Reducing work related psychological ill health and sickness absence: a systematic literature review

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A literature review revealed the following: key work factors associated with psychological ill health and sickness absence in staff were long hours worked, work overload and pressure, and the effects of these on personal lives; lack of control over work; lack of participation in decision making; poor social support; and unclear management and work role. There was some evidence that sickness absence was associated with poor management style. Successful interventions that improved psychological health and levels of sickness absence used training and organisational approaches to increase participation in decision making and problem solving, increase support and feedback, and improve communication. It is concluded that many of the work related variables associated with high levels of psychological ill health are potentially amenable to change. This is shown in intervention studies that have successfully improved psychological health and reduced sickness absence.

Levels of ill health, both physical and psychological, and associated sickness absence are high among those working in health care in the UK. This problem is not unique to the UK. Poor psychological health and sickness absence are likely to lead to problems for patients in that both the quantity and quality of patient care may be diminished. Because most health care is provided by staff working in teams, ill health and sickness absence in any one individual is likely to cause increased work and stress for other staff.

Several explanations have been put forward for this high level of ill health, including the nature of the work, organisational changes, and the large amounts and pressure of work. A comparison across UK hospitals in the public sector found that rates of psychological ill health varied from 17% to 33%, with lower rates in hospitals characterised by smaller size, greater cooperation, better communication, more performance monitoring, a stronger emphasis on training, and allowing staff more control and flexibility in their work. This supports the notion that organisational factors may contribute to the level of psychological ill health experienced by staff.

To tackle the problem of work related psychological ill health, evidence is needed about the work factors associated with psychological ill health and sickness absence, and about interventions that have been implemented successfully to prevent or reduce psychological ill health and sickness absence. The primary focus of this review is the association between work factors and psychological ill health among health care staff. However, because of the paucity of evidence in health care, evidence was reviewed across all work settings, although presented separately for health care workers where appropriate.

METHODS
Our review method was based on that used by the NHS Centre for Reviews and Dissemination. This method involves a systematic examination of selected databases using a variety of strategies, including keywords and subject headings. It allows the integration of quantitative data across studies, where they have similar outcome measures, and the summary of findings where methods used are diverse.

Identification of papers
Four electronic databases were used: Medline (1987–99), PsychInfo (1987–99), Embase (1991–99), and the Cochrane Controlled Trials Register (1987–99). Relevant papers up to and including 1997 were selected from a larger study. The search strategy in the larger study was of MeSH key words and text words in each of three categories: work factors; staff; and ill health/absenteeism/economic consequences. The search included all types of employment and all developed countries but was limited to abstracts in English. Secondary references were chosen from the primary paper references and by contacting academics researching this area. Psychological ill health included measures of anxiety, depression, emotional exhaustion, and psychological distress (“stress” was excluded since it is a mediating hypothetical construct rather than an outcome measure of psychological ill health). For the purpose of this review, papers from 1998 and 1999 were identified using the same search strategy, but excluding physical ill health and economic consequences.

Selection criteria
Abstracts were selected for retrieval of the paper if they were judged to include data about both work factors and psychological ill health or absenteeism. Dissertations were excluded, as were studies of very specific staff groups or settings, work patterns (for example, shift working), or events (for example, violence). All abstracts were selected independently by two researchers (three researchers were involved in this activity). The percentage of abstracts for which two researchers agreed about inclusion and exclusion varied.
between 80% and 90%. Disagreements were resolved by discussion.

**Information extraction**

Information from papers was extracted and coded within the following categories: study aim, study design, type of study population (for example, occupational group), sampling strategy, sample size and response rate, demographic characteristics, type of intervention, type of study measure, main outcomes, and summary of results.

**Further selection criteria**

Coded papers excluded from the review were studies with: volunteer or inadequately described sample; response rate of less than 60%; no standardised measures of psychological outcome.

**RESULTS**

Of the studies identified as part of the larger study, 40 were selected for this study (34 associations and six interventions). A further nine studies meeting the above selection criteria were identified in the period 1998–99, all of associations. No studies were found in the Cochrane Controlled Trials Register. The results are summarised in tables 1–4.

Because these studies were diverse in terms of outcomes and measures used to assess these outcomes, a meta-analysis was not appropriate.

**Associations with work**

The results are presented in three groups: health care workers in the UK, health care workers in other developed countries, and non-health care workers. This enabled an assessment of whether associations between work factors and psychological ill health are similar across sector and country.

