support	15.02 (2.95)	15.32 (2.91)
Mental Stress	13.88 (3.18)	13.56 (3.12)
Inevitability beliefs about ULDs	32.63 (5.81)	32.61 (5.79)
Control	16.69 (4.15)	17.44 (4.05)
Personal influence	11.92 (2.53)	11.99 (2.49)
Organisational climate	13.01 (3.80)	12.28 (3.97)
Relationships at work	24.74 (7.89)	23.82 (8.10)
Home/work balance	13.14 (5.57)	12.50 (5.41)
Perceived Exertion	10.18 (2.69)	10.13 (2.65)

Table 4a.4: Mean psychosocial scores, along with standard deviations (SD) for respondents who did and did not report LBP in previous 7 days

Psychosocial measure	7-day LBP yes	7-day LBP no
Psychological Distress	12.69 (5.39)	10.90 (4.73)
Job Satisfaction	24.37 (6.29)	25.66 (6.03)
Social Support	14.78 (3.11)	15.31 (2.83)
Mental Stress	13.89 (3.24)	13.71 (3.12)
Inevitability beliefs about LBP	25.76 (6.13)	27.95 (5.70)
Attribution (work)	35.05 (6.68)	35.01 (6.03)
Attribution (individual)	29.12 (5.16)	29.62 (4.42)
Control	16.39 (4.26)	17.27 (4.02)
Personal influence	11.82 (2.61)	12.01 (2.46)
Organisational climate	13.34 (3.86)	12.45 (3.84)
Relationships at work	25.42 (8.08)	23.88 (7.86)
Home/work balance	15.33 (5.73)	12.70 (5.39)
Perceived Exertion	10.42 (2.75)	10.02 (2.62)

Table 4a.5: Mean psychosocial scores, along with standard deviations (SD) for respondents who did and did not report ULDs in previous 7 days

Psychosocial measure	**7-day ULDs yes**	**7-day ULDs no**
Psychological Distress	12.41 (5.30)	10.76 (4.67)
Job Satisfaction	24.49 (6.40)	25.81 (5.92)
Social Support	14.86 (3.07)	15.27 (2.85)
Mental Stress	13.85 (3.30)	13.72 (3.08)
Inevitability beliefs about ULDs	32.41 (5.77)	32.75 (5.82)
Control	16.58 (4.20)	17.18 (4.07)
Personal influence	11.82 (2.54)	12.01 (2.50)
Organisational climate	13.10 (3.85)	12.57 (3.88)
Relationships at work	24.99 (7.96)	24.10 (7.96)
Home/work balance	13.05 (5.60)	12.85 (5.48)
Perceived Exertion	10.28 (2.72)	10.09 (2.64)

Table 4a.6: Mean psychosocial scores, along with standard deviations (SD) for respondents who did and did not report LBP disability in previous 12 months

Psychosocial measure	**12-month LBP disability yes**	**12-month LBP disability no**
Psychological Distress	12.69 (5.86)	10.99 (4.57)
Job Satisfaction	24.28 (6.50)	25.63 (5.99)
Social Support	14.74 (3.05)	15.25 (2.89)
Mental Stress	13.78 (3.21)	13.77 (3.15)
Inevitability beliefs about LBP	27.50 (6.04)	27.92 (5.79)
Attribution (work)	34.63 (6.79)	35.16 (6.08)
Attribution (individual)	28.92 (5.19)	29.62 (4.51)
Control	16.48 (4.12)	17.12 (4.12)
Personal influence	11.75 (2.63)	12.01 (2.47)
Organisational climate	13.32 (3.87)	12.57 (3.86)
Relationships at work	25.15 (7.84)	24.18 (8.01)
Home/work balance	13.34 (5.71)	12.78 (5.45)
Perceived Exertion	10.60 (2.78)	10.01 (2.62)

Table 4a.7: Mean psychosocial scores, along with standard deviations (SD) for respondents who did and did not report ULD disability in previous 12 months

Psychosocial measure	12-month ULD disability yes	12-month ULD disability no
Psychological Distress	12.72 (5.58)	11.07 (4.78)
Job Satisfaction	23.80 (6.56)	25.66 (5.98)
Social Support	14.65 (3.18)	15.22 (2.87)
Mental Stress	13.73 (3.37)	13.78 (3.12)
Inevitability beliefs about ULDs	32.37 (6.14)	32.68 (5.72)
Control	16.32 (4.20)	17.10 (4.06)
Personal influence	11.62 (2.65)	12.01 (2.48)
Organisational climate	13.35 (3.95)	12.63 (3.84)
Relationships at work	25.49 (8.14)	24.19 (7.92)
Home/work balance	13.16 (5.69)	12.87 (5.49)
Perceived Exertion	10.57 (2.77)	10.07 (2.64)

Table 4b.1: Mean psychosocial scores, along with standard deviations (SD) for respondents who did and did not take absence due to LBP in previous 12 months

Psychosocial measure	12-month LBP absence yes	12-month LBP absence no
Psychological Distress	13.48 (6.51)	11.32 (4.91)
Job Satisfaction	25.55 (7.31)	25.41 (6.08)
Social Support	14.07 (3.59)	15.16 (2.91)
Mental Stress	12.74 (3.45)	13.80 (3.15)
Inevitability beliefs about LBP	26.05 (6.32)	27.86 (5.84)
Attribution (work)	36.01 (6.05)	34.98 (6.28)
Attribution (individual)	29.49 (4.59)	28.63 (4.41)
Control	16.06 (4.55)	16.98 (4.11)
Personal influence	11.18 (2.81)	11.96 (2.50)
Organisational climate	13.54 (4.13)	12.74 (3.86)
Relationships at work	27.57 (8.22)	24.34 (7.94)
Home/work balance	13.05 (6.04)	12.92 (5.51)
Perceived Exertion	11.79 (2.38)	10.12 (2.67)

Table 4b.2: Mean psychosocial scores, along with standard deviations (SD) for respondents who did and did not take absence due to ULDs in previous 12 months

Psychosocial measure	**12-month ULD absence yes**	**12-month ULD absence no**
Psychological Distress	13.33 (7.35)	11.32 (4.91)
Job Satisfaction	22.63 (6.21)	25.41 (6.08)
Social Support	12.39 (3.82)	15.16 (2.91)
Mental Stress	12.17 (3.10)	13.80 (3.15)
Inevitability beliefs about ULDs	32.00 (6.23)	32.67 (5.79)
Control	16.71 (4.97)	16.98 (4.11)
Personal influence	10.00 (2.86)	11.96 (2.50)
Organisational climate	12.79 (4.00)	12.74 (3.86)
Relationships at work	29.78 (7.11)	24.34 (7.94)
Home/work balance	13.52 (6.11)	12.92 (5.51)
Perceived Exertion	11.58 (2.28)	10.12 (2.67)

APPENDIX 5:
MEAN PSYCHOSOCIAL SCORES
(WORKFORCE SURVEY - PROSPECTIVE ANALYSES)

5a. Mean psychosocial scores for occurrence of MSD absence in subsequent 15 months

The prospective analyses reported in Results 3 document the difference in mean psychosocial score for respondents who did and did not take subsequent absence due to MSDs. The tables below illustrate the actual mean psychosocial scores and standard deviations for the two groups.

5b. Psychosocial factors and duration of MSD absence in subsequent 15 months - univariate analyses

Reported below are the chi-squared tests performed in order to explore the relationship between 'detrimental' and 'non-detrimental' psychosocial scores and short and long durations of subsequent absence (see Results 3).

Table 5a.1: Mean psychosocial scores, along with standard deviations (SD) for respondents who did and did not take absence due to LBP in the subsequent 15 months

Psychosocial measure	15-month LBP absence yes	15-month LBP absence no
Psychological Distress	15.44 (4.19)	17.01 (4.12)
Job Satisfaction	22.58 (7.02)	35.42 (6.08)
Social Support	14.44 (3.24)	15.15 (2.92)
Mental Stress	12.92 (3.40)	13.80 (3.15)
Inevitability beliefs about LBP	25.58 (6.63)	27.90 (5.81)
Attribution (work)	36.74 (6.41)	34.95 (6.26)
Attribution (individual)	30.20 (4.75)	29.41 (4.70)
Control	15.44 (4.19)	17.01 (4.12)
Personal influence	10.93 (2.50)	11.98 (2.51)
Organisational climate	13.78 (4.36)	12.73 (3.85)
Relationships at work	27.68 (8.42)	24.31 (7.93)
Home/work balance	12.92 (5.90)	12.92 (5.51)
Perceived Exertion	12.04 (2.44)	10.09 (2.66)

Table 5a.2: Mean psychosocial scores, along with standard deviations (SD) for respondents who did and did not take absence due to ULDs in the subsequent 15 months

Psychosocial measure	15-month ULD absence yes	15-month ULD absence no
Psychological Distress	12.36 (6.85)	11.32 (4.96)
Job Satisfaction	22.79 (8.27)	25.34 (6.11)
Social Support	14.18 (3.92)	15.13 (2.93)
Mental Stress	12.35 (4.31)	13.78 (3.15)
Inevitability beliefs about ULDs	30.92 (6.91)	32.64 (5.79)
Control	15.55 (4.29)	16.97 (4.13)
Personal influence	10.72 (3.13)	11.95 (2.51)
Organisational climate	12.78 (5.19)	12.77 (3.86)
Relationships at work	26.67 (9.91)	24.41 (7.95)
Home/work balance	13.18 (7.48)	12.92 (5.50)
Perceived Exertion	12.17 (2.52)	10.15 (2.67)

APPENDIX 6: EXPERIMENTAL INTERVENTION INSTRUMENTS

6a. **OHA manual** (including consent form, inclusion/exclusion criteria, questionnaires, psychosocial assessment booklets and communication scripts)

6b. **Educational material** (The Back Book and upper limb disorders pamphlet)

6c. **Sample of individual experimental profile report** (produced from custom-designed database)

6d. **Baseline questionnaire booklet**
The layout and scoring for the instruments used in the workforce survey is as follows:

- The Tampa Scale of Kinisiophobia (TSK) - (see section 10.6.1). Each item consists of a 4-point likert scale, ranging from 1-4. Questions 4, 8, 12 & 16 are reversed. Scores are then summed to give an overall total score.
- Short Form-36 Health Survey (SF-36) - (see section 10.6.2). Using the computerised syntax provided, the questions are compiled into two subgroups.

- Short Form-36 Health Survey (SF-36) - (see section 10.6.2). Using the computerised syntax provided, the questions are compiled into two subgroups.
- Psychosocial Aspects of Work questionnaire (PAW) – (see section 5.1.2). (Only the job satisfaction and social support subscales were used) Questions 1,2, 4, 6, 8, 9 & 10 comprise the Job Satisfaction subscale; and questions 3, 5, 7 & 11 comprise the Social Support subscale. Each items ranges between 1 and 5, and scores are summed to give the total score for that subscale.
- The Attribution Questionnaire – (see section 5.1.6). (Only the ATTRIBW subscale was used). Scores on each item range between 1-5, and are summed to give a total score.
- The Pressure Management Indicator – (see section 5.1.9). Questions 1-5 comprise the control at work subscale, and questions 6-8 comprise the personal influence at work subscale. Each item ranges between 1-6 and scores are summed to give a total subscale score. 35 is subtracted from the personal control subscale.
- Psychological Demands (Karasek – see section 10.6.6). Each item ranges from 1-4 and the scoring is as follows: [(Q1+Q2)x3+(15-Q3+Q4+Q5)x2].
- Pain Scale (VAS – see section 10.6.7). The line is drawn 10mm in length and the score ranges from 0-10.
- Pain Drawing – see section 10.6.8. Each marking on the pain drawing is given a score of 1. The total score ranges between 0-38.

6e. **Follow-up questionnaire booklet** (see above for scoring)

6f. **Reminder letter for follow-up questionnaire**
A reminder letter and a copy of the follow-up questionnaire were sent directly to the worker if they failed to respond to the OHA request to complete the questionnaire.

Trial Document

SMITHKLINE BEECHAM
HEALTH AND SAFETY EXECUTIVE
UNIVERSITY OF MANCHESTER
UNIVERSITY OF HUDDERSFIELD

A nurse-led Return To-Work/Work Retention program for the management of Musculoskeletal Disorders in industry

INTRODUCTION

This intervention aims to reduce the impact of musculoskeletal disorders by providing a new nurse-led approach to management at work. It is based on the best available scientific evidence and uses this to make practical recommendations on how to tackle the occupational health aspects of this problem.

Numerous findings from research exploring the area of musculoskeletal disorder management at work point towards using a biopsychosocial approach. This translated, means that SmithKline Beecham's nurses will be reassuring the worker that the company is concerned about their health and welfare, and that the treatment offered will help them recover quickly, thereby reducing the disruption that musculoskeletal disorders can have on working life.

Major changes to existing practice:

The focus for this intervention lies with the occupational health nurse. This new approach allows the nurses to deal with the emotional problems and physical symptoms that workers with musculoskeletal pain may have.

The scientific question that we are attempting to answer with this study is: "how effective is an early, psychosocial, nurse-led intervention at reducing absence or recurrent workloss due to musculoskeletal disorders?"

Implications of a nurse-led program on current practice are that we require the nurse to be the only healthcare provider at SmithKline Beecham for the 4 weeks that the intervention period runs. This period is conducive with current guidelines. Furthermore, from a research perspective, it would be far too complex to measure the influences of any other treatment that may be provided at SmithKline Beecham, and therefore this study requires the restriction of referrals to physiotherapy, the company doctor and the ICAS program for up to 4 weeks

If a worker is refusing to accept the treatment offered by this program, is demanding to be seen by the physiotherapist, the company doctor or to be referred to ICAS, then refer them and exit them from the study.

PLAN OF INTERVENTION

(0-3 days)

Telephone contact with worker who goes absent, when notified of RTW, when notified of a complaint, if worker fails to attend an appointment, and if worker is unwilling to attend whilst absent

(Script 1)

Send GP letter informing them that you would like to manage the worker with this study

Initial intervention
Either whilst still absent, at return to work, self-referrals, TL referrals, GP referrals, company physio referrals
Check ups - if worker returns to work, or remains at work after intervention, 1 check up to reinforce intervention and check that there are no further problems

Contact Team Leader, if necessary (See TL script)

If worker returns to work, then see RTW script. Also send GP letter informing them of progress

(Scripts 2,3 & RTW)

Send GP letter, reminding them of the study and that the worker has still not returned to work

Additional interventions 2-4 - if worker still not back at work, or additional problems are revealed in check ups, then repeat Script 3 again

Contact Team Leader, if necessary (See TL script)

(4-5 weeks)

Refer to company physiotherapist

If worker still not back at work record that early intervention attempts to return the individual to work have failed.

Contact Team Leader (see TL script)

INCLUSION/EXCLUSION CRITERIA FOR THE INTERVENTION

Included conditions: The following are the musculoskeletal conditions which are to be managed in the scope of this study by the nurse only.

- low back pain with or without related leg pain (sciatica)
- neck pain with or without related arm pain
- upper limb pain (shoulder, elbow, wrist, hand)
- whiplash from minor RTA
- (participants who are receiving osteopathy, physiotherapy and other alternative treatments externally from the company for any of the above conditions should also be included)

Conditions outside the scope of this study: The following conditions are to be excluded from this study

- single-joint problems of the lower extemity
- inflammatory arthritis, e.g. rheumatoid arthritis
- obvious or diagnosed osteo-arthritis (e.g. OA hip)
- post-fracture or post-dislocation cases
- post-surgical cases
- headache or vertigo as primary complaint
- musculoskeletal disorders that are awaiting surgery (those that are just on waiting list to see consultant are eligible)
- musculoskeletal symptoms resulting from serious trauma (including hospitalisation or loss of consciousness)
- participant has serious co-existing disease (e.g. cancer, psychiatric)
- (in addition to exclusion conditions listed above, the participant must be screened for red flags (see clinical assessment) and excluded if necessary).

