

Early interventions to promote work participation in people with regional musculoskeletal pain: a systematic review and meta-analysis

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Abstract

Objectives: To determine the effectiveness of early multidisciplinary interventions in promoting work participation and reducing work absence in adults with regional musculoskeletal pain.

Data sources: Seven databases (CENTRAL, CINAHL, EMBASE, MEDLINE, Scopus, OT Seeker, PEDro; 1990 to December 2016) were searched for eligible studies.

Review methods: Trials were included if they reported on work-based outcomes for participants experiencing difficulties at work or \leq three months' sick leave. Interventions had to include two or more elements of the biopsychosocial model delivered as a coordinated programme. Quality was assessed using the GRADE criteria. Results were analysed by hazard ratios for return to work data; continuous outcomes were analysed as standardised mean difference with 95% confidence intervals.

Results: A total of 20 randomized controlled trials, with 16,319 participants were included; the interventions were grouped according to their main components for meta-analyses. At 12-months follow-up, moderate quality evidence suggests that programmes involving a stepped care approach (four studies) were more effective than the comparisons in promoting return to work (hazard ratio (HR) 1.29 (95% confidence interval (CI) 1.03 to 1.61), $p = 0.03$), whereas case management (two studies) was not (HR 0.92 (95% CI 0.69 to 1.24), $p = 0.59$). Analyses suggested limited effectiveness in reducing sickness absences, in pain reduction or functional improvement across the intervention categories.

Conclusion: There is uncertainty as to the effectiveness of early multicomponent interventions owing to the clinical heterogeneity and varying health and social insurance systems across the trials.

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Introduction

Many adults experience symptoms of musculoskeletal disorders at some time during their working life.¹ While the majority of these episodes are self-limiting, musculoskeletal disorders (MSDs) remain the leading cause of temporary absences from work and permanent work disability across Europe.² Sickness absence and lost work productivity costs the European Union an estimated 240 billion euro annually.³ Musculoskeletal conditions account for around 20% of claims for long-term incapacity benefits in the UK,⁴ and those with a persisting work disability are at greater risk of poor mental health and decreased quality of life.⁵

Work instability and/or disability is not just the consequence of a clinical impairment, but rather is influenced by a number of inter-related factors, including individual psychosocial characteristics, the workplace environment and the social protection system.⁶ Acknowledgement of the multicausal nature of work absence and disability suggests that programmes that address the range of relevant biopsychosocial factors might be most effective in reducing sickness absence and promoting return to work.⁷ While there have been a number of systematic reviews on the impact of interventions on work outcomes, they have typically involved single diagnostic groups and/or targeted patients who have chronic pain, with inconsistent findings.^{8–10}

The lack of robust consistent findings may be explained, in part, by a lack of clarity regarding the optimum timing of intervention.¹¹ Evidence suggests that the probability of sustained return to work is reduced the longer an individual is out of work.¹² Early intervention has the potential to ensure that people are appropriately managed and supported before work absence becomes long-term.¹³ This review differs, therefore, from previous reviews by focusing specifically on multicomponent, biopsychosocial interventions that recruit participants in

the first three months of sick leave. Until recently, most evidence on work-related outcomes⁷ has focused on low back pain; this review will include a wider range of pain disorders that are of importance (e.g. shoulder/neck/forearm pain and knee pain) in relation to work disability.¹⁴

The review objective was to examine the effectiveness of multicomponent interventions, delivered early in the onset of difficulties at work or work absence, for promoting work participation and reducing the duration of sickness absence for people experiencing musculoskeletal pain.

Method

The systematic review was conducted in accordance with the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) statement.¹⁵ The review was registered with PROSPERO (International Prospective Register of Systematic Reviews: registration number: CRD42015019351) prior to the literature search.

Search strategy

We conducted a systematic search of electronic databases (CENTRAL, MEDLINE, CINAHL, EMBASE, SCOPUS, PEDro, OT Seeker) between 1990 and 2016 inclusive. See Appendix 1, available online, for the MEDLINE search strategy. Searches were limited to literature published in English. We also screened existing systematic reviews and the reference lists of other relevant articles to identify potentially eligible trials. Titles and abstracts were screened for eligibility; those deemed immediately irrelevant were discarded. Two review authors independently reviewed the full text of the remaining studies; any disagreement was resolved by discussion and consensus. We

contacted study authors for further information where the eligibility of the study was unclear.

Eligibility criteria

Trial design. Randomized controlled trials (RCTs), cluster randomized trials and quasi-randomized controlled trials that compared an early intervention with 'treatment as usual', 'wait list' or an alternative active intervention.

Population. People aged 18 or over with musculoskeletal pain (e.g. back pain, shoulder/neck/forearm pain and knee pain) who met the following criteria:

- 80% or more of the sample were in paid employment at the time of recruitment;
- three months or less of sickness absence from work, related to musculoskeletal pain, during the previous year – if the sample involved participants with longer periods of sick leave, the study was included if less than 20% of the sample had more than three months sick leave.

Trials focused on patients with inflammatory conditions (i.e. rheumatoid arthritis, ankylosing spondylitis, sero-negative arthritis, connective tissue diseases and psoriatic arthritis) were excluded. We considered trials with mixed populations if the inflammatory conditions comprised less than 10% of the overall sample.

