A prospective study of psychosocial risk factors and absence due to musculoskeletal disorders—implications for occupational screening

Serena Bartys¹, Kim Burton² and Chris Main³

Objectives There is considerable evidence documenting the association between psychosocial risk factors and work disability due to musculoskeletal disorders, and this has prompted suggestions that psychosocial screening should be administered in the workplace in order to identify individuals at risk of prolonged absence. However, the predictive value of psychosocial risk factors on return-to-work is largely unknown. The present study aimed to explore the predictive relationship between psychosocial risk factors and absence due to musculoskeletal disorders of the lower back and upper limbs.

Methods A prospective study of 4637 workers from a large, multi-site company in the UK was conducted in which a wide range of established questionnaires were used to collect baseline psychosocial data. Respondents were then followed over the ensuing 15 months, and absence due to musculoskeletal disorders was recorded.

Results 219 workers took absence due to musculoskeletal disorders. Detrimental cut-off scores (risks) on the psychosocial instruments were established, and it was found that work-related psychosocial risk factors predicted the likelihood of a future spell of absence (odds ratios ranging between 1.6 and 3.2), but not the duration of that absence.

Conclusions Although work-related psychosocial factors were associated with the occurrence of absence due to musculoskeletal disorders, these findings do not lend support to the use of routine occupational psychosocial screening in order to predict prolonged absence.

Key words Low back pain; musculoskeletal; psychosocial; screening; sickness absence; upper limb disorder.

Musculoskeletal disorders (MSDs) represent a significant problem with respect to ill-health and associated sickness absence costs in the workplace. Findings from a survey reported in a previous issue of this journal stated that over a 4-year period, MSDs made up nearly half of all new cases of work-related diseases [1]. An update on this study documented that MSDs were probably the most common occupationally related causes of ill-health in the UK [2].

The natural history of MSDs is highly variable, ranging from brief (acute) episodes that resolve without treatment to chronic or recurrent patterns that lead to prolonged disability despite numerous interventions [3]. Although there are high prevalence rates for acute episodes of MSDs, there are low rates of long-term disability resulting from MSDs, but it is this small number that accounts for disproportionate costs to the industry and society in terms of lost production and social security benefits [4].

Sickness absence due to MSDs has led to substantial research concentrating on physical risk factors. Although very common across all workplaces, several studies have suggested that self-reported MSDs are particularly prevalent in certain types of industries and within certain types of occupations. For example, particularly high prevalence rates of MSDs are found in agricultural workers, construction workers, carpenters, drivers, nurses and nursing assistants, cleaners, orderlies and domestic assistants [5]. However, the UK Occupational Health Guidelines for the Management of Low Back Pain at Work [6] concluded that the effect size of the risk factors inherent in these jobs compared with other working populations not exposed to these risk factors may be modest.
In a shift of focus from physical hazards, there has been growing evidence that documents the association of psychosocial risk factors with MSD-associated disability and work-loss, concentrating on the cognitive and behavioural aspects of MSDs [7]. The detrimental effects of certain psychological risk factors (such as distress, somatization, negative attitudes, mistaken beliefs and poor coping strategies) on the course and recovery of MSDs have been well documented [8–10]. Other literature reviews have concluded that occupational psychosocial risk factors (such as job dissatisfaction, stress, low social support and low perceived control at work) also play a significant role in the recovery from MSDs [11,12].

It has been suggested that psychosocial screening in order to identify individuals at risk of developing long-term problems as a result of MSDs is needed [13]. The potential cost-effectiveness of psychosocial screening (it can be administered relatively cheaply and may save costs incurred by lost production and sickness benefits) makes it an attractive option both to the employers and the authorities. Thus, the development of psychosocial screening tools has become a focus of recent research. To date, clinical guidance for psychosocial screening comes from the Accident Rehabilitation and Compensation Insurance Corporation of New Zealand [14]. While this guidance embodied the latest research and theory at the time, it was lacking in evidence based on vocational outcomes. Several screening instruments have been developed following the rationale of this so-called ‘yellow flags’ document [13,15], but their utility for predicting disability in individuals other than clinical pain patients is limited.