Refer to physiotherapist if:

- The participant has not returned to work after 4 weeks in the trial
- The participant has not returned to normal duties after 2 weeks modified work (or further modified work within 4-week period)
- The participant declines to take part in the study, or requests physiotherapy instead
- The participant has any of the excluded conditions that can be treated by physiotherapy

If you are unsure whether an individual should be included in the program or not and they have had a diagnosis from their GP, contact help-line numbers below:

Serena Bartys - 01484 535200
- 0161 787 5746
- 0771 236 8342 (mobile)   *Professor Burton 01484 535200*
Professor Main - 0161 787 5596
Paul Watson - 0161 787 5590

SCRIPT 1
TELEPHONE CONTACT

Introduction

- *The purpose of the telephone call (initial or follow-up) is to reassure the worker that CHM is concerned about their health and welfare, and that they are being encouraged to take up this new package for their own benefit, and not for the benefit of their employers.*

- *Secondly, this telephone call has to strongly encourage employees to attend this intervention session whilst absent, in order that any potential obstacles to recovery can be identified early on. It is understandable that the employee may not want to attend CHM whilst they are absent, however, for the success of this study, the ideal situation would be for the workers to attend whilst absent.*

First telephone contact with absent worker

Firstly, find out exactly what the problem is. Then see the inclusion/exclusion criteria on page 4 to distinguish whether the worker can be recruited into the program. Record in entry section, and if excluded, in exit section *If you find out in this telephone call that the worker is not suitable for inclusion in the program, then revert to management as usual and do not try to recruit this worker into the program. (This 'exclusion' should not be conveyed to the worker, however).*

The following messages *must* be conveyed in this telephone call

- State that the Team Leader has been in contact to inform you about absence/RTW/complaint, and state that you are working closely with TL; Record in entry section, message 1
- CHM is primarily concerned with the worker's health, safety and welfare, both at work and outside of work. Record in entry section, message 2.
- At Worthing/Crawley a new approach is being developed to help recovery from musculoskeletal disorders. Explain that you are specially trained to be able to deliver this approach effectively, and that you are also trained in the new occupational guidelines for management of these conditions. Record in entry section, message 3
- CHM, SB and you (the worker) will be working together to implement this new approach with the aim of helping you (the worker) to recover as quickly as possible Record in entry section, message 4
- We now know that most musculoskeletal disorders are not serious, and that they need to be managed effectively to reduce further problems. In order to manage your problem effectively, we need you to come in for an initial intervention, and then together we can devise a programme individually tailored to your needs. Record in entry section, message 5
- (Reinforce) You need to come in to the department for this new approach to work successfully. Record in entry section, message 6
    - *If the worker has been signed off by a GP already, establish whether the worker is fit enough to be able to attend, then try and encourage them to come in for an*

initial intervention. If they are not fit enough, then ask them to report in at RTW Record in entry section

- Make an appointment for the initial intervention for the next couple of days, or if absent, at RTW if that is sooner Record date of intervention in intervention section
- Have you got any questions? (Refer to 'overview' section in Script 2 if you need to explain the program)
- If the worker is adamant about not coming in for assessment, and declines the treatment offered by the program, then ask if they would like it at RTW. If they still refuse to accept the treatment, then note that this person has self-exited from the study Record in exit section
- If the worker does not want to come in for the initial intervention whilst absent, but does not refuse the initial intervention at RTW, then note that they are unwilling, and ask them to come in to see you at RTW. *(follow RTW script for assessing these individuals)*. Record date of intervention in intervention section

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REASONS FOR ADDITIONAL TELEPHONE CONTACT

At 1-4 weeks: telephone call if worker has not kept initial intervention appointment (i.e. possibly 4 calls)

- Find out why the worker did not attend the initial intervention appointment. If it was simply forgotten, then re-schedule for as soon as possible Record date in intervention section
- If the worker starts having doubts about the program, then re-emphasise messages 2, 3, 4, 5, & 6 from page 6. If the worker has become unwilling and does not want the treatment, then they have self-exited from the program Record in exit section
- Keep trying to contact workers who have re-scheduled and then failed to attend initial intervention appointments for up to four weeks (i.e. four missed appointments). Record date in intervention section. After this time, record that the early intervention attempts to return the individual to work/recruit into study have failed. Record in exit section

At 1-4 weeks: if individual is still absent and has not had an intervention because they are not fit enough to come in (possibly 4 calls)

- If any worker has made an initial intervention appointment but has got worse and is not fit enough to attend, then state that you will contact them in another week, or alternatively, ask them to report in to you at RTW if that is sooner. If the worker remains absent and unfit to come in for intervention, contact each week for up to 4 weeks and re-iterate messages 2,3,4,5 & 6 from page 6. After this time, if they have not returned to work, record that early intervention attempts to return the individual to work have failed. Record in exit section
- If at any stage, you are successful in making an initial intervention appointment for the above workers, then Record the date of this appointment in the intervention section

At 1-4 weeks: if worker did not want to come in whilst absent) (possibly 4 calls) ***Note! This is different from refusing treatment, as some workers may have said they will come for assessment at RTW, but have not come back. The nurse needs to keep contact with these workers.***

- If a worker was unwilling to come in to come in for an initial assessment whilst absent, and has not returned to work after 1 week, then contact again and repeat messages 2,3,4,5 & 6 from page 6. Contact worker for up to 4 weeks if they remain absent, (unless start to refuse treatment) and if the worker has not returned to work after this time, record that early intervention attempts to return the individual to work have failed. Record in exit section

- If at any stage, you are successful in making an initial assessment appointment for the above workers, then Record the date of this appointment in the intervention section

At 1-4 weeks: if worker has had initial assessment, but has not returned to work/taken absence

- Contact the worker if not back at work within 1 week of the intervention, and find out why. If the worker has got worse, then state that you will contact them in another week, or ask them to report in to you at RTW if that is sooner. Re-iterate assessment findings (i.e. reinforce positive messages, active management, etc), and state that you can accommodate them at work when they return.
- If the worker needs modified work, then suggest modifications and encourage to return to work. If not done already, then convey messages 1-10 in modified work script. Record in modified work section
- Contact each week up to 4 weeks of absence, and if not back at work then record that early intervention attempts to return the individual to work have failed. Record in exit section

SCRIPT 2
NURSE INITIAL INTERVENTION

This section includes:

- *carrying out the clinical assessment,*
- *explaining the study*
- *gaining consent and,*
- *administering the baseline questionnaire booklet.*
- *Psychosocial intervention*

The workers entering the study at this point will either:

- *be absent*
- *have remained at work*
- *have returned to work after absence*

Clinical Assessment
(for all workers eligible to enter the study).

The clinical assessment is for you to gain an indication of 'severity', and to identify if there is a need to refer to the GP immediately. It also helps to establish nurse clinical credibility in the administering of the intervention. *(Note! The worker may ask questions regarding their problem as you are carrying out this examination. It is important to acknowledge them, but as they are likely to be dealt with in the psychosocial intervention, state that you will discuss all questions later).* Please carry out the items below:

In entry section, status of worker should have been recorded, e.g absent, at work, returned from absence

- Ask about previous medical history Record in intervention section the date of onset for this spell
    - Ask whether worker is receiving any other treatment for their problem Record in intervention section. *If the worker has gone directly to the company physiotherapist, and it is a new case of musculoskeletal pain, then they should be referred directly to the nurse to be given the choice of entering the study*

This section requires special attention

- 'Red Flags' questions
    - non-mechanical pain pattern? Record in intervention section
    - Past history of carcinoma, steroid use, HIV, drug abuse? Record in intervention section
    - Unwell, unexplained weight loss? Record in intervention section
    - Severe thoracic pain? Record in intervention section
    - Widespread neurological signs? Record in intervention section
    - Unremitting pain (including unexplained headache)? Record in intervention section
    - ***Violent trauma suggesting dislocation/fracture?*** ***Record in intervention section***
    - ***Sphincter disturbance/saddle anaesthesia?*** ***Record in intervention section***
    - ***Persistent vertigo/blackouts?*** ***Record in intervention section***

(Any of the last 3, refer immediately)

Use your clinical judgement, but if there is more than one red flag (or any of last 3), refer the individual to their GP immediately. If there is just one red flag, proceed with due caution, but refer to GP if situation deteriorates. If nerve root pain is present, proceed as normal but refer to GP if situation deteriorates substantially.

(If unsure about any of Red Flags, then ask company doctor)

Overview of the study
(For all workers who have passed above assessment,

This is to help explain to the worker the nature of the study, and to establish your role in the program.

SmithKline Beecham, in conjunction with The Health and Safety Executive, is looking to improving care for musculoskeletal disorders at work, and Corporate Health Management is now offering a new approach to the management of musculoskeletal disorders.

We have been specially trained to manage musculoskeletal disorders in an occupational setting. I/We will manage your case under an 'optimal' intervention package'. This means that we will be able to give advice specifically suited for you. This new approach is in line with the 'Occupational Health Guidelines for the Management of Low Back Pain at Work' recently published by The Faculty of Occupational Medicine. This means your back will be managed according to the latest scientific evidence, and you will not be subjected to any untested medical treatments.

As you will probably know, musculoskeletal pains such as back pain and neck pain are very common, and though risk assessments of work stations and health and safety initiatives can reduce the strain on the body and prevent accidents, it is now widely acknowledged that we can do little to prevent musculoskeletal disorders from occurring altogether. What we would like to concentrate on with this new approach is giving you skills and support in coping with your problem, and how it affects your lifestyle.

Consent form

(For all employees who are entering into the study and have passed above assessment and been given the overview)

SMITHKLINE BEECHAM

CONSENT FORM FOR RESEARCH INTO OCCUPATIONAL HEALTH MANAGEMENT OF MUSCULOSKELETAL DISORDERS

SmithKline Beecham, in conjunction with The Health and Safety Executive, is looking to improving care of musculoskeletal disorders at work, and Corporate Health Management is now offering a new approach to the management of musculoskeletal disorder.

The occupational health nurse has been specially trained to manage musculoskeletal disorder in an occupational setting. She will manage your case under 'an optimal intervention package'. This means that she will be able to give you advice suited specifically for you, and will liase with your GP and Team Leader/Manager, and will monitor your progress so that you recover as quickly as possible. This new approach is in line with the Faculty of Occupational Medicine guidelines. This means that your musculoskeletal disorder will be managed according to the latest scientific evidence, and you will not be subjected to any untested medical treatments.

It is important to find out how well this new approach helps people, so you will be asked to complete some questionnaires over the next twelve months. Also, medical details about your musculoskeletal disorder will need to be available to a medical research team.

You are not obliged to receive this new package, and you may ask to revert to the Department's usual management at any time.

I confirm that I understand my musculoskeletal disorder will be managed through the new initiative described above, and that my questionnaire responses and some clinical details will be used to evaluate the initiative. I understand that all data will be kept confidential in accordance with the Data Protection Act. My signature below gives my informed consent to be part of this initiative.

Signature ....

Name (print) ....

Date: ....

I confirm that I have explained fully the above study

Nurse Signature ....

Date ....

Baseline Questionnaire

The questionnaire booklet should now be given to the worker, along with an explanation that this data will be used externally, aside from the nurse intervention. Explain that this questionnaire will be analysed by research teams at the University of Manchester, and that this information is very important in terms of evaluating the success of the nurse intervention.

Explain that the University is very grateful to individuals for taking time out to complete this questionnaire, and that the information will be handled in a strictly confidential, scientific manner.

Reinforce that although some of the questions may not be relevant to the individual, it is imperative that they answer ALL the questions in the booklet.

(This booklet must be completed at the initial intervention stage. Do not allow the worker to take the booklet away. Return all completed booklets to Serena Bartys)

BASELINE QUESTIONNAIRE

Name:

Employee ID No:

Date:

1

This is a list of phrases that other patients have used to express how they view their condition. Please indicate the extent to which you agree with each statement by circling the appropriate number from the scale below.

Strongly Disagree 1 *Somewhat Disagree 2* *Somewhat Agree 3* *Strongly Agree 4*

1	I'm afraid that I might injure myself if I exercise	1	2	3	4
2	If I were to try to overcome it, my pain would increase	1	2	3	4
3	My body is telling me I have something dangerously wrong	1	2	3	4
4	My pain would probably be relieved if I were to exercise	1	2	3	4
5	People aren't taking my medical condition seriously	1	2	3	4
6	My accident has put my body at risk for the rest of my life	1	2	3	4
7	Pain always means I have injured my body	1	2	3	4
8	Just because something aggravates my pain does not mean it is dangerous	1	2	3	4
9	I am afraid that I might injure myself accidentally	1	2	3	4
10	Simply being careful that I do not make any unnecessary movements is the safest thing I can do to prevent my pain from worsening	1	2	3	4
11	I wouldn't have this much pain if there wasn't something potentially dangerous going on in my body	1	2	3	4
12	Although my condition is painful, I would be better off if I were physically active	1	2	3	4
13	Pain lets me know when to stop exercising so that I don't injure myself	1	2	3	4
14	It's really not safe for a person with a condition like mine to be physically active	1	2	3	4
15	I can't do all the things normal people do because it's too easy for me to get injured	1	2	3	4
16	Even though something is causing me a lot of pain, I don't think it's actually dangerous	1	2	3	4
17	No one should have to exercise when they are in pain	1	2	3	4

We would like to know your views about your health and the impact of your back/neck/arm pain. This information will help us keep track of how you feel and how well you are able to do your usual activities.

Answer every question by shading the appropriate circle. If you're unsure about how to answer a question, give the best answer you can.

- My main problem just now is my:

Back	Neck	Arm
O	O	O

- In general, would you say your health is:

Excellent	Very good	Good	Fair	Poor
O	O	O	O	O

- *Compared to six months ago*, how would you rate your health in general *now*?

Much better now	Somewhat better now	About the same	Somewhat worse now	Much worse now
O	O	O	O	O

- The following questions are about activities you might do during a typical day. Does your pain *now* limit you in these activities? If so, how much?

	Yes, limited a lot	Yes, limited a little	No, not limited at all
Vigorous activities, such as running, lifting heavy objects, participating in strenuous sport	O	O	O
Moderate activities, such as moving a table, pushing a vacuum cleaner, bowling, or playing golf	O	O	O
Lifting or carrying groceries	O	O	O
Climbing **several** flights of stairs	O	O	O
Climbing **one** flight of stairs	O	O	O
Bending, kneeling, or stooping	O	O	O
Walking **more than a mile**	O	O	O
Walking **several hundred yards**	O	O	O
Walking **one hundred yards**	O	O	O
Bathing or dressing yourself	O	O	O

4. During the *past 4 weeks*, have you had any of the following problems with your work or other regular daily activities as a result of your physical health?

Cut down on the **amount of time** you spent on work or other activities

All of the time	Most of the time	Some of the time	A little of the time	None of the time
❍	❍	❍	❍	❍

Accomplished less than you would like

All of the time	Most of the time	Some of the time	A little of the time	None of the time
❍	❍	❍	❍	❍

Were limited in the **kind** of work or other activities

All of the time	Most of the time	Some of the time	A little of the time	None of the time
❍	❍	❍	❍	❍

Had **difficulty** performing the work or other activities (for example, it took extra effort)

All of the time	Most of the time	Some of the time	A little of the time	None of the time
❍	❍	❍	❍	❍

- During the *past 4 weeks*, have you had any of the following problems with your work or other regular daily activities as a result of any emotional problems (such as feeling depressed or anxious)?

Cut down on the **amount of time** you spent on work or other activities

All of the time	Most of the time	Some of the time	A little of the time	None of the time
❍	❍	❍	❍	❍

Accomplished less than you would like

All of the time	Most of the time	Some of the time	A little of the time	None of the time
❍	❍	❍	❍	❍

Didn't do work or other activities as **carefully** as usual

All of the time	Most of the time	Some of the time	A little of the time	None of the time
❍	❍	❍	❍	❍

- During the *past 4 weeks*, to what extent has your physical health or emotional problems interfered with your normal social activities with family, friends, neighbours, or groups?

Not at all	Slightly	Moderately	Quite a bit	Extremely
❍	❍	❍	❍	❍

- How much *bodily* pain have you had during the *past 4 weeks*?

None	Very mild	Mild	Moderate	Severe	Very severe
❍	❍	❍	❍	❍	❍

- During the *past 4 weeks*, how much did pain interfere with your normal work (including both work outside the home and housework)?

Not at all	A little bit	Moderately	Quite a bit	Extremely
❍	❍	❍	❍	❍

- These questions are about how you feel and how things have been with you during the past 4 weeks. For each question, please give the one answer that comes closest to the way you have been feeling.

  How much of the time during the *past 4 weeks…*

  Did you feel full of life?