Intervention. Trials that involved two or more different components from the biopsychosocial model delivered as an integrated programme by a multidisciplinary team or single health professional were included. In the absence of fixed or standard components of the biopsychosocial model, we adopted the criterion from an earlier review¹⁶ and included trials where the intervention comprised a physical (bio-) component and at least one psychosocial element.

- *Physical/bio:* The participant was assessed by physician, physiotherapist or other health professional for causes of their pain and received exercise/physical therapy if indicated.

- *Psychological,* for example: Education, self-management training, coping with pain and unhelpful beliefs, counselling and cognitive behavioural approaches.
- *Social/occupational,* for example: Workplace assessment and adaptations or barriers to work, development of communication and problem-solving skills.

The intervention could be of any intensity, and delivered to individuals or groups in a variety of settings, including hospital, community and the workplace. Trials of primary prevention for healthy workers and of surgical interventions were excluded. Control groups consisted of: (1) the usual treatment available in the trial location; (2) wait-list; or (3) active intervention arms.

Outcomes. Trials must have measured one of the following work outcomes: (1) duration of sick leave, or (2) time to return to work. Secondary outcomes included: pain; disability; psychological functioning; quality of life; fatigue; and adverse effects. We planned to consider work productivity, presenteeism and healthcare utilisation if a sufficient number of trials included these as outcomes. Studies of cost effectiveness were included if conducted alongside or subsequent to a trial that met the inclusion criteria. We included trials that reported outcomes for short-term (e.g. 3–6 months) and long-term follow-up (e.g. 12 months or longer).

Risk of bias assessment

Methodological risk of bias was assessed in accordance with Cochrane guidelines.¹⁷ The six main domains of the risk of bias tool and the following other potential sources of bias were assessed: (1) baseline comparability of groups; (2) compliance with intervention; and (3) use of co-interventions. Each item was judged separately as being at high, low, or unclear risk of bias.¹⁷ Studies were assigned a low quality (low risk of bias on four or less items); moderate quality (low risk of bias on 5–7 items) or high quality rating (low risk of bias on eight or more items). Two reviewers independently assessed the risk of bias of included studies; any

disagreements were resolved by discussion and consensus.

Quality of the evidence

Two reviewers independently assessed the quality of the evidence for each outcome using the GRADE (Grades of Recommendation, Assessment, Development and Evaluation) criteria¹⁷ for each of the following parameters: Risk of bias, inconsistency, imprecision, indirectness and publication bias. A rating of 'high quality' evidence was downgraded by one level for serious concerns, and by two levels for very serious concerns.

Data extraction and synthesis of results

Data were extracted independently by two reviewers including: Participants, diagnosis and setting; intervention characteristics (including timing and intensity); comparison group details; assessment timeframes; outcomes. Study authors were contacted to clarify methodological components and/or access unpublished outcome data (for example means and standard deviations). Where necessary, methods described in the Cochrane Handbook were used to convert study results to the required format or to impute missing standard deviations.¹⁷ Where no estimates were possible using the methods outlined, the data were not used. Intention-to-treat (ITT) analyses were used when available. In trials where there were multiple groups from the same study (e.g. two active arms and a control group), we followed the approaches outlined in the Cochrane Handbook¹⁷ to either combine groups or conduct pair-wise comparisons as long as both active arms met our inclusion criteria.

Meta-analysis was conducted where homogeneity was sufficient in terms of the main components of the intervention, outcome domains and follow-up time point. Where time to return to work data were reported as hazard ratios, we obtained estimates of log hazard ratios and standard errors from the hazard regression models and study results were combined using the generic inverse-variance method. The duration of sickness absence days was measured for different time spans in the included

trials; therefore, we used standardised mean differences (SMDs) with 95% confidence intervals (CIs) and the random effects method to pool results. We also planned to use SMDs for other continuous variables (e.g. pain intensity and disability) as these were measured using different scales across trials. The degree of statistical heterogeneity was assessed by examining the Chi-squared test and the I^2 statistic. An I^2 value of 50% or more was considered to represent substantial heterogeneity. All analyses were calculated using Review Manager 5.3.¹⁸

Results

Figure 1 summarises the screening and selection process; the search resulted in 10,871 studies once duplicates were removed. We obtained the full text of 328 articles; twenty separate trials met our inclusion criteria.

Trial characteristics

Nineteen of the included studies were RCTs, one was a cluster RCT. The majority of the studies were conducted in Europe ($n = 17$), three were from Canada. Study characteristics are presented in Table 1. A very large-scale study from Spain¹⁹ recruited 13,077 participants; the sample sizes of the remaining studies ranged from 54 to 466. The combined total was 16,319 participants, with mean age of 42.8 years (range 32–51), and 54.27% were female. The majority of participants were on sick leave at the time of inclusion into the trials.

The interventions were conducted in various settings and there was considerable variation in the components employed (Table 1). The interventions were grouped into categories according to their main components as described in the publication and data, where available, were pooled for these groupings.

