Obstacles to recovery from musculoskeletal disorders in industry

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Obstacles to recovery from musculoskeletal disorders in industry

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The burden of musculoskeletal disorders on society is substantial, requiring effective management especially in an occupational context. Occupational health guidelines recommend addressing potentially detrimental psychosocial factors in the management of workers sick-listed with musculoskeletal disorders, yet the specific influence on absence from occupational and clinical psychosocial risk factors (termed 'blue' and 'yellow' flags) remains under-explored.

A four-year study was carried out in two phases: (1) a workforce survey of a large multi-site company in the UK, (2) a controlled trial of an occupational guidelines-based intervention protocol for workers with musculoskeletal disorders, focusing on obstacles to recovery/return-to-work.

The results confirmed a general association between the psychosocial work environment and musculoskeletal disorders. Prospectively, psychosocial risk factors predicted the likelihood of future absence, but not its duration; routine psychosocial screening to predict return-to-work time may have limited value. Implementation of an early proactive occupational health protocol (psychosocial intervention and a supportive network with all players onside) was a successful strategy for reducing absence due to musculoskeletal disorders, for both return-to-work time and future workloss. The effect was observed at both the site level and the individual level. Organisational obstacles (black flags) were identified, which compromised the experimental intervention. It remains to be determined which, if any, specific components of the intervention package might be most effective.

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EXECUTIVE SUMMARY

BACKGROUND & OBJECTIVES

Occupational musculoskeletal disorders, generally manifesting as recurrent musculoskeletal symptoms, are experienced by a high proportion of workers. Many symptoms are short-lived but some workers develop chronic symptoms and become unable to work, perhaps as a consequence of psychosocial obstacles to recovery, which may also in turn become obstacles to return to work. Emerging occupational health guidance suggests that optimal intervention requires a biopsychosocial approach, focusing on tackling psychosocial obstacles together with a general management framework that facilitates early return to work and work retention (defined in terms of future workloss). This necessitates getting all the players onside: workers, employers, and health professionals. It would seem reasonable to base any such intervention on prior identification of potential obstacles. The objectives of the study, then, were twofold: (1) to identify workplace psychosocial obstacles, the so-called 'yellow flags' and 'blue flags' associated with sickness absence due to musculoskeletal disorders, and (2) to test a novel workplace intervention, designed to reduce sickness absence, with a focus on addressing psychosocial obstacles and involving all key players.

METHODS

The study required access to a large workforce in a company offering an in-house occupational health service and a system for sickness absence identification. GlaxoSmithKline (formerly SmithKline Beecham) was identified as an appropriate partner. The study was in two phases.

Phase 1: A survey to identify psychosocial factors across a wide range of industrial workers and job types, providing (a) a cross-sectional data-set enabling investigation of the relationships between psychosocial data and symptoms/absence, and (b) baseline data to explore the predictive value of psychosocial data on sickness absence over the ensuing two years. The entire workforce at GlaxoSmithKline (n = 7,838) was surveyed in 2000.

Phase 2: A controlled trial among workers presenting to occupational health units with musculoskeletal disorders, in order to test the effectiveness of a guidelines-based early intervention protocol compared with management as usual. Two experimental and three control sites at GlaxoSmithKline were enrolled. Participants were principally workers absent due to musculoskeletal disorders, but the study group also included those reporting symptoms whilst still at work. The outcomes were duration of absence for the index spell, and duration of future workloss during 12-month follow-up. Analysis of absence at the site level (using data from company records) covered the two years prior to the intervention and the two-year intervention period; for the experimental sites, absence data for the post-intervention year were also examined.

MAIN FINDINGS

The workforce survey results confirmed a general association between perceptions of the psychosocial work environment and self-reports of previous symptoms/disability related to musculoskeletal disorders. Several different aspects of work and the work environment (blue flags) were associated with symptoms and previous workloss. The associations were additive and similar to that of psychological distress (yellow flag). Prospectively, scores beyond statistically determined cut-off points on both blue and yellow flags predicted the likelihood of future absence, but not its duration.

During the controlled trial one of the experimental sites did not deliver the intervention according to the protocol. At that site the majority of workers taking absence were contacted relatively late (average 12.4 days v 2.5 days) meaning that few were contacted whilst absent. This demonstration of how local organisational constraints, termed black flags, can impede delivery of an early occupational health intervention provided an unexpected comparison between the experimental sites (a 'found experiment').

At the site level, although absence rates fluctuated somewhat during the study period, spells of absence at the site operating per protocol reduced during the intervention period in comparison with the controls and with the site operating suboptimally. There was some reduction in duration for absence across the experimental and control sites, but appeared proportionally greater at the site operating per protocol.

At the individual level, the average return-to-work time at the site operating per protocol was 40% less, and for both experimental sites participants receiving the intervention had a 57% lower future workloss during 12-month follow-up, in comparison with the controls. Additional analysis on an intention-to-treat basis took account of workers declining to participate. There remained a reduction in return-to work time favouring the site operating per protocol compared with the suboptimal site, but future workloss was not significantly different between the two. Only a limited number of the psychosocial scores improved for the intervention participants at the experimental sites; comparative data were not available at the controls. Finally, although an overall benefit was demonstrated for the optimal intervention package, it was not possible to identify which of the components were most effective.

SYNTHESIS

A range of psychosocial factors (yellow and blue flags) were associated with symptoms and absence due to musculoskeletal disorders, but the strength of the associations was relatively weak, and a routine screening tool based solely on these factors is unlikely to be helpful in predicting return-to-work time. Interventions that simply address psychosocial factors alone are likely to be ineffective in reducing return-to-work times.

In this study, a very early workplace intervention was implemented in the occupational health setting. It was designed to identify and target obstacles to recovery/return-to-work at the individual level, and also included 'systems' components such as structured modified work and systematic liaison with general practitioners, ie getting all the key players onside. When implemented per protocol, the intervention was effective in reducing absence due to musculoskeletal disorders. It would appear, however, that a clear and major commitment, particularly from employers, is required to eliminate procedural obstacles to implementation. Results from the site that implemented the intervention per protocol suggest that, in principle, it is possible to achieve a reduction in workloss of the order of 50%. Sustaining that effect would require all the intervention systems to be maintained.

Considered together, the two phases of this study have confirmed the importance of adopting a biopsychosocial approach. It has demonstrated that substantial benefits are achievable from a move to a broader perspective of absence management through removing obstacles to recovery/return-to-work, rather than sole reliance on traditional medical intervention and ergonomic strategies of prevention. More specifically, implementing early occupational intervention, along the lines reported here, could contribute to achieving the target reduction in working days lost due to work related musculoskeletal disorders as stated in the Strategic Plan for 2001/04 by the Health & Safety Commission and the Health & Safety Executive.

CONTENTS

1. INTRODUCTION

1.1 PREAMBLE

In their Strategic Plan for 2001/04, the Health & Safety Commission (HSC) and the Health & Safety Executive (HSE) agreed targets for health and safety, underpinned by government targets. The targets stem from initiatives such as Revitalising Health & Safety and Securing Health Together. According to the Strategic Research Outlook 2003, musculoskeletal disorders are the commonest kind of occupational ill health, with around 200,000 new cases of work-related MSDs occurring each year. It was estimated that in 2001/02 some 12.3 million working days were lost by around 1.1 million workers, with a cost to society of about £5.7 billion.

The policy challenge is to reduce, by 2010:

- the number of working days lost due to work-related injury and ill health by 30%
- the incidence rate of cases of work related ill health by 20%

and to:

- achieve half of these improvements by 2004
- ensure people in employment but off work due to ill health or disability are aware of opportunities for rehabilitation back into work as soon as possible

Considering musculoskeletal disorders (MSD) the Strategic Research Outlook for 2003 from HSC/HSE outlined the following Programme Objectives:

- reduce the incidence of work related musculoskeletal disorders by 12% by 2004.
- reduce the number of working days lost per 100,000 workers due to work related musculoskeletal disorders by 15% by 2004.

In addition, the following were included in the Policy Objectives:

- secure management commitment to and employee involvement in tackling MSDs.
- secure appropriate arrangements for managing episodes of MSDs
- secure appropriate evaluation of programmes for controlling MSDs.
- identify examples of good practice which will help to generate guidance on how to manage MSDs appropriately (eg reporting systems, evaluation, treatment and rehabilitation).

These HSC/HSE objectives, which recognise both the size and complexity of the problem, underpinned the present research project, which intended to provide some evidence-based answers.

1.2 BACKGROUND

The present study is focused on the most common, potentially work-related, musculoskeletal disorders - low back pain and upper limb disorders.

Low back pain (LBP) refers to the range of disorders characterised by pain in the back/hip/leg areas. The term upper limb disorders (ULD) covers the neck as well as shoulder, elbow, arm, and hand/wrist.

LBP and ULDs are common health problems reported by a large proportion of the population throughout life. Having various manifestations, they have been termed collectively as 'subjective health complaints' (Ursin 1997), 'medically unexplained syndromes' (Page & Wessely 2003), 'functional somatic symptoms' (Wessely & Hotopf 1999)or 'regional musculoskeletal disorders' (Hadler 2001). These descriptors emphasise the symptomatic nature of MSDs, the limited evidence of objective disease or impairment, and the accompanying social constructions (Waddell & Burton 2004). . It should be clarified that the primary focus of the present study is the reporting of symptoms. The extent to which these may or may not have been supported by an objective medical diagnosis or identifiable injury was beyond the remit of this study, as was identification of chronic widespread pain.

The epidemiology, characteristics, and consequences of LBP and ULDs will be briefly introduced prior to defining the specific aims of the present research.

1.2.1 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. 1994) estimated a population prevalence for back pain of 16.5 million, resulting in 2.4 million outpatient attendances and 12 million General Practitioner 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). That 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 did 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). LBP is not confined to adults, with some 50% of adolescents at age 15 years reporting a history of symptoms (Burton et al. 1996a).

1.2.2 Epidemiology of ULDs in the general population

Epidemiologic data on ULDs are sparse compared with LBP, but it has been reported that in the UK general population over a month, ULDs affect the shoulder (25%) wrists/hands (15%), elbows (11%) and forearm (8%) (Papageorgiou et al. 1995). A Nordic study (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 month, compared to 35% who complained of LBP. However, in one population-based study considering shoulder pain, the prevalence varied between 31% and 48% depending on the precise case definition used (Pope et al. 1997). As with back pain, neck and upper limb pain is common among adolescents, with a cumulative incidence of 28%, and occasional symptoms being reported by 50% (Feldman et al. 2002).

1.2.3 Temporal aspects of musculoskeletal disorders

The natural history of musculoskeletal disorders (MSD) 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 a given episode, the recurrence rates for MSDs are very high. The one-year the recurrence rate of LBP has been reported to be between 20% and 40% (Andersson 1999), but can be as high as 75% (van den Hoogen et al. 1997), with a lifetime recurrence rate of up to 85% being reported (Andersson 1999). Most MSDs resemble

LBP in that they display what has been described as ‘an untidy pattern of grumbling symptoms and periods of relative freedom from pain and disability interspersed with acute episodes, exacerbations and recurrences’ (Croft et al. 1998).

1.2.4 Chronicity and disability

A relatively small proportion (yet overall a large number) of individuals will progress to long-term incapacity (Waddell et al. 2003).These cases account for disproportionate costs to industry and the state in terms of lost production and social security benefits (Waddell 1998) Limited data are available about the prevalence of chronic MSDs, partly because of a lack of agreement about the definition. For back pain, chronicity 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 1999), and is largely measured in association with workloss and compensation costs. The Department for Work and Pensions estimates that each week in the UK about 17,000 people reach their sixth week of sickness absence. About 3000 will remain off work and move to Incapacity Benefit, usually after 26 weeks on Statutory Sick Pay, and about 40% of them will remain on benefits for 52 weeks, and are then likely to continue to long-term incapacity – essentially, the longer someone is off work, the less likely they are to return to work (Waddell et al. 2003). Understanding how to prevent chronicity and disability resulting from MSDs has proved to be complex. The focus of recent research into understanding this problem has been summarised by saying "the road from disease to disability is paved with behavioural elements" (Aarts & De Jong 1992). Thus, it may be helpful to view MSD-associated disability as a progressional pathway (Hadler 1997). The direct link between disease or impairment and functioning or incapacity is much weaker than commonly assumed. Many people with severe medical conditions and/or permanent impairment do work, yet many recipients of disability and incapacity benefits have little evidence of disease or impairment. Functioning and disability also depend on personal and psychological factors, and interactions between the person and the environment. Indeed, for common health problems such as MSDs, psychological and psychosocial issues are often more important in understanding disability or work-associated limitations than any underlying biological problem (Waddell & Burton 2004).

1.2.5 Epidemiology of MSDs at work

The estimated prevalence of self-reported work-related illness in Great Britain in 2001/02 was 2.3 million cases, with an estimated 32.9 million working days lost. Musculoskeletal disorders (bone, joint, or muscle problems) were most commonly reported, with 520 000 people believing it was caused or made worse by their work, accounting for an estimated 5.7 million working days lost (Jones et al. 2003). Another 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).

Physical workplace risk factors

Although very common across all types of industries and jobs, several studies have demonstrated that rates for reported MSDs are more prevalent in certain types of industries and within certain occupations. Despite some inconsistency, it is generally accepted that heavy physical work (bending/twisting/handling) and exposure to whole body vibration constitute physical workplace risk factors for LBP (Waddell & Burton 2001), and that risk factors for ULDs are force applications by the upper extremities, both repetitive and static (Buckle & Devereux 1999). However, the influence of the risk factors inherent in these jobs compared with other working populations not exposed to

these risk factors may be modest (Waddell & Burton 2001). The relationship between physical workplace factors and MSDs is difficult to determine because the level of exposure is sometimes impossible to quantify, and unclear definitions exist for what constitutes 'heavy' and 'light' work. In principle, regulations to improve the physical working environment, such as the Manual Handling Operations Regulations 1992 should be reducing exposure to undesirable physical stressors, yet prevalence rates for MSDs remain high. So, it has been suggested that it is the less tangible aspects of work that represent the most common threat to worker ill-health today (Griffiths 1998; Hadler 2001).

Psychosocial workplace risk factors

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 (Croft et al. 1995; Fordyce 1995; Pincus et al. 2002). It has been suggested that occupational psychosocial factors (such as job satisfaction, stress, social support and perceived control) should be distinguished from clinical psychological factors, partly because they are only appropriate for a working population but also because they may influence different outcomes (work-related v clinical) (Burton & Main 2000a). Indeed, reviews of the literature suggest that occupational psychosocial factors have a significant role in the course and recovery from MSDs, (Linton 2001; Bongers et al. 2002). A hypothesised explanation of how psychosocial factors influence recovery from MSDs suggests that differing responses to (perceptions) environmental factors influence how the individual may accept and cope with pain or injury (Davis & Heaney 2000). This 'biopsychosocial' approach 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.

1.2.6 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 1997) 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. Measurement of sickness absence due to MSDs can be based on the number of ‘spells’ (episodes) of absence occurring over a specified time, or on the number of individuals (cases) absent at a point in time or taking absence over a specified period. Alternatively, sick leave can be quantified as the total number of days of absence occurring for a particular population over a specified period, or given as a summary statistic (eg mean, median). The duration of absence for individuals is often calculated as the return-to-work (RTW) time, and may require sub-classification into return to modified work, and return to normal duties. Furthermore, the first RTW time may be misleading if the individual takes subsequent absence (Butler et al. 1995); the concept of sustained RTW (work retention) can be a highly relevant measure. Five measures of sick leave have been suggested as appropriate within an epidemiological framework, to cover the various aspects: frequency of sick leave, length of absence, incidence rate, cumulative incidence and duration of a sick-leave spell (Hensing et al. 1998). Further complicating the measurement of health in the workplace is the fact that sick leave and incapacity are 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; Waddell et al. 2003).