### Health care

In the UK, factors associated with psychological ill health in doctors, from junior to senior grades, are long hours worked, high workload and pressure of work, and lack of role clarity (table 1). Pressure of work has also been found to be associated with poor mental health in dentists. Among UK nurses, the most frequently reported source of psychological ill health was workload pressures. Distress in student nurses has been caused by low involvement in decision making and use of skills, and low social support at work. In a study of health care workers across job type, bullying was found to be prevalent, carried out mainly by managers and associated with both anxiety and depression.

Among UK nurses, the most frequently reported source of psychological ill health was workload pressures. Distress in student nurses has been caused by low involvement in decision making and use of skills, and low social support at work. In a study of health care workers across job type, bullying was found to be prevalent, carried out mainly by managers and associated with both anxiety and depression.

Of the two studies addressing sickness absence, one found a negative association with job demands, while the other found no association with control over work.

Similar factors are associated with psychological ill health in health care workers in the rest of Europe, the USA, and Australia (table 2). The one study of doctors found an association between work control and social support and psychological distress. Among nurses, lack of co-worker support, job influence, and organisational climate and role ambiguity were associated with psychological distress.

Among hospital workers, work overload and pressure, role ambiguity, lack of control over work, and lack of participation in decision making were all found to be associated with distress.

Sickness absence was associated with work pressures and lack of training, unsupportive management style, role ambiguity, tolerance of absenteeism, and low pay.

### Beyond health care

The picture among non-health care workers in Europe and the USA was similar to that of health care workers (table 3). The
Table 2 Summary of observational studies of associations between work factors and ill health: health care workers in developed countries beyond the UK