There are few prospective studies to date, which document the association between psychosocial factors and duration of absence due to MSDs [11,16], and the lack of empirical evidence has impeded the development of a robust workplace screening tool. The present study aimed to redress this imbalance and employed a prospective design to examine the relationship between psychosocial factors and the duration of future absence from work due to MSDs.

**Methods**

A workforce survey was conducted at a large pharmaceutical company in the UK, whereby a range of psychosocial data were collected. The company comprised 14 nation-wide sites employing a total of 7838 permanent workers. A questionnaire booklet was delivered to each worker via on-site occupational health nurses, and the completed questionnaires were returned to a central company site whereby data were extracted. The study was funded by the Health & Safety Executive in the UK and therefore ethical approval for the survey was sought and obtained from the Health & Safety Executive Research Ethics Committee. A covering letter accompanied the questionnaire booklets stating that all the information provided was confidential and would not be seen by the employer.

For the survey, several previously validated questionnaires were selected, which are described in detail elsewhere [17]. From this range of psychosocial concepts, data on several specific factors were chosen for analysis in the current study on the basis that they have been the most commonly studied in association with MSDs. The psychosocial concepts explored in the present study were:

- psychological distress (measured by the General Health Questionnaire) [18],
- job satisfaction, and social support (measured by the Psychosocial Aspects of Work Questionnaire) [19],
- perceived control at work (measured by the Pressure Management Indicator) [20],
- organizational climate (measured by the Pressure Management Indicator) [20],
- workplace causal attribution (measured by the Attribution Questionnaire) [21].

In addition to the psychosocial questionnaires, the Nordic Musculoskeletal Questionnaire (NMQ) [22] was used in order to gain information on self-reported MSDs (low back pain and upper limb disorders) experienced during the previous 12 months.

Following completion of the survey, the respondents’ absence due to MSDs was tracked prospectively over an ensuing 15-month period using company records. From these data, two outcomes were measured: [1] whether or not absence (due to MSDs) was taken and [2] the duration of that absence. The data for these outcomes were restricted to the first (index) subsequent spell of absence during the specified period—a definition that has been used in similar studies [23].

Inferential statistical tests were performed (independent samples t-test) in order to explore the difference in psychosocial scores for workers who did and did not take subsequent absence due to MSDs. In order to define psychosocial risk in a manner conducive with a practical screening process, cut-off points were devised for each of the above-mentioned psychosocial questionnaires. This was done by considering each value as a potential cut-off point, and determining statistically significant relationships with self-reports of MSDs in the previous 12 months. Self-report data were used for two reasons; (a) so that the cut-off points would be defined in a context relevant to MSDs, and (b) so the cut-off points would be relevant to the workforce under study [17].

These cut-off points defined an empirical detrimental level (risk) for each psychosocial factor. In order to establish whether these risk factors were associated with...
the occurrence of future absence, categorical analyses (2 × 2 tables) were performed for each dichotomous exposure variable (‘risk/no risk’) and outcome variable (‘absence yes/no’), and odds-ratios were calculated using the risk estimate statistics. The Mann–Whitney U test was then performed in order to examine the difference in median durations of absence for respondents displaying zero psychosocial risk factors, compared with workers displaying up to six psychosocial risk factors.

Results

The total response rate of the survey was 59.2% (n = 4637). Despite two manufacturing sites (predominantly manual workers) being under-represented, the average site response rate was in excess of 50% and the survey sample was not significantly different from the company as a whole, in terms of summary demographics (Table 1). Psychosocial scores were similar to those reported in comparable studies [19,20,24], and the 12-month prevalence rate for self-reported MSDs (from the NMQ) closely matched those reported in previous cross-sectional studies of MSDs at work (65.6%) [25–28]. However, there was a non-response bias associated with previous absence, whereby only 2.9% of respondents had taken previous absence, compared with 4.5% of non-respondents.