1.2.7 Theoretical background to early intervention

The identification of rapidly increasing costs of pain-associated disability has stimulated redirection of the primary focus of clinical activity from treatment to prevention. It has been shown that costs of subsequent episodes of low back pain are more costly than new episodes, and that the burden of work-associated sickness costs is a consequence of chronic sufferers (Watson et al. 1998). Previous work in clinical pain management (Main & Spanswick 2000) had recommended the extension of the fundamental pain management approach, based on biopsychosocial principles (Morley et al. 1999) from tertiary pain clinics to clinical and occupational settings. Since MSDs are both common and recurrent, prevention of disabling consequences would appear to be a much more realistic target than primary prevention. A focus on secondary prevention in clinical settings has the principal aim of preventing unnecessary pain-associated limitations, or disability. In occupational settings, the context is one of work retention.

Early intervention requires a system for identification of those potentially at risk of chronicity. The term “risk” is however used in a number of different ways, and so before consideration of possible targets for prevention, a degree of conceptual clarification is necessary. Concepts of risk have usually been based on identification of factors associated with poor outcome, but there are different types of predictors of outcome, and not all are potential targets for intervention. *Epidemiological* studies are primarily descriptive, rather than explanatory and are population based. Statistically significant associations may serve as a foundation for major clinical initiatives (such as immunization) or social policy decisions involving the re-direction of resources, but such risk factors are usually not sufficiently powerful to be useful for decision making on an individual basis. The *clinical* perspective on risk tends to focus primarily on factors associated with healthcare outcome. Although clinical studies are more narrowly focused than epidemiological investigations, and therefore provide a better basis for clinical intervention, the incorporation of demographic and educational factors, for example, may be helpful in targeting certain groups, they may not provide particular therapeutic targets or assist in the design of the preventative intervention. *Occupational* risk factors tend to be wide-ranging, may be very different from clinical risk factors but equally may be of little help in the targeting or design of preventative interventions. It may be helpful to base prevention not on risk as such, but to refocus attention on *obstacles to recovery.*

1.2.8 Obstacles to recovery and return to work

Accepting that many people experiencing MSDs either remain at work or return to work rapidly, begs the question why some people seem not to recover and have difficulty returning to work. It has been suggested that understanding and managing MSDs is dismal, being partly due to adherence to an incomplete conceptualisation of the phenomenon; what is required to understand the factors influencing illness and recovery is an integrated biopsychosocial model (Battié et al. 1998). It follows that, rather than relying on inappropriate medical concepts of prevention and cure, attention should shift to a paradigm that concentrates on obstacles to recovery (Burton & Main 2000b). These obstacles seem to fall into three basic categories; biomedical, ergonomic and psychosocial (Feuerstein & Huang 1998); the accumulating evidence indicates that the first two categories exert a modest influence compared with the third (Battié et al. 1998). Psychosocial obstacles are a rather heterogeneous group of variables, and it is helpful to distinguish them when considering their effects. There are the personal/psychological obstacles – the so-called ‘yellow flags’, which are essentially psychological parameters, such as distress, depression, coping strategies and disadvantageous beliefs (Main & Burton 2000). They can alert the clinician to a risk for chronicity, being present in workers and non-workers alike (Pincus et al. 2002). For

workers, the yellow flags will operate alongside a number of work-related obstacles that might be termed ‘blue flags’ (Main & Burton 2000; Marhold et al. 2002). These include worker-specific personal factors such as attribution of blame, beliefs about the work/injury relationship, perceived work demands, and psychosocial aspects of work. In addition there are more general work-specific issues such as managerial attitudes, return to work policies, and work organisation, which have the capacity to influence groups of workers. The blue flags are essentially a matter of perception, and individual workers may differ in their perception of the same working environment. In order to formulate optimal interventions to address psychosocial obstacles, there is a need to identify and understand the interactions between the yellow flags and blue flags. There is a further set of obstacles, which have been termed ‘black flags’ (Main & Burton 2000). These are external to the person, being more characteristics of the occupational environment, and all workers in a given setting may be equally exposed (though they may have differing susceptibility). They are often aspects of organisational policy, process, and practice that reflect employers’ perceptions and attitudes – including issues such as policies for sick certification, absence monitoring, loss of contact, availability of modified work, and unfounded concerns over early return to work (Waddell & Burton 2004). Whilst not specifically concerned with ‘recovery’, these system obstacles can impede the delivery of otherwise suitable interventions. Whilst much of this evidence comes from the field of back pain, it is apparent that the same factors are similarly important for ULDs (Feuerstein 1996; Moon 1996).The corollary of the concept of obstacles to recovery/return to work is that interventions specifically addressing these factors will have a beneficial effect on vocational outcomes (Waddell & Burton 2004).

1.2.9 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, usually with little success (Main et al. 1999). Given the high prevalence and recurrence rates for MSDs in the general population, primary prevention strategies are unlikely to have a major impact on the prevalence of work-related symptoms (Burton 1997). Arguably, a more relevant target is reduction in the number of episodes and duration of absence, with particular emphasis on interventions aimed at reducing the risk of long-term disability/incapacity (Burton & Main 2000a).

In addition to the type of intervention that might be employed, the timing of the intervention is important. Several reports have concluded that there should be a critical early time frame within which treatment should be initiated in order to prevent delayed recovery (Linton & Warg 1993; Hellsing 1994; Smith et al. 2002; Waddell & Burton 2004). The most promising indications to date are that an integrated, biopsychosocial approach should be applied as soon as the worker has become symptomatic and entered health care, which may or may not coincide with the start of sick leave (ACC and the National Health Committee 1997; Waddell & Burton 2004).

In answer to the increasing demand for evidence-based health care, the Faculty of Occupational Medicine (FOM) has produced occupational health guidelines for the management of low back pain at work (Carter & Birrell 2000), which were considered to be of high quality in an international comparison (Staal et al. 2003). There is general agreement among the various occupational health guidelines for back pain in respect of: need for diagnostic triage, identification of potential psychosocial obstacles to recovery, provision of advice that back pain is a self-limiting condition and, importantly, that remaining at work or an early return to work, if necessary with modified duties, should be encouraged and supported (Staal et al. 2003). The FOM guidelines also take account of the principle of getting all the players onside, emphasising that successful management will require more than simple health care. It is suggested that joint

employer-worker initiatives, combined with support from health professionals, is needed to provide optimum support so as to facilitate workers remaining at work or returning to work as early as possible, and that such initiatives may reduce sickness absence (Carter & Birrell 2000). Whilst there are no similar clinical guidelines for ULDs, there is increasing recognition of a similar multidimensional approach to their management (Buckle & Devereux 2002); indeed, some of these principles are embodied in recent guidance from HSE (HSE 2002; HSE 2004). Although based on the available scientific evidence, the multidimensional approach advocated by the guidelines, which recognises psychosocial influences that arise as a consequence of being a worker along with those which comprise individual experiences and beliefs, has not been tested empirically.

1.2.10 Synopsis

The proposed study starts from the recognition that MSDs (in particular LBP and ULDs) afflict most people at some time. Although they manifest as recurrent symptoms, the progression to disability and workloss is inconsistent, and long-term incapacity is not inevitable (Waddell et al. 2003; Waddell & Burton 2004). They are characterised by a strong association with psychosocial factors and (generally) a lack of identifiable pathology or specific injury. The reason why some people do not recover and take prolonged time off work may be a reflection of obstacles to recovery, which may also form obstacles to return to work. Emerging occupational health guidance suggests that the optimal intervention will be biopsychosocial in nature, focusing on tackling psychosocial obstacles, and providing a general management framework that facilitates early return to work (or work retention) - this necessitates getting all the players onside: workers, employers, and health professionals (Waddell & Burton 2004). Before such a strategy can be implemented, though, it is important to identify the pertinent obstacles.

1.3 RESEARCH PROPOSAL

In recognition of the burden imposed by MSDs at work and the potential for psychosocial factors to act as obstacles to recovery, the HSE commissioned the present research project with a commencement date of 01 October 1999 and a study-duration of four years.

The specific objective of the study was to construct and test an evidence-based optimal intervention package for management of workers with MSDs, with the intention of reducing sickness absence. In addition, the study aimed to explore the relative influence of ‘blue’ flags on symptoms and workloss.

A two-phase study was proposed:

Phase 1: A survey to identify psychosocial factors (yellow and blue flags) across a range of industrial workers, informing the development of an optimal intervention package focused on obstacles to recovery. This survey provided (a) cross-sectional data to explore relationships between psychosocial data and symptoms/absence, and (b) baseline data to explore prospectively the predictive value of psychosocial data on sickness absence over the ensuing two years.

Phase 2: A controlled trial among workers presenting to occupational health units with MSDs, in order to compare the efficacy of the guidelines-based optimal intervention protocol with management as usual. Participants included workers taking absence due to MSDs, and those reporting symptoms whilst still at work. The outcomes were duration of absence for the index spell, and duration of future workloss over a 12-month follow-up. Analysis of absence at the site level (using data from company

records) covered the two years prior to the intervention and the two-year intervention period.

A pre-requisite for the study was an industrial partner with a large multi-task, multi-site workforce, comprehensive absence recording, occupational health services, and supportive management. A large pharmaceutical company, GlaxoSmithKline (formerly SmithKline Beecham), fulfilled these criteria, was keen to contribute and was involved from the outset.

Two academic units, The Department of Behavioural Medicine (Hope Hospital, Salford) and the Spinal Research Unit (University of Huddersfield), with complementary areas of expertise, were responsible for the conduct of the study.

Although the two phases of the study will be reported separately, the findings of both parts of the study will be integrated into the conclusions and recommendations.

2. PHASE 1: WORKFORCE SURVEY

2.1 METHODS

2.1.1 Questionnaires

In order to collect data on clinical and occupational psychosocial factors, and on self-reported experience of MSDs, a range of questionnaires was reviewed. Ten instruments were selected that covered the parameters of interest. Of these, eight had been previously validated and used on industrial samples, and two were adaptations of previously used questionnaires. All were suitable for use irrespective of whether the workers had experienced MSDs.

A copy of the questionnaire booklet can be found elsewhere (Bartys 2004), but a brief description of each of them is presented here:

Clinical psychosocial factors ('yellow flags')

- The General Health Questionnaire (GHQ) (Goldberg & Williams 1988) 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 et al. 2000). The score ranges between 0-36, and a higher score indicates a higher level of distress.
- The Back Beliefs Questionnaire (BBQ) (Symonds et al. 1996) was used to estimate beliefs about the inevitable consequences of LBP - it has been shown that negative inevitability beliefs regarding the course and consequences of LBP have a detrimental effect on outcome (Symonds et al. 1996) (Burton et al. 1996b) (Burton et al. 1997). There are two subscales: (a) the Inevitability of future life with LBP, and (b) Treatments for LBP. For the purposes of the present study, only the inevitability subscale was analysed. The score ranges from 9-45, and a lower score would indicate stronger negative beliefs about the inevitable consequences of LBP.
- The Upper Limb Disorders Questionnaire (ULDQ) (Bartys 2004). In order to include a questionnaire that also measured the beliefs about the inevitable consequences of ULDs, the Back Beliefs Questionnaire was 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"). 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. A lower score indicates stronger negative beliefs about the inevitable consequences of ULDs.

Occupational psychosocial factors ('blue flags')

- The Psychosocial Aspects of Work questionnaire (PAW) (Symonds et al. 1996) was used to measure 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 (Linton & Warg 1993; Daltroy et al. 1993; Unden 1996; Papageorgiou et al. 1997). 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 Attribution Questionnaire (Linton & Warg 1993) was used to measure the beliefs about the causation of LBP, and whether the causes were attributed to the Workplace or to the Individual. Previous research has indicated that most workers attribute the cause of their MSD to work (Jones et al. 1998). The Workplace subscale score ranges from 12-60, and the Individual subscale score ranges from 8-40. A higher score on either subscale would indicate stronger causal attributions. The questionnaire used in the current study was modified from the original in order to tailor it to the study aims, and this procedure is described in detail elsewhere (Bartys 2004).
- The Rating of Perceived Exertion scale (RPE) (Borg 1970) was used to reflect the evidence 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 et al. 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 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.
- The Pressure Management Indicator (PMI) (Williams & Cooper 1998) is a 120-item self-report questionnaire and was designed to measure sources of occupational stress. The sections from the PMI that were used in the current study were those that measured (1) Control and Personal Influence at work; (2) Sources of Pressure at work. The control and personal influence at work questionnaire was chosen in recognition of Karasek's theory of perceived control and demand at work (Karasek 1979); research has shown that the content of work and the perception of autonomy over work have detrimental outcomes concerning MSDs (Mackay et al. 1998). The scores range from 5-30 and 3-18 on the Control and Personal Influence 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 subscales chosen from the sources of pressure questionnaire were: Relationships at Work; Home/Work Balance; and Organisational Climate. Sources of pressure at work have been found to be important psychosocial influences on work-related MSDs (Kuorinka & Forcier 1995). Scores range from 8-48 on the Relationships subscale; 6-36 on the Home/Work Balance subscale; 4-24 on the Organisational Climate subscale, and a higher score on each of the subscales would indicate a higher perceived source of pressure.

Self-report of symptoms/disability:

- The Nordic Musculoskeletal Questionnaire (NMQ) (Kuorinka et al. 1987) is a widely used instrument which measures various prevalence rates of self-reported MSDs over several anatomical sites. 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 (Dickinson et al. 1992). Symptoms and disability in these body areas were self-reported for the last 12 months and 7 days. The responses were categorised into LBP (by combining the lower back, upper back and hips/thighs/buttocks sections), and ULDs (by combining the neck, shoulders, elbows and wrists/hands sections) (Mackay et al. 1998).

- Two additional items were included to assess lifetime prevalence of LBP and to identify previous health-care usage.

2.1.2 Questionnaire presentation

The questionnaires were compiled in the form of a booklet, which was constructed using Teleform© (Cardiff Software, Inc., San Marcos, CA, USA). Teleform© is a software application that consists of three main components which enable the user to create forms for collecting data, export the data to a spreadsheet using a scanner, and interpret the data using a verifier. In order to check the accuracy of Teleform©, five dummy forms were completed by members of the research team, and then processed; the accuracy of Teleform© was found to be 100%.

2.1.3 Pilot study

The booklet of questionnaires was piloted on a clinical laboratories site of GSK (n=160), which was not used in the main workforce survey. Completed questionnaires were returned to the occupational health department and responses were processed using Teleform©. The total response rate was 50% (n=80). In order to gain feedback on the questionnaire and to gain reasons for non-response, a random group of non-respondents (n=25) was targeted. The most common reason given for non-response was that the questionnaire was too long and took up too much time. Another reason was that the questionnaire was felt to be 'irrelevant' to those workers who had not experienced MSDs.

Included in this pilot booklet were an additional job satisfaction questionnaire chosen from the PMI, together with additional subscales from the PMI sources of pressure questionnaire that were not essential for the study. Therefore, in order to reduce the length of the questionnaire booklet, and following feedback from the pilot study with regard to the relevance of certain questions, these items were excluded.

2.1.4 Procedures to enhance participation

A number of strategies were adopted to enhance participation:

- To involve a 'trusted neutral' individual on-site, the occupational health nurse signed the covering letter that accompanied the questionnaire booklet, and collected the booklets. The nurse was also available to answer any queries regarding the study or completion of the questionnaire booklet.
- A paragraph on the front of the questionnaire booklet and in the covering letter emphasised that the opinions of those who had *not* experienced MSDs were equally important as those who had.
- Participants were assured that their data were confidential, and that individual responses would not be seen by the employer.
- A prize draw was offered to all workers who completed their questionnaire by the return date specified (4 weeks following distribution).

A series of preparatory meetings was conducted over a 2-day period with the occupational health nurses from each site to be targeted in the workforce survey. The purpose of these meetings was to explain the study, to fully inform the nurses of their involvement in the workforce survey, and to answer any queries.