<table>
<thead>
<tr>
<th>Study</th>
<th>Country</th>
<th>Design</th>
<th>Participants</th>
<th>Response rate</th>
<th>Work factors</th>
<th>Outcomes</th>
<th>Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>Arsena ult et al, 1991</td>
<td>Canada</td>
<td>Cross sectional</td>
<td>760 hospital workers</td>
<td>Not reported</td>
<td>Professional latitude, clinical demands, workload problems, role difficulties</td>
<td>Mental strain including depression (Cobb and anxiety (STA))</td>
<td>Low professional latitude (F=12.7, p&lt;0.001) and high workload problems (F=4.5, p&lt;0.04) and role difficulties (F=31.6, p&lt;0.001) associated with mental strain</td>
</tr>
<tr>
<td>Brooke and Price, 1989</td>
<td>USA</td>
<td>Cross sectional</td>
<td>425 hospital workers</td>
<td>74%</td>
<td>Routinisation, centralisation, pay, reward policy, role ambiguity, conflict, overload, organisational tolerance of absenteeism</td>
<td>Absenteeism</td>
<td>High role ambiguity and tolerance of absenteeism, low pay and low centralisation predicted absenteeism (structural coefficients 0.21, p&lt;0.001; 0.27, p&lt;0.001; -0.11, p&lt;0.05; -0.19, p&lt;0.02, respectively)</td>
</tr>
<tr>
<td>Estryn-Behar et al, 1990</td>
<td>France</td>
<td>Cross sectional</td>
<td>1505 female hospital workers</td>
<td>90%</td>
<td>Mental load, insufficient training, time pressure</td>
<td>Psychological distress (GHQ-12)</td>
<td>Mental load and time pressure associated with psychological distress (ORs 2.9 and 2.2)</td>
</tr>
<tr>
<td>Gray-Toft and Anderson, 1985</td>
<td>USA</td>
<td>Experimental</td>
<td>159 nurses</td>
<td>Not reported</td>
<td>Open, supportive supervisory style</td>
<td>Absenteeism</td>
<td>Open supportive supervisory style associated with lower absenteeism (relevant statistics not presented)</td>
</tr>
<tr>
<td>Johnson et al, 1995</td>
<td>USA</td>
<td>Longitudinal</td>
<td>581 doctors</td>
<td>86%</td>
<td>Job demands, work control, social support</td>
<td>Psychological distress (GHQ-20)</td>
<td>Work control and social support negatively associated with psychological distress (B=0.44, p&lt;0.05 and B=-0.46, p=0.05) Work pressures associated with absence frequency (B=0.12) and promotion/training negatively associated (B=-0.12)</td>
</tr>
<tr>
<td>Landeweerd and Boumans, 1994</td>
<td>Netherlands</td>
<td>Cross sectional</td>
<td>561 nurses</td>
<td>96%</td>
<td>Work pressure, job complexity, feedback, autonomy, promotion/training</td>
<td>Absence frequency</td>
<td>Work control factors associated with distress (canonical correlations=0.53 and 0.41, p=0.001) Job influence negatively associated with emotional exhaustion (p&lt;0.001) Co-worker social support directly associated with distress and mediates association with supervisor social support (path coefficients &lt;0.001)</td>
</tr>
<tr>
<td>Marshall &amp; Barnett, 1992</td>
<td>USA</td>
<td>Cross sectional</td>
<td>362 female nurses and social workers</td>
<td>Not reported</td>
<td>Work related support, job overload</td>
<td>Psychological distress (SCL-90-R) and emotional wellbeing (Rand Corporation)</td>
<td>Co-worker support associated with emotional wellbeing (B=-0.20, p&lt;0.01)</td>
</tr>
<tr>
<td>Martin, 1984</td>
<td>USA</td>
<td>Cross sectional</td>
<td>95 and 140 hospital workers</td>
<td>63% and 70%</td>
<td>Work overload and ambiguity, participation in decision making</td>
<td>Psychological distress (GHQ-12)</td>
<td>Work factors associated with distress (canonical correlations=0.53 and 0.41, p=0.001) Job influence negatively associated with emotional exhaustion (p&lt;0.001) Co-worker social support directly associated with distress and mediates association with supervisor social support (path coefficients &lt;0.001)</td>
</tr>
<tr>
<td>Peterson et al, 1995</td>
<td>Sweden</td>
<td>Cross sectional</td>
<td>2568 nurses</td>
<td>76%</td>
<td>Job influence</td>
<td>Emotional exhaustion (MBI)</td>
<td>Job influence negatively associated with emotional exhaustion (p&lt;0.001) Co-worker social support directly associated with distress and mediates association with supervisor social support (path coefficients &lt;0.001)</td>
</tr>
<tr>
<td>Pisarski et al, 1998</td>
<td>Australia</td>
<td>Cross sectional</td>
<td>172 nurses, aged 21–40 years</td>
<td>Not reported</td>
<td>Social support</td>
<td>Psychological distress (GHQ-12)</td>
<td>Co-worker social support directly associated with distress and mediates association with supervisor social support (path coefficients &lt;0.001)</td>
</tr>
<tr>
<td>Revicki and May, 1989</td>
<td>USA</td>
<td>Cross sectional</td>
<td>232 nurses</td>
<td>77%</td>
<td>Organisational climate, supervisor behaviour, role ambiguity, social support</td>
<td>Depression (Rand Corporation)</td>
<td>The association of organisational climate and role ambiguity with depression is mediated by stress</td>
</tr>
</tbody>
</table>

key work factors associated with psychological ill health were: work overload and pressure, conflicting demands, lack of control over work and lack of participation in decision making, poor social support at work, unclear management and work role, interpersonal conflict; and conflict between work and family demands. Long hours were found to be associated with depression in women, but not in men. Sickness absence was negatively associated with high job demand, and positively associated with monotonous work, not learning new skills and low control over work, and non-participation at work.

**Evaluated interventions**

Six intervention studies met our methodological criteria (table 4). Three were randomised controlled trials, and three were conducted in the USA, one in the UK, and two in Scandinavia. Three were of health care workers. Five were training programmes offered as part of the working day and one was an organisational intervention.

Skills to mobilise support at work and to participate in problem solving and decision making were taught to care staff of people with mental ill health or mental disability in a randomised controlled trial. Groups of 20 had six sessions of 4–5 hours training over two months, and were trained to train those in their workplace. Compared to those in the control group, the intervention group reported more supportive feedback, more ability to cope, and better work team functioning and climate. Among those most at risk of leaving, those undergoing the training reported reduced depression. The second randomised controlled trial compared receiving support, advice, and feedback from a psychologist with having access to a mentor. Between groups, with a decrease of stress hormone levels in the intervention group. Among physically inactive employees of an insurance company, a randomised controlled trial found stress management training and aerobic exercise interventions had mixed results.
### Table 3: Summary of observational studies of associations between work factors and ill health: non-health care workers