1. Back school programmes.^{20,21}
2. Case-manager-led programmes.^{22–25}
3. A focus on increasing physical activity in combination with multidisciplinary input.^{26–29}

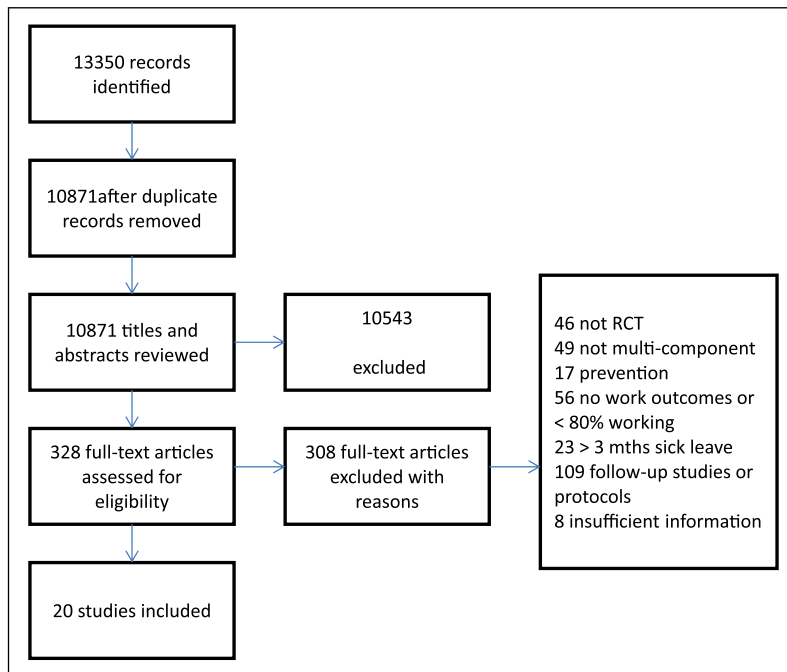


Figure 1. Flowchart of screened, excluded and included studies.
RCT: randomized controlled trial.

4. A psychosocial intervention;^{30,32} psychosocial in combination with exercise;^{31,33} workplace;³⁴ or conventional clinical management.³⁵
5. Stepped care approaches: (a) protocol-based rheumatologist-led clinical management with three levels;¹⁹ (b) the same rheumatologist-led clinical management supplemented with cognitive behavioural therapy;³⁶ (c) occupational intervention followed by a clinical intervention (the Sherbrooke Model);³⁷ (d) work assessment and adjustments directly after enrolment followed by graded activity for participants who had not returned to work after eight weeks.³⁸

Five studies employed multiple groups (e.g. two active arms and a control group); only the arms that met the criteria for two or more components from the biopsychosocial model were used as the intervention group. Pair wise comparisons were used to include both active arms from two studies;^{20,27} in two studies two arms that did not meet the criterion

were combined as a control group^{29,33} using the recommended statistical adjustments to sample sizes;¹⁷ in one study only data for a combined intervention (workplace and graded activity) was used in the analyses.³⁸

Quality of the evidence

The studies were judged to be at low risk of bias for between three and eight of the nine categories, although in some cases there was insufficient information to make a judgement. Few studies provided adequate information relating to how treatment fidelity, compliance with the intervention and use of additional healthcare resources/co-interventions were monitored. Only one trial was rated as being of high quality,²⁸ 11 were rated as of moderate quality and eight of low quality, primarily owing to insufficient detail in the articles (see supplementary data available online). According to the GRADE assessment, the evidence was of very low to moderate quality primarily owing to risk of bias

Table 1. Characteristics of included studies.

Trial	Country/setting	Participants	MSK condition	Intervention	Comparison group	Duration of intervention	Primary outcome(s)	Study authors conclusions
<i>Back school</i>								
Heymans et al., ²⁰ 2006	The Netherlands Occupational health services	I = 98/98; C = 103 Mean age: 40.3 21% female	Non-specific low back pain	Group 1. Low intensity back school; Group 2. High intensity back school Both groups received physical exam and identification of problem activities in workplace Standard back care and daily physiotherapy plus back school; education; lifestyle changes and coping mechanisms and techniques to increase self-care	Standard care according to Dutch occupational guidelines	Low intensity: four 2-hour group sessions over 4 weeks High intensity: one hour twice weekly for 8 weeks Back school; three 90-minute group sessions	RTW for at least 4 weeks; sick-leave days; recurrent episodes of sick-leave Time to RTW; Recurrence of LBP requiring sick-leave	Trend for low intensity group to be more effective in facilitating RTW than usual care, but not high intensity No significant difference on any outcome
<i>Case management</i>								
Bültmann et al., ²² 2009	Denmark Healthcare centre	I = 68; C = 51 Mean age: 43.7 49% female	Mixed	Starting one week after inclusion: assessment of disability and functioning; identification of barriers for RTW; case-manager-led tailored work rehabilitation plan developed with interdisciplinary team	Conventional case management within 8 weeks after first day of work incapacity	Screening: 2.5 hours per discipline; team conference 0.5 hours. Case-management lasted no longer than three months	Sickness absence hours significantly lower for intervention group	Sickness absence hours significantly lower for intervention group
Jensen et al., ²³ 2011	Denmark Hospital	I = 176; C = 175 Mean age: 42 52.1% female	Low back pain	As for: brief intervention plus case-manager-led tailored intervention aiming for full or partial RTW; appointments with other members of the team, workplace or social service	Brief intervention: medical pain management; information and reassurance; advice to increase physical activity and exercise. Follow-up with physiotherapist and physician after 2 weeks Flexible, clinical need driven case-management. As for intervention group, but applied to meet individual needs	Seen by case manager at least twice, more often if needed. Case closed once RTW achieved or recovery deemed unrealistic	Time to RTW; 4 weeks without social welfare payments	RTW rates similar for both groups. No differences on other outcomes
Schultz et al., ²⁴ 2013	Canada Occupational health service	I = 29; C = 34 Mean age: 41.6 36.5% female	Back injury (stratified as high or moderate risk)	Fixed protocol driven case-management. Standardised coordination of inter-disciplinary RTW activities, including workplace, removal of barriers, education, support and advice; referrals as and worksite visit as needed	Not stated	Time to RTW; work days lost	Time to RTW; work days lost	RTW rates similar for both groups. No differences on other outcomes