2.1.5 Ethical clearance

The questionnaire booklet was submitted to The Health and Safety Executive's Research Ethics Committee prior to commencement. Approval was given in June 2000 (reference ETHCOM/REG/00/06).

2.1.6 Survey distribution

Questionnaire booklets were distributed to all permanent workers of GlaxoSmithKline (GSK) on 13 UK sites (ranging from 132 to 1773 employees per site) during June 2000. 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 - financial restrictions can influence the decision to take absence, resulting in a confounding variable (Latza et al. 2000; Main & Burton 2000); (2) permanent employees were more likely to be available for prospective analyses.

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 re-sealable envelope that was printed with instructions for return on the outside. Questionnaires were completed, resealed and returned to the OHN, who in turn returned them to the research unit.

All returned questionnaires were processed using Teleform© and, in order to check that data were being transferred correctly, a sample was manually checked – no inaccuracies were found. In accordance with the ethical requirements for data storage, all questionnaires have been stored in a secure facility at the University of Huddersfield.

2.1.7 Collection of absence data

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. Therefore, absence due to MSDs was collected from company records in collaboration with a database coordinator at GSK.

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 comprises the following conditions:

- Arthropathies and related disorders, e.g. diffuse diseases of connective tissue, infectious arthropathies, rheumatoid arthritis, osteoarthrosis and osteoarthritis, joint derangement
- Dorsopathies, e.g. ankylosing spondylitis, spondylosis, intervertebral disc disorders and other cervical and back disorders
- Rheumatism, e.g. polymyalgia rheumatica, disorder of synovium, tendon, bursa, muscle, ligament and fascia
- Osteopathies, 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 coordinator at GSK categorised absences resulting from MSDs into either low back pain or upper limb disorders (as defined in section 2.2.1), and excluded other diseases/disorders.

2.1.8 Follow-up data

Company-recorded absence data were tracked over an ensuing 2-year period, and absence due to MSDs was extracted and mapped onto the workforce survey data using the employee ID number.

2.1.9 Statistical analysis

The data were analysed using SPSS; and statistical methods included *t*-tests, chi-square tests, Mann-Whitney U tests, and calculation of odds ratios (OR) and 95%

confidence intervals (CI) where appropriate. The level of statistical significance was set at 5%. Both cross-sectional and prospective data were collected in the workforce survey:

Cross-sectional analyses

Initial cross-sectional analyses explored the prevalence of self-reported MSDs in the previous 12 months and 7 days. Relationships were then explored between mean psychosocial scores, self-reported MSDs (yes/no), and company-recorded absence due to MSDs in the previous 12 months (yes/no). In order to define levels of psychosocial risk (yellow and blue flags), empirically derived cut-off points were established (Bartys 2004) and ORs were calculated for outcomes of self-reported LBP in the previous 12 months, and for the occurrence of absence in the previous 12 months. (LBP alone was used because of the small number of workers taking absence due to ULDs).

Prospective analyses

Absence data were collected for number of *spells* of future absence, and *duration* of that absence (number of working days lost) due to MSDs. Relationships were then explored between mean psychosocial scores and absence due to MSDs in the ensuing 2 years (yes/no). In order to explore the influence of yellow and blue flags on future absence, the established cut-off points (see above) were used and odd-ratios were calculated, both for the occurrence of absence and for the duration of absence.

2.2 RESULTS: CROSS-SECTIONAL

2.2.1 Response rate and demographics

Questionnaire booklets were administered to 7,838 permanent workers at GSK; following one reminder, the total response rate was 59.2% (n=4,637). 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 (as classified by GSK) in the company. The respondent sample can be considered representative of the GSK workforce in terms of gender and job-type - see Table 2.1. The average age of respondents was 40 years, ranging from 19-65 years.

Table 2.1
Numbers for respondents and GSK workforce based on gender and job-type, expressed as a percentage of total number of respondents and workers

	Survey respondents	%	GSK workforce	%
Male	2614	57.0%	4232	54.0%
Female	1969	43.0%	3606	46.0%
Manual	995	21.5%	2430	31.0%
Non-manual	3642	71.5%	5408	69.0%

2.2.2 Prevalence of self-reported MSDs in the previous 12 months

The self-reported lifetime prevalence of LBP was 59.2% (n=2744). The 12-month prevalence rate for LBP was 64.3% (n=2982), and that for ULDs was 66.8% (n=3099). Although the proportion of respondents who reported ULDs in the previous 12 months was slightly higher than that for LBP, the proportion who reported an accompanying 12-month disability was higher for those reporting LBP compared with ULDs (40.7% (n=1214) v 27.8% (n=861)) – see Figure 2.1.

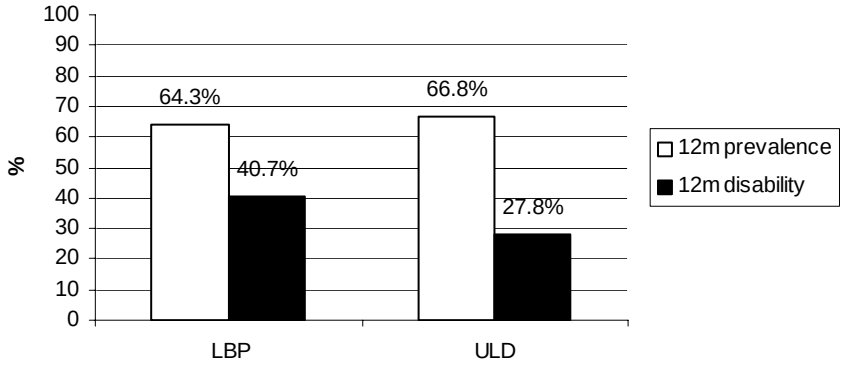

Figure 2.1:
Percentage of survey respondents who reported LBP and ULDs in the past 12 months, along with those who reported associated disability

These prevalence rates can be compared with those from a survey of British supermarket cashiers, which used the same questionnaire and definitions of LBP and ULD (Mackay et al. 1998). For those essentially part-time workers, the annual

prevalence rates for LBP and ULDs were around 10% lower than the present population, whilst the self-reported disability rates were about half.

2.2.3 Absence due to MSDs in the previous 12 months

Company records showed that the occurrence of absence due to MSDs (LBP and ULDs) in the 12 months preceding the survey accounted for 5% of the workforce (4% due to LBP, 1% due to ULDs). There was a reduced response rate to the workforce survey from workers who had taken absence due to MSDs in the previous 12 months (48.9% (n=135)). Further investigation of the association between previous absence and non-response was not possible due to ethical constraints.

2.2.4 Self-reported MSDs and psychosocial scores

The mean scores on the psychosocial instruments were shown to be similar to those reported in comparable studies (Bartys 2004). Mean psychosocial scores were calculated for those respondents who did and did not report previous MSDs, using three period prevalence rates: (a) lifetime, (b) 12-months, and (c) 7-days – the data tables providing the means and standard deviations for the following analyses are given in Appendix 1.

Differences in mean psychosocial scores between those with and those without a history were calculated, and are presented below. [There is a conceptual or empirical 'detrimental' direction for each psychosocial instrument; the scale direction (up or down) corresponding with that detrimental direction is indicated by an arrow for each measure in Table 2.2. A history of MSDs should be associated with more detrimental scores – this was not always the case; the arrows in the data columns of the following tables indicate whether higher or lower scores were associated with MSDs].

Lifetime prevalence of LBP

Mean psychosocial scores for respondents who did (n=2744) and did not (n=1893) report a lifetime prevalence of LBP were significantly different (P<0.001), with the exception of those for mental stress and personal influence at work. Further, the differences for those with a history were in the expected 'detrimental' direction, with the exception of beliefs about the inevitable consequences of LBP and attributions of LBP to work (displayed in italics) – Table 2.2.

Table 2.2
Mean psychosocial score difference between respondents who did and did not report lifetime prevalence of LBP

Psychosocial measure (conceptual detrimental direction ↑↓ of scale)	**Mean** (direction ↑↓) **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 at work ↓	ns
Organisational climate ↑	0.78 ↑
Relationships at work ↑	0.86 ↑
Home/work balance ↑	0.58 ↑
Perceived Exertion ↑	0.26 ↑

[Differences significant at 1% level: ns = not significant]

12-month prevalence of LBP and ULDs

Mean psychosocial scores for respondents who did (n=2982) and did not (n=1655) report LBP in the previous 12 months were significantly different, with the exception of those for mental stress. Further, for respondents who reported LBP, the differences were in a 'detrimental' direction, with the exception of inevitability beliefs about LBP and attribution of LBP to work (displayed in italics) – Table 2.3.

Mean psychosocial scores for respondents who did (n=3099) and did not (n=1538) report ULDs in the previous 12 months were significantly different, with the exception of mental stress, inevitability beliefs about ULDs, personal influence at work and perceived exertion. Further, for respondents who reported ULDs, the differences were in a 'detrimental' direction - Table 2.3.

There were no significant differences in mean psychosocial scores between respondents reporting LBP or ULDs.

Table 2.3
Mean psychosocial score difference between those respondents who did and did not report LBP and ULDs in previous 12 months

Psychosocial measure	**Mean** (direction ↑↓) **12m LBP (yes/no)**	**Mean** (direction ↑↓) **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	*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

*[Differences significant at 1% level, except where * indicates 5% level: ns = not significant]*

Mean psychosocial scores for respondents who did (n=1214) and did not (n=3423) report disability due to LBP in the previous 12 months were significantly different, with the exception of mental stress. Further, for respondents who reported disability due to LBP the differences were in a 'detrimental' direction, with the exception of those for attribution of LBP to work (displayed in italics) – Table 2.4.

Mean psychosocial scores for respondents who did (n=861) and did not (n=3776) report disability due to ULDs in the previous 12 months were significantly different, with the exception of mental stress, beliefs about the inevitable consequences of ULDs, and home/work balance. Further, for those respondents who reported disability due to ULDs, the differences were in a 'detrimental' direction - Table 2.4.

There were no significant differences in mean psychosocial scores between respondents reporting LBP or ULDs.

7-day prevalence of LBP and ULDs

Mean psychosocial scores for respondents who did (n=1672) and did not (n=2965) report LBP in the previous 7 days were significantly different, with the exception of mental stress and attribution of LBP to work. Further, for respondents who reported LBP the differences were in a 'detrimental' direction, with the exception of those for inevitability beliefs about LBP (displayed in italics) – Table 2.5.

Mean psychosocial scores for respondents who did (n=1743) and did not (n=2894) report ULDs in the previous 7 days were significantly different, with the exception of those for mental stress and home/work balance. Further, for respondents who reported ULDs the differences were in a 'detrimental' direction - Table 2.5.

There were no significant differences in mean psychosocial scores between respondents reporting LBP or ULDs.

Table 2.4
Mean psychosocial score difference between respondents who did and did not report disability due to LBP and ULDs in the previous 12 months

Psychosocial measure	**Mean** (direction ↑↓) **LBP disability 12m (yes/no)**	**Mean** (direction ↑↓) **ULD disability 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	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 ↑

*[Differences significant at 1% level, except where * indicates 5% level: ns = not significant]*

Table 2.5
Mean psychosocial score difference between those respondents who did and did not report LBP and ULDs in previous 7 days

Psychosocial measure	**Mean** (direction ↑↓) **7-day LBP (yes/no)**	**Mean** (direction ↑↓) **7-day 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	*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 ↑ *

*[Differences significant at 1% level, except where * indicates 5% level: ns = not significant]*

2.2.5 Psychosocial scores and previous absence

Using company-recorded absence data mean psychosocial scores were calculated for respondents who had and had not taken absence due to MSDs in the previous 12 months. The differences in mean psychosocial score between these groups are given in Table 2.6 (LBP and ULDs separately). A small number of respondents (n=12) took absence due to both LBP and ULDs in the previous 12 months, but were not included in these analyses.

Mean psychosocial scores for respondents who had (n=98) and had not (n=4527) taken absence due to LBP in the previous 12 months were significantly different, with the exception of social support, attribution of LBP to work, attribution of LBP to the individual, personal influence at work and home/work balance. Further, for respondents who had taken absence, the differences were in a 'detrimental' direction, with the exception of those for mental stress (displayed in italics) – Table 2.6.

Mean psychosocial scores for those respondents who had (n=25) and had not (n=4600) taken absence due to ULDs in the previous 12 months were significantly different, with the exception of psychological distress, beliefs about the inevitable consequences of ULDs, control, organisational climate, and home/work balance. Further, for respondents who had taken absence, the differences were in a 'detrimental' direction, with the exception of mental stress (displayed in italics) – Table 2.6.

There were no significant differences in mean psychosocial scores between respondents who had taken absence due to LBP or ULDs.

Table 2.6
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** (direction ↑↓) **LBP absence (yes/no)**	**Mean** (direction ↑↓) **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 ↑ *

*[Differences significant at 1% level, except where * indicates 5% level: ns = not significant]*

2.2.6 Yellow and blue flags, and their relationship with previous absence

To reflect the concept of yellow and blue flags as obstacles to recovery (Main & Burton 2000; Waddell & Burton 2004), certain clinical and occupational psychosocial risk factors were examined for their relative association with previous absence. Based on a general synthesis of the literature, five occupational psychosocial factors were chosen to represent the psychosocial work environment (blue flags), together with one clinical psychological factor (yellow flag).

Blue flags:

- Job satisfaction
- Social support
- Attribution (to work)
- Control
- Organisational climate.

Yellow flag:

- Psychological distress.

Using the empirically derived cut-off points, ORs were calculated for outcomes of self-reported LBP in the previous 12 months, and for occurrence of absence in the previous 12 months.

The cut-off point for each psychosocial factor, along with an indication that this score, or a score above or below (indicated by arrow), was associated with LBP or absence in the previous 12 months is given in Table 2.7. The blue flags showed similar statistically significant associations as did the yellow flag, and there was a tendency for stronger association with absence than reported LBP.

Table 2.7
Yellow (Y) and blue (B) flags, and their association with self-reported LBP or absence during the previous 12 months, expressed as ORs (95% CI)

Psychosocial flag	Cut-off point	LBP 12 months	LBP absence 12 months
Psychological Distress (Y)	14 ↑	2.1 (1.8 to 2.5) *	2.1 (1.4 to 3.1)
Job Satisfaction (B)	16 ↓	1.3 (1.0 to 1.6)	3.1 (1.9 to 4.9)
Social Support (B)	11 ↓	1.4 (1.2 to 1.7)	2.4 (1.5 to 3.9)
Attribution (work) (B)	41 ↑	ns	1.7 (1.1 to 2.7)
Control (B)	11 ↓	1.4 (1.2 to 1.8) *	1.9 (1.1 to 3.3)
Organisational climate (B)	13 ↑	1.6 (1.4 to 1.9)	1.4 (1.0 to 2.1)

[ORs significant at 5% level: ns = not significant]

The influence of multiple flags was explored. Odds ratios were calculated for the association between varying numbers of flags flying and absence, using the cut-off scores for those respondents who reported LBP in the previous 12 months (n=98). Due to small numbers, it was not meaningful to explore the cumulative effect at each increment, i.e. 1 versus 2 versus 3 flags, etc, so the number of blue flags flying was categorised as 0, 1, or more than 1 (Table 2.8). Associations were incremental, in that increasing numbers of flags (yellow and blue) were associated with a greater proportion of workers having taken absence. The effect of any blue flag alone was similar to the effect of the yellow flag alone, but no single flag was dominant; rather the pattern of psychosocial flags varied from individual to individual.