<table>
<thead>
<tr>
<th>Study</th>
<th>Country</th>
<th>Design</th>
<th>Participants</th>
<th>Response rate</th>
<th>Work factors</th>
<th>Outcomes</th>
<th>Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bacharach et al, 1991&lt;sup&gt;12&lt;/sup&gt;</td>
<td>USA</td>
<td>Cross sectional</td>
<td>430 public sector engineers</td>
<td>79%</td>
<td>Role conflict, time pressure</td>
<td>Emotional exhaustion (MBI)</td>
<td>High role conflict (B=0.24) associated with emotional exhaustion</td>
</tr>
<tr>
<td>Carayon et al, 1995&lt;sup&gt;15&lt;/sup&gt;</td>
<td>USA</td>
<td>Prospective</td>
<td>148 public sector office workers</td>
<td>71%</td>
<td>Job demands, content and control, social support, task clarity and job future ambiguity</td>
<td>Worker strain, including anxiety and depression (McNair)</td>
<td>Predictors of worker strain at one and two years were task clarity and job future ambiguity</td>
</tr>
<tr>
<td>Driscoll et al, 1995&lt;sup&gt;31&lt;/sup&gt;</td>
<td>USA</td>
<td>Cross sectional</td>
<td>4900 public sector workers</td>
<td>70%</td>
<td>Job demands, control and social support</td>
<td>Anxiety and depression (NOSGH Generic Job Stress Questionnaire)</td>
<td>High demand and low support associated with anxiety (ORS 1.46 and 2.01) and depression (ORS 2.0 and 1.69)</td>
</tr>
<tr>
<td>Ferrie et al, 1998&lt;sup&gt;13&lt;/sup&gt;</td>
<td>UK</td>
<td>Prospective</td>
<td>10308 public sector workers</td>
<td>80%</td>
<td>Job insecurity</td>
<td>Psychological distress (GHQ-20)</td>
<td>Non-significant association</td>
</tr>
<tr>
<td>Frese, 1999&lt;sup&gt;33&lt;/sup&gt;</td>
<td>Germany</td>
<td>Longitudinal</td>
<td>90 male blue collar workers</td>
<td>35-66%</td>
<td>Work intensity, uncertainty, organisational problems, environmental problems, social pressure, social support</td>
<td>Depression, Anxiety, Depression (CES-D)</td>
<td>Social pressure and support associated with anxiety/depression (≥0.21/0.20 and ≤0.21/0.27)</td>
</tr>
<tr>
<td>Frone et al, 1995&lt;sup&gt;44&lt;/sup&gt;</td>
<td>USA</td>
<td>Cross sectional</td>
<td>795 employed adults</td>
<td>67%</td>
<td>Role conflict, time pressure</td>
<td>Depression (Capi)</td>
<td>High demand and low support associated with anxiety (ORS 1.46 and 2.01) and depression (ORS 2.0 and 1.69)</td>
</tr>
<tr>
<td>Fusilier et al, 1987&lt;sup&gt;35&lt;/sup&gt;</td>
<td>USA</td>
<td>Cross sectional</td>
<td>312 police officers and fire fighters</td>
<td>71%</td>
<td>Job demands, content and control, social support, time pressure</td>
<td>Depression (GHQ-20)</td>
<td>High demand and low support associated with anxiety (ORS 1.46 and 2.01) and depression (ORS 2.0 and 1.69)</td>
</tr>
<tr>
<td>Karasek, 1979: Study 1&lt;sup&gt;21&lt;/sup&gt;</td>
<td>Sweden</td>
<td>Longitudinal</td>
<td>1896 working males</td>
<td>92% and 85%</td>
<td>Decision latitude and job demands</td>
<td>Anxiety and depression (GHQ-20)</td>
<td>Depression (amended from American Health Survey), absenteism (B=0.01, p&lt;0.01)</td>
</tr>
<tr>
<td>Study 2</td>
<td>USA</td>
<td>Cross sectional</td>
<td>911 working males</td>
<td>76%</td>
<td>As above</td>
<td>Anxiety and depression (Cobb and Kasl)</td>
<td>Depression (amended from American Health Survey), absenteism (B=0.01, p&lt;0.01)</td>
</tr>
<tr>
<td>Karasek, 1990&lt;sup&gt;37&lt;/sup&gt;</td>
<td>Sweden</td>
<td>Cross sectional</td>
<td>8504 white collar workers</td>
<td>87%</td>
<td>Changes in control over work</td>
<td>Anxiety and depression (GHQ-20)</td>
<td>Depression (amended from American Health Survey), absenteism (B=0.01, p&lt;0.01)</td>
</tr>
<tr>
<td>LaRocco et al, 1990&lt;sup&gt;21&lt;/sup&gt;</td>
<td>USA</td>
<td>Cross sectional</td>
<td>636 male workers</td>
<td>Not reported</td>
<td>Supervisor support, participation, future ambiguity, under-utilisation, workload, role conflict</td>
<td>Anxiety and depression (Capi)</td>
<td>Depression (amended from American Health Survey), absenteism (B=0.01, p&lt;0.01)</td>
</tr>
<tr>
<td>Niedhammer et al, 1998&lt;sup&gt;30&lt;/sup&gt;</td>
<td>France</td>
<td>Prospective</td>
