RESEARCH

Multidisciplinary biopsychosocial rehabilitation for chronic low back pain: Cochrane systematic review and meta-analysis

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Abstract

Objective To assess the long term effects of multidisciplinary biopsychosocial rehabilitation for patients with chronic low back pain.

Design Systematic review and random effects meta-analysis of randomised controlled trials.

Data sources Electronic searches of Cochrane Back Review Group Trials Register, CENTRAL, Medline, Embase, PsycINFO, and CINAHL databases up to February 2014, supplemented by hand searching of reference lists and forward citation tracking of included trials.

Study selection criteria Trials published in full; participants with low back pain for more than three months; multidisciplinary rehabilitation involved a physical component and one or both of a psychological component or a social or work targeted component; multidisciplinary rehabilitation was delivered by healthcare professionals from at least two different professional backgrounds; multidisciplinary rehabilitation was compared with a non- multidisciplinary intervention.

Results Forty one trials included a total of 6858 participants with a mean duration of pain of more than one year who often had failed previous treatment. Sixteen trials provided moderate quality evidence that multidisciplinary rehabilitation decreased pain (standardised mean difference 0.21, 95% confidence interval 0.04 to 0.37; equivalent to 0.5 points in a 10 point pain scale) and disability (0.23, 0.06 to 0.40; equivalent to 1.5 points in a 24 point Roland-Morris index) compared with usual care. Nineteen trials provided low quality evidence that multidisciplinary rehabilitation decreased pain (standardised mean difference 0.51, −0.01 to 1.04) and disability (0.68, 0.16 to 1.19) compared with physical treatments, but significant statistical

heterogeneity across trials was present. Eight trials provided moderate quality evidence that multidisciplinary rehabilitation improves the odds of being at work one year after intervention (odds ratio 1.87, 95% confidence interval 1.39 to 2.53) compared with physical treatments. Seven trials provided moderate quality evidence that multidisciplinary rehabilitation does not improve the odds of being at work (odds ratio 1.04, 0.73 to 1.47) compared with usual care. Two trials that compared multidisciplinary rehabilitation with surgery found little difference in outcomes and an increased risk of adverse events with surgery.

Conclusions Multidisciplinary biopsychosocial rehabilitation interventions were more effective than usual care (moderate quality evidence) and physical treatments (low quality evidence) in decreasing pain and disability in people with chronic low back pain. For work outcomes, multidisciplinary rehabilitation seems to be more effective than physical treatment but not more effective than usual care.

Introduction

Low back pain is a highly prevalent health condition responsible for considerable suffering across the world. Recent research shows that low back pain causes more years lived with disability than any other health condition.[1] Many people with low back pain have ongoing and recurrent complaints,[2][3] and these people bear the greatest proportion of the disease burden. At a societal level, low back pain is also responsible for substantial costs by way of healthcare expenditure, disability insurance, and work absenteeism.[4][5]

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Chronic low back pain is defined by symptoms that persist for a period of greater than three months.[6] Along with pain and impaired function, people with chronic low back pain frequently experience anxiety and depression, as well as effects on social, recreational, and work life.[7] Recognition of this widespread impact led to the formulation of the biopsychosocial model of low back pain,[8] as well as efforts to develop interventions that target all facets of the disorder. These multidisciplinary biopsychosocial rehabilitation programmes involve a combination of physical, psychological, educational, and/or work related components and are often delivered by a team of healthcare providers with expertise in different fields.

Increasingly widespread acceptance of the biopsychosocial model,[9] along with the relatively modest performance of monotherapies in clinical trials,[10] has led to increased research into the effectiveness of multidisciplinary rehabilitation. Since the previous Cochrane systematic review on the topic published in 2001,[11 12] many more trials have been published and an updated synthesis of the literature is needed. The objective of this systematic review and meta-analysis of randomised controlled trials was to estimate the effectiveness of multidisciplinary rehabilitation on decreasing pain, disability, and work absenteeism in people with chronic low back pain.