Table 2.8
The proportion of workers reporting LBP in the previous 12 months who also took absence, categorised by the yellow flag and the number of blue flags flying

	0 blue flags flying	1 blue flag flying	2 to 5 blue flags flying
Yellow flag not flying	2.5%	3.5%	7.8%
Yellow flag flying	4.0%	5.8%	9.8%

2.2.7 Key points: cross-sectional results from workforce survey:

- The workforce survey population was representative of GSK as a whole in terms of gender and job type, and likely to be of similar 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 was similar to previous comparable studies.
- There were no significant differences in mean psychosocial scores between respondents reporting LBP and those reporting ULDs, or between those taking absence due to LBP and those taking absence due to ULDs.
- There was an under-representation of respondents who had taken absence due to MSDs in the 12 months preceding the workforce survey, the possible implications of which will be discussed later.
- The majority of psychosocial scores from respondents who had reported a previous MSD, and who had taken previous absence due to MSDs, differed significantly in a 'detrimental' direction, compared with respondents who had not reported a previous MSD or taken absence.
- Seen overall, modest but statistically significant differences across a range of work-related psychosocial measures were found in association with symptom reporting and previous absence. There was a similar association with psychological distress.
- Blue flags were statistically significantly associated with self-reported LBP and absence. The ‘strength’ of association was similar to that of the more established yellow flag.
- The cumulative influence of blue and yellow flags indicates each ‘type’ have similar potential detrimental influences on MSD outcomes.

2.3 RESULTS: PROSPECTIVE

In order to determine the predictive influence of psychosocial factors on future absence, company-recorded absence data were collected over an approximate 2-year follow-up period after the workforce survey (actually 27 months for convenience of data collection: April 2000 to July 2002). The psychosocial data from the workforce survey were explored in order to identify any predictive influences that the psychosocial factors had on future absence taken by the respondents.

In the two years following the completion of the workforce survey, 244 respondents took absence due to MSDs (LBP and ULDs only), which resulted in 297 spells of absence, and 4,089 working days lost. The majority of absence was due to LBP (76.4%), occurred mostly at the manufacturing sites (88.2%), and was self-certified (57.6%) – ie spells lasting less than one week.

Among the respondents who had taken absence, there were higher proportions of males, manual workers, and older workers than among the non-absentee respondents (see Table 2.9). Furthermore, compared with the actual proportions of manual workers in the whole survey population (31%), there was an over-representation of manual workers who took absence (57%).

Table 2.9
Distribution of respondents who did and did not take absence in the ensuing 2-year period, categorised by gender, job type and age

	Absentees (n)	Non-absentees (n)	*P*
Gender	Male (n=163)	Male (n=2460)	<0.001
	Female (n=81)	Female (n=1933)	
Job-type	Manual (n=139)	Manual (n=835)	<0.001
	Non-manual (n=105)	Non-manual (n=3558)	
Age group	19-40 yrs (n=95)	19-40 yrs (n=2461)	<0.001
	41-65 yrs (n=149)	41-65 yrs (n=1932)	

2.3.1 Psychosocial scores and subsequent absence

Mean psychosocial scores were calculated for those respondents who did and did not take absence due to MSDs during follow-up. The mean differences for psychosocial scores were calculated, and the results are reported for absence due to LBP and ULDs separately. [A small number of respondents took absence due to both LBP and ULDs (n=12), but were not included in these analyses]. Data tables providing the means and standard deviations for the following analyses are presented in Appendix 1

Absence due to LBP

Mean psychosocial scores for those respondents who did (n=227) and did not (n=4340) take absence due to LBP during follow-up were statistically significantly different, with the exception of home/work balance. Further, for those respondents who had taken subsequent absence, the differences were in a 'detrimental' direction (indicated by the arrow in Table 2.10), with the exceptions of mental stress and attribution of LBP to individual factors (displayed in italics).

Table 2.10
Mean psychosocial score difference between respondents who did and did not take absence due to LBP in the ensuing 2-year period

Psychosocial measure (conceptual detrimental direction ↑↓ of scale)	**Mean** (direction ↑↓) **LBP absence (yes/no)**
Psychological Distress ↑	1.27 ↑ *
Job Satisfaction ↓	3.01 ↓
Social Support ↓	1.04 ↓
Mental Stress ↑	*0.88 ↓*
Inevitability beliefs about LBP ↓	2.27 ↓
Attribution (work) ↑	1.82 ↑
Attribution (individual) ↓	*0.75 ↑**
Control ↓	1.77 ↓
Personal influence at work ↓	1.08 ↓
Organisational climate ↑	1.19 ↑
Relationships at work ↑	3.44 ↑
Home/work balance ↑	ns
Perceived Exertion ↑	1.88↑

*[Differences significant at 0.1% level, except where * indicates 5% level: ns = not significant]*

Absence due to ULDs

The majority of mean psychosocial scores for respondents who did (n=58) and did not (n=4340) take absence due to ULDs during follow-up were not statistically significantly different, with the exception of those for social support, mental stress, control at work, personal influence at work and perceived exertion. For those respondents who had taken absence due to ULDs, and had scores that were significantly different, these were in a 'detrimental' direction (indicated by the arrow in Table 2.11), with the exception of mental stress (displayed in italics).

Table 2.11
Mean psychosocial score difference between respondents who did and did not take absence due to ULDs in the ensuing 2-year period

Psychosocial measure	**Mean score difference ULD absence (yes/no)**
Psychological Distress	ns
Job Satisfaction	ns
Social Support	1.04↓
Mental Stress	*1.41↓*
Inevitability beliefs about ULDs	ns
Control	1.18 ↓
Personal influence over work	1.08 ↓
Organisational climate	ns
Relationships at work	ns
Home/work balance	ns
Perceived Exertion	1.48↑ **

*[Differences significant at 5% level, except where ** indicates 1% level: ns = not significant]*

2.3.2 Key points: prospective workforce survey results - psychosocial scores

- 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 respondents who had not taken absence in the ensuing 2-year

period. However, the association was substantially less consistent for respondents who had taken absence due to ULDs.

- Although statistically significant, the differences in mean psychosocial scores between respondents who did and did not take absence were relatively small compared with the range of possible scores.

2.3.3 Yellow and blue flags, and their relationship with future absence

By way of comparison with the cross-sectional data on the relationship that yellow and blues flags had with absence due to LBP (Section 2.2.6), the prospective data were similarly analysed using the established cut-off points on the same psychosocial instruments. [The small number of workers taking future absence for ULDs was considered insufficient to obtain a reliable estimate of ORs for the psychosocial factors in prediction of future absence].

Likelihood of absence

Odds-ratios were calculated to determine the association between the yellow and blue flags and the likelihood of subsequent absence due to LBP over the follow-up period. Compared with the cross-sectional data (Table 2.7), a broadly similar range of ORs was found, all of which were statistically significant - see Table 2.12.

Table 2.12
The association between yellow and blue flags and the occurrence of absence due to LBP in the ensuing 2-year period, expressed as ORs (95% CI)

Psychosocial flag	Subsequent absence
Psychological distress	1.6 (1.2 to 2.1)
Job satisfaction	2.8 (2.1 to 3.8)
Social support	2.4 (1.8 to 3.2)
Attribution (work)	2.1 (1.6 to 2.8)
Control	2.1 (1.5 to 2.8)
Organisational climate	2.7 (1.8 to 4.1)

Duration of absence

The mean duration of subsequent absence for respondents who took absence due to LBP was 12.5 working days (SD 22.9). In view of the wide range of durations (between one and 194 working days), it is also appropriate to report the median duration of absence (5 working days) and the mode of that duration (2 working days).

Mean durations of subsequent absence were compared between respondents who had zero yellow or blue flags flying (n=151), and those who had up to six flags flying (n=76). The mean duration of subsequent absence for respondents who had zero flags flying was less than for those respondents who had one or more flags flying (13 v 15 working days), but the difference was not statistically significant - see Table 2.13.

Table 2.13
Mean duration of absence in the subsequent 2-year period for respondents with zero and up to six yellow or blue flags flying

	Mean (SD) duration future absence	*P*
0 flags	12.80 (20.30) working days	ns
1-6 flags	15.14 (26.12) working days	

The relative influence of all the psychosocial factors studied in the workforce survey (not just the ones used to define the flags) on the duration of all subsequent MSD absence was also explored. Because the sickness absence data were skewed with the majority of absence lasting less than one week, the data were dichotomised into self-certified absences (lasting up to 7 days, n=171) and medically certified absences (over 7 days, n=126). Univariate analyses on the dichotomised sickness absence variable and the psychosocial factors showed that the score for 'relationships at work as a source of pressure' was significantly lower for those with longer durations of absence ($P<0.05$), but this was against the expected direction of the scale. No other statistically significant relationships were found. The lack of statistical significance in univariate analyses meant that multivariable approaches (such as regression analyses) were unnecessary and would not be helpful.

Other factors known to influence the likelihood of absence might also influence the duration of absence. Therefore, analyses were performed exploring the effects of gender, age (younger and older groups) and previous absence due to MSDs on the different durations of subsequent absence. A significantly higher proportion of older workers took longer absences ($P<0.05$), but no other significant associations were found.

2.3.4 Key points: prospective workforce survey results – yellow and blue flags.

- Yellow and blue flags predicted the *likelihood* of subsequent absence due to LBP.
- Yellow and blue flags did not predict the *duration* of subsequent absence due to LBP.
- Older age was significantly associated with longer duration of subsequent absence, but there were no relationships with gender, with previous absence due to MSDs, or with those psychosocial factors not included in the 'flags'.

3. PHASE 2: INTERVENTION STUDY

3.1 METHODS

A non-randomised controlled trial of a psychosocial intervention was conducted at five manufacturing sites of GSK. There were two experimental sites (termed E1 and E2: n=1,435 employees), and three control sites (termed C1, C2 and C3: n=1,483 employees). Manufacturing sites were chosen for the trial because:

- they were broadly matched for job type and demographic data,
- the absence rate due to MSDs was approximately 12% of the workforce, compared to approximately 5% at other sites of GSK,
- there was an organisational requirement for early notification of absence.

3.1.1 Experimental design and procedures

The experimental intervention protocol comprised a structured program involving collaboration between all the key players (Frank et al. 1998), delivered, using a case-management approach over a period of four weeks. A central feature was one-on-one psychosocial assessment; although delivered by occupational health nurses at the experimental sites, it was not simply a 'health care' intervention. Rather the nurses assessed and addressed psychosocial factors using cognitive behavioural principles, and monitored each participant during the intervention period. Furthermore, in order to generate a supportive network and bring all players onside, the nurses also liaised with Team Leaders and General Practitioners (GP); and arranged modified work if necessary - see Figure 3.1. Importantly, the protocol required the nurses to contact absent workers early (within the first few days) and, reflecting their normal practice, also to deliver the intervention to workers presenting with MSDs who were still at work.

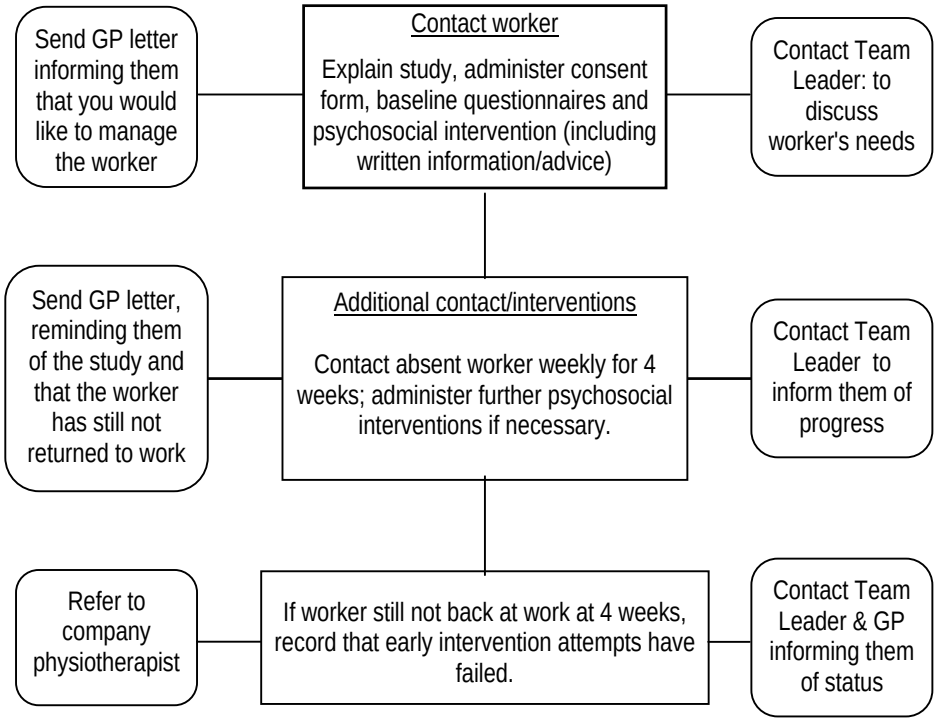

Figure 3.1
Experimental intervention protocol

3.1.2 Inclusion/exclusion criteria

Workers were initially assessed by the nurse for the presence of clinical 'red flags', in order to screen for possible serious underlying pathology (Royal College of General Practitioners 1995). The inclusion and exclusion criteria for the study are outlined below:

Inclusion criteria

- Low back pain with or without related leg pain
- Neck pain with or without related arm pain
- Upper limb pain (shoulder, elbow, wrist, hand)
- Whiplash from minor road traffic accidents

Exclusion criteria

- Single-joint problems of the lower extremity
- Inflammatory arthritis, e.g. rheumatoid arthritis
- Obvious or diagnosed osteoarthritis
- Post-fracture or post-dislocation cases
- Post-surgical cases
- Headache or vertigo as primary complaint
- Musculoskeletal disorders awaiting surgery
- Musculoskeletal disorders resulting from serious trauma
- Serious co-existing morbidity

Workers were referred to the company physiotherapist if they declined to take part in the study, or specifically requested the physiotherapist instead:

3.1.3 Ethical clearance

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

3.1.4 Nurse Training

The experimental intervention was designed as a brief early intervention protocol that lasted a maximum of four weeks; further care for participants who had not returned to normal duties by that time was provided under ‘usual care’ arrangements as offered at the control sites. The intervention comprised several procedures that the occupational health nurses (OHN) were trained to deliver:

<u>Identification of participants</u>

Potential participants were identified by the OHNs. The protocol relied on the GSK policy for workers taking absence to inform their OHN at the start of absence, ideally on the first day. This meant that absent workers be contacted early in order to ascertain their eligibility, and invite them to participate in the experimental intervention.

To reflect the OHNs’ usual practice, eligible workers who presented with symptoms whilst still working could be invited to participate. Furthermore, to accommodate those workers who did not inform the OHN of absence, other methods of identification were accepted; these included primarily notification to the OHN via a doctor’s certificate or notification by the Team Leader on return to work.

<u>Psychosocial assessment</u>

The psychosocial assessment comprised several sections where specific ‘stem questions’ were asked in order to elicit responses that were indicative of psychosocial risk (yellow and blue flags). It was recognised that the OHNs did not have specific

expertise in pain management or psychosocial intervention, and therefore an assessment manual was devised which documented all the necessary intervention advice, a copy of which is presented in Appendix 2. The yellow and blue flags were addressed using a technique broadly based on cognitive-behavioural principles (Main & Watson 2002), and the 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). In addition to the advice administered as part of the psychosocial assessment, educational booklets targeting unhelpful beliefs were also provided. Participants with LBP were given *The Back Book* (Roland et al. 1998), whilst those with ULDs were given *Neck and arm pain - don't suffer needlessly* (Bartys 2004). The latter was written specifically for the present study, being based closely on a pamphlet previously used successfully in industry (Symonds et al. 1993), and is reproduced in Appendix 3.

Modified work

The potential value of modified work has been widely acknowledged (Krause et al. 1998), and was incorporated within the intervention. Although modified work was used at GSK prior to the study, it was without clear criteria for implementation and temporal restriction. The experimental protocol required the nurses to use modified work for the specific purpose of facilitating early return-to-work or reducing future workloss; it was not used as a routine. Following guideline recommendations (Waddell & Burton 2000), the availability of modified work was restricted to a 2-week period, with re-assessment at 1 week. If it was not possible for the participant to return to normal duties within 2 weeks, the participant was referred to the company physiotherapist.