<td>11552</td>
<td>92%</td>
<td>Psychological demands, decision latitude and social support</td>
<td>Depression (Capi)</td>
<td>High demand and low support associated with anxiety (B=0.01, p&lt;0.01) and depression (B=0.01, p&lt;0.01)</td>
</tr>
<tr>
<td>Payne and Fletcher, 1983&lt;sup&gt;40&lt;/sup&gt;</td>
<td>UK</td>
<td>Cross sectional</td>
<td>148 teachers</td>
<td>74%</td>
<td>Workload demands, discretion</td>
<td>Depression (Capi)</td>
<td>Depression (amended from American Health Survey), absenteism (B=0.01, p&lt;0.01)</td>
</tr>
<tr>
<td>Reifman et al, 1991&lt;sup&gt;14&lt;/sup&gt;</td>
<td>USA</td>
<td>Cross sectional</td>
<td>200 married, professional women</td>
<td>&gt;90%</td>
<td>Social support at work, control over work, role ambiguity, workload</td>
<td>Depression (SCL-90)</td>
<td>Cross sectionally, associated with social support at work (B=0.37), role ambiguity (B=0.35) and workload (B=0.29). No associations one year later</td>
</tr>
<tr>
<td>Romanov et al, 1996&lt;sup&gt;21&lt;/sup&gt;</td>
<td>Finland</td>
<td>Prospective</td>
<td>15530 employees</td>
<td>Not reported</td>
<td>Conflict at work</td>
<td>Psychiatric morbidity (hospital discharge registry)</td>
<td>Increased prevalence of psychiatric morbidity (hospital discharge registry) (B=0.01, p&lt;0.01)</td>
</tr>
<tr>
<td>Rubenzoll et al, 1983&lt;sup&gt;41&lt;/sup&gt;</td>
<td>Sweden</td>
<td>Cross sectional</td>
<td>25 departments of S companies</td>
<td>85-90%</td>
<td>Perceived participation (individual, group, representative)</td>
<td>Absenteeism</td>
<td>Negative association for individual participation (B=0.03, p&lt;0.01)</td>
</tr>
<tr>
<td>Shields, 1999&lt;sup&gt;44&lt;/sup&gt;</td>
<td>Canada</td>
<td>Prospective</td>
<td>39200 working population</td>
<td>80%</td>
<td>Long working hours</td>
<td>Depression (Composite International Diagnostic interview)</td>
<td>Cross sectionally, job control associated with low absence rate (B=0.03, p&lt;0.05) and job demand associated with low absence rate (B=0.03, p&lt;0.05)</td>
</tr>
<tr>
<td>Smolders and Nijius, 1999&lt;sup&gt;42&lt;/sup&gt;</td>
<td>The Netherlands</td>
<td>Cross sectional and prospective</td>
<td>1755 male public sector workers</td>
<td>70%</td>
<td>Job control and job demands</td>
<td>Absence rate and absence frequency (B=0.10, p&lt;0.01)</td>
<td>Cross sectionally, job control associated with low absence rate (B=0.03, p&lt;0.05) and job demand associated with low absence rate (B=0.03, p&lt;0.05)</td>
</tr>
<tr>
<td>Sparks and Cooper, 1999&lt;sup&gt;43&lt;/sup&gt;</td>
<td>UK</td>
<td>Cross sectional</td>
<td>7099 from 13 occupations</td>
<td>Not reported</td>
<td>Work control, career achievement, organisational climate, job factors, home/work interface, work relationships</td>
<td>Mental health (OSI)</td>
<td>All associated (B=0.22 to ≤0.28, p&lt;0.001)</td>
</tr>
<tr>
<td>Stansfield et al, 1995&lt;sup&gt;42&lt;/sup&gt;</td>
<td>UK</td>
<td>Cross sectional</td>
<td>1301 public sector employees</td>
<td>73%</td>
<td>Job demands, decision latitude, social support and effort/reward imbalance</td>
<td>Psychological distress (GHQ-20)</td>
<td>All significantly associated (intertile trend p values &lt; 0.001)</td>
</tr>
<tr>
<td>Stansfield et al, 1998&lt;sup&gt;45&lt;/sup&gt;</td>
<td>UK</td>
<td>Prospective</td>
<td>7372 public sector workers</td>
<td>72%</td>
<td>Job demands, decision latitude, social support and effort/reward imbalance</td>
<td>Psychological functioning (SF-36)</td>
<td>Low support and effort/reward imbalance associated with poor psychological functioning (B=1.2 for men and 1.4 for women, 1.8 for men and 2.3 for women respectively). In men, low decision latitude (B=1.2) and in women, high job demand (B=2.0) were associated with poor psychological functioning</td>
</tr>
</tbody>
</table>
effects. After three sessions a week for 10 weeks, stress management training resulted in improved perceived coping ability but no change in physical or psychological health. Aerobic exercise resulted in improved feelings of wellbeing and decreased complaints of muscle pain.