In the 15-month period following the survey, 219 respondents took absence due to MSDs, amounting to a 4.7% period prevalence rate, which closely matched previous MSD absence rates at the company (~ 5%). Categorical analyses were performed in order to establish whether the statistically determined cut-off points on the psychosocial factors represented a ‘risk’ for the occurrence of future absence. Scores beyond the cut-offs for each psychosocial risk factor were predictive of the occurrence of a future spell of absence due to MSDs (P < 0.05, see Table 2).

In order to explore the relationship between psychosocial risk factors and duration of absence, or return-to-work time, the mean durations of subsequent absence were compared between respondents who displayed zero psychosocial risk factors (n = 154) and those who had displayed up to all six psychosocial risk factors at baseline (n = 65). Absence duration was shorter for those workers who did not display any psychosocial risk factors (9.44 working days) compared to those workers who displayed up to six psychosocial factors at baseline (12.56 working days), but this difference was not statistically significant.

There was found to be a wide range of absence durations (between 1 and 119 working days); the majority of respondents had taken absence lasting less than 1 week (56.2%), and the proportion of respondents taking absence in excess of 4 weeks was relatively small (9.2%). The skewed distribution of the absence data encouraged dichotomization into self-certified spells of absence (n = 123) and medically certified spells (n = 96, less than or greater than 1 week, respectively). Using the established cut-off points, analyses were performed comparing risk status (risk/no risk) and absence durations. No statistically significant differences were revealed (Table 3).

Discussion

It has been proposed that psychosocial risk factors may act as obstacles in recovery from MSDs, and that zero psychosocial risk factors (n = 154) and those who had displayed up to all six psychosocial risk factors at baseline (n = 65). Absence duration was shorter for those workers who did not display any psychosocial risk factors (9.44 working days) compared to those workers who displayed up to six psychosocial factors at baseline (12.56 working days), but this difference was not statistically significant.

Table 1. Representativeness of respondents in terms of gender and job-type, compared with total workforce

<table>
<thead>
<tr>
<th></th>
<th>Respondents</th>
<th>Workforce</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>n</td>
<td>%</td>
</tr>
<tr>
<td>Male</td>
<td>2614</td>
<td>57</td>
</tr>
<tr>
<td>Female</td>
<td>1969</td>
<td>43</td>
</tr>
<tr>
<td>Manuala</td>
<td>995</td>
<td>21.5</td>
</tr>
<tr>
<td>Non-manuala</td>
<td>3642</td>
<td>71.5</td>
</tr>
</tbody>
</table>

Table 2. Odds ratios (and 95% confidence intervals) that psychosocial risk factors were predictive of occurrence of future absence due to MSDs

<table>
<thead>
<tr>
<th>Psychosocial risk factor</th>
<th>Number of absentees displaying risk factor</th>
<th>Odds ratio (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Psychological distress</td>
<td>77</td>
<td>1.6 (1.1–2.0)</td>
</tr>
<tr>
<td>Job satisfaction</td>
<td>53</td>
<td>3.2 (2.0–4.2)</td>
</tr>
<tr>
<td>Social support</td>
<td>48</td>
<td>2.3 (1.6–3.3)</td>
</tr>
<tr>
<td>Attribution</td>
<td>66</td>
<td>2.1 (1.4–2.8)</td>
</tr>
<tr>
<td>Control</td>
<td>35</td>
<td>1.8 (1.3–2.9)</td>
</tr>
<tr>
<td>Organizational climate</td>
<td>21</td>
<td>2.3 (1.3–3.9)</td>
</tr>
</tbody>
</table>

Table 3. Association between psychosocial risk factors and duration of future absence

<table>
<thead>
<tr>
<th>Psychosocial risk factor</th>
<th>Short absence duration</th>
<th>Long absence duration</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>% n</td>
<td>% n</td>
<td></td>
</tr>
<tr>
<td>Psychological distress</td>
<td>54.5 42</td>
<td>45.5 35</td>
<td>0.542</td>
</tr>
<tr>
<td>Job satisfaction</td>
<td>60.3 32</td>
<td>39.7 21</td>
<td>0.174</td>
</tr>
<tr>
<td>Social support</td>
<td>60.4 29</td>
<td>39.6 19</td>
<td>0.287</td>
</tr>
<tr>
<td>Attribution</td>
<td>48.4 32</td>
<td>51.6 34</td>
<td>0.129</td>
</tr>
<tr>
<td>Control</td>
<td>62.8 22</td>
<td>37.2 13</td>
<td>0.298</td>
</tr>
<tr>
<td>Organizational climate</td>
<td>47.6 10</td>
<td>52.4 11</td>
<td>0.308</td>
</tr>
</tbody>
</table>