General Practitioner liaison

Steps were taken to involve GPs in the management of absent participants, and to covertly discourage unnecessary sickness certification. A letter was sent to GPs informing them of the study, and explaining that the OHN was managing the case at the workplace, in addition to informing on 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 might discourage unnecessary sickness absence if they happened to be consulted. Status letters were sent to GPs for workers who failed to return to work after four weeks, and also for those who had remained on modified work for more than two weeks.

Team Leader liaison

The Team Leaders were considered to be a potentially helpful link between the OHN and the worker. Nurses were required to communicate with Team Leaders and discuss return-to-work/work-retention plans formulated during the course of the experimental intervention. This communication was used to highlight any problems with colleagues or aspects job (physical or organisational) that the participant had revealed to the nurse, and facilitated a discussion of possible modifications to the work.

3.1.5 Training tools

To encourage and aid the nurses in following procedures consistently and systematically, a manual was devised. This manual included scripts for each communication that the nurse would be required to engage in (e.g. with GP and Team Leader) and outlined procedures for each stage of the intervention (e.g. psychosocial assessment, modified work) (Bartys 2004). A database was custom-designed to enable the nurses to record data for each participant.

3.1.6 Baseline questionnaires

To monitor any changes in psychosocial status as a result of the intervention, eight questionnaires were administered at baseline. These are described below:

- The Visual Analogue Scale (VAS) (Huskisson 1974) is one of the most widely used measures of recording pain intensity (Carlsson 1983). Pain is a common presenting symptom of 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 et al. 2001). The VAS consists of a horizontal line 100 mm in length - the respondent is asked to represent their level of pain by marking the line, and the score is obtained by measuring the distance (in mm) from the left-hand end. The score ranges between 0-100, whereby 0 represents "no pain at all" and 100 represents "the worst pain imaginable".
- The Pain Drawing (Ransford et al. 1976) consists of front and back outlines of a body on which the respondent is required to indicate different sensations (ache, pain, pins and needles, and numbness) by drawing symbols. The Pain Drawing has been described as an aid to psychological evaluation of patients with MSDs. A score ranging between 0-38 is calculated based on the number of different sensations indicated, and the density of markings (Parker et al. 1995). A higher score indicates a poorer psychometric profile.
- The Short Form-36 Health Survey (SF-36) (Medical Outcomes Trust, Boston, MA, USA) is a multi-purpose health survey which has been widely used and documented (Shiely et al. 1996). The SF-36 has been shown to be valid, reliable and responsive to changes in health for people presenting with musculoskeletal disorders (Garratt et al. 1993). Following changes to the original SF-36, the modified version was used in the present study (Garratt et al. 1994). The eight sub-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 Tampa Scale of Kinisiophobia (TSK) (Kori et al. 1990) was devised in the light of evidence suggesting that, in many cases, chronic pain behaviour has more to do with phobic processes than neurological 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 re-injury. 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.
- The Psychosocial Aspects of Work (PAW) (Symonds et al. 1996) questionnaire (see above). For 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.
- The Attribution Questionnaire (Linton & Warg 1993) (see above). For the experimental intervention, only the attributions subscale relating to Workplace Factors as causes of back pain was used. 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).

- The Pressure Management Indicator (PMI) (Williams & Cooper 1998) (see above). Only those sections relating to Control and Personal Influence at work were used for the experimental intervention.
- The Psychological Demands Questionnaire was adapted from The Job Content Questionnaire (JCQ) (Karasek et al. 1998). The psychological demands component of the JCQ relates to 'how hard workers work' (Meshkati et al. 1990). Although the scale has been criticised for several deficiencies (Kristensen 1996) (Johnson et al. 1996), the interaction between perceived control over demands at work has been consistently associated with MSDs in the literature (Hollmann et al. 2001) (Linton 2001). 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.

3.1.7 Follow-up

After a period of 12-months, each participant was contacted by the OHN, and invited to complete repeat questionnaires. The follow-up questionnaire booklet comprised the same questionnaires as in the baseline questionnaire booklet, with the exception of the Pain Drawing. In the event that participants did not attend appointments with the nurse 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.

3.1.8 Statistical analysis

Data from the intervention phase were analysed to explore three specific outcomes.

- *Return-to-work time:* this outcome was explored to assess the efficacy of the early intervention. Return-to-work time was defined as the duration of the presenting spell of absence.
- *Future workloss:* this outcome was explored to assess the efficacy of the intervention on reducing future absence. Both the *occurrence* and *duration* of any future absence, during the follow-up period were analysed.
- *Changes in psychosocial profile:* changes in mean psychosocial scores between baseline and follow-up were analysed for the intervention participants. No comparable data could be collected at the control sites.

Comparisons were primarily between participants and controls, but additional comparisons were made between workers receiving different components of the intervention protocol. The independent measures *t*-test and analysis of variance (ANOVA) were used as appropriate. The level of statistical significance was set at 5%.

3.1.9 Feasibility phase

Preceding the main trial of the experimental intervention, a short feasibility phase was implemented at the proposed experimental sites. The OHNs were asked to deliver the experimental intervention in accordance with the protocol (see Figure 3.1), and collected baseline questionnaire data. No significant problems were noted, so the data

collected from these participants (n=20) were incorporated into the main experimental intervention database.

The presentation of the results section is structured to describe the characteristics of the participants and the delivery of the intervention, followed by analysis of the relationship between psychosocial and the intervention, and analysis of the relationship between the intervention and absence at the site level and at the individual level.

3.1.10 Procedure on control sites

There was no systematic intervention at the control sites; rather they were left to continue management of MSDs 'as usual'. There were no company-defined procedures for managing MSDs or related absence; rather, the OHNs at the control sites managed these issues according to their clinical judgement and experience. In practice, this meant that workers absent due to MSDs generally would be seen by the OHN only on return to work, and offered physiotherapy as required. Modified work was available, but was not implemented specifically on a time-limited basis. Workers experiencing MSDs whilst at work could see the OHN on-demand, and be referred to the physiotherapist as necessary. Usual management, then, was essentially a 'health care' intervention, albeit within an occupational setting. It did not entail the key features of the experimental intervention, which were early contact whilst absent; assessing and addressing psychosocial issues; provision of written information/advice; selective use of time-limited modified work; focused liaison with Team Leaders or GPs to develop a supportive framework to facilitate early return to work.

3.2 RESULTS: INTERVENTION DELIVERY

3.2.1 Structure of experimental intervention

The main trial recruitment period, commencing at the beginning of the feasibility stage, covered 24 months (August 2000-July 2002).

During this 2-year period, 300 workers were contacted across both experimental sites. In total, 61.3% (n=185) of workers contacted received the experimental intervention. Figure 3.2 is a flowchart illustrating the breakdown of participants contacted and recruited into the experimental intervention.

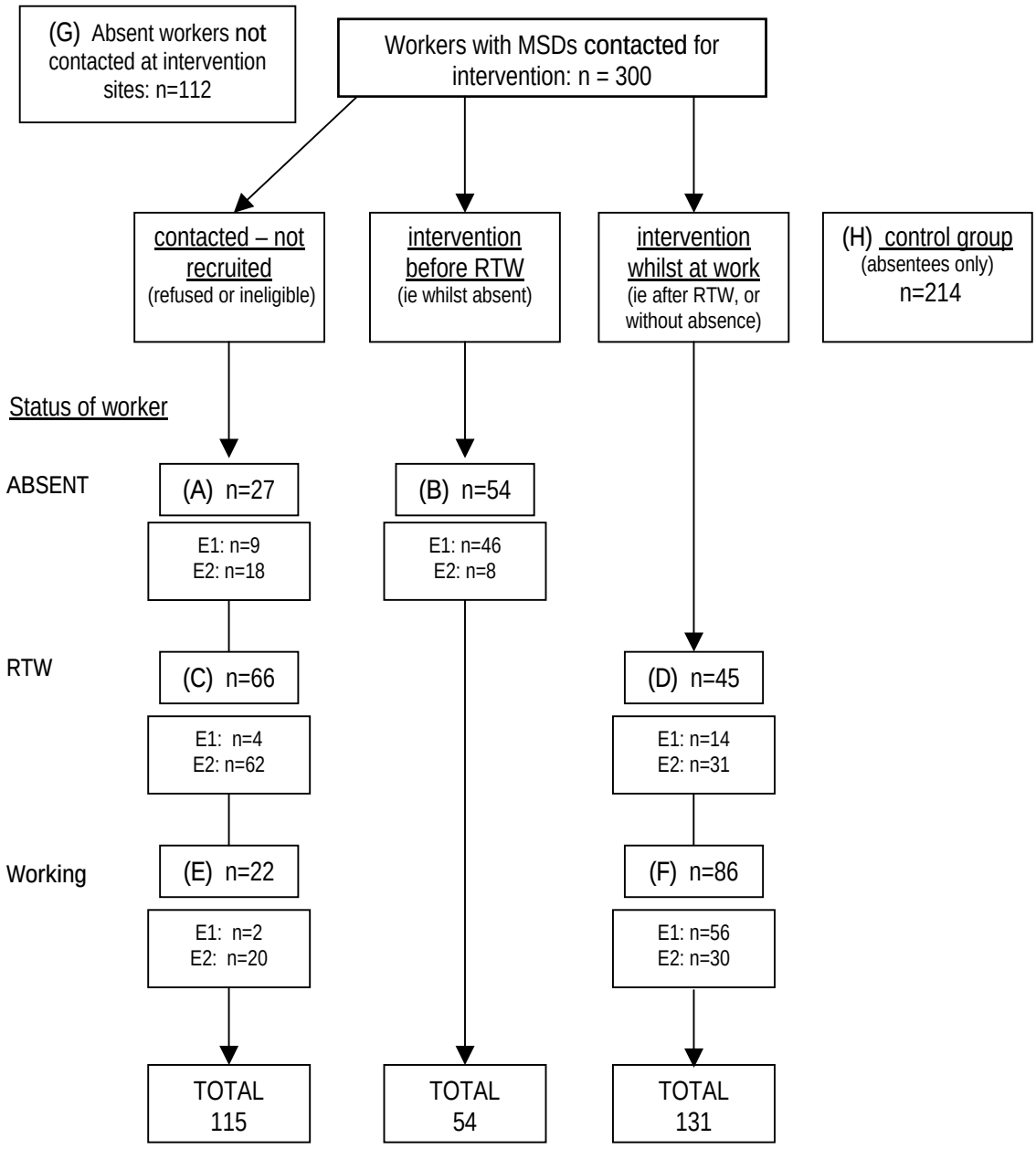

Figure 3.2
Breakdown of participants contacted and recruited for experimental intervention
[RTW = return to work]

Figure 3.2 shows that the majority of workers were not contacted in accordance with the protocol (ie whilst absent). It was found that 37% (n=111) of workers were contacted and invited to receive the intervention only after they had returned to work, and 36% (n=108) were contacted whilst working (but having not taken absence). Just 27% (n=81) were contacted (early) whilst they were absent.

3.2.2 Differences in delivery of experimental intervention

Notification of absence

The method of absence notification to the OHNs was examined In order to seek reasons for the under-representation of workers contacted for the early intervention (whilst absent). There were three main sources of notification of absence to the OHN: by the team leader, by the workers themselves, and by certificate. It transpired that the proposed early notification culture was in place at E1, but not at E2, where it was found that often the first notification of absence was more often via a sickness certificate (often incurring a delay of up to 4 weeks). Furthermore, although Team Leaders were contacting the OHN, this was mostly after the individual had returned to work. The early reporting culture at E1, by contrast, entailed Team Leaders and workers themselves contacting the OHN at the start of absence (see Table 3.1).

Table 3.1
Method of absence notification for workers contacted at experimental sites

Method of notification to OHN	Site E2 (n=119)	Site E1 (n=73)
By Team Leader	39.7% (n=46)	36.0% (n=27)
By worker	19.3% (n=26)	56.2% (n=41)
By certificate	39.5% (n=47)	6.8% (n=5)

Intervention delivery

From the total number of workers contacted for the experimental intervention (n=300), 61.7% (n=185) actually received the intervention (Figure 3.2, boxes B, D & F). The remaining workers either declined the intervention or were deemed ineligible by the OHN (Figure 3.2, boxes A, C & E), but they were not distributed equally across both experimental sites. Only 5% (n=15) of workers contacted at E1 were deemed ineligible for, or declined the experimental intervention, compared with 33.3% (n=100) at E2. Consequently, the majority of intervention participants came from E1 (n=116) compared to E2 (n=69), despite the population at E2 being approximately twice the size - see Table 3.2.

Table 3.2
Number of workers contacted for intervention, and numbers who did and did not receive the intervention across experimental sites

	Contacted	Received intervention	Ineligible	Declined
Site E2	169	69	38	62
Site E1	131	116	5	10
Totals	300	185	43	72

There were no a priori reasons to suppose that workers at E2 and E1 should be inherently different, and later questioning of the OHNs revealed that those at E2 were seemingly applying the medical ‘ineligibility’ rules inappropriately.

There was also a disproportionate number of workers who declined the intervention at E2 compared to E1. A sample of workers who declined the experimental intervention

(n=24), said it was because they already 'felt better' at the time of contact, and that the intervention 'would not be useful at this time'.

Timing of contact

Since differences were identified in absence notification procedures between the experimental sites, the association between timing of contact and receipt of the experimental intervention was examined. First, the two experimental sites were compared in terms of the time to contact times for absent workers. The average time was significantly longer at E2 compared to E1 (P<0.001) - see Table 3.3.

Table 3.3
Mean number of working days taken to contact absent workers at experimental sites, along with standard deviations and the range of working days

	Mean contact time	Range
Site E2 (n=119)	12.44 (SD 10.41)	0-58
Site E1 (n=73)	2.54 (SD 3.60)	0-18

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. It was found that a significantly greater number of absent workers contacted early agreed to receive the intervention compared with workers contacted late (P<0.001) - see Table 3.4.

Table 3.4
Early v late contact and number of absent workers agreeing or declining to receive intervention (n=154)

	Early contact	Late contact
Workers agreeing to intervention	61	35
Workers declining intervention	15	43

3.2.3 Key points: contacting absent workers

- Sickness absence procedures in place at E2 precluded the delivery of an early intervention. In contrast, the optimum sickness absence procedures in place at E1 facilitated the delivery of an early intervention.
- Late contact (of absent workers) significantly increased the likelihood of participants declining the experimental intervention.

3.2.4 Breakdown of intervention participants

During the 2-year recruitment period (August 2000 to July 2002), 185 workers received the experimental intervention and completed psychosocial questionnaires. Figure 3.3 is a flow chart illustrating the breakdown of the intervention participants.

One hundred thirty one participants received the psychosocial intervention whilst at work, and just 54 received the intervention whilst absent. Of those receiving the intervention whilst at work, it was on return from absence for 45 and whilst still working (having had no absence) for 86. Due to the procedural differences between the two experimental sites in terms of absence notification, significantly more participants received an early intervention (ie whilst absent) at E1 (n=46), compared with E2 (n=8) – see Figure 3.2.