All of the time	Most of the time	Some of the time	A little of the time	None of the time
❍	❍	❍	❍	❍

  Have you been very nervous?

All of the time	Most of the time	Some of the time	A little of the time	None of the time
❍	❍	❍	❍	❍

  Have you felt so down in the dumps that nothing could cheer you up?

All of the time	Most of the time	Some of the time	A little of the time	None of the time
❍	❍	❍	❍	❍

  Have you felt calm and peaceful?

All of the time	Most of the time	Some of the time	A little of the time	None of the time
❍	❍	❍	❍	❍

  Did you have a lot of energy?

All of the time	Most of the time	Some of the time	A little of the time	None of the time
❍	❍	❍	❍	❍

  Have you felt downhearted and low?

All of the time	Most of the time	Some of the time	A little of the time	None of the time
❍	❍	❍	❍	❍

Did you feel worn out?

All of the time	Most of the time	Some of the time	A little of the time	None of the time
❍	❍	❍	❍	❍

Have you been happy?

All of the time	Most of the time	Some of the time	A little of the time	None of the time
❍	❍	❍	❍	❍

Did you feel tired?

All of the time	Most of the time	Some of the time	A little of the time	None of the time
❍	❍	❍	❍	❍

- During the *past 4 weeks*, how much of the time has your physical health or emotional problems interfered with your social activities (like visiting friends, relatives, etc.)?

All of the time	Most of the time	Some of the time	A little of the time	None of the time
❍	❍	❍	❍	❍

- How TRUE or FALSE is each of the following statements for you?

I seem to get ill more easily than other people

Definitely true	Mostly true	Don't know	Mostly false	Definitely false
❍	❍	❍	❍	❍

I am as healthy as anybody I know

Definitely true	Mostly true	Don't know	Mostly false	Definitely false
❍	❍	❍	❍	❍

I expect my health to get worse

Definitely true	Mostly true	Don't know	Mostly false	Definitely false
❍	❍	❍	❍	❍

My health is excellent

Definitely true	Mostly true	Don't know	Mostly false	Definitely false
❍	❍	❍	❍	❍

3

Below are statements which help us to understand your general work situation.

Please answer ALL statements and indicate whether you agree or disagree with each statement by circling the appropriate number on the scale ranging from 1 COMPLETELY DISAGREE to 5 COMPLETELY AGREE.

1	2	3	4	5
COMPLETELY DISAGREE			COMPLETELY AGREE	

1	I enjoy my work	1	2	3	4	5
2	My job meets my expectations	1	2	3	4	5
3	I can turn to a fellow worker for help when I have problems	1	2	3	4	5
4	I get satisfaction from my job	1	2	3	4	5
5	I like most of my fellow workers	1	2	3	4	5
6	I enjoy the tasks involved in my job	1	2	3	4	5
7	My fellow workers talk things over with me	1	2	3	4	5
8	I am happy with my job	1	2	3	4	5
9	I would recommend my job and place of work to a friend	1	2	3	4	5
10	I would choose the same job, in the same place, again	1	2	3	4	5
11	My fellow workers accept and support my new ideas	1	2	3	4	5

4

Please could you give an indication of how important you believe the items below are in causing musculoskeletal pain by circling the appropriate number from the scale below:

1	2	3	4	5
NEVER A CAUSE			ALWAYS A CAUSE	

1	Heavy lifts at work	1	2	3	4	5
2	Monotonous work	1	2	3	4	5
3	Rapid work pace	1	2	3	4	5
4	Poor work posture	1	2	3	4	5
5	Lack of information about how work is to be done	1	2	3	4	5
6	Lack of safety and assistance devices	1	2	3	4	5
7	Long working hours	1	2	3	4	5
8	Too few breaks	1	2	3	4	5
9	Workplace's physical environment	1	2	3	4	5
10	Lack of proper work organisation	1	2	3	4	5
11	Lack of interest from company's management	1	2	3	4	5

Please indicate the extent to which you agree or disagree with the following statements by circling the appropriate number from the scale below:

1=very strongly disagree, 2=strongly disagree, 3=disagree, 4=agree, 5=strongly agree, 6=very strongly agree

1	Assessments of performance do not reflect the way and how hard individuals work	1 2 3 4 5 6
2	Even though some people try to control company events by taking part in social affairs or office politics, most of us are subject to influences we can neither comprehend nor control	1 2 3 4 5 6
3	Management can be unfair when appraising subordinates since their performance is often influenced by accidental events	1 2 3 4 5 6
4	Most of us are subject to events we cannot influence or control	1 2 3 4 5 6
5	I have little influence over what happens to me at work	1 2 3 4 5 6
6	I have a lot of discretion in my work	1 2 3 4 5 6
7	I enjoy the freedom to manage my own work	1 2 3 4 5 6
8	I think that my job gives me a lot of influence	1 2 3 4 5 6

Please indicate the extent to which you agree or disagree with the following statements by circling the appropriate number from the scale below:

1=strongly disagree, 2=disagree, 3=agree, 4=strongly agree

1	My job requires working very fast	1 2 3 4
2	My job requires working very hard	1 2 3 4
3	I am not asked to do excessive amounts of work	1 2 3 4
4	I have enough time to get the job done	1 2 3 4
5	I am free from conflicting demands that others make	1 2 3 4

6

PAIN SCALE

We want you to give us an idea of just how bad your pain has been on average over the last couple of days. Use the scale below to grade your pain by simply putting a cross at the point on the line that best indicates the level of your pain.

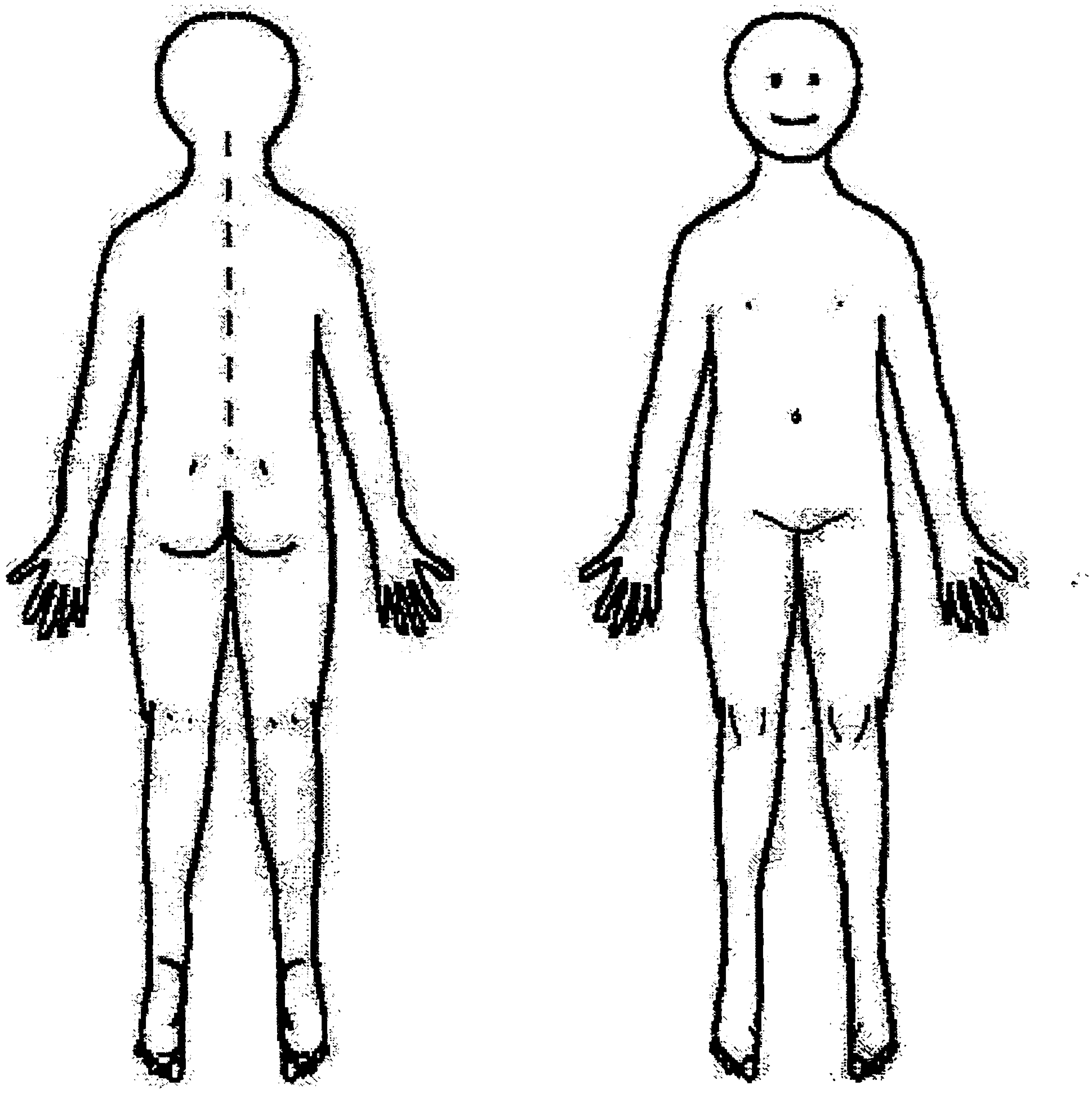
No Pain | Worst Imaginable pain

7

Pain diagram

Mark the areas of your body where you feel the following sensations:

Numbness	Pins and needles	Ache	Pain
= = = = = = = = = = = = = = = = = =	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	X X X X X X X X X X X X X X X X X X X	/ /



SCRIPT 3
PSYCHOSOCIAL INTERVENTION

Initial psychosocial intervention
(For all workers, after completion of items in Script 2)

The workers entering the study at this point will either:

- *be absent/on extended absence*
- *have remained at work*
- *have returned to work after absence*

Approach the psychosocial intervention as an informal chat.

- *You will firstly be asking the stem questions from each section in the booklet, and then asking the subsequent question to try and identify possible problems that the individual may have (examples of problems can be picked up from the 'rationale' section in each area).*
- *Then, follow the relevant action points from the 'intervention' section. These give you an indication of what should be done to address any problems.*
- *You will need to record your actions carefully in the boxes after each section.*
- *If no problems are identified, this also must be recorded in the boxes provided.*
- *Follow-up appointments are only to reinforce what was said in previous intervention, and to check that worker is OK. If any further problems arise in the follow up appointment, then a further intervention must be given.*

PSYCHOSOCIAL INTERVENTION

(Please keep this booklet with you (in case of further interventions) unless the worker has:

- *remained at work, no modifications needed*
- *returned to work, no modifications needed*
- *remained at work/returned to work, modifications needed but they have been removed and it is 1 month since they had the initial intervention appointment*

Please then send the booklets to Serena Bartys

NAME

EMPLOYEE ID NO:

ASSESSMENT OF PSYCHOSOCIAL FLAGS

Attitudes and Beliefs about musculoskeletal disorders

- Rationale: the worker's ideas (beliefs) about the onset and cause of their pain will influence their reactions to it. In general, this section should attempt to address beliefs about 'inevitability', i.e. what consequences the worker believes that the pain is having or is going to have on their life, and to encourage the worker to air any fears in order that the nurse can allay them. For example, if the worker believes that they have one thing, e.g. 'a slipped disc' and the nurse tells them another (e.g. soft tissue strain), there will be a lack of concordance about the usefulness of the treatment. Therefore, it is important to try and uncover as much of the worker's beliefs as possible.

Stem Question ***"If someone has had pain, they usually have their own ideas of the cause. I know you are not a doctor, but what do YOU think is the cause of your pain?"***

After allowing the individual to answer, and identifying any particular problems, other areas may also need to be explored. The following questions should enable you to do that

- *"Do you believe that the pain hurting means that harm is being done, or that you will get disabled. Do you find yourself worrying in case your pain might become progressively worse?"*

- *"Do you believe that you need to be completely pain-free in order to get back to normal daily functioning?"*

- *"Do you believe you can do much to help yourself, or is it just a matter of waiting for things to get better?"*

- Intervention: If there are unhelpful beliefs about back pain (e.g. "out of my control", "going to get progressively worse", to have to be "completely pain-free") then these must be countered by giving information about:
  - the course of musculoskeletal pain (usually short),
  - the known causes (soft tissue injury, sprain or strain),
  - explain that hurting does not mean harming, and that any *normal* activity will not cause damage
  - encourage the individual to keep active, even if this is something light
  - give written information such as the *Back Book* or ULD pamphlet. (Educational materials which give only messages regarding

anatomy of the spine but do not tell people to keep active is at best unhelpful, and at worse misleading).

- The worker's understanding should be checked to ensure that it has indeed reduced and not heightened fears by asking if they feel better about their worries/fears now.
- As a general rule ask yourself "what information do I need to give this person to allow them to move forward to seeing increasing activity as a helpful way to manage their problem and to reassure them that their problem will not disable them."
- Encourage the worker that by taking up this advice and thereby taking control of their problem, this will help speed up recovery

Checklist

Please tick relevant boxes according to which areas indicated a problem

	Initial Assessment	***2nd assessment***	***3rd assessment***	***4th assessment***
Date				
Stem Question				
Item 1				
Item 2				
Item 3				

Please tick the relevant boxes according to how you intervened

	Initial Assessment	***2nd assessment***	***3rd assessment***	***4th assessment***
Date				
Explained the course of musculoskeletal pain				
Explained the known causes of musculoskeletal pain				
Explained that hurting does not mean harming				
Encouraged to keep active				
Have fears been reduced?	***Yes/no***	***Yes/no***	***Yes/no***	***Yes/no***
(Tick this box if this section did not present any problems)				

Date of follow up appointment (if applicable)				

Diagnosis and treatment issues

- Rationale: Attributions and misunderstandings about the nature of the condition exert a considerable influence on outcome (see attitudes and beliefs section). Workers expecting a passive role in the management of their condition are more likely to become dependent on passive treatments (and on the treatment provider) if this is the treatment offered. This section attempts to explore the worker's worries that they have not been fully investigated. For example, issues about not having had an X-ray, scan or consultant's opinion may come up in this section. Note: the clinical examination you give is part of the process of challenging unhelpful beliefs about the 'seriousness' of the problem.

Stem Question

"(Your doctor/physio, etc and) I have examined you and checked you out. Are you worried that anything might have been missed?"

After allowing the individual to answer and identifying any particular problems, other areas may also need to be explored. The following questions should enable you to do that

- *"Do you feel that specific treatment is needed?"*
- *"Have you become anxious, confused or dissatisfied with the explanations which you have been given?"*
- *"Have you been encouraged to limit your functioning or give up/stop work because of your pain?"*
- *"Are you reluctant to take painkillers?"*
- Intervention: This also links with the earlier section on attributions and beliefs. The nurse needs to know: how those attributions arose and, in particular from whom they came and, the level of importance the worker attaches to them. It is also important to find out the worker's ideas about type of treatment they feel they need
    - o Having gained this information, misunderstandings need to be addressed. (This may be very difficult if the employee is particularly fixed on the need for specialist investigation). Once again the importance of an examination and explanation allowing a more benign attribution of the pain problem is the key. Try to get them to see that they actually do not need specialist treatment for the time that they are recruited in this study. If after 4 weeks, the worker still feels they need specialist treatment, e.g. physio, then refer them

- If the worker has been advised to stop working by their GP, then suggest that you will be contacting the GP to discuss this. It could also be the case that another health professional has given them this advice, or that the worker themselves feels that they cannot stay at work/return to work. However, in all cases if you feel (from your clinical and psychosocial assessment) that the worker can be accommodated at work, then early worker participation in active management is essential. Encourage the worker to keep up normal activities (see 'behaviours' section, but go to 'work' section in this booklet before discussing changes in work))
- Early over-reliance on passive treatments should be avoided at all costs (also see 'behaviours' section). However, if the worker has any worries about taking painkillers, reassure them that analgesics are actually helpful to reduce the pain thus allowing you to be more active. Confirm that this is a good thing, and that the body will not allow the worker to do further harm. (Note!: before encouraging people to take painkillers moderately, ensure that they do not have any allergic reactions/problems in taking them)

Checklist

Please tick relevant boxes according to which areas indicated a problem

	Initial Assessment	***2nd assessment***	***3rd assessment***	***4th assessment***
Date				
Stem Question				
Item 1				
Item 2				
Item 3				
Item 4				

Please tick the relevant boxes according to how you intervened

	Initial Assessment	***2nd assessment***	***3rd assessment***	***4th assessment***
Date				
Allayed any fears regarding 'seriousness' of problem				
Countered the need for further examination/specialist treatment				
Discouraged limiting normal function/ stopping work				
Reassured about medication				
(Tick this box if this section did not present any problems)				

Date of follow up appointment (if applicable)				

Behaviours

- Rationale: this helps to identify the worker's current coping strategy. The nurse should interpret activity and inactivity as an indication of behavioural responses rather than always being indicators of nature of the pathophysiology. Those who are trying to keep active despite the pain, provided that they are pacing activity appropriately are unlikely to have difficulties in remaining active. Extra attention should be paid to those who are already using rest and inactivity and over-reliance on support aids/medication inappropriately as a coping strategy. This indicates that these people are developing a passive attitude to their pain and will take longer to recover.