Methods

Eligibility criteria

We did the systematic review by following the Cochrane Collaboration guidelines.[6 13] We included only randomised controlled trials published in full text in peer reviewed journals. We included trials published in any language that enrolled adults with chronic low back pain, defined as pain between the 12th rib and buttock crease. Where samples included patients with spinal pain at any level, we included the study if more than 75% of patients had low back pain. We defined chronic low back pain as pain that had persisted for longer than three months. Where the sample also included patients with symptoms of less than three months' duration, we included the study if more than 75% had chronic low back pain. We excluded trials if they recruited patients with specific low back pain caused by infection, neoplasm, metastasis, rheumatoid arthritis or other inflammatory articular conditions (such as ankylosing spondylitis), spinal stenosis, or fractures. We included trials that reported on patients with diagnoses such as disc degeneration or bulging discs, facet joint dysfunction, or sacroiliac joint pain. The protocol for the original version of this review was published on the Cochrane website in advance of publication of the full review,[12] and only minor amendments were made to that protocol before we began this review. These amendments were not published.

We defined multidisciplinary rehabilitation in alignment with the biopsychosocial model. A study was eligible for inclusion if the multidisciplinary rehabilitation intervention involved a physical component and one or both of a psychological component or a social/work targeted component. Furthermore, the different components had to be delivered by clinicians with different professional backgrounds, but no specific professional backgrounds were required. Multidisciplinary rehabilitation interventions could be of any intensity and rehabilitation approach and could be provided in inpatient or outpatient settings. Randomised controlled trials that tested multidisciplinary rehabilitation programmes versus any other treatment were eligible for inclusion. We categorised control interventions as usual care, physical treatment, surgery, and waiting list.

The primary outcomes were pain, disability, and work absenteeism. Secondary outcomes were psychological functioning, quality of life, adverse events, and health service utilisation. We split outcomes into short term (three months' follow-up or less), medium (three to less than 12 months), and long term (12 months or more). We considered long term outcomes to be primary.

Study identification

We devised electronic searches and ran them in conjunction with a research librarian from the Cochrane Back Review Group. They included searches of the Cochrane Back Review Group Trials Register, CENTRAL, Medline, Embase, PsycINFO, and CINAHL databases (web appendix 1). We searched databases from 1998 (the date of the search conducted for the previous version of this review) until February 2014. We included all articles included by Guzman et al and also screened studies listed as excluded from that review.[12] We screened reference lists of related systematic reviews and included studies, and we used Science Citation Index to do forward citation tracking of included randomised controlled trials. Two of three authors independently screened all studies identified in the searches. Clearly ineligible studies were excluded on the basis of title and abstract; all remaining studies were retrieved in full text and reviewed independently by two authors for inclusion. Disagreements about inclusion were resolved by consensus or by a third author where necessary.

Quality of evidence

We used the 12 point Cochrane risk of bias tool to assess risk of bias.[14] Two authors independently assessed risk of bias, and disagreements were resolved by consensus or by a third author where necessary. We used risk of bias assessments to do sensitivity analyses, using the threshold of six items to denote low risk of bias.[15] We also incorporated them into the assessment of the quality of evidence. We used the Grades of Recommendation, Assessment, Development, and Evaluation (GRADE) approach to assess the overall quality of the evidence.[16] Quality of evidence started out as strong for all comparisons but was decreased by one level in the presence of each of the following factors: risk of bias, inconsistency of results, indirectness, imprecision, and other factors (for example, reporting bias). Quality was downgraded for risk of bias where any one of the studies in the meta-analysis did not meet the threshold of six items on the risk of bias tool,[15] for consistency where substantial statistical heterogeneity existed according to the Cochrane Handbook,[13] and for precision where fewer than 400 participants were included in the comparison.[17] We did the downgrading of evidence quality on the basis of risk of bias in a strict way, providing a conservative assessment of the quality of the evidence. Where sufficient trials were included in a comparison,[13] we inspected funnel plots to assess the probability of small study bias.