Table 1. (Continued)

Trial	Country/setting	Participants	MSK condition	Intervention	Comparison group	Duration of intervention	Primary outcome(s)	Study authors' conclusions
Stapelfeldt et al., ²⁵ 2011	Denmark Hospital	I = 60; C = 60 Mean age: 40.7 58.3% female	Low back pain	As for Jensen 2011 ²³	As for Jensen 2011	As for Jensen 2011	As for Jensen 2011	Intervention more effective in facilitating RTW than comparison. Both groups reduced pain and disability
<i>Physical activity plus</i>								
Andersen et al., ²⁶ 2015	Denmark Healthcare centre	I = 27; C = 27 Mean age: 46.1 94.5% female (nurses and nurses' aides)	Back or upper body work-related pain	Development of goal-oriented health plan; Tailored physical activity programme (TPA); standardised fitness and strength training	Development of goal-oriented health plan	Health plan: 1.5 hours TPA; 50 minutes three times per week over 10 weeks during work time	Sickness absence	No effect in reducing sickness absence; intervention reduced pain intensity and increased work ability
Bernaards et al., ²⁷ 2011	The Netherlands Workplace	I = 152/156; C = 158 Mean age: 43.7 49% female (computer operators)	Neck and upper limb symptoms	Group 1. <i>Workstyle</i> promote behavioural change – posture, breaks, works adjustments, coping with high demands Group 2. <i>Workstyle</i> plus behavioural change – engage in moderate to high intensity physical activity	No treatment unless participant attended occupational physician	Six interactive group meetings over six months during work time. Each meeting 1 hour for Group 1 and 1.5 hours for Group 2	Self-reported recovery; absenteeism from paid work	No significant difference in absenteeism rates. <i>Workstyle</i> reduced all pain measures, and improved recovery in neck/shoulder
Karajalainen et al., ²⁸ 2003	Finland Outpatients	I = 56/51; C = 57 Mean age: 43.6 58.7% female	Subacute low back pain	Group 1. <i>Mini-intervention</i> : light mobilisation, graded activity, discussion of working conditions, explanation of tests, individualised exercises Group 2. <i>Mini-intervention plus</i> <i>worksite visit</i> : practical instructions on using back at work; encouraged to involve supervisor and company physicians	Treated by GP, including specialist consultations and physiotherapy; no restrictions on seeking specialist treatments privately	Mini-intervention: one hour with doctor and 1.5 hours with physio. <i>Worksite visit</i> : approximately 75 minutes + written reports	Sickness absence; pain intensity; function (Oswestry); HRQoL (15D)	Mini-intervention reduced sick days, compared with usual care. <i>Worksite visit</i> did not increase effectiveness

(Continued)

Table 1. (Continued)

Trial	Country/setting	Participants	MSK condition	Intervention	Comparison group	Duration of intervention	Primary outcome(s)	Study authors conclusions
Rantonen et al., ²⁹ 2012	Finland Workplace and outpatients	I = 43/43; C = 40 Mean age: 44.7 31.7% female (employees in forestry company)	Low back pain	Group 1. Precourse light mobilisation and exercise; intensive progressive exercise, multidisciplinary education and pain management; individualised maintenance exercise programme + access to occupational health service Group 2. Progressive back specific exercises + access to occupational health service	Provided with back book + access to occupational health service	Group 1: 3-week pre-course of 1.5 hours for 3 days; followed by 6.5 hours 5 days per week for 3 weeks Group 2: 1 hour 2 or 3 times a week for 12 weeks	Sickness absence; pain intensity; function; HRQoL	Group 1 reduced probability of days absent during 2-year follow-up, and total number of days absent during 4th year of follow-up
<i>Psychosocial plus</i>								
Hutting et al., ³⁰ 2015	The Netherlands Workplace	I = 66; C = 57 Mean age: 46.3 75% female (medical centre employees)	Arm neck or shoulder pain	Self-management programme; development of action plans, focusing on pain, fatigue and time management, lifestyle changes, communication skills, and dealing with negative emotions. Access to on-line e-health module	Able to use all available both within and outside of the organisation	Six weekly group sessions of 2.5 hours; e-health module available for 12 months	Self-reported disability	Some improvement in work-related function for intervention group. No other differences
Jensen et al., ³¹ 2012	The Netherlands Outpatients	I = 150 C = 150 Mean age: 45.4 54.8% female	Neck and upper limb symptoms	Assessment by physiotherapist; counselling session, development of individualised plan to remove barriers to work retention and increase physical activity; workplace visit if necessary; interview at 6 weeks and concluding session at 3 months	Assessment by physiotherapist, brief instructions in exercises; referral to physiotherapist or chiropractor at GPs discretion	Three months	Sickness absence; self-reported recovery; pain intensity	Intervention more effective in facilitating RTW, and improved HRQoL
Linton et al., ³² 1997	Sweden Clinic	I = 39/39; C = 25 Mean age: 43.6 58.7% female	Mixed (2-24 weeks sick leave over previous year)	Group 1. Educational support group: based on self-help book. Group 2. Professional support group: cognitive behavioural change, identify risk factors, education regarding workplace and family issues, development of strategies and skills	Medical exam by GP, prescription analgesics; referral physiotherapist or specialist rehabilitation at GPs discretion	Both groups 15 three-hour sessions over one year	Sickness (MPI: PAIRS); Function (sickness impact profile) coping strategies	No benefits of either intervention on sick leave, coping function or experienced pain