Stem Question

"What are you currently doing to relieve your pain?"

After allowing the individual to answer and identifying any particular problems, other areas may also need to be explored. The following questions should enable you to do that

- *"Do you find yourself having to lie down, take a lot of rest or do much less of your usual activities because of the pain?"*
- *"Have you found yourself overdoing exercise on a 'good day'?"*
- *"Have you found yourself getting more and more reliant on aids such as walking sticks ,belts, splints, supports, painkillers, etc?"*

- Intervention: This section should be linked to the beliefs section regarding the cause of the worker's pain and their fears, as it is usually these beliefs that drive the behaviour. The intervention identified in the previous section should be implemented once the unhelpful beliefs are identified in this section. Workers can be:
  - encouraged to identify what they are currently doing, those things they find difficult, and those things that they currently cannot do

  The worker should then be encouraged to see the consequences of their current behaviour, i.e. withdrawn from activities they enjoy, becoming too reliant on rest/support aids. From this, the worker needs encouragement to carry on with normal activity. Focus on:
  - the positive things the individual feels they can do and work around that

- remind the worker that over-reliance on rest/support aids/medication leads to deconditioning making it harder in the long-term to re-establish activity levels
- remember that encouragement to resume/keep up normal activities of daily living should be specific to what the worker has identified as a problem, and it should be carefully paced ***(Note! Go to 'work' section in this booklet before discussing any changes in work))***

Checklist

Please tick relevant boxes according to which areas indicated a problem

	Initial Assessment	***2nd assessment***	***3rd assessment***	***4th assessment***
Date				
Stem Question				
Item 1				
Item 2				
Item 3				

Please tick the relevant boxes according to how you intervened

	Initial Assessment	***2nd assessment***	***3rd assessment***	***4th assessment***
Date				
Encouraged activity worker likes/can do				
Discouraged over-reliance on medical aids and medication				
Identified levels of current activity, and activities worker feels cannot do. Discouraged 'boom-bust exercising'				
Goals set for resumption of normal activities of daily living				
(Tick this box if this section did not present any problems)				

Date of follow up appointment (if applicable)				

Emotion

- Rationale: it is normal to be somewhat concerned, perhaps anxious and even upset about pain, particularly if it is severe or recurrent. Stress and worry can affect both the perception of pain and tolerance of it. In the management of musculoskeletal symptoms, it is important to firstly distinguish *pain-associated* disability and distress from other life stresses. For the purposes of this study, we are only requiring you to intervene for pain-associated dysfunction and distress, and for other non-serious life distress you may want to give basic counselling.

Stem Question

"Is there anything upsetting or worrying you about your pain at the moment?"

After allowing the individual to answer and identifying any particular problems, other areas may also need to be explored. The following questions should enable you to do that

- *"Are you getting demoralised, depressed or more irritable because of your pain?"*
- *"Have you lost interest in your social life or become a bit anxious about mixing with people because of your pain?"*

Intervention: This requires a simple clarification of issues, i.e. pain associated distress or life distress. If you feel that the distress is generally due to pain, then this can be addressed by:

- reassurance by addressing distress, beliefs and behaviour as shown in previous sections.
- encourage the worker to keep up with their social life - the aim being that this will be a distraction from their problem

You may feel or uncover in this section that the distress is actually due to something other than pain. If this is the case, then you may want to:

- give basic counselling/support if not 'serious'
- refer to external source/counselling program if 'serious'

By 'serious,' we mean that if the worker is displaying more severe emotional problems then you cannot deal with this in this program. If this is the case then they must be exited from the program. .

Checklist

Please tick relevant boxes according to which areas indicated a problem

	Initial Assessment	***2nd assessment***	***3rd assessment***	***4th assessment***
Date				
Stem Question				
Supplementary 1				
Supplementary 2				

Please tick the relevant boxes according to how you intervened

	Initial Assessment	***2nd assessment***	***3rd assessment***	***4th assessment***
Date				
Identified pain associated distress				
Identified life associated distress				
Addressed pain associated distress				
Encouraged social life				
Basic counselling given for life associated distress	***Yes/No***	***Yes/No***	***Yes/No***	***Yes/No***
Any severe emotional disorder identified?	***Yes/No***	***Yes/No***	***Yes/No***	***Yes/No***
(Tick this box if this section did not present any problems)				

Date of follow up appointment (if applicable)				

Family

- Rationale: Family members can exert a powerful influence on the worker's perception of pain and disability. It should be remembered that the influence could be either helpful or detrimental. In establishing the role of the family, whilst the view of the worker on the matter is clearly paramount, it may be advisable to speak with the relevant family member if possible, and if it is agreed by the worker.

Stem Question

"Is your pain affecting anything at home?"

After allowing the individual to answer and identifying any particular problems, other areas may also need to be explored. The following questions should enable you to do that

- *"Are members of your family trying to stop you doing things for yourself, or reminding you to be careful what you do?"*

- *"Is there anyone you can talk to about your pain and its effects on your life?"*

- Intervention: Any intervention which may need to acknowledge unhelpful behaviour from family members has to be carried out with the primary aim of:
  - reinforcing positive beliefs in the worker,
  - giving confidence to the worker and
  - encouraging the worker to carry out the active management plan worked out with the nurse.
  - If you think it is necessary to contact a family member by telephone, then first get permission from the worker. The worker can be asked a question such as "*Would you mind if I had a quick word with your husband/wife/partner/family member.* The purpose of this telephone contact would be to inform the family member of the active management plan, about the program currently being carried out at SB, and also to encourage their support in the recovery of the worker.
  - If the worker does not feel that they have anybody to talk to about their pain, then state that they can come to you at anytime

Checklist

Please tick relevant boxes according to which areas indicated a problem

	Initial Assessment	***2nd assessment***	***3rd assessment***	***4th assessment***
Date				
Stem Question				
Item 1				
Item 2				

Please tick the relevant boxes according to how you intervened

	Initial Assessment	***2nd assessment***	***3rd assessment***	***4th assessment***
Date				
Reinforced positive beliefs with worker				
Gave confidence to worker in carrying out recovery plan				
Contacted family member				
Offered support if necessary				
(Tick this box if this section did not present any problems)				

Date of follow up appointment (if applicable)				

W Work

- Rationale: anxiety about finding work difficult, workloss and work being the cause of their pain may be of major concern to the worker. However, the nurse must concentrate on possible pain-associated limitations and attributions perceived by the worker. They should determine the extent to which these may be influenced by mistaken beliefs or fears about hurting and harming, lack of self-confidence in sustaining adequate work performance or convictions that work is only safe when completely pain-free.

Stem Question

"Is your pain affecting your ability to work?"

After allowing the individual to answer and identifying any particular problems, other areas may also need to be explored. The following questions should enable you to do that

- *"What do you think if any, are the problems with working in view of your pain?"*
    - *"Are you having any particular problems in terms of heavy lifting, extended standing, difficult postures or inflexible schedules preventing appropriate breaks?*
- *"Are you generally pretty happy about work?"*
- *"Are your colleagues sympathetic towards people who have pain problems, or do you feel that you are letting your colleagues/manager down if you can't perform your normal duties?"*

Intervention: Try to identify if the person is afraid that their work is damaging them.

- If the worker is concerned about hurting/harming, they can be reminded that there is little evidence that work actually produces serious spinal damage. You can empathise that working can be difficult with pain problems, but that even demanding work is not necessarily harmful.
- You will need to find out what they do and how they operate at work (it is helpful to distinguish work task from work organisation here). Explain that they managed this work before and will be able to do so again. The SB risk assessment has shown the work to be safe.
- Suggestions that the workplace, posture or task is the cause of the pain are not helpful.

- Try to help the worker identify the work they can currently do, tasks they cannot currently do. Reinforce that some aspects of work may be more difficult because of the pain, but that is not the same as work being harmful.
- In fact getting back to normal activities as soon as possible (including work) is now known to be very helpful for recovery, and can reduce the chance of future problems. Of course, it may be necessary to give some help for a short while with modified work, but that is not always needed. *(see modified work script before discussing any changes in work)*
- Reassurance about the nature of their work and offering an optimistic but realistic view of the relationship between back pain and work is helpful. Stress, worrying about the future and what it means for work ability is unhelpful – try to promote a relaxed attitude.
- Emphasise that everyone (CHM, TLs and colleagues) appreciates the difficulty, and that a big part of this new program is to get all the players on the same side – say that that includes the worker!
- If the worker is having social problems at work, suggest that you can contact the Team Leader/manager to discuss this (See TL script)

Checklist

Please tick relevant boxes according to which areas indicated a problem

	Initial Assessment	***2nd assessment***	***3rd assessment***	***4th assessment***
Date				
Stem Question				
Supplementary 1				
Supplementary 2				
Supplementary 3				

Please tick the relevant boxes according to how you intervened

	Initial Assessment	***2nd assessment***	***3rd assessment***	***4th assessment***
Date				
Identified whether worker believes that work is problem				
Addressed fear and misunderstandings about hurting/harming				
Reassured worker that work does not cause serious harm				

Focus on what they can do at work				
Alert Team Leader to any problems with colleagues/work environment				
(Tick this box if this section did not present any problems)				

Date of follow up appointment (if applicable)				

- ***If you feel that modified work probably is needed, or that the worker wants modified work and you feel that this can be carried out, then encourage the worker to return to work/stay at work, and that this will be implemented. (See modified work script for implementation)***

AFTER SCRIPTS 2 AND 3 HAVE BEEN CARRIED OUT

This is an important part of the intervention. Really the focus here should be on encouraging the worker to return to work/stay at work, and that you will work together as a team to make that happen. (Most of this can be carried out at the follow-up appointment, but if you feel that one is not necessary, ensure that you carry out the following)

- Check that worker has been reassured or feels that problems have been addressed
- Unless the findings from the intervention show that the worker needs to be exited from the study, then encourage the worker to come back to work as quickly as possible/remain at work.
- Go to modified work script. If modified work is needed, then implement as soon as possible if at work, or if absent on RTW.
- Contact Team Leader to discuss findings of intervention, and modified work if necessary
- Send the worker's GP a letter stating that you feel that you can accommodate the worker and manage their problem. This is to update the GP, and to alert them to the fact that you can accommodate them if the worker presents to them wanting sick certification.

WHEN IT IS NECESSARY FOR PSYCHOSOCIAL ASSESSMENT TO BE REPEATED

At 1-4 weeks: if the worker has not returned to work, but has had psychosocial intervention previously (See Script 1, page 9)

If worker is having further problems and presents to the department within 1 month of first intervention

- Look at the answers given in the initial or previous intervention sessions, and identify whether these problems are still the same, i.e. you could start by going over the last session with the worker and take it from there. This may also include recommendations for modified work.
- Run through the booklet again. By doing this, you may identify problems that were not apparent in an earlier session
- Again, record the questions asked and answers given in the boxes provided.
- See previous page for what to do after each assessment

(If worker presents to the department with further problems and it is over 1 month since their first intervention, then start the psychosocial assessment again)

MODIFIED WORK SCRIPT

Introduction

Modified work is the term used to refer to adjustments of work organisation in order to facilitate return-to-work (RTW) or work-retention (WR). Modified work is quite different in concept from 'restricted duties' or 'light work'.

The focus is firmly on facilitation of RTW or WR, not on limiting work activities per se. The intention is to 'accommodate' the symptomatic worker. What this means in practice is that workers can (usually) be returned to their previous work - even if that work entails elements that provoke symptoms or may have been perceived as causative of the problem. The intention is to reduce exposure to the pain-provoking elements, not to remove them entirely. It is recognised that some activities may be more difficult in the presence of a musculoskeletal disorder, but that does not mean to say that they should be prohibited. (At this stage it is presumed, of course, that the statutory risk assessment has not revealed any significant risks to health, or if it has, that these have been remedied, i.e. so far as you can tell, this is a safe job).

A fundamental feature of a modified work program is that it is time-contingent, not pain-contingent. A period of 2 weeks modified duties is considered sufficient time for most workers to build up their strength and co-ordination, and at the same time develop a positive belief set. The worker comes to appreciate that they can safely do more than they think (i.e. they eliminate their fears) and realise the benefit of an 'active' approach to overcoming their problem.

To achieve this they will need help. That comes from a combination of your explanations, advice and guidance, together with the support of the Team Leader (TL) (and where appropriate their workmates).

Who?

A modified work program is not always appropriate or required - it should be considered only for those workers in need of additional help to facilitate RTW or WR. Obviously some workers can safely return to (or continue with) their normal duties, but others will require your assistance to get them back to normal. The decision to implement a modified work program is yours (based on your assessment of the worker's needs (as opposed to desires)) - but the *actual means of implementation depends on a consensus between you, the worker and the TL - however, it is you who guides and controls this process.*

Action

- **Decide if a modified work program is really needed**

  You will do your normal risk assessment to identify any risks for this particular person (the statutory risk assessment, and its suggested controls, ensures that the work is safe for healthy individuals). You need to identify risks for this worker with a musculoskeletal disorder, based on the fact that they are sore - don't focus on the 'danger' of physical factors, but on their potential as an 'obstacle' .

  Program not needed:

  - If there is not a clear relationship between work activities and symptoms
  - If the work does not entail activities that are significant risk factors for the disorder concerned
  - If the worker feels able to manage their normal work without difficulty
  - If the worker is symptom-free

  Program probably needed:

  - If there is clearly a relationship between work activities and symptoms
  - If the work entails activities that are significant risk factors for the disorder concerned
  - If your assessment shows that the worker has concerns and feels help is needed

- **How to design modified work program**

  - Assess risks at workplace, involving worker and TL if possible *(see Team Leader script)* Record in modified work section
  - Assumption is that there'll be no significant risks, but some risk factors possible, i.e. heavy weights, repetitive actions, postural issues. Record in modified work section

- Need to reduce exposure to those factors, rather than remove them
- Thrust is to make the work accommodating
- Do this, in first instance, by modifying the organisation of the work - e.g.:

  Allocate additional breaks
  Organise task rotation
  Organise extra manpower
  Reduce pace of work
  Provide for postural comfort (e.g. introduce seat)

- Only if the work is very heavy or the worker is in considerable difficulty:

  Consider additional aids such as mechanisation, wrist rests, new chairs, etc.

- **Problems**

- If risk assessment finds significant risk: i.e. an uncontrolled hazard - see HSE guidance documents Record in modified work section
- Take normal company action to reduce the risk
- Make whatever temporary (major) modifications you can
- Try to achieve RTW or WR
- If there is major concern about worker's ability to return to work/stay at work despite modifications, then refer to company doctor and/or worker's own GP. Contact that doctor/GP to seek help with designing suitable modifications, or to confirm that your proposals are acceptable medically
- If not acceptable, and GP/doctor is concerned, then exit from the study Record in exit section

HOW TO IMPLEMENT THE MODIFIED WORK PROGRAM

Discuss the program and its purposes with worker - ensure following messages are conveyed: Record in modified work section

- purpose of program is to help with early RTW (or ensure WR)
- most people can return to work (or keep working) even if still some symptoms
- it is beneficial to return to normal work, as quickly as possible
- long periods of absence are known to be detrimental

early work return is beneficial - not just for recovery now, but for future

- modified work is to help you do your job even if you are sore
- it is a bit like recovering from a sports injury - some discomfort is OK when getting back in
- the action program reduces discomfort but will not remove it - (*worker must use common sense)*
- (if you needed to contact the GP, and they were willing) state that the GP has agreed to this program
- TL is signed up to the program and will do whatever is needed

- **Implement the program** Record what was implemented in modified work section, and the date started
  - Return to nurse if in difficulty - don't just go off work

(Note! it is assumed that problems identified at initial intervention are fully addressed)

AFTER MODIFIED WORK PROGRAM HAS BEEN IMPLEMENTED

Monitor at 1-week and 2-weeks

- Check status at 1-week - reduce or remove modifications as possible. Record in modified work section Inform TL and worker why.
- If not possible to reduce or remove modifications, then re-iterate messages 1-10 as necessary from 'implementation' section above Record in modified work section
- Check status at 2-weeks - remove modifications as possible Record in modified work section
- Inform worker that they should come back to you if further difficulties
- If worker is still having difficulty after two weeks on modified work program, refer to physio if applicable Record in exit database

Worker with further difficulties

There may be some people who have had modified work restrictions removed, and have returned to the nurse again stating that they are experiencing difficulties:

- If it is within one month of being entered into the study, and worker has not absented, then consider modifications again to aid work retention, and repeat steps 1 and 2 from above Record in modified work section.
- If worker has absented again, even if within one month, then re-enter into the study.
- If it is longer than one month since the worker was entered into the study, and if worker has not absented, then re-enter the worker into the study, starting from Script 2 onwards.