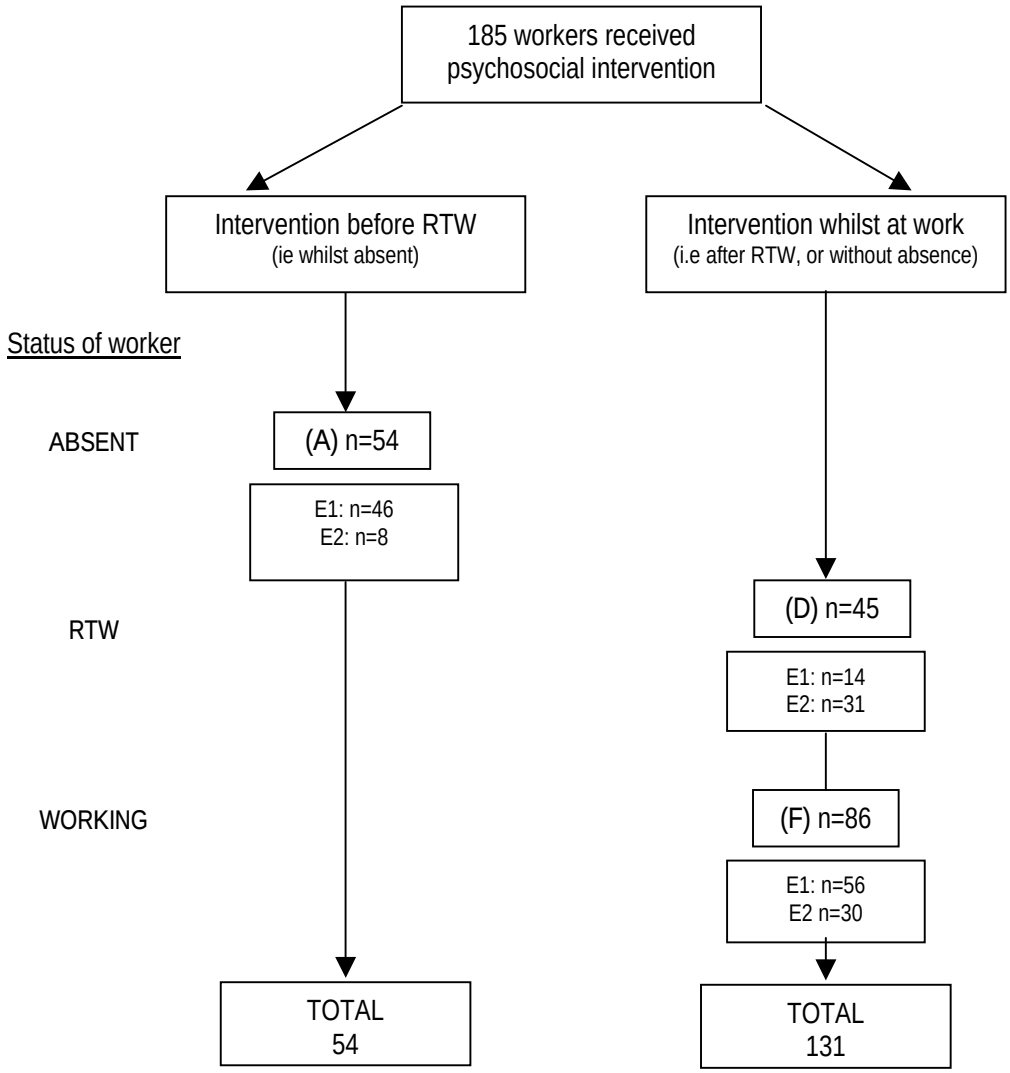

Figure 3.3
Breakdown of intervention participants

3.2.5 Characteristics of intervention participants

The characteristics of the experimental intervention sample (gender and job-type) were representative of the experimental sites as a whole, where male manual workers predominate – see Tables 3.5. Approximately equal numbers of the experimental sample were above and below 40 years of age, but these data were not available for the experimental sites as a whole.

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 3.6.

Table 3.5
Characteristics of experimental sample compared with overall characteristics of the experimental sites (in parentheses).

Age group	Gender	Job-type
19-40 = 49.2%	Male = 67.0% (65.0%)	Manual = 69.2% (66.0%)
41-61 = 50.8%	Female = 33.0% (35.0%)	Non-manual = 30.8% (34.0%)

Table 3.6
Characteristics of experimental sample compared with characteristics of the control sites.

	Experimental sample (n=185)	Control sites (n=1,483)
Gender	Male = 65.0%	Male = 67.0%
	Female = 35.0%	Female = 33.0%
Job-type	Manual = 69.2%	Manual = 70.0%
	Non-manual = 30.8%	Non-manual = 30.0%

Participants were asked to document their main musculoskeletal complaint at the time of entry into the study. The majority of complaints were due to LBP (n=120), followed by ULDs (n=50); a small number of participants (n=15) reported both LBP and ULD symptoms. The majority of participants received intervention at an early stage of their complaint; some 71% reported they had experienced symptoms for their presenting complaint for less than two weeks prior to the intervention, whilst 58% received it within the first week - see Figure 3.4.

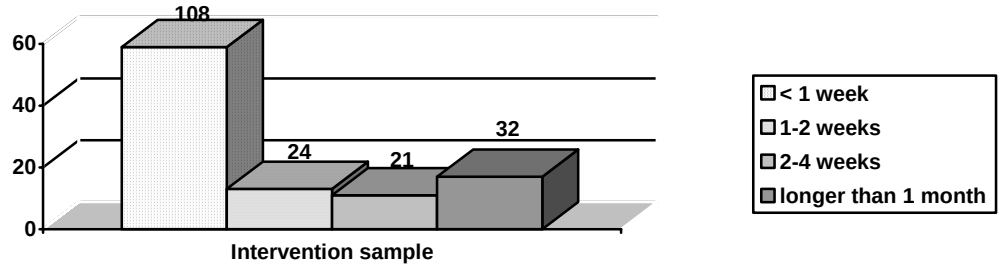

Figure 3.4
Participants who reported duration of symptoms lasting up to 1 week, 1-2 weeks, 2-4 weeks and longer than 1 month for the presenting complaint

3.3 RESULTS: PSYCHOSOCIAL SCORES

3.3.1 Psychosocial scores before and after intervention

Each participant was contacted 12 months after initial presentation and invited to complete the same psychosocial questionnaires as at baseline (see Methods). The response rate to the follow-up questionnaire was 75.7% (n=140). Table 3.7 illustrates the mean psychosocial scores at baseline and at follow up.

Table 3.7
Mean baseline and 12-month follow-up psychosocial scores (SD), along with the mean shift in scores

Psychosocial measure	Baseline	Follow-up	Mean shift (95% CI)
TSK	37.19 (6.71)	35.00 (6.37)	↓2.19 (0.880 to 3.51)
SF-36-Physical Component	43.48 (7.79)	50.55 (6.32)	↑7.07 (6.55 to 9.41)
SF-36-Mental Component	50.43 (8.95)	50.52 (8.13)	↑0.09 (ns)
Job Satisfaction	24.96 (5.99)	23.92 (6.31)	↓1.04 (ns)
Social Support	16.04 (3.05)	15.42 (2.98)	↓0.62 (0.032 to 1.31)*
Attribution (work)	35.36 (8.98)	34.70 (9.82)	↓0.66 (ns)
Control	16.35 (4.33)	16.08 (4.41)	↓.27 (ns)
Personal Influence	11.35 (2.43)	11.31 (2.68)	↓0.04 (ns)
Psychological Demand	37.14 (5.66)	37.40 (5.60)	↑0.26 (ns)
VAS	53.6 (22.3)	15.3 (20.7)	↓38.3 (33.7 to 42.9)

*[Differences significant at 1% level, except where * indicates 5% level: ns = not significant]*

Significant mean shifts were found on scores for the TSK, the physical summary component of the SF-36, social support, and the VAS. The significant mean shifts were all in the hypothesised 'positive' direction, with the exception of social support, which decreased slightly following the psychosocial intervention. The majority of mean scores were not significantly different following the psychosocial intervention, and there were no statistically significant differences in either baseline or follow-up scores between the two experimental sites.

3.3.2 Key points: psychosocial scores

- 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 promoted certain positive attitudes and beliefs. However, most of the psychosocial scores did not change significantly at the 12-month follow-up.
- Because psychosocial data from the control sites were not available, it is not possible to conclude that the observed changes in psychosocial scores were due specifically to the intervention.

3.4 ANALYSIS OF ABSENCE AT THE SITE LEVEL

This section provides a general overview of the patterns of sickness absence due to MSDs at the site level (experimental v control) over time for a 4-year period covering the 2 years prior to intervention, and the 2-years when the intervention was in place at the experimental sites.

3.4.1 Annual occurrence rate of absence

The annual occurrence rate of absence was defined in terms of the number of spells of absence due to MSDs taken in each year. The data were standardised for each site and reported as the annual occurrence rate per 10,000 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.

The annual occurrence rate of absence due to MSDs per 10,000 working hours remained relatively stable at the control sites (C1, C2 and C3) over the 4-year period. In contrast, the occurrence rate steadily increased at one experimental site (E2) but decreased during the intervention period at the other (E1) - see Table 3.8.

Table 3.8
Annual occurrence rate of absence due to MSDs at each site, expressed as spells per 10,000 working hours

	Site E2 (n=949)	Site E1 (n=486)	Site C1 (n=706)	Site C2 (n=446)	Site C3 (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 not available]*

The C1 site clearly had a lower occurrence rate, so the rates at the three control sites were averaged, and plotted against the experimental sites. Absence data were unavailable for C1 in year 4 and for C2 in year 1 (Table 3.8); in view of the relative stability of absence at these sites, the missing values were replaced with the mean of the available data for those sites. The average occurrence rate across the control sites showed no consistent deviation. The E2 site, which started with a low rate, experienced a progressive increase despite being an experimental site. E1, by contrast, started with a high rate, which diminished during the period of intervention (years 3 and 4) – Figure 3.5.

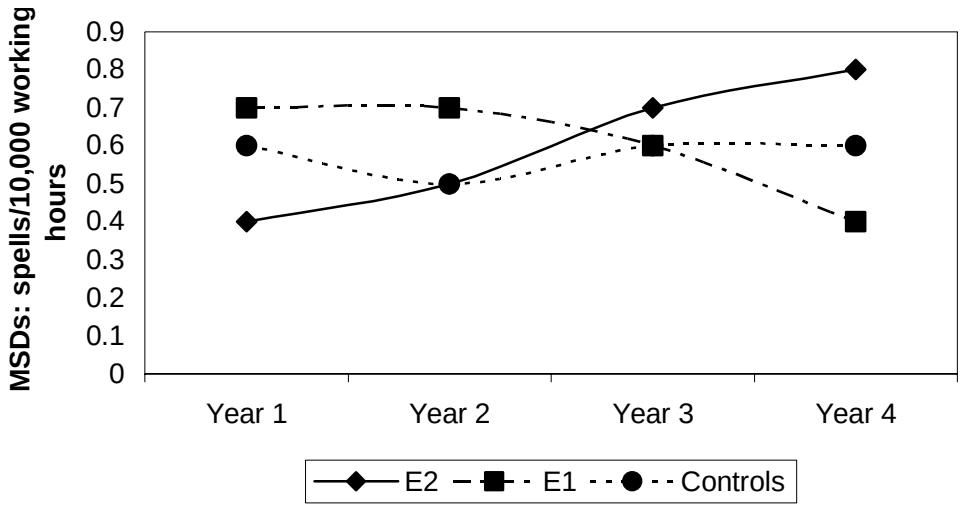

Figure 3.5
Annual occurrence rate of absence due to MSDs, expressed as spells per 10,000 working hours: experimental sites v average of control sites

3.4.2 Annual duration of absence

The annual duration rate of absence was defined in terms of the average number of days of absence due to MSDs taken in each year. The data were standardised for each site and reported as the average annual duration per 1,000 working days. The average duration of absence at the three control sites fluctuated over the 4-year period without any obvious systematic pattern. In contrast there was a tendency for absence duration at the experimental sites to be lower during the intervention period (years 3 and 4) - see Table 3.9.

Table 3.9
Average annual duration of absence due to MSDs at each site, expressed as number of days lost per 1,000 working days

	Site E2 (n=949)	Site E1 (n=486)	Site C1 (n=706)	Site C2 (n=446)	Site C3 (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 not available]*

There was considerable variation in duration of absence between the control sites, so they were averaged, and plotted against the experimental sites. As above, the missing values were replaced by averages for C1 and C2. The pattern of absence duration for one of the experimental sites (E2) resembled the control sites, starting at a relatively high level and decreasing modestly. The other experimental site (E1) however, started with relatively low absence duration and then tended to decline more steeply, particularly during the second intervention year – Figure 3.6.

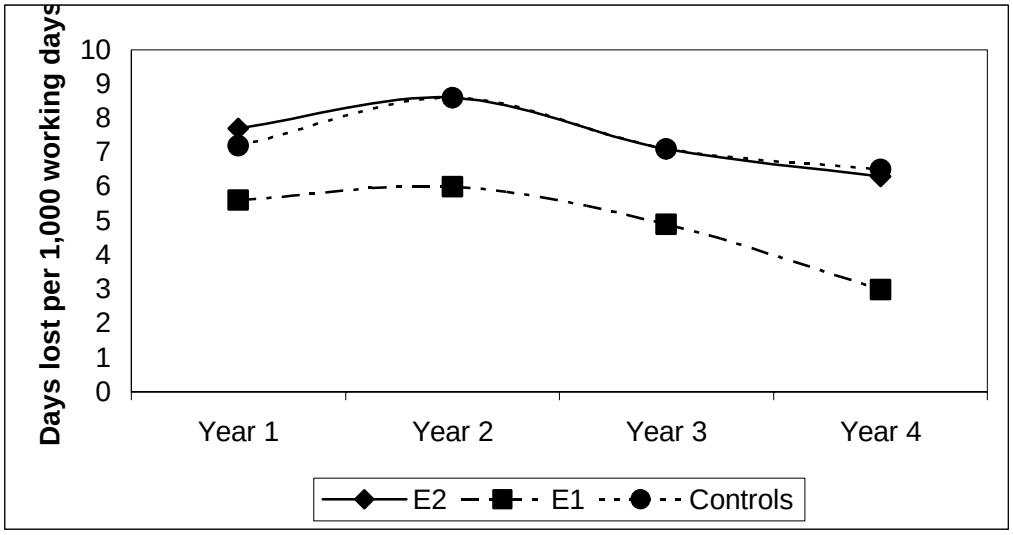

Figure 3.6
Average annual duration of absence due to MSDs at each site, expressed as days lost per 1,000 working days: experimental sites v average of control sites

Overall, by the end of the intervention, the average duration of absence had dropped proportionally more at E1 than it had at E2 or the controls compared with the pre-intervention period. That, though, was against a background of fluctuating patterns of absence duration.

3.4.3 Absence following the intervention period

There was the opportunity to explore these patterns of absence during a 12-month period following the 2-year intervention period at the experimental sites. The previous recording system at these sites remained operational, so data on their absence rates for the 12-months after the intervention ceased was available, but at the control sites, a company change to data recording precluded further follow up of the controls.

In the 12-months following the intervention period (year 5), the occurrence rate (spells per 10,000 working hours) reduced from 0.8 to 0.7 at E2, and increased from 0.4 to 0.7 at E1. To accommodate fluctuations over time, the occurrence rates were averaged over the pre-intervention period (years 1-2) and the subsequent period (years 3-5). Overall, comparing the rates for occurrence of absence between the two pre-intervention years and the three subsequent years, there was an increase at E2 and decrease at E1 - these changes are expressed as percentages in Table 3.10.

The duration rate of absence (days per 1,000 working days) over the 12-month post-intervention period decreased slightly at E2 (5.9 days compared with 6.3 days in the previous year), but at E1 the average increased (4.1 days compared with 3.0 days in the previous year). Overall, comparing the rates for duration of absence between the two pre-intervention and the three subsequent years, there was a reduction at both E2 and E1 - as shown in Table 3.10, this was proportionally greater at E1.

Table 3.10
Occurrence rate and duration of, absence at the experimental sites, averaged for the pre-intervention period (Years 1-2) and the subsequent period (Years 3-5).

	Site E2 (n=949)		Site E1 (n=486)	
	Occurrence rate	Duration (days)	Occurrence rate	Duration (days)
Pre-intervention period	0.45	8.15	0.70	5.80
Subsequent period	0.73	6.40	0.56	4.00
Percentage change	62% ↑	22% ↓	20% ↓	31% ↓

3.4.4 Key points: absence at site level

- The *occurrence* rate for absence at one experimental site (E1) decreased during the intervention period, whilst at the other (E2) it increased.
- There was a trend for the annual *duration* rate for absence to decline at both experimental sites during the intervention period; the reduction at one site (E1) appeared proportionally greater than that at the other (E2).
- In the year following the intervention period, the improvements in occurrence and duration rates were not sustained at E1, and remained largely unchanged at E2.
- The *occurrence* rate for absence (due to MSDs) at the control sites did not substantially change over the 4-year observation period.
- There was a trend for the annual *duration* rate for absence to decline modestly at the control sites during the second two years of the observation period; this mirrored the pattern seen at E2.