Table 1. (Continued)

Trial	Country/setting	Participants	MSK condition	Intervention	Comparison group	Duration of intervention	Primary outcome(s)	Study authors' conclusions
Linton et al., ³³ 2005	Sweden Community	I = 69/69; C = 47 Mean age: 48.2 85% female	Non-specific neck or back pain (<4 months sick leave over previous year)	Group 1. <i>Minimal treatment + structured CBT</i> : develop individual coping skills, problem solving, graded activity, applied relaxation Group 2. <i>Minimal treatment + structured CBT + preventive physiotherapy</i> : assessment by physiotherapist and tailored physical training Worker: motivational interviewing, psychoeducation problem solving and communication skills training Supervisor: psychoeducation, problem solving and communication skills training	<i>Minimal treatment</i> : medical exam, information, encouraged to remain active; free to seek usual medical care	CBT: 6 sessions once a week for 2 hours Physical therapy: all attended at least on sessions	Sickness absence	The two intervention groups had fewer sick leave days during the 12-month follow-up compared with minimal treatment group
Linton et al., ³⁴ 2016	Sweden Occupational Health Centre	I = 82; C = 58 Mean age: 49.8 94.3% female	Low back pain	Worker: motivational interviewing, psychoeducation problem solving and communication skills training Supervisor: psychoeducation, problem solving and communication skills training	Treatment according to evidence-based guidelines; could include physical exam; consult with nurse, physician, psychologist or physical therapist, physical therapy, education	Three sessions (60–90 minutes) with worker; two sessions (90–120 minutes) with supervisor plus feedback by telephone or email over 4 weeks	Pain intensity; work absence; healthcare utilisation	No difference in pain intensity; intervention group fewer days sick leave at 6 months
Schiltenswolf et al., ³⁵ 2006	Germany Inpatient	I = 33; C = 31 Mean age: 35.8 43.8% female	Subacute low back pain (first episode of sick leave between 3 and 12 weeks)	<i>Biopsychosocial</i> : Conventional biomedical + adapted psychotherapy focusing on individual factors, understanding pain, education, problem-solving, managing stress and conflict	<i>Conventional biomedical</i> : functional restoration, physiotherapy, group water therapy, workout and back school	Biomedical: 6 hours of daily treatment for 15 days over three weeks Biopsychosocial: psychotherapy 3 times a week; relaxation 4 times a week over 3 weeks	Sickness absence; pain intensity; function	Improvements in pain, depression and function maintained at 6 months for biopsychosocial group but not biomedical. And fewer sick leave days at 2-year follow-up
<i>Stepped care</i> Abásolo et al., ¹⁹ 2005	Spain Specialised centres in three health districts	I = 5272; C = 7805 Mean age: 40.3 51.4% female	Mixed (TWD)	Rheumatologist-led specific programme: protocol-based (three levels). First level: clinical management, including pharmacological and education. Second level: maintenance, plus referral for formal rehabilitation and laboratory tests. Third level: after 4–8 weeks if no improvement, further diagnostic procedures, or referral for surgical or other specialised care	Standard primary care management	Patients seen as necessary until resolved or recovery deemed unrealistic	Days of TWD; number with permanent work disability; direct and indirect costs	TWD shorter in intervention group for all condition except knee pain. Maximum effect within first two-months

(Continued)

Table 1. (Continued)