GP SCRIPT

This script outlines all the possible communications you may need to have with the worker's GP.

A circular will have been sent to all GPs informing them of the study

After completion of Scripts 2 and 3

- If clinical assessment indicates 'red flags', then refer to GP. Contact GP and inform GP Record in exit section
- If worker has signed up for the study, then send the corresponding letter. Record in intervention section
- If worker does not sign up to study, then send the corresponding letter. Record in intervention section and then exit section
- If worker is having difficulty with removal of modified work, then send corresponding letter Record in exit section
- Inform the GP by letter if somebody has successfully or unsuccessfully returned to work Record in exit section if unsuccessful
- If at any stage, you are unhappy with the worker's progress, or feel that they have deteriorated, then contact the GP as normal

For employees who have sent in second Med 3, and who have had assessment by nurse

- If you believe that you are able to manage this worker, and that there is no strong reason for extended absence, then send corresponding letter again re-iterating that the worker has joined up to the study.

If GP is unwilling to co-operate or if gives worker another Med 3, then do not contact after a second time.

<u>FOR THE ATTENTION OF ALL GPs</u>

Dear Dr

<u>Management of musculoskeletal disorders at work</u>

I am writing to let you know that SmithKline Beecham, in conjunction with the Health and Safety Executive, is looking to improving care for musculoskeletal disorders at work, and we are now offering a new approach to the management of musculoskeletal disorders.

This approach aims to reduce the impact of musculoskeletal disorders by providing a new occupational nurse-led intervention for management at work. It is based on recommendations both in the RCGP guidelines and in the Faculty of Occupational Medicine's guidelines, and uses these to take practical steps to tackle the occupational health aspects of the problem.

The scientific question that the researchers are attempting to answer with this study is: "how effective is an early, nurse-led, psychosocial intervention at reducing absence or recurrent workloss due to musculoskeletal disorders?"

The focus for this intervention lies with the occupational health nurse. This new approach allows the nurses to deal with the psychosocial problems and physical symptoms that workers with musculoskeletal pain may have. Therefore we, as an occupational health unit, would be willing and feel able to manage any SmithKline Beecham worker who experiences a musculoskeletal disorder, and would be most grateful if you could inform any such workers who present to you that we are offering this management approach.

Yours sincerely

GP LETTER
(Notification that worker has joined study)

Dear Dr.............

Re: <Mr/Mrs.........> <address> <date of birth>

Mr/Mrs .... has attended the Occupational Health Department with .... They have signed up to our new program which manages musculoskeletal disorders at work. (Please see enclosed letter).

I trust you are happy for me to manage the case, but if you have any queries, please do not hesitate to contact me.

Thank you

Yours sincerely

GP LETTER
(For workers who have not signed up for the program)

Dear Dr......................,

Re: <Mr/Mrs.........> <address> <date of birth>

I am writing to inform you that Mr/Mrs......................... may be presenting to you regarding their .... problem. As you know we are offering a new management program for musculoskeletal disorders at SmithKline Beecham (see enclosed letter), and I trust you feel able to support us in this, but if you have any queries please do not hesitate to contact me.

Thank you

Yours sincerely

GP LETTER
(If unsuccessful at removing from modified work)

Dear Dr............,

Re: <Mr/Mrs.........> <address> <date of birth>

I am writing to you regarding Mr/Mrs...................., who has attended the Occupational Health Department with .... and has been managed using our new program (see enclosed letter). Mr/Mrs .... has been on modified work for two weeks, but unfortunately is still experiencing problems, and has now been referred to the company physiotherapist.

Yours sincerely

GP LETTER
(Returned to work/failed to return after 4 weeks)

Dear Dr...............

Re: <Mr/Mrs..........> <address> <date of birth>

I am writing to inform you that Mr/Mrs..................... who presented with ....has successfully/failed to* returned to work.

Yours sincerely

*delete as appropriate

TEAM LEADER SCRIPT

The communications that you will have with Team Leaders will essentially be to discus RTW/WR plans. This will incorporate modified work, and alerting the Team Leader to any specific social problems individuals may have at their workstation.

After assessment (this could be just once if worker remains at work or returns to work), or up to 4 times, (if worker remains absent)

- Contact Team Leader and discuss findings of your assessment Record in intervention section
- If worker needs modified work, carry out risk assessment and discuss implementation
- Alert Team Leader to any particular social problems the individual may be having Record in intervention section

When monitoring modified work

- After 1 and 2 weeks of modified work, assess worker (*see modified work script, implementation section*) and discuss findings with Team Leader. The primary aim here is to be working to reduce or remove modifications if possible.

SCRIPT 4
RETURN-TO-WORK

A worker may return to work at any stage of the program, and there will be different things to assess depending on when this is

For those workers who have returned to work after initial telephone contact, but who have not had an initial intervention

- There should have been an instruction in the initial telephone call for workers to report in to you at RTW. As back up, the Team Leader should be briefed to report when somebody has come back to work $\boxed{\text{Record date of RTW in entry section}}$
- Make an appointment as soon as possible for this individual to come to see you $\boxed{\text{Record date in intervention section}}$
- Follow scripts 2 & 3

For those employees who return to work after initial intervention (at any stage from 0 days to 4 weeks)

- After carrying out initial intervention, an appointment should have been made for the individual to see the nurse at RTW. $\boxed{\text{Record date of RTW in entry section}}$ This appointment may just be a follow-up or a further intervention.
- If applicable, implement modified work plan with worker as soon as possible.

Patients want accurate and effective information - The Back Book has been written to meet that need.

The Back Book (American Edition) is intended as a guide for patients and the advice it contains is based on the latest research: clinical trials have shown it to be effective. It should be suitable for anyone with back problems, and clinicians may give it to their patients to help with early management. It is scientifically linked with the US Department of Health and Human Services' AHCPR Literature Review process for Acute Low Back Problems Guideline #14, and with the Royal College of General Practitioners, and Faculty of Occupational Medicine guidelines for back pain in the UK.

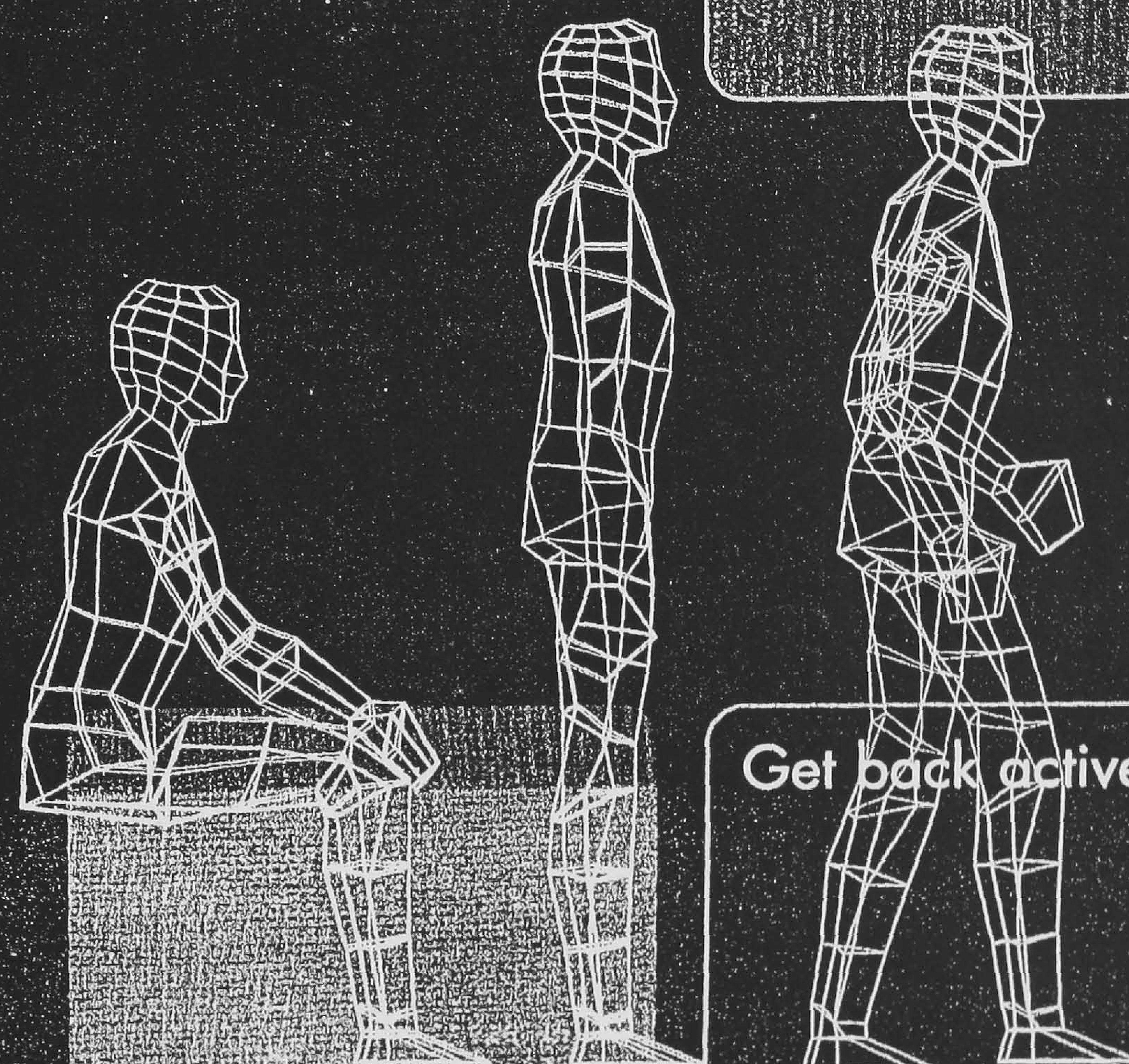
To be sure it contains the latest reliable back information, it has been written by a team of experts:
Orthopaedics, Prof Stanley Bigos, Seattle
General Practice, Prof Martin Roland, Manchester.
Orthopaedics, Prof Gordon Waddell, Glasgow.
Physiotherapy, Dr Jennifer Klaber Moffett, Hull.
Osteopathy, Prof Kim Burton, Huddersfield.
Psychology, Prof Chris Main, Salford.

TSO

www.tso.co.uk

THE BACK BOOK

The best way to deal with back problems -



Get back active

MEMBER.......

- Neck and arm pain is common but rarely serious

- Most neck and arm pain is only temporary: too much rest or worrying will only make it worse

- Activity or work is better than doing nothing: modified work (for a short period) is far better for you than no work

- **DON'T FORGET – A POSITIVE, ACTIVE APPROACH TO NECK AND ARM PAIN WILL MEAN LESS TROUBLE LATER.**

- Keep this leaflet handy, you may need it.

- If you experience neck and arm trouble which gives you persistent severe pain you should seek advice from your doctor.

NECK AND ARM PAIN

Don't suffer needlessly

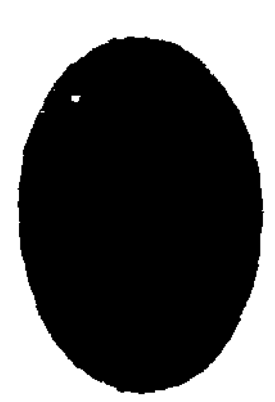
This leaflet is designed to aid your understanding of neck and arm trouble, and to help you recover quickly. The information is based on the latest scientific research, and applies to common arm conditions such as tennis elbow, tenosynovitis and 'RSI' as well as neck problems.

THE FACTS

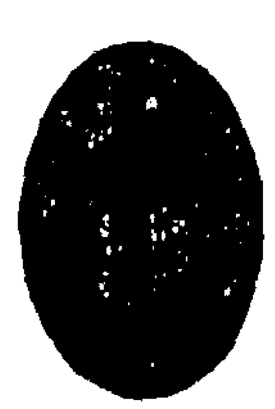
- Neck and arm pain affects most people at some point in their life, just like headache or back pain: it does not mean there's serious damage.
- Often there is no obvious cause and generally it gets better quickly of its own accord: there is no good reason why it should be persistent.
- The old approach of rest and more rest was wrong: it made matters worse. Treatment is now much more active.
- Hurting does not necessarily mean harming: it is very important (though often difficult) to accept and believe this!
- Worrying about the problem or about the future also makes matters worse: a positive approach helps recovery.
- We now know that doing too little is worse than doing too much.
- Neck and arm pain does not need to be a permanent problem – if you manage it properly.
- The amount of trouble you get depends largely on your reaction to the pain: *see below:*

TWO TYPES OF SUFFERER

One who **avoids** activity, and one who copes.



- The 'avoider' becomes frightened by the pain
- The 'avoider' rests a lot, worries about the future and does too little
- The 'avoider' believes that hurting always means further damage – it doesn't



- The 'coper' realises the pain is temporary and behaves as normally as possible
- The 'coper' accepts it will soon get better and has no fears for the future
- The 'coper' deals with the pain by being positive, being active and taking little time off work

WHO SUFFERS MOST?

- **'AVOIDERS'** suffer the most. They have pain for longer, have more time off work and can become disabled.
- 'COPERS' suffer less at the time and they are healthier in the long run.

..........so how do I become a 'COPER' and prevent unnecessary suffering?

Follow these guidelines

- you really can help yourself.

DO:

- Live life as normally as possible. This is better than resting.
- Keep up normal activities. They will not do damage – just avoid really strenuous things.
- Try to stay fit – general exercises such as walking, swimming or going to the gym should make you feel better.
- Do a little more each day so you can see the progress you are making.
- Either stay at work or go back to work as soon as possible: you may need modified work, but only for a week or two.
- Be patient. It is normal to get discomfort or twinges for some time.

DON'Ts:

- Don't just rely on rest and medication. Remain positive and take control of the pain.
- Don't worry. Neck and arm pain does not mean you are going to become an invalid.
- Don't stay at home or stop activities you enjoy.

Individuals Report

lame	CAROLINE ELIZABETH ,PANAH	EmpID	901085	Birthdate:	06/02/1969
ob Description:	Manager	Department:	Tablets	Site Name:	CRAWLEY

Entry into details

tatus of worker	At work
ate Of First Abs	
Date Of RTW	
eferral Method	Self
ate Of Telephone Call	
ligible To Join Study?	☑
f Not Eligible Why Not?	
Given Messages1 - 6	☐
Agreed To Intervention	0 (where 0 = NA, 1 = whilst absent 2 = when RTW)
Need To Contact Again WK1	☐
Need To Contact Again WK2	☐
Need To Contact Again WK3	☐
Need To Contact Again WK4	☐

Intervention details

Date Of Intervention	10/04/2001	Severe Thoracic Pain?	☐
Overview	☑	Widespread Neurological Signs?	☐
Signed Consent Form	☑	Unremitting Pain (Including Unexplained Headache)	☐
Completed Baseline Questionnaires	☑	Violent Trauma Suggesting Dislocation/Fracture?	☐
Asked Clinical History	☐	Sphincter Disturbance/Saddle Anaesthesia?	☐
Date Of Onset (this spell)	08/04/2001	Persistent Vertigo/Blackouts?	☐
Completed Tubingen	☑	Other Treatment	
Non-Mechanical Pain Pattern?	☐	Sent GP Letter	☐
Past History Of Carcinoma, Steroid Use, HIV, Drug Abuse?	☐	Discussed Concerns With TL	☐
		Carried Out Psychosocial Interventions	☐

Modified work details

Unwell,Unexplained Weight Loss?			☐
Worker Asks For Modified Work			☐
Risk Assessment Carried Out			☐
Significant Risk Identified			☐
What Was Implemented			
Reduced At 1Wk	☐	Removed At 1Wk	☐
Removed At 2Wks	☐	Reduced At 2Wks	☐
Messages 1-10 Given			☐
Date Modified Work Started			
Need For Further Modified Work			☐

Reason for exit details

Date of exit:	

Trial Document

BASELINE QUESTIONNAIRE

Name:

Employee ID No:

Date:

This is a list of phrases that other patients have used to express how they view their condition. Please indicate the extent to which you agree with each statement by circling the appropriate number from the scale below.