3.5 ANALYSIS OF ABSENCE AT THE INDIVIDUAL LEVEL

Individual patterns of absence were analysed in a number of ways to determine the effectiveness of the experimental intervention.

Two main outcomes were explored: return-to-work time (defined as the mean duration of the presenting spell of absence – ie from first day of absence to day of RTW) and future workloss (defined as the mean duration of future absence due to MSDs over the 12-month follow-up period), both being measured as working days lost.

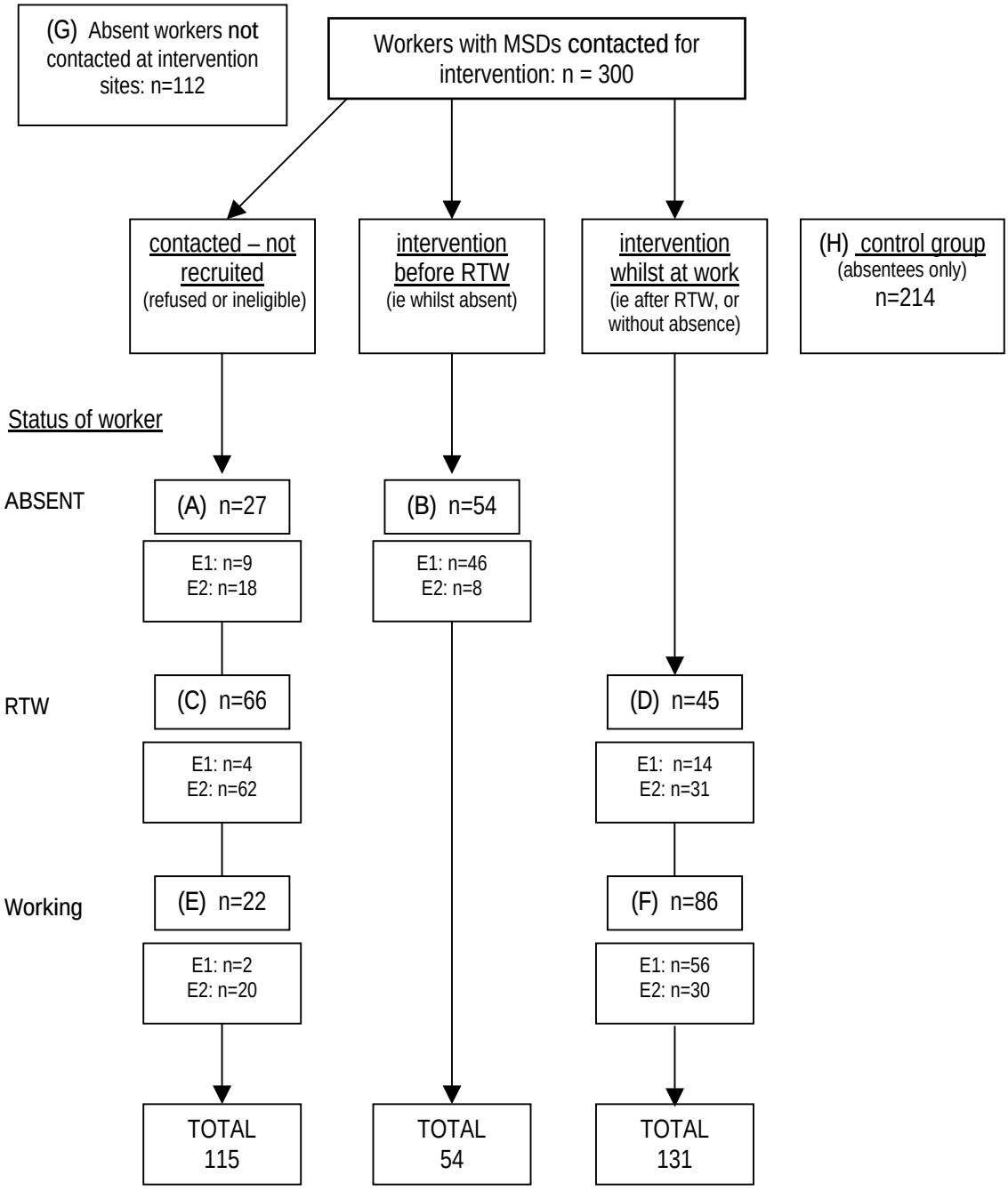

Figure 3.3
Breakdown of participants contacted and recruited for experimental intervention
[Repeat of Figure 3.2]

It is clear from Figure 3.2 (reproduced above as Figure 3.3 for convenience) that the intervention participants were not a homogenous group. Some workers taking absence at the experimental sites were not contacted during absence, and therefore were not recruited. Furthermore, some workers who were contacted either chose not to participate or were deemed ineligible (ostensibly on the grounds of the exclusion criteria). In addition, some workers were only contacted on return to work, whilst others consulted the OHN whilst still at work. These various categories of participation and non-participation enabled specific questions to be addressed. In addition to comparisons between experimental and control groups, the fact that one of the experimental sites performed very differently from the other in terms of early recruitment and delivery provided a 'found experiment' enabling comparisons between the two experimental sites.

Return-to-work time could only be calculated for those workers who took absence, but future workloss could be calculated for all participants (whether or not they were recruited whilst absent).

3.5.1 Return-to-work time

The mean return-to-work time for participants who received an early intervention (ie whilst absent, (box B in Figure 3.3)) was compared with the controls (box H), and was found to be statistically significantly shorter (see Table 3.11), amounting to a 40% lower absence duration for the index spell. Because of the small number of participants receiving an early intervention at E2, it was not practicable to analyse any differences between the experimental sites for return-to-work time for those receiving early intervention.

Table 3.11
Return-to-work time (working days lost): early experimental intervention v controls

	Mean RTW time (SD)	***P***
Early intervention (n=54)	6.47 (6.60)	0.005
Control (n=214)	10.81 (17.84)	

In addition to comparing experimental and control sites, it was possible to look at 'internal control' at the experimental sites (ie absentees not contacted). The return-to-work time for absentees who received the early intervention was shorter than for those not contacted (box G in Figure 3.3): 6.47 days (SD 6.60) v 11.30 days (SD 16.40) respectively ($P<0.001$). The return-to-work time for subjects not contacted at the intervention sites was not statistically significantly different from the controls.

As noted above, the E2 site had a high number of subjects inappropriately recorded as 'ineligible'. Therefore the overall effect on return-to-work from *offering* the intervention to those contacted whilst absent at the experimental sites (irrespective of take-up: boxes A & B in Figure 3.3) was explored. E1 had a statistically significantly shorter return-to-work time than did E2 (Table 3.12).

Table 3.12
Return-to-work time (working days lost) for all subjects *offered* the intervention whilst absent (subjects who received the early intervention + those contacted whilst absent but not recruited): Site E1 v Site E2

	Mean RTW time (SD)	*P*
Site E1 (n=53)	6.79 (7.64)	<0.05
Site E2 (n=24)	14.96 (13.82)	

3.5.2 Future workloss

The mean future workloss for intervention participants was statistically significantly less at the experimental sites compared with the control sites (Table 3.13), amounting to 57% fewer days lost. Future workloss for workers not contacted for the intervention was very similar to that at the control sites: 22.4 and 25.1 working days respectively - the difference was not statistically significant.

Table 3.13
Future workloss (working days lost): experimental intervention v controls

	Mean future workloss (SD)	*P*
Experimental (n=30)	10.80 (14.93)	0.024
Control (n=37)	25.08 (33.35)	

At the experimental sites, the overall effect on future workloss from *offering* the intervention to those contacted (whilst absent or not, and irrespective of take-up - boxes A to F in Figure 3.3) was explored. The overall effectiveness of offering the intervention was compared between the experimental sites. E1 had a lower future workloss than did E2, but the difference was not statistically significant (Table 3.14).

Table 3.14
Future workloss (working days lost) for all subjects who had future absence and were *offered* the intervention (irrespective of take-up): Site E1 v Site E2

	Mean future workloss (SD)	*P*
Site E1 (n=19)	11.21 (16.85)	ns
Site E2 (n=35)	14.34 (20.05)	

Finally, considering all workers at the experimental sites who were eligible for the intervention (whether contacted or not), it was found that a lower proportion at E1 had workloss during follow-up than at E2 (Table 3.15).

Table 3.15
Proportion of workers eligible for the intervention who had workloss during follow-up: Site E1 v Site E2

Eligible subjects	Proportion with workloss during follow-up(n)	*P*
Site E1 (n=139)	14.4% (n=20)	0.045
Site E2 (n=273)	21.6% (n=59)	

3.5.3 Key points: individual level

- Early intervention (whilst absent) reduced the return-to-work time by 40%, compared with controls and those not contacted.
- For participants, the intervention led to a future workloss rate 57% lower than the controls.
- At the experimental sites, return-to-work time and future workloss for subjects who were contacted but not recruited were indistinguishable from the controls.
- Successful implementation of the experimental intervention had a positive influence on duration of absence for both the presenting spell and future spells.
- Analysing the data using an intention-to-treat principle (ie including subjects *offered* the intervention, whether received or not) showed a reduction in return-to-work time at site E1 compared with site E2, but the future workloss was not statistically significantly different between the two sites.
- There were proportionally fewer *episodes* of future workloss among workers eligible for the intervention (whether recruited or not) at the site that provided intervention per protocol (E1) compared with the site that did not (E2).

4. SUMMARY OF MAIN FINDINGS AND INTERPRETATION

The objectives of this two-phase study were: (1) to investigate the relationship of individual and workplace psychosocial obstacles, termed 'yellow flags' and 'blue flags' respectively, to absenteeism; (2) to test the effectiveness of a novel early intervention package, comprising a psychosocial approach and workplace facilitation, for reducing workloss due to musculoskeletal disorders.

Musculoskeletal symptoms are highly prevalent in the population, and often resolve uneventfully, although recurrence is common. Failure to recover and pain-related workloss may be partly a function of obstacles to recovery, which in turn may become obstacles to return to work (Main & Burton 2000; Marhold et al. 2002). Narrowly focused clinical or workplace rehabilitation interventions that don't address such obstacles are quite ineffective at returning people with MSDs to work (Waddell & Burton 2004; Williams et al. 2004). Emerging occupational health guidance suggests that optimal intervention requires a biopsychosocial approach, focusing on tackling psychosocial obstacles in the context of a general management framework that facilitates early return to work (or work retention). All key players - workers, employers, and health professionals – need to be involved in the process (Frank et al. 1998; Carter & Birrell 2000; Waddell & Burton 2004). Under this framework a successful intervention to reduce absence needs to be based on the identification of appropriate obstacles, complemented by the appropriate techniques to overcome them.

The principal hypotheses investigated in this study are that: (1) psychosocial factors will be associated with self-reported musculoskeletal symptoms and previous absence; (2) the relationship between psychosocial factors and symptoms/absence will be similar for low back pain and upper limb disorders; (3) the likelihood and duration of future absence due to musculoskeletal disorders will be predicted by psychosocial factors (yellow and blue flags); (4) a guidelines-based optimal intervention protocol targeted at obstacles to recovery/return-to-work will reduce absence due to musculoskeletal disorders.

4.1 WORKFORCE SURVEY

The workforce survey comprised both a cross-sectional analysis and a prospective investigation.

4.1.1 Cross-sectional data

The self-report data from the Nordic Musculoskeletal Questionnaire revealed that the prevalence of symptoms of ULDs was very similar to that for LBP, but self-reported disability due to those symptoms was lower for ULDs. Whilst the rates were somewhat higher in the present population, they match the pattern found in a previous HSE study involving supermarket cashiers, which used the same categorisation of NMQ responses (Mackay et al. 1998).

There were clear associations between self-reported musculoskeletal symptoms and disability and a wide range of psychosocial measures for both low back pain and upper limb disorders. The majority of psychosocial scores among respondents who reported previous symptoms or absence were significantly different from those who did not report symptoms or absence, and were in the hypothesised 'detrimental' direction for each measure. Although the large number of statistical comparisons is likely to reveal a number of chance findings, the consistent pattern of the results supports the contention

that there is an association between detrimental psychometrics and the experience of MSDs.

A sub-set of these psychosocial measures was chosen to explore the relationships in more detail at the individual level. Five variables were selected to represent the workplace-related psychosocial dimensions previously described as blue flags - job satisfaction, social support, attribution, control and organisation (Main & Burton 2000). The psychosocial yellow flags were represented by the score on a single, well established, clinical dimension - psychological distress. Using cut-off points statistically determined for the purposes of the present study, respondents with flags 'flying' (ie scores beyond the cut-off point) were significantly more likely to report previous absence and disability. The relationship held for all the blue flags, and the strength of the association was similar to that of the yellow flag; no single flag dominated. Furthermore, it was found that the effect was cumulative; individuals with multiple flags flying (blue and yellow) were more likely to report previous symptoms/disability, suggesting that both classes of psychosocial factor have similarly detrimental associations with MSDs.

These cross-sectional data add further support to the general concept that work-related perceptions, as well as individual psychological factors, are important in the manifestation of MSDs among workers, and may act as obstacles to recovery and return to work (Burton & Main 2000a; Waddell & Burton 2004). However, a longitudinal study is required to determine whether these factors contribute to the likelihood or duration of future absence.

4.1.2 Prospective data

The absence records for respondents to the workforce survey were tracked for the following two years, enabling investigation of the relationship between baseline psychosocial scores and subsequent absence due to MSDs.

Individuals with scores beyond the cut-offs on the blue and yellow flags were more likely to take absence during follow-up. However, the number of flags flying was not statistically significantly related to the duration of that absence, lending support to the notion that absence duration and long-term incapacity are under the control of a wide range of social and demographic variables as well as perceptions (Waddell & Burton 2004). Indeed, of the variables studied here, only older age was predictive of the duration of future absence; perhaps surprisingly, a history of previous absence due to MSDs had no predictive effect.

Screening for the risk of long-term incapacity may be feasible in principle, but it is a complex matter (Burton et al. 2003). The present findings suggest that use of a general screening tool based solely on psychosocial factors (yellow and blue flags) is unlikely to be helpful for predicting return-to-work time, though it may serve to predict those more likely to take absence.

Overall, the data from the workforce survey indicate that (1) psychosocial perceptions of work and the workplace (blue flags) have a similar strength of association with symptom reporting and absence as do individual psychological factors (yellow flags); (2) since psychosocial perceptions are not strongly associated with absence duration, simply addressing the yellow and blue flags alone is unlikely to be sufficient to improve return-to-work times.

4.2 INTERVENTION STUDY

The intervention protocol was designed to be implemented in the occupational health environment, specifically by the company's OHNs already in-post. In view of the easy

occupational health access afforded to workers at GSK, it was possible to design the protocol with a primary focus on reducing obstacles at a very early stage of absence. Whilst this was sooner than might usually be recommended for rehabilitation interventions, it fits with the concept of incorporating sound principles from the outset (Waddell & Burton 2004), and with the notion of a stepped care approach that seeks to optimise allocation of limited resources by providing patients with only the care necessary (Balderson & Von Korff 2002). Simple measures, if effective at an early stage, are likely to lead to cost savings from avoidance of unnecessary investigation, treatment and workloss.

4.2.1 Black flags

The unexpected difference in contact times for absent workers between the two experimental sites demonstrated a powerful influence of organisational procedures on early intervention strategies. Sickness absence procedures at one of the experimental sites (E2) were such that delivery of the early intervention package was essentially precluded because absent workers were not contacted at an early stage during absence. Furthermore, workers who were contacted after some weeks of absence were more likely to decline the intervention. By contrast, the OHNs at the other experimental site (E1) used a proactive approach (facilitated by helpful organisational procedures), which led to early contact with absent workers thus enabling implementation of the early intervention package.