Trial	Country/setting	Participants	MSK condition	Intervention	Comparison group	Duration of intervention	Primary outcome(s)	Study authors conclusions
Leon et al., ³⁶ 2009	Spain Specialised centres in one health district of Madrid	I = 115; C = 66 Mean age: 45 76% female	Mixed (TWD) ≥4 weeks; part of rheumatologist-led programme; Abásolo et al., ¹⁹ 2005	Rheumatologist-led specific programme + individualised CBT (three levels). First level: two sessions on education on pain, ergonomics, breathing, strategies to help coping. Second level: if still off sick at 2 weeks three further sessions. Third level if remains off sick indeterminate number of sessions – training coping skills for interpersonal and work issues	Rheumatologist led specific programme: protocol-based (three levels) (as for Abásolo et al., ¹⁹ 2005)	Sessions 60 minutes each	Duration of sick leave, and relapse rates	Episodes of TWD tended to be shorter for CBT group
Loisel et al., ³⁷ 1997	Canada Workplace/clinic	I = 22/31/25; C = 26 Mean age: 40.9 40.4% female	Thoracic or lumbar: back pain (sick leave or light duties for >4 weeks and <3 months)	Occupational intervention: after 6 weeks absence OP arrange for light duties or investigations/treatment; worksite visit and ergonomic evaluation. Clinical intervention: after 8 weeks medical examination, back pain specialist and back school; after 12 weeks multidisciplinary rehabilitation. Combined intervention: occupational + clinical	Care from primary physician, prescribe tests and treatment; referral to specialists as necessary	12 weeks +	Sickness absence; RTW (identical to that before onset of back pain)	Combined intervention more effective in facilitating RTW than usual care
Anema et al., ³⁸ 2007	The Netherlands Occupational health services and physiotherapy centres	I = 27; C = 85 Mean age: 42.4 60% female	Non-specific low back pain (Full or partial sick leave lasting 2–6 weeks)	Single worksite visit with assessment and work adjustments; after 8 weeks (if not back to work) graded activity exercise	Standard care according to Dutch occupational guidelines	Graded activity one hour sessions until RTW (maximum 26)	Duration of sick leave until full RTW for at least 4 weeks	No significant difference on any outcome

I: intervention; C: control; RTW: return to work; LBP: low back pain; HRQoL: health-related quality of life; TWD: temporary work disability; CBT: cognitive behavioural therapy; MSK: musculoskeletal; OP: occupational physician; TPA: tailored physical activity; MPI: multidimensional pain inventory; PAIRS: pain and impairment relationship scale.

and imprecise results because of small sample size. Table 2 presents an overview of these judgements.

Return to work

The criteria used to define return to work varied, and included: (1) the cessation of temporary disability payments;^{19,33,36} (2) return to work identical to that before the onset of musculoskeletal (MSK) pain;³⁷ (3) return to previous or equal work for at least four weeks.^{20,23,25,38}

Hazard ratios for return to work were available for two studies at 3–6 months^{20,31} and six studies for 12-month follow-up.^{19,23,25,36,37,38} One trial of moderate quality³¹ found that a counselling-based intervention was more effective than usual care at three-month follow-up (hazard ratio (HR) 2.57, 95% CI 1.98 to 3.34; $p = 0.0001$). Four trials^{19,36,37,38} of low quality examined the effects of stepped care at 12 months, and the pooled data suggest that stepped care probably facilitates return to work more effectively than the comparison interventions (HR 1.29, 95% CI 1.03 to 1.61; $p = 0.03$, $I^2 = 50\%$). The moderate-quality pooled data for case management^{23,25} indicated that the intervention may make little or no difference above that of the comparison intervention (HR 0.92, 95% CI 0.69, 1.24; $p = 0.59$, $I^2 = 36\%$). Two studies^{21,24} provided return to work data as a percentage of those back to work at 12 months, with no difference between intervention and control groups (p 's 0.61 and 0.14, respectively). (See Table 2 and Supplementary Data for forest plots for all analyses.)

Sickness absence

Sickness absence, measured in days, was obtained from the records kept by social security and health insurance systems in ten studies,^{19,21–25,31,32,35,36} five accessed data through company records/occupational health^{20,27,29,37,38} and five used self-reported data.^{26,28,30,33,34} Only 13 studies presented sickness absence data that could be used in the analyses. At a 3–6 month follow-up, low- to moderate-quality evidence revealed no difference for the psycho-social interventions^{30,34} case management²⁴ nor back school (high and low intensity).²⁰

For sickness absence rates at longer term follow-up, we found very low to moderate quality evidence of little or no difference above that of the comparison group across the intervention categories.^{19,22,23,24,27,29,30,35,36,37} Statistical heterogeneity was generally high with I^2 values ranging from 27% to 97%.

Four studies^{19,20,21,36} reported on the number and duration of recurrent episodes of sickness absences related to musculoskeletal pain. The large-scale study conducted in Spain¹⁹ reported that a quarter of participants had more than one episode of temporary work disability during the follow-up period, with no difference between the intervention and control groups in the number of episodes per participant, although the duration of the episodes was shorter for the intervention group compared with the control (mean 25.33 days vs. 43.33 days, $p < 0.0001$). Similar effects were reported for the other rheumatology-led study with added cognitive behavioural therapy component,³⁶ the intervention group experienced shorter episodes of temporary work disability relative to the control group (mean 63.69 days vs. 197.62 days, $p = 0.002$). The remaining two studies reported no differences between the intervention and comparison groups for recurrence rates or the duration of these episodes.^{20,21}

Pain intensity and disability

Three studies^{20,31,35} reported on pain intensity and disability at 3–6 months, and three^{21,26,34} on pain only. At longer-term follow-up, eight studies^{20–22,24,28,29,31,32} reported on both pain and disability, and one²⁷ on pain only. There was no consistent evidence that any of the intervention categories had an effect on either pain intensity or disability above that of the comparison for either follow-up period.