Strongly Disagree 1 *Somewhat Disagree 2* *Somewhat Agree 3* *Strongly Agree 4*

1	I'm afraid that I might injure myself if I exercise	1	2	3	4
2	If I were to try to overcome it, my pain would increase	1	2	3	4
3	My body is telling me I have something dangerously wrong	1	2	3	4
4	My pain would probably be relieved if I were to exercise	1	2	3	4
5	People aren't taking my medical condition seriously	1	2	3	4
6	My accident has put my body at risk for the rest of my life	1	2	3	4
7	Pain always means I have injured my body	1	2	3	4
8	Just because something aggravates my pain does not mean it is dangerous	1	2	3	4
9	I am afraid that I might injure myself accidentally	1	2	3	4
10	Simply being careful that I do not make any unnecessary movements is the safest thing I can do to prevent my pain from worsening	1	2	3	4
11	I wouldn't have this much pain if there wasn't something potentially dangerous going on in my body	1	2	3	4
12	Although my condition is painful, I would be better off if I were physically active	1	2	3	4
13	Pain lets me know when to stop exercising so that I don't injure myself	1	2	3	4
14	It's really not safe for a person with a condition like mine to be physically active	1	2	3	4
15	I can't do all the things normal people do because it's too easy for me to get injured	1	2	3	4
16	Even though something is causing me a lot of pain, I don't think it's actually dangerous	1	2	3	4
17	No one should have to exercise when they are in pain	1	2	3	4

We would like to know your views about your health and the impact of your back/neck/arm pain. This information will help us keep track of how you feel and how well you are able to do your usual activities.

Answer every question by shading the appropriate circle. If you're unsure about how to answer a question, give the best answer you can.

0. My main problem just now is my:

Back	Neck	Arm
❍	❍	❍

1. In general, would you say your health is:

Excellent	Very good	Good	Fair	Poor
❍	❍	❍	❍	❍

2. *Compared to six months ago*, how would you rate your health in general *now*?

Much better now	Somewhat better now	About the same	Somewhat worse now	Much worse now
❍	❍	❍	❍	❍

3. The following questions are about activities you might do during a typical day. Does your pain *now* limit you in these activities? If so, how much?

	Yes, limited a lot	Yes, limited a little	No, not limited at all
Vigorous activities, such as running, lifting heavy objects, participating in strenuous sport	❍	❍	❍
Moderate activities, such as moving a table, pushing a vacuum cleaner, bowling, or playing golf	❍	❍	❍
Lifting or carrying groceries	❍	❍	❍
Climbing **several** flights of stairs	❍	❍	❍
Climbing **one** flight of stairs	❍	❍	❍
Bending, kneeling, or stooping	❍	❍	❍
Walking **more than a mile**	❍	❍	❍
Walking **several hundred yards**	❍	❍	❍
Walking **one hundred yards**	❍	❍	❍
Bathing or dressing yourself	❍	❍	❍

4. During the *past 4 weeks*, have you had any of the following problems with your work or other regular daily activities as a result of your physical health?

Cut down on the **amount of time** you spent on work or other activities

All of the time	Most of the time	Some of the time	A little of the time	None of the time
❍	❍	❍	❍	❍

Accomplished less than you would like

All of the time	Most of the time	Some of the time	A little of the time	None of the time
❍	❍	❍	❍	❍

Were limited in the **kind** of work or other activities

All of the time	Most of the time	Some of the time	A little of the time	None of the time
❍	❍	❍	❍	❍

Had **difficulty** performing the work or other activities (for example, it took extra effort)

All of the time	Most of the time	Some of the time	A little of the time	None of the time
❍	❍	❍	❍	❍

---

5. During the *past 4 weeks*, have you had any of the following problems with your work or other regular daily activities as a result of any emotional problems (such as feeling depressed or anxious)?

Cut down on the **amount of time** you spent on work or other activities

All of the time	Most of the time	Some of the time	A little of the time	None of the time
❍	❍	❍	❍	❍

Accomplished less than you would like

All of the time	Most of the time	Some of the time	A little of the time	None of the time
❍	❍	❍	❍	❍

Didn't do work or other activities as **carefully** as usual

All of the time	Most of the time	Some of the time	A little of the time	None of the time
❍	❍	❍	❍	❍

6. During the *past 4 weeks*, to what extent has your physical health or emotional problems interfered with your normal social activities with family, friends, neighbours, or groups?

Not at all	Slightly	Moderately	Quite a bit	Extremely
❍	❍	❍	❍	❍

7. How much *bodily* pain have you had during the *past 4 weeks*?

None	Very mild	Mild	Severe	Very severe
❍	❍	❍	❍	❍

8. During the *past 4 weeks*, how much did pain interfere with your normal work (including both work outside the home and housework)?

Not at all	A little bit	Moderately	Quite a bit	Extremely
❍	❍	❍	❍	❍

9. These questions are about how you feel and how things have been with you during the past 4 weeks. For each question, please give the one answer that comes closest to the way you have been feeling.

How much of the time during the *past 4 weeks*...

Did you feel full of life?

All of the time	Most of the time	Some of the time	A little of the time	None of the time
❍	❍	❍	❍	❍

Have you been very nervous?

All of the time	Most of the time	Some of the time	A little of the time	None of the time
❍	❍	❍	❍	❍

Have you felt so down in the dumps that nothing could cheer you up?

All of the time	Most of the time	Some of the time	A little of the time	None of the time
❍	❍	❍	❍	❍

Have you felt calm and peaceful?

All of the time	Most of the time	Some of the time	A little of the time	None of the time
❍	❍	❍	❍	❍

Did you have a lot of energy?

All of the time	Most of the time	Some of the time	A little of the time	None of the time
❍	❍	❍	❍	❍

Have you felt downhearted and low?

All of the time	Most of the time	Some of the time	A little of the time	None of the time
❍	❍	❍	❍	❍

Did you feel worn out?

All of the time	Most of the time	Some of the time	A little of the time	None of the time
❍	❍	❍	❍	❍

Have you been happy?

All of the time	Most of the time	Some of the time	A little of the time	None of the time
❍	❍	❍	❍	❍

Did you feel tired?

All of the time	Most of the time	Some of the time	A little of the time	None of the time
❍	❍	❍	❍	❍

---

10. During the *past 4 weeks*, how much of the time has your physical health or emotional problems interfered with your social activities (like visiting friends, relatives, etc.)?

All of the time	Most of the time	Some of the time	A little of the time	None of the time
❍	❍	❍	❍	❍

---

11. How TRUE or FALSE is each of the following statements for you?

I seem to get ill more easily than other people

Definitely true	Mostly true	Don't know	Mostly false	Definitely false
❍	❍	❍	❍	❍

I am as healthy as anybody I know

Definitely true	Mostly true	Don't know	Mostly false	Definitely false
❍	❍	❍	❍	❍

I expect my health to get worse

Definitely true	Mostly true	Don't know	Mostly false	Definitely false
❍	❍	❍	❍	❍

My health is excellent

Definitely true	Mostly true	Don't know	Mostly false	Definitely false
❍	❍	❍	❍	❍

Syntax for SF-36 Scoring

```
********** SF-36 Version II.

*****Baseline.

Compute asf1   = asf361.
Compute asf2   = asf362.
Compute asf3a  = asf363a.
Compute asf3b  = asf363b.
Compute asf3c  = asf363c.
Compute asf3d  = asf363d.
Compute asf3e  = asf363e.
Compute asf3f  = asf363f.
Compute asf3g  = asf363g.
Compute asf3h  = asf363h.
Compute asf3i  = asf363i.
Compute asf3j  = asf363j.
Compute asf4a  = asf364a.
Compute asf4b  = asf364b.
Compute asf4c  = asf364c.
Compute asf4d  = asf364d.
Compute asf5a  = asf365a.
Compute asf5b  = asf365b.
Compute asf5c  = asf365c.
Compute asf6   = asf366.
Compute asf7   = asf367.
Compute asf8   = asf368.
Compute asf9a  = asf369a.
Compute asf9b  = asf369b.
Compute asf9c  = asf369c.
Compute asf9d  = asf369d.
Compute asf9e  = asf369e.
Compute asf9f  = asf369f.
Compute asf9g  = asf369g.
Compute asf9h  = asf369h.
Compute asf9i  = asf369i.
Compute asf10 = asf3610.
Compute asf11a= asf3611a.
Compute asf11b= asf3611b.
Compute asf11c= asf3611c.
Compute asf11d= asf3611d.

Recode asf1  asf2  asf3a asf3b asf3c asf3d asf3e
asf3f asf3g asf3h asf3i asf3j asf4a asf4b asf4c asf4d asf5a asf5b asf5c
asf6 asf7  asf8 asf10 asf9a asf9b asf9c asf9d asf9e asf9f asf9g asf9h asf9i asf10 asf11a
asf11b asf11c asf11d (99=0) (missing = 0).

Recode  asf6 asf2 asf9d asf9h asf9a asf9e (1=5)  (2=4)  (4=2)  (5=1).
Compute asf1a = asf1.
recode asf1a (1=5) (2=4.4) (3=3.4) (4=2) (5=1).
Recode asf8  (1=5)  (2=4)  (4=2)  (5=1).
Recode asf11b asf11d  (1=5)  (2=4)  (4=2)  (5=1).
Recode  asf7 (1=5)  (2=4) (3=3) (4=2) (5=1).

***** Calculation of SF-36 scale scores.

* Physical Functioning.
Compute count = 0.
If (asf3a ne 0) count = count + 1.
If (asf3b ne 0) count = count + 1.
If (asf3c ne 0) count = count + 1.
If (asf3d ne 0) count = count + 1.
```

```
If (asf3e ne 0) count = count + 1.
If (asf3f ne 0) count = count + 1.
If (asf3g ne 0) count = count + 1.
If (asf3h ne 0)count = count + 1.
If (asf3i ne 0) count = count + 1.
If (asf3j ne 0) count = count + 1.
Compute average = (asf3a + asf3b + asf3c + asf3d + asf3e + asf3f
+ asf3g + asf3h + asf3i + asf3j) / count.
Compute aphysic = average * 10.
If (count lt 5) aphysic = 99.
If (count ge 5) aphysic = ((aphysic - 10) / 20) * 100.
Missing value aphysic (99).

* Social Functioning.
Compute count = 0.
If (asf6 ne 0) count = count + 1.
If (asf10 ne 0) count = count + 1.
If (count = 2) asocial = asf10 + asf6.
If (asf10 = 0) asocial = asf6*2.
If (asf6 = 0) asocial = asf10*2.
If (count = 0) asocial = 99.
If (count ne 0) asocial = ((asocial - 2) / 8) * 100.
If (asocial le 0) asocial = 0.
Missing value asocial (99).

* Role Limitations Due to Physical Problems.
Compute count = 0.
Compute arolphy = 0.
If (asf4a ne 0) count = count + 1.
If (asf4b ne 0) count = count + 1.
If (asf4c ne 0) count = count + 1.
If (asf4d ne 0) count = count + 1.
If (count = 4) arolphy = ((asf4a + asf4b + asf4c + asf4d - 4)/16)*100.
If (count = 3) arolphy =  ((asf4a + asf4b + asf4c + asf4d - 3)/12)*100.
If (count = 2) arolphy = ((asf4a + asf4b + asf4c + asf4d - 2)/8)*100.
If (count le 1) arolphy = 99.
Missing value arolphy (99).


* Role Limitations Due to Emotional Problems.
Compute count = 0.
Compute arolmen = 0.
If (asf5a ne 0) count = count + 1.
If (asf5b ne 0) count = count + 1.
If (asf5c ne 0) count = count + 1.
If (count = 3) arolmen = ((asf5a + asf5b + asf5c - 3) / 12)*100.
If (count = 2) arolmen = ((asf5a + asf5b + asf5c - 2) / 8)*100.
If (count le 1) arolmen = 99.
Missing value arolmen (99).

* Mental Health.
Compute count = 0.
compute amental = 0.
If (asf9b ne 0) count = count + 1.
If (asf9c ne 0) count = count + 1.
If (asf9d ne 0) count = count + 1.
If (asf9f ne 0) count = count + 1.
If (asf9h ne 0) count = count + 1.
If (count = 5) amental = ((asf9B + asf9C + asf9D + asf9F + asf9H - 5)/20)*100.
If (count = 4) amental = ((asf9B + asf9C + asf9D + asf9F + asf9H - 4)/16)*100.
If (count = 3) amental = ((asf9B + asf9C + asf9D + asf9F + asf9H - 3)/12)*100.
If (count le 3) amental = 99.
```

```
Missing value amental (99).

* Vitality.
Compute count = 0.
Compute avital = 0.
If (asf9A ne 0) count = count + 1.
If (asf9E ne 0) count = count + 1.
If (asf9G ne 0) count = count + 1.
If (asf9I ne 0) count = count + 1.
If (count = 4) avital = ((asf9A + asf9E + asf9G + asf9I - 4)/16)*100.
If (count = 3) avital = ((asf9A + asf9E + asf9G + asf9I - 3)/12)*100.
If (count = 2) avital = ((asf9A + asf9E + asf9G + asf9I - 2)/8)*100.
If (count le 1) avital = 99.
Missing value avital (99).

* Pain.
Compute apain = 99.
Compute count = 0.
If (asf7=0) count = count +1.
If (asf8=0) count = count +1.
If (count = 0) apain = ((asf7+asf8 - 2)/8)*100.
If (asf7 = 0) apain = ((asf8 - 1)/4)*100.
If (asf8 = 0) apain = ((asf7 - 1)/4)*100.
If (count =2) apain = 99.
Missing value apain (99).

* General Health Perceptions.
Compute count = 0.
Compute agener = 0.
If (asf1a ne 0) count = count + 1.
If (asf11a ne 0) count = count + 1.
If (asf11b ne 0) count = count + 1.
If (asf11c ne 0) count = count + 1.
If (asf11d ne 0) count = count + 1.
If (count = 5) agener = ((asf1a + asf11a + asf11b + asf11c + asf11d - 5)/20)*100.
If (count = 4) agener = ((asf1a + asf11a + asf11b + asf11c + asf11d - 4)/16)*100.
If (count = 3) agener = ((asf1a + asf11a + asf11b + asf11c + asf11d - 3)/12)*100.
If (count le 2) agener = 99.
Missing value agener (99).

* Change in Health.
If (asf2 ne 0) achange = ((asf2 - 1) / 4) * 100.
If (asf2 = 0 ) achange = 99.
Missing value achange(99).
```

Below are statements which help us to understand your general work situation.

Please answer ALL statements and indicate whether you agree or disagree with each statement by circling the appropriate number on the scale ranging from 1 COMPLETELY DISAGREE to 5 COMPLETELY AGREE.