Organisational procedures (including behaviours of occupational health staff) that compromise early contact of absent workers have been termed black flags (Main & Burton 2000). The unexpected difference in procedures at sites E1 and E2 afforded the opportunity to test the impact of black flags on the effectiveness of the experimental intervention on absence rates.

4.2.2 Absence at site level

The absence rates were compared at the site level, irrespective of whether the individuals concerned had received the intervention, in order to estimate the overall effect of optimal early intervention for workers with MSDs. Absence rates were available from company records for the 2-year period prior to the intervention and the 2-year period during which the intervention took place (for experimental and control sites), along with the 1-year period following the intervention at the experimental sites.

The *occurrence* rate for absence (standardised as spells per 10,000 working hours) did not substantially change at the control sites over the 4-year observation period. The site not operating the optimal intervention protocol per protocol (E2) showed a steady increase in occurrence rates over that period, whilst the site offering the optimal intervention (E1) showed a decrease.

The *duration* rate for absence (standardised as days per 1,000 working days) declined slightly both at the control sites and experimental site E2 (not working to protocol) during the 2-year period of the intervention compared with the two previous years. In contrast experimental site E1 (offering the optimal intervention package) showed a more substantial decline in absence duration during the intervention period, but that should not be over-interpreted in view of the background fluctuations in annual absence rates.

Differences in absence rates between sites E1 and E2 were found also during the year after the intervention ceased. Site E2 showed no substantial change from the preceding pattern, while at site E1 the previous improvements in absence rates were not sustained. There was no policy decision (or encouragement) to maintain the experimental protocol during the non-intervention follow-up year, so the overall

deterioration seen at site E1 may indicate that improvements in absence management are difficult to sustain if specific procedures and policies are not maintained.

There is an inherent difficulty in interpretation of such serial data, particularly with variation across data points and between sites since it is unknown how the observed pattern fits with previous or subsequent patterns. Nevertheless, the data consistently favoured a positive effect at the site where the optimal intervention package was implemented.

4.2.3 Absence at individual level

At the individual level, analysis of MSD absence data enabled examination of the effectiveness of the optimal intervention package under a variety of scenarios, depending on whether and when absent workers were contacted, and whether and when they received the intervention. These factors, in addition to comparisons between the two experimental sites, comparisons between experimental and control sites, and the use of two outcome measures (return-to-work time for the index spell and future workloss during 12-month follow-up) yielded a complex but revealing picture.

The intervention package reduced the return-to-work time for the index spell by 40% compared with the control sites, when it was implemented early per protocol (site E1). Furthermore, participants receiving the intervention had a 57% lower future workloss during 12-month follow-up compared with the controls.

Small numbers precluded direct comparison between the two experimental sites in respect of future absence durations, but the intervention at site E1 (working to protocol) was associated with proportionally fewer *episodes* of future workloss compared with site E2 (not working to protocol). Accepting the differential contact/recruitment rates at the two experimental sites, an analysis on an intention to treat principle was appropriate (ie including all those *offered* the intervention, irrespective of whether they received it). There remained a reduction in return-to-work time at site E1, but the duration of future workloss, whilst lower, was not statistically different from site E2.

At the experimental sites, the simple presence of a new procedure for absence management did not explain the reduced absence rates. For both return-to-work time and future workloss, the rates for workers who were not contacted and workers who were contacted but not recruited were indistinguishable from the controls.

The optimal intervention package involved the OHNs individually identifying and targeting participant's psychosocial concerns, and all participants received written material that targeted the range of beliefs and perceptions encompassed by the yellow and blue flags. It was anticipated therefore that participants' psychometrics would have improved at follow-up, but significant positive shifts were found for only a limited number of the psychosocial factors studied, with no difference between the two sites. It may be that the intervention simply did not influence some of the chosen variables, or that any shifts that did occur had decayed by 12-months. A lack of psychosocial data from the control sites precluded any further attempt to relate the absence outcomes to changes in psychosocial profiles.

No difference in the effectiveness of the intervention for low back pain and upper limb disorders was apparent, though low numbers or workers taking absence for ULDs precluded meaningful statistical analysis.

Overall, the results strongly supported the effectiveness of the optimal early intervention package incorporating the key elements of current occupational health guidelines (Staal et al. 2003), that focus on getting all the players onside. It would seem that substantial reductions in both return-to-work time and future workloss, for workers

experiencing MSDs, are achievable. However, effective procedures for implementation of the package are essential if those benefits are to be realised.

4.3 METHODOLOGICAL ISSUES

This study was large, complex and ambitious. Conducting a large prospective survey along with a controlled trial of a novel intervention, across multiple sites of an industry, presented difficulties as well as opportunities, and a number of limitations need to be acknowledged.

4.3.1 Limitations

There was a lower compliance with the workforce survey among workers having a history of previous absence, which was possibly a consequence of concerns about job security at a time when the company was undergoing a merger. This may have attenuated the strength of the association between psychosocial factors and previous absence.

Only one yellow flag (psychological distress) was included in the psychosocial measures, but it was the one most extensively studied with a known relationship with clinical and occupational outcomes. Furthermore, it is conceivable that the effect of the blue flags would be confounded with distress. Whilst this cannot be ruled out, the fact that blue flags were additive predictors (irrespective of distress) suggests they were acting somewhat independently.

There was an unexpected difference in the procedure for early identification of absent workers due to the presence of black flags at one site, which was not foreseeable. Although this reduced the numbers on which the efficacy of the novel intervention could be tested, it enabled an additional comparison.

The actual delivery of the experimental intervention was not audited, thus the competences of the OHNs are not known with certainty. Validation of the intervention content using videotape could not be implemented because of anxieties and concerns amongst the OHNs. Despite using the alternative of self-completed checklists, it is not possible confidently to state which, if any, of the components were the more effective.

Although a common training package was delivered to the OHNs, it was not possible to select staff for the project, or require a specific level of competence in adherence to the protocol and delivery of the intervention. The results can be viewed, however, as a pragmatic estimate of what might happen when implementing the protocol in the general occupational health environment.

Participants in the intervention were not randomised between receiving the novel intervention or management as usual. Whilst randomised trials substantially reduce biases, they are rarely feasible in industry and blinding would have been impossible for the experimental intervention. The alternative used in the present trial was to have a distant control group matched as closely as possible to the intervention group.

The number of subjects who received the experimental intervention delivered per protocol was relatively small. This was an inevitable consequence of the differential behaviour of the two experimental sites, the relatively low prevalence of MSD absence, and subject attrition. However, for the majority of the principal analyses there were sufficient participants to enable a satisfactory statistical evaluation.

The system of clinical and psychosocial assessment in the trial might be seen as somewhat rudimentary in comparison with pain management protocols. However, it was intended to develop a protocol that could be generalised to a range occupational

health staff working under existing company systems, therefore a previous clinical protocol (Main & Watson 2002) was adapted for the occupational health environment.

4.3.2 Strengths

The project was administered and managed with a strong hands-on approach by a full-time project manager (SB). A process of close communication (by email and telephone) between the OHNs, Human Resources and the trial team was implemented from the outset in order to address threats to the successful conduct of the trial as they presented. Team meetings (involving representation from the company as well as researchers) were arranged at which problems could be discussed, and solutions sought.

Considerable effort was expended on defining numerous procedures and strategies prior to commencement, in conjunction with the company staff involved. These centred on encouragement of participation and assurances of confidentiality, both for the workforce survey and the controlled trial. The whole study was given a high profile by GSK management: as well as official endorsement, there was a logo competition and articles in the in-house magazine.

Customised systems were developed to handle the large quantity of data collected in the workforce survey and the trial. These variously involved the use of scanning technology for survey forms and email systems to regularly transfer trial data from the OHNs to the research office. The absence data were extracted from company records. All data, including the company's absence data, were fastidiously checked at frequent intervals to limit missing-data problems.

An especially wide range of psychosocial factors was used in both the workforce survey and the controlled trial; the best available instruments were derived from the literature, and new ones developed to fill the gaps.

A particular strength of the intervention study was the development and use of a special manual serving as a system for recording, and as an aide-memoire for the OHNs. This contributed to standardisation of data collection and intervention delivery, as well as helping to maintain motivation.

5 CONCLUSIONS

- Musculoskeletal symptoms were, as expected, common in this population. The prevalence of LBP and ULDs was very similar, but both self-reported disability and actual absence were lower for ULDs. Overall, the annual absence rate for MSDs for this workforce was about 5%, with a mean duration of about 9 days and a median of 5 days.
- There was a clear cross-sectional relationship between a wide range of psychosocial factors and symptoms/disability due to MSDs, with no substantial or systematic differences between LBP and ULDs.
- Both workplace-related psychosocial factors (blue flags) and distress (yellow flag) are independently predictive of future absences but not their duration; psychosocial mechanisms in isolation do not fully explain absence behaviour. Although it is necessary to consider specific work perceptions as well as more traditional measures of distress, a more thorough understanding of a wide range of factors not investigated here is required.
- An individualised intervention has been designed to target obstacles to recovery/return-to-work, and can be implemented in an occupational health environment. The intervention package demedicalised MSDs (avoidance of unnecessary health care), identified and addressed psychosocial factors, and provided a supportive framework involving all the key players (worker, employer and health professionals).
- If this intervention is delivered per protocol, at an early stage of absence due to MSDs, it can reduce both return-to-work time and future workloss.
- Within the confines of this study, it was not possible fully to explain the relative importance of individualised intervention on psychosocial obstacles and other management strategies (eg modified work, liaison with health professionals). These issues would appear to merit further investigation.
- The present study was not able to provide a robust explanation of the interactions between psychosocial factors and absence. However, a study of psychosocial mechanisms in isolation may not necessarily be helpful, because the influence of other factors (eg other health problems, financial issues) may mediate the relationship between psychosocial factors and sickness absence.

6 SYNTHESIS

- Very early workplace interventions addressing obstacles to recovery/return-to-work, which requires all key players to be onside, can be effective in reducing absence due to MSDs. Such interventions require substantial commitment, particularly from employers, to eliminate procedural obstacles to implementation.
- In principle, if the results from the site that implemented the intervention per protocol were generalisable, a reduction in workloss of the order of 50% appears achievable. Sustaining that effect would require all the intervention systems to be maintained.

- This study has confirmed the importance of adopting a biopsychosocial approach. It has demonstrated that substantial benefits are achievable from a move to a broader perspective of absence management through removing obstacles to recovery/return-to-work, rather than sole reliance on traditional medical intervention and ergonomic strategies of prevention. Implementing early occupational intervention, along the lines reported here, could contribute to achieving the target reduction in working days lost due to work related musculoskeletal disorders stated in the Strategic Plan for 2001/04 by the Health & Safety Commission and the Health & Safety Executive.

CONTRIBUTORS

Dr Paul Watson (University of Leicester) contributed to the conceptual development of the project, to the development of questionnaires used in the workforce survey, and to the design of the psychosocial intervention used in the controlled trial. Professor Colin Mackay, on behalf of HSE, oversaw the project and provided valuable input during the development phase.

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APPENDICES

APPENDIX 1: DATA TABLES

A1: Mean psychosocial scores: workforce survey – cross-sectional analysis

Table A1.1
Mean psychosocial scores (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 A1.2
Mean psychosocial scores (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 A1.3
Mean psychosocial scores (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 A1.4
Mean psychosocial scores (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)

TableA1.5
Mean psychosocial scores (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 A1.6
Mean psychosocial scores (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 A1.7
Mean psychosocial scores (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 A1.8
Mean psychosocial scores (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 A1.9
Mean psychosocial scores (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)

A2 Mean psychosocial scores: workforce survey – prospective analysis

Table A2.1
Mean psychosocial scores (SD) for respondents who did and did not take absence due to LBP in the subsequent 2 years

Psychosocial measure	2-year LBP absence yes	2-year LBP absence no
Psychological Distress	12.57 (6.15)	11.30 (4.88)
Job Satisfaction	22.48 (6.94)	25.49 (6.04)
Social Support	14.14 (3.37)	15.18 (2.90)
Mental Stress	12.96 (3.55)	13.84 (3.13)
Inevitability beliefs about LBP	25.55 (6.34)	27.82 (5.80)
Attribution (work)	36.67 (6.72)	34.85 (6.23)
Attribution (individual)	30.01 (5.02)	29.26 (4.68)
Control	15.29 (4.30)	17.06 (4.10)
Personal influence	10.93 (2.65)	11.99 (2.49)
Organisational climate	13.89 (4.52)	12.70 (3.82)
Relationships at work	27.46 (8.59)	24.02 (7.89)
Home/work balance	13.15 (6.14)	12.91 (5.48)
Perceived Exertion	11.87 (2.54)	9.99 (2.65)

Table A2.2
Mean psychosocial scores (SD) for respondents who did and did not take absence due to ULDs in the subsequent 2 years

Psychosocial measure	2-year ULD absence yes	2-year ULD absence no
Psychological Distress	12.61 (5.86)	11.36 (4.97)
Job Satisfaction	23.61 (7.82)	25.34 (6.11)
Social Support	14.14 (3.84)	15.18 (2.93)
Mental Stress	12.43 (4.26)	13.84 (3.15)
Inevitability beliefs about ULDs	31.19 (6.79)	32.64 (5.79)
Control	15.79 (4.16)	16.97 (4.13)
Personal influence	10.87 (3.13)	11.95 (2.51)
Organisational climate	13.30 (4.97)	12.76 (3.86)
Relationships at work	26.33 (9.34)	24.41 (7.95)
Home/work balance	13.79 (6.95)	12.91 (5.50)
Perceived Exertion	11.54 (2.67)	13.02 (2.78)

APPENDIX 2: EXTRACTS FROM MANUAL FOR NURSES

A nurse-led protocol for the management of MSDs in industry

The protocol required the nurse to undertake a number of specific steps, for which scripts were written to foster a full and consistent approach. Extracts from these scripts are presented below.

Script 1: Telephone contact

- *The purpose of the telephone call (initial or follow-up) is to reassure the worker that the company 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 assessment 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 the occupational health unit whilst they are absent, however, for the success of this study, the ideal situation would be for the workers to attend whilst absent.*

Script 2: Nurse initial assessment

Detailed explanation for:

- *carrying out the clinical assessment (identification of clinical 'red flags')*
- *explaining the study*
- *gaining consent*
- *the baseline psychosocial questionnaire booklet and administration instructions*

Script 3: Psychosocial intervention

Approach the psychosocial assessment as an informal chat.

- *You will firstly be asking the stem questions for each section in the booklet, and identifying possible problems that the individual may have (these can be picked up from the 'rationale' section).*
- *Before giving any advice/intervention, let the worker finish answering the question and then state that you would like to ask some further questions to help you to gain as much information as possible.*
- *The answers to these questions should also give you further information on problems concerning the worker that were not revealed by the answers to the stem question.*
- *Some individuals will give you all the information you may need just from answering the stem question, but more than likely you will need to investigate further to check that there are no other problems that need addressing.*
- *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.*
- Of course, there may not be any problems identified. If this is so, this must be recorded in the box provided.
- If the answers to any of the questions give you cause for concern (i.e. psychological disturbance), then this individual must be exited from the program.

At the required times use the following scripts: *[not reproduced here]*
Modified work script; GP script*;* Team Leader script*;* Return to work script

[Note: the version of the psychosocial assessment used in the study included checklists for the nurse to complete for each assessment section]

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 become 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

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
    - 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)

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
- **o** 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))*

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. .

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

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)

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.

APPENDIX 3: UPPER LIMB DISORDER PAMPHLET

REMEMBER…….

- 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 <u>avoids</u> activity, and one who <u>copes</u>.

- 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 <u>and</u> 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

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