aJob type defined by company.
successful management should be aimed at identifying and addressing these obstacles before they become disabling [29]. Therefore, screening to identify workers at risk of prolonged absence is, in principle, attractive for guiding the timing and nature of interventions [30]. The present study investigated the concept of screening (prior to symptom onset) using psychosocial factors that are a practical target for workplace and/or clinical interventions.

Stated simply, psychosocial risk factors were found to predict the occurrence of future absence due to MSDs, but not its duration. Other prospective studies have also reported an association between psychosocial risk factors and the occurrence of absence [31], but there is a dearth of prospective studies examining the influence of psychosocial risk factors on absence duration, or return-to-work time. The present study served to redress that imbalance, but was not able to provide an explanation for the mediating mechanisms involved between psychosocial factors and absence due to MSDs. It is acknowledged that the distinct influence of the psychosocial risk factors remains unclear, but the present study did not find any robust relationship between psychosocial factors and duration of absence, suggesting that occupational screening alone may not be effective in predicting delayed return-to-work.

Importantly, the psychosocial data in the present study were collected as long as 15 months prior to absence, and therefore may have had limited relevance. That is to say, the influence of psychosocial factors on return-to-work may be more pertinent in the early stages of absence, rather than prior to taking time off work, in much the same way that psychosocial factors are predictive of unfavourable outcomes in clinical studies [8].

A more general limitation of workplace screening is the influence of the healthy worker effect [32], whereby those workers who had become incapacitated (possibly with high levels of psychosocial risk) would no longer be in the workforce. There were indications that this effect may have occurred in the present study population; the prevalence rate of MSDs (approximately 5%) was not substantial, and the majority of absence was short term. Future research into the influence of psychosocial factors on return-to-work may be more illuminating in populations that report higher rates of MSDs, or in studies where the majority of workers report unfavourable conditions, and in studies employing shorter follow-up times.

A particular limitation of the present study was the non-response bias associated with previous absence due to MSDs. It is recognized that previous absence can be predictive of future absence [33], and the psychosocial profile of non-respondents with a previous history of absence in the present study may have been different. There was also a slight under-representation of responses from manual workers, resulting largely from the overall low response rate from two manufacturing sites. Whilst every attempt was made to maximize the initial response rate (e.g. offering a prize draw; ensuring anonymity from employer), ethical constraints meant it was not possible within the remit of the present study to pursue these non-respondents in order to further encourage participation.

In accordance with the nature of MSD-associated absence, a skewed distribution of absence durations was found. This has been found in previous studies of sickness absence [34,35], and recommendations from these studies were incorporated into the present study (e.g. categorizing durations of absence). It is also acknowledged that only one definition of return-to-work was used in the present study—that of first return-to-work, and it has been stated that this is not always appropriate, particularly if the individual then continues to take many recurrent absences [36]. Future research may need to incorporate several return-to-work outcomes.

A review of the literature reporting determinants of non-return to work following absence due to MSDs found support for the role of psychosocial variables but considered further investigation necessary to specify the nature of inter-relationships among them [37]. It has also been suggested that other factors (e.g. financial aspects, other health problems) may override the influence of psychosocial factors [15,30,38]. Nevertheless, the present confirmation that psychosocial risk is associated with the likelihood of future absence supports the notion of providing workers with appropriate information and advice [19], but such interventions do not require screening. Accepting that the relationship between psychosocial risk factors and MSDs may be more pertinent once the individual has developed persistent symptoms, the complex methodological and theoretical considerations involved mean that routine psychosocial screening employed in the workplace in order to predict who is likely to become disabled appears to have limited value.

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References

2. Cherry NM, Meyer JD, Chen Y, et al. The reported incidence of work-related musculoskeletal disease in