Early intervention and cost savings

Eight studies collected direct health costs and indirect work- and benefits-related costs, and the majority adopted a human capital approach when estimating productivity loss. Methodological differences in terms of the interventions, health systems and the types of economic analyses make it

Table 2. Summary of findings: Multicomponent biopsychosocial interventions compared with standard care (or single component intervention).

Outcome	Intervention category	Anticipated absolute effects (95% CI)	Relative effect (95% CI)	No of participants (studies)	Quality of the evidence (GRADE)
RTW 3–6 months	Back school ²⁰ Psychosocial ³¹		HR 1.18 (0.85 to 1.63) HR 2.57 (1.98 to 3.34)	298 (1) 75 (1)	⊕○○○ Very low ^{a,b,c} ⊕⊕○○ Moderate ^c
RTW 12–24 months	Case management ^{23,25} Stepped care ^{19,36,37,38}		HR 0.92 (0.69 to 1.24) HR 1.29 (1.03 to 1.61)	471 (2) 13421 (4)	⊕⊕○○ Moderate ^d ⊕⊕○○ Low ^{a,d}
Sick leave 3–6 months	Back school ²⁰ Case management ²⁴ Psychosocial ^{31,34}	SMD 0.06 lower (–0.3 to 0.18) SMD 0.37 higher (–0.13 to 0.87) SMD 2.47 lower (–6.47 to 1.56)		298 (2) 63 (1) 329 (2)	⊕⊕○○ Low ^{a,c} ⊕⊕○○ Moderate ^c ⊕⊕○○ Low ^{a,c}
12–24 months (lower scores = fewer days absent)	Case management ^{22,23,24} Physical ^{27,29} Psychosocial ^{27,30,35} Stepped care ^{19,36,38}	SMD 0.48 lower (–1.85 to 0.88) SMD 0.01 lower (–0.23 to 0.22) SMD 0.24 lower (–0.5 to 0.01) SMD 0 (–0.56 to 0.55)		527 (3) 343 (2) 375 (2) 13370 (3)	⊕⊕○○ Low ^{b,d} ⊕⊕○○ Low ^{a,d} ⊕⊕○○ Low ^e ⊕○○○ Very low ^{a,b,d}
Pain Intensity 3–6 months	Back school ²⁰ Physical ²⁶ Psychosocial ^{31,34}	SMD 0.58 lower (–1.6 to 0.44) SMD 0.34 lower (–0.88 to 0.19) SMD 0.08 lower (–0.27 to 0.12)		347 (3) 54 (1) 420 (3)	⊕○○○ Very low ^{a,b,d} ⊕⊕○○ Moderate ^{c,d} ⊕⊕○○ Moderate ^a
12–24 months (lower score = less pain)	Back school ²¹ Case management ^{22,23} Physical ^{27,28} Psychosocial ^{27,30,32,33}	SMD 0.1 higher (–0.2 to 0.4) SMD 0.12 lower (–0.49 to 0.25) SMD 0.03 higher (–0.22 to 0.28) SMD 0.15 lower (–0.46 to 0.17)		168 (1) 356 (3) 284 (2) 569 (4)	⊕⊕○○ Low ^{a,c} ⊕⊕○○ Low ^{b,c} ⊕⊕○○ Low ^{a,c} ⊕○○○ Very low ^{b,e}
Disability 3–6 months	Back school ²⁰ Psychosocial ^{31,35}	SMD 0.91 lower (–2.37 to 0.55) SMD 0.11 lower (–0.35 to 0.12)		207 (2) 280 (2)	⊕○○○ Very low ^{a,b,c} ⊕⊕○○ Low ^{a,c}
12–24 months (lower score = less disability)	Back school ²¹ Case management ^{22,23,25} Physical ²⁹ Psychosocial ^{30,32,33}	SMD 0.14 higher (–0.19 to 0.47) SMD 0.1 lower (–0.39 to 0.2) SMD 0.1 lower (–0.46 to 0.27) SMD 0.07 lower (–0.26 to 0.13)		141 (1) 376 (3) 126 (1) 410 (3)	⊕⊕○○ Low ^{a,c} ⊕⊕○○ Moderate ^c ⊕⊕○○ Moderate ^c ⊕○○○ Very low ^e

CI: confidence interval; RTW: return to work; HR: hazard ratio; SMD: standardised mean difference.

Reasons to downgrade:

^aSome risk of bias (–1);

^bSome inconsistency (–1);

^cSmall sample size/ and or single study (–1);

^dSome imprecision (–1);

^eSerious risk of bias concerns (–2).

difficult to make direct comparisons across the trials. Three trials reported cost savings in health service costs and limiting productivity losses^{19,22,36} and also by reducing the number of patients transitioning to long-term disability.¹⁸ For example, every dollar invested produced savings of between US\$4 and US\$11 in the two Spanish studies^{36,19} and a third study reported a saving of US\$1366 per participant in the intervention group by reducing sick days and productivity loss.²² Five trials reported no overall benefits in terms of cost savings.^{23,24,27,28,37}

Discussion

This systematic review provides only very limited evidence that early multicomponent interventions are more effective than comparisons (both 'treatment as usual' and active interventions that did not meet our biopsychosocial criterion) in promoting return to work and reducing sickness absence among people with musculoskeletal pain. Low-quality evidence from the meta-analysis of four trials suggests that a stepped care approach is more effective than usual care in facilitating return to work. This is consistent with the suggestion that first-line interventions that include early access to treatment, reassurance about activity and work and/or workplace accommodation is sufficient for most workers, while more structured vocational rehabilitation is reserved for those who do not respond to conservative management.⁷ The analyses on sick leave data, which included 11 trials with a long-term follow-up period, did not find an effect for any of the five different categories of interventions above that of the comparison in reducing sick leave. Similarly, there was little or no difference in the effects of the intervention groupings on pain intensity and disability.