1	2	3	4	5
COMPLETELY DISAGREE			COMPLETELY AGREE	

1	I enjoy my work	1	2	3	4	5
2	My job meets my expectations	1	2	3	4	5
3	I can turn to a fellow worker for help when I have problems	1	2	3	4	5
4	I get satisfaction from my job	1	2	3	4	5
5	I like most of my fellow workers	1	2	3	4	5
6	I enjoy the tasks involved in my job	1	2	3	4	5
7	My fellow workers talk things over with me	1	2	3	4	5
8	I am happy with my job	1	2	3	4	5
9	I would recommend my job and place of work to a friend	1	2	3	4	5
10	I would choose the same job, in the same place, again	1	2	3	4	5
11	My fellow workers accept and support my new ideas	1	2	3	4	5

Please could you give an indication of how important you believe the items below are in causing musculoskeletal pain by circling the appropriate number from the scale below:

1	2	3	4	5
NEVER A CAUSE			ALWAYS A CAUSE	

1	Heavy lifts at work	1 2 3 4 5
2	Monotonous work	1 2 3 4 5
3	Rapid work pace	1 2 3 4 5
4	Poor work posture	1 2 3 4 5
5	Lack of information about how work is to be done	1 2 3 4 5
6	Lack of safety and assistance devices	1 2 3 4 5
7	Long working hours	1 2 3 4 5
8	Too few breaks	1 2 3 4 5
9	Workplace's physical environment	1 2 3 4 5
10	Lack of proper work organisation	1 2 3 4 5
11	Lack of interest from company's management	1 2 3 4 5

Please indicate the extent to which you agree or disagree with the following statements by circling the appropriate number from the scale below:

1=very strongly disagree, 2=strongly disagree, 3=disagree, 4=agree, 5=strongly agree, 6=very strongly agree

1	Assessments of performance do not reflect the way and how hard individuals work	1	2	3	4	5	6
2	Even though some people try to control company events by taking part in social affairs or office politics, most of us are subject to influences we can neither comprehend nor control	1	2	3	4	5	6
3	Management can be unfair when appraising subordinates since their performance is often influenced by accidental events	1	2	3	4	5	6
4	Most of us are subject to events we cannot influence or control	1	2	3	4	5	6
5	I have little influence over what happens to me at work	1	2	3	4	5	6
6	I have a lot of discretion in my work	1	2	3	4	5	6
7	I enjoy the freedom to manage my own work	1	2	3	4	5	6
8	I think that my job gives me a lot of influence	1	2	3	4	5	6

Please indicate the extent to which you agree or disagree with the following statements by circling the appropriate number from the scale below:

1=strongly disagree, 2=disagree, 3=agree, 4=strongly agree

1	My job requires working very fast	1	2	3	4
2	My job requires working very hard	1	2	3	4
3	I am not asked to do excessive amounts of work	1	2	3	4
4	I have enough time to get the job done	1	2	3	4
5	I am free from conflicting demands that others make	1	2	3	4

6

PAIN SCALE

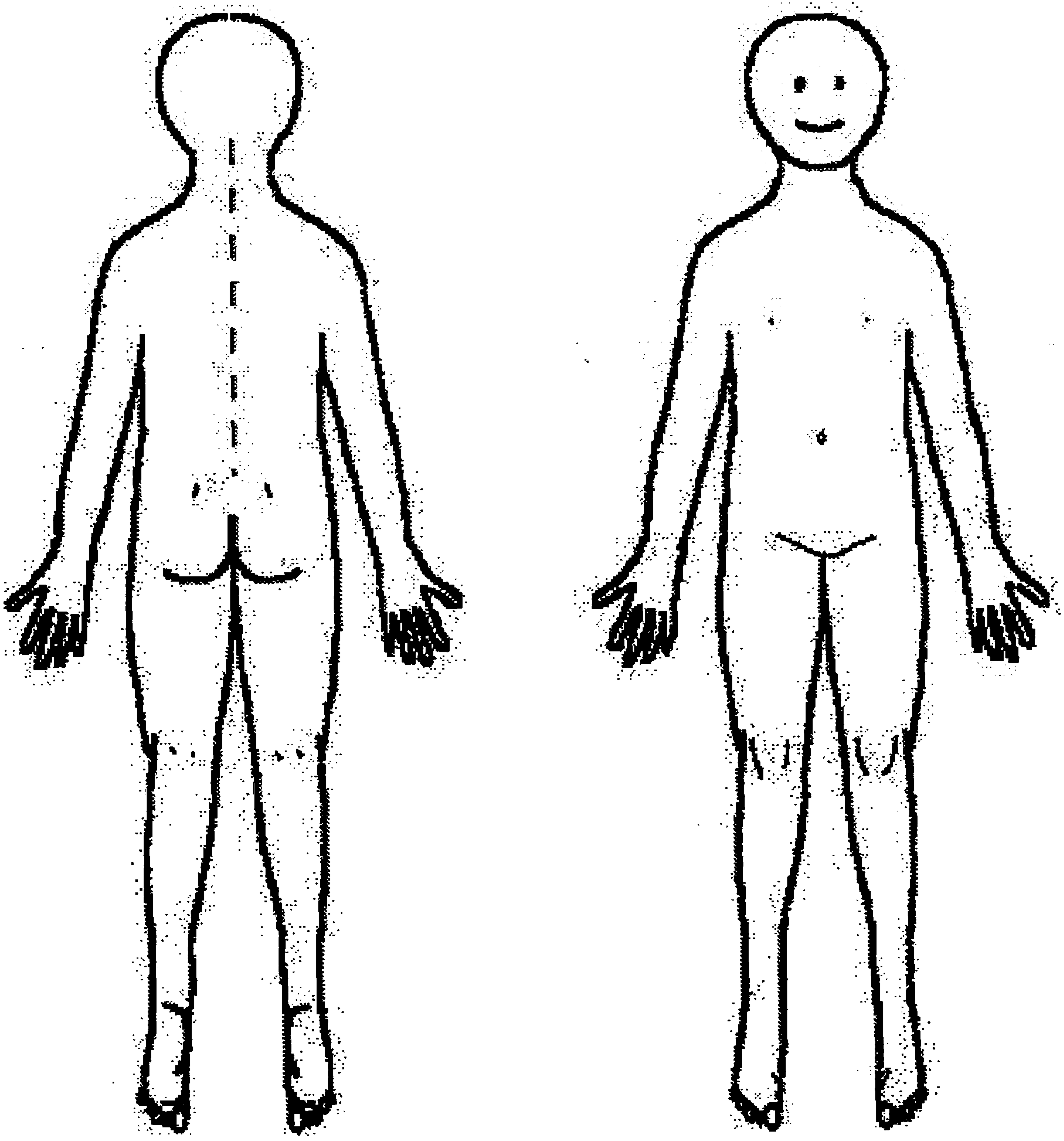
We want you to give us an idea of just how bad your pain has been on average over the last couple of days. Use the scale below to grade your pain by simply putting a cross at the point on the line that best indicates the level of your pain.

No pain | Worst imaginable pain

Pain diagram

Mark the areas of your body where you feel the following sensations:

Numbness	Pins and needles	Ache	Pain
= = = = = =	o o o o o o o o o	X X X X X X	/ / / / / / /
= = = = = =	o o o o o o o o	X X X X X X X	/ / / / / / /
= = = = = =	o o o o o o o o o	X X X X X X	/ / / / / / /



FOLLOW-UP QUESTIONNAIRE

You may recall that in September 2000 you had a back problem that was managed by your Occupational Health Advisor under a new GSK program aimed at helping you to understand and recover from this problem. Your opinions on this program will help us to improve it, so please take this opportunity to give us your views (in confidence, of course).

It is appreciated that you may not be experiencing any musculoskeletal problems at this time, and therefore you may feel that some of the questions are not relevant to you. However, it is very important that you answer all these questions fully as your opinions and beliefs are very important to this study.

Thank you

Name:

Site:

Employee ID No:

Date of entry:

This is a list of phrases that other patients have used to express how they view their condition. Please indicate the extent to which you agree with each statement by circling the appropriate number from the scale below.

Strongly Disagree 1 Somewhat Disagree 2 Somewhat Agree 3 Strongly Agree 4

1	I'm afraid that I might injure myself if I exercise	1	2	3	4
2	If I were to try to overcome it, my pain would increase	1	2	3	4
3	My body is telling me I have something dangerously wrong	1	2	3	4
4	My pain would probably be relieved if I were to exercise	1	2	3	4
5	People aren't taking my medical condition seriously	1	2	3	4
6	My accident has put my body at risk for the rest of my life	1	2	3	4
7	Pain always means I have injured my body	1	2	3	4
8	Just because something aggravates my pain does not mean it is dangerous	1	2	3	4
9	I am afraid that I might injure myself accidentally	1	2	3	4
10	Simply being careful that I do not make any unnecessary movements is the safest thing I can do to prevent my pain from worsening	1	2	3	4
11	I wouldn't have this much pain if there wasn't something potentially dangerous going on in my body	1	2	3	4
12	Although my condition is painful, I would be better off if I were physically active	1	2	3	4
13	Pain lets me know when to stop exercising so that I don't injure myself	1	2	3	4
14	It's really not safe for a person with a condition like mine to be physically active	1	2	3	4
15	I can't do all the things normal people do because it's too easy for me to get injured	1	2	3	4
16	Even though something is causing me a lot of pain, I don't think it's actually dangerous	1	2	3	4
17	No one should have to exercise when they are in pain	1	2	3	4

We would like to know your views about your health and the impact of your back/neck/arm pain. This information will help us keep track of how you feel and how well you are able to do your usual activities.

Answer every question by shading the appropriate circle. If you're unsure about how to answer a question, give the best answer you can.

0. My main problem just now is my:

Back	**Neck**	**Arm**
○	○	○

1. In general, would you say your health is:

Excellent	**Very good**	**Good**	**Fair**	**Poor**
○	○	○	○	○

2. *Compared to six months ago*, how would you rate your health in general *now*?

Much better now	**Somewhat better now**	**About the same**	**Somewhat worse now**	**Much worse now**
○	○	○	○	○

3. The following questions are about activities you might do during a typical day. Does your pain *now* limit you in these activities? If so, how much?

	Yes, limited a lot	**Yes, limited a little**	**No, not limited at all**
Vigorous activities, such as running, lifting heavy objects, participating in strenuous sport	○	○	○
Moderate activities, such as moving a table, pushing a vacuum cleaner, bowling, or playing golf	○	○	○
Lifting or carrying groceries	○	○	○
Climbing **several** flights of stairs	○	○	○
Climbing **one** flight of stairs	○	○	○
Bending, kneeling, or stooping	○	○	○
Walking **more than a mile**	○	○	○
Walking **several hundred yards**	○	○	○
Walking **one hundred yards**	○	○	○
Bathing or dressing yourself	○	○	○

4. During the *past 4 weeks*, have you had any of the following problems with your work or other regular daily activities as a result of your physical health?

Cut down on the **amount of time** you spent on work or other activities

All of the time	Most of the time	Some of the time	A little of the time	None of the time
❍	❍	❍	❍	❍

Accomplished less than you would like

All of the time	Most of the time	Some of the time	A little of the time	None of the time
❍	❍	❍	❍	❍

Were limited in the **kind** of work or other activities

All of the time	Most of the time	Some of the time	A little of the time	None of the time
❍	❍	❍	❍	❍

Had **difficulty** performing the work or other activities (for example, it took extra effort)

All of the time	Most of the time	Some of the time	A little of the time	None of the time
❍	❍	❍	❍	❍

---

5. During the *past 4 weeks*, have you had any of the following problems with your work or other regular daily activities as a result of any emotional problems (such as feeling depressed or anxious)?

Cut down on the **amount of time** you spent on work or other activities

All of the time	Most of the time	Some of the time	A little of the time	None of the time
❍	❍	❍	❍	❍

Accomplished less than you would like

All of the time	Most of the time	Some of the time	A little of the time	None of the time
❍	❍	❍	❍	❍

Didn't do work or other activities as **carefully** as usual

All of the time	Most of the time	Some of the time	A little of the time	None of the time
❍	❍	❍	❍	❍

6. During the *past 4 weeks*, to what extent has your physical health or emotional problems interfered with your normal social activities with family, friends, neighbours, or groups?

Not at all	Slightly	Moderately	Quite a bit	Extremely
❍	❍	❍	❍	❍

7. How much *bodily* pain have you had during the *past 4 weeks*?

None	Very mild	Mild	Severe	Very severe
❍	❍	❍	❍	❍

8. During the *past 4 weeks*, how much did pain interfere with your normal work (including both work outside the home and housework)?

Not at all	A little bit	Moderately	Quite a bit	Extremely
❍	❍	❍	❍	❍

9. These questions are about how you feel and how things have been with you during the past 4 weeks. For each question, please give the one answer that comes closest to the way you have been feeling.

How much of the time during the *past 4 weeks*...

Did you feel full of life?

All of the time	Most of the time	Some of the time	A little of the time	None of the time
❍	❍	❍	❍	❍

Have you been very nervous?

All of the time	Most of the time	Some of the time	A little of the time	None of the time
❍	❍	❍	❍	❍

Have you felt so down in the dumps that nothing could cheer you up?

All of the time	Most of the time	Some of the time	A little of the time	None of the time
❍	❍	❍	❍	❍

Have you felt calm and peaceful?

All of the time	Most of the time	Some of the time	A little of the time	None of the time
❍	❍	❍	❍	❍

Did you have a lot of energy?

All of the time	Most of the time	Some of the time	A little of the time	None of the time
❍	❍	❍	❍	❍

Have you felt downhearted and low?

All of the time	Most of the time	Some of the time	A little of the time	None of the time
❍	❍	❍	❍	❍

Did you feel worn out?

All of the time	Most of the time	Some of the time	A little of the time	None of the time
❍	❍	❍	❍	❍

Have you been happy?

All of the time	Most of the time	Some of the time	A little of the time	None of the time
❍	❍	❍	❍	❍

Did you feel tired?

All of the time	Most of the time	Some of the time	A little of the time	None of the time
❍	❍	❍	❍	❍

---

10. During the *past 4 weeks*, how much of the time has your physical health or emotional problems interfered with your social activities (like visiting friends, relatives, etc.)?

All of the time	Most of the time	Some of the time	A little of the time	None of the time
❍	❍	❍	❍	❍