Employees of a fire department underwent one of seven training programmes emphasising one or more aspect of management training: physiological processes, coping with people, or interpersonal awareness processes. Weekly sessions for 8–10 people were run over 42 weeks. There was no control group. Compared to baseline, there were reductions in depression, anxiety, psychological strain, and emotional exhaustion immediately after the programme. There was a further reduction in psychological strain and emotional exhaustion at 9–16 months follow up.

A structural intervention for local authority staff on long term sickness absence was effective in reducing sickness absence. Referral to occupational health services was triggered after two or three months absence, rather than at six months which was the practice before the intervention. The average duration of sickness absence reduced from 40 to 25 weeks before resumption of work and from 72 to 53 weeks for those staff who left employment for medical reasons. The authors describe large financial savings but no statistical tests are reported.

**DISCUSSION**

This systematic review of a large number of studies covers a wide range of employment sectors in the developed world and summarises those studies that use rigorous methods. The studies show that, while levels of psychological ill health are higher in health care than in non-health care workers, the associations between work factors and psychological ill health are similar. They are also similar across continents. This suggests that a generic approach to reducing work related psychological ill health may be appropriate.

The most common work factors associated with psychological ill health were work demand (long hours, workload, and pressure), lack of control over work, and poor support from managers. These were also associated with sickness absence. The findings of this review, summarised in tables 1–4, are consistent with the demand-control model of job strain. Interventions aimed at changing these workplace factors reduced psychological ill health.

This review highlights limitations in the research identified. The studies that have been carried out are limited in the questions addressed and in the study designs used. Since most studies are cross sectional, causal relations cannot be shown. It may be that the associations found reflect a tendency for more vulnerable people to choose work in caring roles or other types of job which are well represented in published research studies. The question of what aspects of work lead to ill health and sickness absence can only be addressed by longitudinal studies that are able to investigate the causal relations between work factors and health outcomes and by randomised controlled trials of interventions. A longitudinal study that directly addressed the nature of the relation found a causal relation between psychological stress and psychosomatic complaints.

There are several practical implications suggested by the studies of association in this review, for both employment managers.