There was considerable variation in the duration of sick leave during the follow-up periods; in some cases, mean sick-leave data were skewed by the small number of participants who remained on long-term sick leave. It is not clear whether the variations in sick leave were related to the severity of symptoms at baseline or other factors, including the influence of the differing social protection

systems within each jurisdiction. Considering the likelihood of recurring episodes of musculoskeletal pain, long-term follow-up periods are needed to provide information on the recurrence of absenteeism after the initial resumption of employment. Few studies in the current review reported on this, thus it was not possible to determine the extent to which further episodes of sick leave occurred. The effectiveness of interventions in preparing people to cope with reoccurrence of symptoms warrants further exploration.

It is not necessary for people to be pain free before they return to work,³⁹ therefore it may not be surprising that the interventions made little or no difference to pain intensity compared with the comparison groups. There are, however, several possible explanations as to why we did not find more robust effects on our outcomes as methodological limitations may have biased effect estimates. First, in at least six studies the comparison groups were able to avail of a range of additional services, and it is possible that the benefits achieved by engaging in cointerventions reduced the likelihood of identifying differences in outcomes between the intervention and control groups. Second, variations in the delivery and acceptance of treatment may have substantially impacted outcomes.⁴⁰ Treatment fidelity and participant compliance with the prescribed intervention were not reported consistently. Furthermore, as these were early interventions it is possible that some participants in both the intervention and comparison groups had low levels of symptom intensity at baseline and/or may have improved spontaneously as part of a natural disease course.

Limitations of the review

We conducted an extensive search, but it is possible that we failed to identify some eligible trials. We limited our search to publications since 1990, as it seems likely that clinical practice prior to this date was unlikely to meet our inclusion criteria. In addition, we omitted a number of potentially eligible studies from the review as we were unable to make contact with authors to confirm that trials met our inclusion criteria; the possibility that their

inclusion may have changed our conclusions cannot be ruled out. This raises some important issues regarding the need for consistency of reporting, including for example, sufficiently detailed protocols and procedures, some agreement on defining terms such as return to work and a core set of outcomes.⁴¹

While the current review does have some overlap with previous effectiveness reviews,^{9,10,39} our focus on early multicomponent interventions offered an opportunity to identify an optimal treatment approach soon after the start of difficulties in remaining at work. The inclusion criteria for the review were stringent in terms of employment and sick leave status, yet our relatively open definition of 'biopsychosocial' interventions resulted in considerable variation in the active components included in the trials. We based decisions as to which studies could be pooled for analyses, on a determination of sufficient clinical homogeneity. However, these subjective decisions are open to debate and the magnitude of effects of the individual studies may be different from the summary effect of the meta-analyses. An alternative approach would have been to specify the type of intervention to be included more tightly; however, there are some indications from our own experience and other reviews that further restrictions would have identified few studies sufficiently similar for analysis.^{8,42,43}

A further limitation relates to the impact of combining data from participants with a range of musculoskeletal conditions. While more than a half of the included studies recruited patients with a single diagnosis of back pain ($n = 13$), we were unable to conduct any subgroup analyses in relation to diagnoses owing to an insufficient number of trials within each of our intervention categories. There is, however, some evidence that the same general principles for effective return to work strategies apply across the most common musculoskeletal conditions.⁷ Finally, we were also unable to conduct the other planned subgroup analyses, including baseline symptom severity, and the effects of age and gender because of the low number of trials within each intervention category.

Implications

Multicomponent interventions can be costly both in terms of money and time commitments.¹⁰ A stepped approach that introduces more complex interventions only for those who do not respond to conservative management may help to limit the use of more expensive components. Some uncertainty remains as to the optimum time for intervention, as it has been suggested that enrolling in an intervention too soon may delay the natural progression to return to work.¹¹ Thus, the challenge is to identify and target those who are at risk of chronicity and disability, one promising approach is to screen for risk factors linked to delayed recovery and return to work as this may help to identify those workers who would benefit most from early intervention.^{6,44}

Given the diversity of interventions included in this review, some caution in interpretation and application of the findings is warranted. The included trials were conducted across seven different countries with differing health services and social security systems. Variation also existed in the components constituting usual care for the control/comparison groups. These possible confounds have been acknowledged in other reviews. For example, a review of the effectiveness of multidisciplinary interventions on return to work for low back pain reported a clinically relevant effect only when the meta-analysis was limited to studies conducted in Scandinavia – that is, countries with similar labour markets, unemployment rates and insurance systems.⁴²

Clinical messages

- There is still uncertainty regarding the effectiveness of early multicomponent interventions owing to clinical heterogeneity and varying health and social insurance systems.
- The need to identify the patients who are most likely to benefit and to establish the active components that promote work participation in this population remains.

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