---

11. How TRUE or FALSE is each of the following statements for you?

I seem to get ill more easily than other people

Definitely true	Mostly true	Don't know	Mostly false	Definitely false
❍	❍	❍	❍	❍

I am as healthy as anybody I know

Definitely true	Mostly true	Don't know	Mostly false	Definitely false
❍	❍	❍	❍	❍

I expect my health to get worse

Definitely true	Mostly true	Don't know	Mostly false	Definitely false
❍	❍	❍	❍	❍

My health is excellent

Definitely true	Mostly true	Don't know	Mostly false	Definitely false
❍	❍	❍	❍	❍

Syntax for SF-36 Scoring

```
********** SF-36 Version II.

*****Baseline.

Compute asf1   = asf361.
Compute asf2   = asf362.
Compute asf3a  = asf363a.
Compute asf3b  = asf363b.
Compute asf3c  = asf363c.
Compute asf3d  = asf363d.
Compute asf3e  = asf363e.
Compute asf3f  = asf363f.
Compute asf3g  = asf363g.
Compute asf3h  = asf363h.
Compute asf3i  = asf363i.
Compute asf3j  = asf363j.
Compute asf4a  = asf364a.
Compute asf4b  = asf364b.
Compute asf4c  = asf364c.
Compute asf4d  = asf364d.
Compute asf5a  = asf365a.
Compute asf5b  = asf365b.
Compute asf5c  = asf365c.
Compute asf6   = asf366.
Compute asf7   = asf367.
Compute asf8   = asf368.
Compute asf9a  = asf369a.
Compute asf9b  = asf369b.
Compute asf9c  = asf369c.
Compute asf9d  = asf369d.
Compute asf9e  = asf369e.
Compute asf9f  = asf369f.
Compute asf9g  = asf369g.
Compute asf9h  = asf369h.
Compute asf9i  = asf369i.
Compute asf10 = asf3610.
Compute asf11a= asf3611a.
Compute asf11b= asf3611b.
Compute asf11c= asf3611c.
Compute asf11d= asf3611d.

Recode asf1  asf2  asf3a asf3b asf3c asf3d asf3e
asf3f asf3g asf3h asf3i asf3j asf4a asf4b asf4c asf4d asf5a asf5b asf5c
asf6 asf7  asf8 asf10 asf9a asf9b asf9c asf9d asf9e asf9f asf9g asf9h asf9i asf10 asf11a
asf11b asf11c asf11d (99=0) (missing = 0).

Recode  asf6 asf2 asf9d asf9h asf9a asf9e (1=5)  (2=4)  (4=2)  (5=1).
Compute asf1a = asf1.
recode asf1a (1=5) (2=4.4) (3=3.4) (4=2) (5=1).
Recode asf8  (1=5)  (2=4)  (4=2)  (5=1).
Recode asf11b asf11d  (1=5)  (2=4)  (4=2)  (5=1).
Recode  asf7 (1=5)  (2=4) (3=3) (4=2) (5=1).

***** Calculation of SF-36 scale scores.

* Physical Functioning.
Compute count = 0.
If (asf3a ne 0) count = count + 1.
If (asf3b ne 0) count = count + 1.
If (asf3c ne 0) count = count + 1.
If (asf3d ne 0) count = count + 1.
```

```
If (asf3e ne 0) count = count + 1.
If (asf3f ne 0) count = count + 1.
If (asf3g ne 0) count = count + 1.
If (asf3h ne 0)count = count + 1.
If (asf3i ne 0) count = count + 1.
If (asf3j ne 0) count = count + 1.
Compute average = (asf3a + asf3b + asf3c + asf3d + asf3e + asf3f
+ asf3g + asf3h + asf3i + asf3j) / count.
Compute aphysic = average * 10.
If (count lt 5) aphysic = 99.
If (count ge 5) aphysic = ((aphysic - 10) / 20) * 100.
Missing value aphysic (99).

* Social Functioning.
Compute count = 0.
If (asf6 ne 0) count = count + 1.
If (asf10 ne 0) count = count + 1.
If (count = 2) asocial = asf10 + asf6.
If (asf10 = 0) asocial = asf6*2.
If (asf6 = 0) asocial = asf10*2.
If (count = 0) asocial = 99.
If (count ne 0) asocial = ((asocial - 2) / 8) * 100.
If (asocial le 0) asocial = 0.
Missing value asocial (99).

* Role Limitations Due to Physical Problems.
Compute count = 0.
Compute arolphy = 0.
If (asf4a ne 0) count = count + 1.
If (asf4b ne 0) count = count + 1.
If (asf4c ne 0) count = count + 1.
If (asf4d ne 0) count = count + 1.
If (count = 4) arolphy = ((asf4a + asf4b + asf4c + asf4d - 4)/16)*100.
If (count = 3) arolphy =  ((asf4a + asf4b + asf4c + asf4d - 3)/12)*100.
If (count = 2) arolphy = ((asf4a + asf4b + asf4c + asf4d - 2)/8)*100.
If (count le 1) arolphy = 99.
Missing value arolphy (99).


* Role Limitations Due to Emotional Problems.
Compute count = 0.
Compute arolmen = 0.
If (asf5a ne 0) count = count + 1.
If (asf5b ne 0) count = count + 1.
If (asf5c ne 0) count = count + 1.
If (count = 3) arolmen = ((asf5a + asf5b + asf5c - 3) / 12)*100.
If (count = 2) arolmen = ((asf5a + asf5b + asf5c - 2) / 8)*100.
If (count le 1) arolmen = 99.
Missing value arolmen (99).

* Mental Health.
Compute count = 0.
compute amental = 0.
If (asf9b ne 0) count = count + 1.
If (asf9c ne 0) count = count + 1.
If (asf9d ne 0) count = count + 1.
If (asf9f ne 0) count = count + 1.
If (asf9h ne 0) count = count + 1.
If (count = 5) amental = ((asf9B + asf9C + asf9D + asf9F + asf9H - 5)/20)*100.
If (count = 4) amental = ((asf9B + asf9C + asf9D + asf9F + asf9H - 4)/16)*100.
If (count = 3) amental = ((asf9B + asf9C + asf9D + asf9F + asf9H - 3)/12)*100.
If (count le 3) amental = 99.
```

```
Missing value amental (99).

* Vitality.
Compute count = 0.
Compute avital = 0.
If (asf9A ne 0) count = count + 1.
If (asf9E ne 0) count = count + 1.
If (asf9G ne 0) count = count + 1.
If (asf9I ne 0) count = count + 1.
If (count = 4) avital = ((asf9A + asf9E + asf9G + asf9I - 4)/16)*100.
If (count = 3) avital = ((asf9A + asf9E + asf9G + asf9I - 3)/12)*100.
If (count = 2) avital = ((asf9A + asf9E + asf9G + asf9I - 2)/8)*100.
If (count le 1) avital = 99.
Missing value avital (99).

* Pain.
Compute apain = 99.
Compute count = 0.
If (asf7=0) count = count +1.
If (asf8=0) count = count +1.
If (count = 0) apain = ((asf7+asf8 - 2)/8)*100.
If (asf7 = 0) apain = ((asf8 - 1)/4)*100.
If (asf8 = 0) apain = ((asf7 - 1)/4)*100.
If (count =2) apain = 99.
Missing value apain (99).

* General Health Perceptions.
Compute count = 0.
Compute agener = 0.
If (asf1a ne 0) count = count + 1.
If (asf11a ne 0) count = count + 1.
If (asf11b ne 0) count = count + 1.
If (asf11c ne 0) count = count + 1.
If (asf11d ne 0) count = count + 1.
If (count = 5) agener = ((asf1a + asf11a + asf11b + asf11c + asf11d - 5)/20)*100.
If (count = 4) agener = ((asf1a + asf11a + asf11b + asf11c + asf11d - 4)/16)*100.
If (count = 3) agener = ((asf1a + asf11a + asf11b + asf11c + asf11d - 3)/12)*100.
If (count le 2) agener = 99.
Missing value agener (99).

* Change in Health.
If (asf2 ne 0) achange = ((asf2 - 1) / 4) * 100.
If (asf2 = 0 ) achange = 99.
Missing value achange(99).
```

3

Below are statements which help us to understand your general work situation.

Please answer ALL statements and indicate whether you agree or disagree with each statement by circling the appropriate number on the scale ranging from 1 COMPLETELY DISAGREE to 5 COMPLETELY AGREE.

1 2 3 4 5

COMPLETELY DISAGREE — COMPLETELY AGREE

1	I enjoy my work	1 2 3 4 5
2	My job meets my expectations	1 2 3 4 5
3	I can turn to a fellow worker for help when I have problems	1 2 3 4 5
4	I get satisfaction from my job	1 2 3 4 5
5	I like most of my fellow workers	1 2 3 4 5
6	I enjoy the tasks involved in my job	1 2 3 4 5
7	My fellow workers talk things over with me	1 2 3 4 5
8	I am happy with my job	1 2 3 4 5
9	I would recommend my job and place of work to a friend	1 2 3 4 5
10	I would choose the same job, in the same place, again	1 2 3 4 5
11	My fellow workers accept and support my new ideas	1 2 3 4 5

4

Please could you give an indication of how important you believe the items below are in causing musculoskeletal pain by circling the appropriate number from the scale below:

1	2	3	4	5
NEVER A CAUSE			ALWAYS A CAUSE	

1	Heavy lifts at work	1	2	3	4	5
2	Monotonous work	1	2	3	4	5
3	Rapid work pace	1	2	3	4	5
4	Poor work posture	1	2	3	4	5
5	Lack of information about how work is to be done	1	2	3	4	5
6	Lack of safety and assistance devices	1	2	3	4	5
7	Long working hours	1	2	3	4	5
8	Too few breaks	1	2	3	4	5
9	Workplace's physical environment	1	2	3	4	5
10	Lack of proper work organisation	1	2	3	4	5
11	Lack of interest from company's management	1	2	3	4	5

Please indicate the extent to which you agree or disagree with the following statements by circling the appropriate number from the scale below:

1=very strongly disagree, 2=strongly disagree, 3=disagree, 4=agree, 5=strongly agree, 6=very strongly agree

1	Assessments of performance do not reflect the way and how hard individuals work	1	2	3	4	5	6
2	Even though some people try to control company events by taking part in social affairs or office politics, most of us are subject to influences we can neither comprehend nor control	1	2	3	4	5	6
3	Management can be unfair when appraising subordinates since their performance is often influenced by accidental events	1	2	3	4	5	6
4	Most of us are subject to events we cannot influence or control	1	2	3	4	5	6
5	I have little influence over what happens to me at work	1	2	3	4	5	6
6	I have a lot of discretion in my work	1	2	3	4	5	6
7	I enjoy the freedom to manage my own work	1	2	3	4	5	6
8	I think that my job gives me a lot of influence	1	2	3	4	5	6

Please indicate the extent to which you agree or disagree with the following statements by circling the appropriate number from the scale below:

1=strongly disagree, 2=disagree, 3=agree, 4=strongly agree

1	My job requires working very fast	1	2	3	4
2	My job requires working very hard	1	2	3	4
3	I am not asked to do excessive amounts of work	1	2	3	4
4	I have enough time to get the job done	1	2	3	4
5	I am free from conflicting demands that others make	1	2	3	4

6

PAIN SCALE

We want you to give us an idea of just how bad your pain has been on average over the last couple of days. Use the scale below to grade your pain by simply putting a cross at the point on the line that best indicates the level of your pain.

No pain ____ Worst imaginable pain

APPENDIX 7:
Questionnaire for workers declining experimental intervention

A questionnaire was administered to all workers who declined the experimental intervention in order to establish the reasons for refusal. This is discussed in detail in Results 4.

Dear ....,

You may recall that in ......, your Occupational Health Advisor contacted you in order to take part in a new Health and Safety Executive/GSK initiative that aimed at helping you recover from a musculoskeletal disorder. By consenting to receive this programme, you also agreed to be contacted after 12 months in order to find out your opinions of this programme.

Therefore, it would be most helpful to the research team if you could complete the enclosed questionnaire, and return it using the stamped addressed envelope provided. I would like to remind you that the information you provide is strictly confidential and will only be seen by an external researcher.

Thank you

Yours sincerely

Serena Bartys
Project Manager

Name: J

Please answer the following questions:

1. How were you contacted in order to take part in the program?
   - ☐ Telephone ☐ Email ☐ Via colleague
   - ☐ Other (please state method) ....

2. Please tick if the following points were explained:
   - ☐ A new approach is being developed to help recovery from musculoskeletal disorders
   - ☐ Employee health management and GSK will be working with you to help you recover
   - ☐ The Occupational Health Advisors have been trained to be able to deliver this program
   - ☐ It is desirable that you come for an appointment to allow an individual program to be tailored specifically for you

3. Why did you decline to take part in the program?
   - ☐ Occupational Health Advisor advised against
   - ☐ GP advised against
   - ☐ Physiotherapist advised against
   - ☐ I was worried about confidentiality aspects
   - ☐ I did not feel it would be useful
   - ☐ I felt better at time of contact

4. What could (if anything) have persuaded you to take part?

Thank you for taking the time to complete this questionnaire, your opinions are very useful.

APPENDIX 8:
MEAN PSYCHOSOCIAL SCORES
(EXPERIMENTAL INTERVENTION - BASELINE & FOLLOW-UP)

8a. Mean psychosocial scores for experimental sample

The mean psychosocial scores for the experimental sample were presented in Results 5, and were broken down by various subgroups. The actual mean psychosocial scores and standard deviations for the whole sample are given in the following table.

8b. Mean psychosocial scores at follow-up for each experimental site

The mean shifts in psychosocial score between baseline and follow-up were presented in Results 5. The actual mean psychosocial scores and standard deviations for the follow-up sample are given in the following table.

Table 8a1: Mean baseline psychosocial scores, along with standard deviations (SD) for experimental sample

Psychosocial Factor	Experimental sample
TSK	37.20 (6.61)
SF36-Physical Component	42.28 (8.07)
SF36-Mental Component	50.67 (9.16)
Job satisfaction	24.59 (6.32)
Social support	15.76 (3.09)
Attribution (of LBP to work)	35.45 (9.11)
Control	16.24 (4.55)
Influence at work	11.37 (2.55)
Psychological demands	37.03 (5.44)
VAS	52.01 (2.30)
Pain Drawing	4.86 (2.90)

Table 8b1: Mean psychosocial scores at follow-up, along with standard deviations (SD) for each experimental site

Psychosocial Factor	Worthing	Crawley
TSK	36.70 (6.33)	34.00 (5.83)
SF36-Physical Component	49.35 (7.34)	51.75 (5.30)
SF36-Mental Component	50.36 (9.42)	50.68 (6.83)
Job satisfaction	22.35 (6.14)	24.60 (6.49)
Social support	14.50 (3.15)	15.99 (2.79)
Attribution (of LBP to work)	35.69 (9.68)	35.28 (9.32)
Control	15.45 (4.12)	16.41 (4.05)
Influence at work	11.18 (2.30)	11.28 (2.69)
Psychological demands	35.55 (5.76)	39.25 (6.23)
VAS	17.03 (2.30)	14.46 (1.92)

APPENDIX 9: MEAN PSYCHOSOCIAL SCORES (EXPERIMENTAL INTERVENTION - PROSPECTIVE ANALYSES)

9a. Psychosocial factors and occurrence of MSD absence in subsequent 18 months

The prospective analyses reported in Results 6 document the difference in mean psychosocial score for experimental participants who did and did not take subsequent absence due to MSDs. The tables below illustrate the actual mean psychosocial scores and standard deviations for the two groups.

9b. Psychosocial factors and duration of MSD absence in subsequent 18 months - univariate analyses

Reported below are the mann-whitney u tests and chi-squared performed in order to explore the relationship between 'detrimental' and 'non-detrimental' psychosocial scores and short and long durations of subsequent absence (see Results 6).

Table 9a.1: Mean psychosocial scores, along with standard deviations (SD) for experimental participants who did and did not take MSD absence in the subsequent 18 months

Psychosocial Factor	MSD absence yes	MSD absence no
TSK	37.76 (5.92)	37.13 (6.89)
SF36-Physical Component	42.09 (6.94)	42.35 (8.48)
SF36-Mental Component	49.09 (8.48)	51.26 (9.38)
Job satisfaction	24.61 (6.62)	24.58 (6.24)
Social support	15.75 (3.07)	15.76 (3.12)
Attribution (of LBP to work)	35.75 (8.78)	35.34 (9.28)
Control	16.84 (4.29)	16.00 (4.65)
Influence at work	11.43 (2.43)	11.35 (2.60)
Psychological demands	37.41 (5.68)	36.88 (5.37)
VAS	17.03 (2.30)	14.46 (1.92)
Pain Drawing	4.86 (3.29)	3.75 (2.69)

PSYCHOSOCIAL FACTORS AND DURATION OF MSD ABSENCE IN SUBSEQUENT 18 MONTHS - UNIVARIATE TESTS

Mann Whitney U-tests

Mann-Whitney U tests were performed in order to examine the differences in median scores on the psychosocial factors, and self-certified vs medically-certified absence durations. The direction of the arrow indicates the detrimental direction.

Variable	Absence duration	Median duration	*P*
Control	Self-cert Med-cert	16.00 days 19.00 days	.093
Influence at work	Self-cert Med-cert	11.00 days 12.50 days	.132
TSK	Self-cert Med-cert	39.00 days 38.00 days	.600
Job satisfaction	Self-cert Med-cert	24.00 days 28.00 days	.018
Social support	Self-cert Med-cert	15.00 days 18.00 days	.399
Attribution (work)	Self-cert Med-cert	37.00 days 26.00 days	.126
Psychological demands	Self-cert Med-cert	37.00 days 36.00 days	.525
SF36-Physical Component	Self-cert Med-cert	42.00 days 42.00 days	.670
SF36-Mental Component	Self-cert Med-cert	49.00 days 48.00 days	.915
VAS	Self-cert Med-cert	6.30 days 6.60 days	.327
Pain Drawing	Self-cert Med-cert	3.50 days 4.50 days	.111

Chi-squared tests

Scores on the psychosocial variables were split at the median, and then compared in 2 x 2 tables with self-cert and med 3 sickness absence length. The following tables show the numbers in each group.

Control	Low control	High control
Self-cert	10	15
Med-cert	3	9

Personal influence at work	Low influence	High influence
Self-cert	10	15
Med-cert	4	8

Psychological demands	Low demands	High demands
Self-cert	12	13
Med-cert	7	5

Job satisfaction	Low satisfaction	High satisfaction
Self-cert	14	11
Med-cert	5	6

Social support	Low support	High support
Self-cert	13	12
Med-cert	2	9

TSK	Low score	High score
Self-cert	9	13
Med-cert	6	6

Attribution (work)	Low attribution	High attribution
Self-cert	13	12
Med-cert	8	3

VAS	Low score	High score
Self-cert	10	7
Med-cert	4	3

SF36-Physical Component	Low score	High score
Self-cert	11	12
Med-cert	4	6

SF-36 Mental Component	Low score	High score
Self-cert	16	8
Med-cert	6	5

Pain Drawing	Low score	High score
Self-cert	12	12
Med-cert	2	10