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**Table 4** Summary of studies of interventions

<table>
<thead>
<tr>
<th>Study</th>
<th>Participants Design</th>
<th>Response rate</th>
<th>Intervention</th>
<th>Outcomes</th>
<th>Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gronningsaeter et al, 1992</td>
<td>76 physically inactive Norwegian insurance workers</td>
<td>Stratified RCT 72%</td>
<td>6 sessions aerobic exercise per week for 10 weeks or 3 sessions stress management training per week for 10 weeks</td>
<td>Anxiety (SCL-90R), stress complaints</td>
<td>No association of either intervention with anxiety. Aerobic exercise associated with reduced health complaints (F=3.4, p=0.07 compared to controls), F=4.8, p&lt;0.05 compared to stress management intervention)</td>
</tr>
<tr>
<td>Heaney et al, 1995</td>
<td>1375 US residential care workers</td>
<td>Cluster RCT 62%</td>
<td>6 × 4 hour sessions over 9 weeks to teach skills to enhance social support and problem solving</td>
<td>Depression (SCL-90R)</td>
<td>For those most at risk of leaving their jobs, R²=0.41, p&lt;0.01</td>
</tr>
<tr>
<td>Kagan et al, 1995</td>
<td>373 US fire department workers</td>
<td>Randomised, uncontrolled</td>
<td>42 weeks of 7 psycho-educational programmes, 6 weeks each</td>
<td>Anxiety, depression, psychological strain, emotional burnout</td>
<td>Compared to baseline, F=52.3, 42.2, 29.1, 10.6 respectively; p&lt;0.001 for all. At 9–16 month follow up, F=4.8 (p&lt;0.05), 8.7 (p&lt;0.01), 21.4 (p&lt;0.001), 45.2 (p&lt;0.001) respectively</td>
</tr>
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<td>Lokk and Arnetz, 1997</td>
<td>26 Swedish hospitalward workers</td>
<td>RCT 93%</td>
<td>20 weekly 1 hour stress management sessions</td>
<td>Stress hormone (prolactin) level</td>
<td>Change scores: Intervention group +1.85, Control group +1.85, F=7.3, p&lt;0.01</td>
</tr>
<tr>
<td>Malcolm et al, 1931</td>
<td>604 UK long term sick local government workers</td>
<td>Observational 100%</td>
<td>Early referral to Occupational Health</td>
<td>Duration of sickness absence (weeks)</td>
<td>25 weeks in intervention period compared to 40 in control period, % change: -28.2 in experimental group, -6.4 in control group</td>
</tr>
</tbody>
</table>
| Smoot and Gonzales, 1995     | 65 US hospital workers | Matched controlled | 4 weekly 8 hour sessions of communication training | Sick leave (hours) in 6 months after compared to 6 months before | 36
practices and management style. Intervention studies, however, have focused mainly on staff training. There is a need for future studies to evaluate interventions based on employment practices and management style. This would represent primary prevention, reducing sources of psychological ill health, rather than secondary prevention, training individuals who are already experiencing work related stress, to be more robust in the face of such pressures. Only one of the intervention studies included an economic evaluation: such evaluations are important in facilitating employers to make decisions about whether or not to implement interventions. Future research should adhere to minimum scientific standards absent in many of the studies reviewed, such as adequate design, sufficiently large samples, and valid outcome measures. Lessons that are learnt from rigorously evaluated interventions can then be applied more generally.

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Air pollution study confirms concerns over childhood rickets

A study in India has shown that young children living in areas of high air pollution are in danger of developing rickets.

Two groups of age matched infants and toddlers were compared for serum vitamin D metabolites, calcium, alkaline phosphatase (AP), and parathormone (PTH) concentrations. One group lived in a central location in Delhi and the other on the outskirts of the city, where air pollution is much lower.

Children from the city centre had significantly lower mean serum total 25-hydroxyvitamin D (25(OH)D)—an indicator of vitamin D status—than children from the outskirts (12.4 ng/ml vs 27.1 ng/ml). Their mean serum AP and PTH concentrations were significantly higher, and the inverse relations between 25(OH)D and AP, PTH were also significant. Three children had serum total 25(OH)D low enough to indicate rickets, and nine more below adequate amounts. All children from the outskirts had adequate 25(OH)D. Mean haze score was significantly less at the city centre (2.1 against 2.7).

Each group included 34 children aged 9–24 months with similar home conditions, diet, family income, and time spent outside. Blood was taken from 26 children from the city centre and 31 from the outskirts. Haze scores measured at ground level three times daily (0900, 1200, 1600) during February 2000 were taken as a marker for UVB radiation.

Concerns are growing that increasing air pollution from industry and motor vehicles blocks out UVB radiation and children’s ability to make vitamin D naturally, leading to rickets.

\[\text{Archives of Disease in Childhood 2002; 87: 111–113.}\]
Reducing work related psychological ill health and sickness absence: a systematic literature review
S Michie and S Williams

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