Data extraction, meta-analysis, and data synthesis

We extracted data necessary to characterise the study sample and interventions along with outcomes at all reported time points. One author extracted data into spreadsheets, and another checked for accuracy. We did meta-analyses where homogeneity was sufficient in terms of comparator intervention, outcome domain, and follow-up time point. As trials used different measurement scales to assess a given outcome, we used standardised mean differences to pool trial results for continuous

variables. The standardised mean difference is the difference in mean values between the intervention and control group divided by the standard deviation. To facilitate interpretation, we translated pooled standardised mean difference values to the equivalent in commonly used scales for measuring pain and disability, using the standard deviation reported in the included studies. We pooled effects on absenteeism by calculating odds ratios of being at work a year after the intervention.

If necessary, we approximated the numbers needed for calculations from graphs and statistics in the article. Where follow-up standard deviations were not reported, we used the standard deviation for the same measure at baseline. Where the baseline standard deviation was not reported, we estimated the standard deviation from the same measure reported in other studies within the comparison. Where no estimate was possible using the aforementioned methods, we did not use the data in the meta-analysis.

We used random effects models in all meta-analyses to provide a summary effect size that represents the mean of a distribution of effects from the included studies.[18] We quantified statistical heterogeneity by using the τ^2 and I^2 statistics. High statistical heterogeneity did not preclude meta-analysis, but it downgraded ratings of the quality of evidence. We did meta-analyses in RevMan 5.1 using the Der Simonian and Laird method.[19] We generated funnel plots where at least 10 studies were included in a comparison. We assessed symmetry by visual inspection to assess the probability of small study bias.

We did pre-planned sensitivity analyses to investigate whether risk of bias influenced effect estimates. We did meta-analyses including only studies that met the threshold for low risk of bias (six items) and including only studies that reported adequately concealed allocation.[15] We also did pre-planned subgroup analyses to assess the influence of severity of symptoms at baseline and intensity of the intervention on effect estimates. We categorised studies as high symptom severity when the mean pain and disability scores at baseline were above 60% of the maximum possible on the scale. We categorised studies as high multidisciplinary biopsychosocial rehabilitation intervention intensity when they used more than 100 hours of face-to-face contact between clinicians and patients and treatment was delivered on a daily basis.

Results

Electronic and hand searches identified 6189 candidate studies, and 174 full text articles were retrieved. Thirty one studies met the inclusion criteria and were added to the 10 studies included in the previous version of the review for a total of 41 included randomised controlled trials (fig 1⇓). Thirty three studies were conducted in Europe, three in Iran, three in North America, and two in Australia. Sample sizes ranged from 20 to 542, with a combined total of 6858 participants (web appendix 2). Samples were recruited at rehabilitation units to which patients were referred from primary care, secondary care, or insurance providers. Most studies included patients with an average age between 40 and 45 years and a mean duration of symptoms of more than one year. Many patients had undergone other conservative treatment before participation in the study. Four studies reported high baseline symptom intensity (group mean >60% of the maximum score in pain and disability scales), 33 were lower than this threshold, and insufficient data was reported for us to categorise four studies. Fifteen studies reported high intervention intensity (>100 hours and daily contact), and 15 did not meet either of these criteria and were categorised as low intensity.

The included studies met between one and nine of the risk of bias criteria; 13 (32%) studies were categorised as low risk of bias. Although all studies reported randomisation, only 29 (71%) described an adequate randomisation procedure and 23 (56%) reported adequate concealment. Owing to the nature of the interventions and the patient reported primary outcomes, blinding was not possible for patients, clinicians, or assessors. Twenty six (63%) studies reported complete outcome data, 16 (39%) described an intention to treat analysis, and between group comparability at baseline was adequate in 31 (76%) studies (fig 2⇓). We constructed funnel plots (included in web appendix 3) where comparisons included at least 10 studies; they showed no appreciable asymmetry aside from one outlying study that reported a very large effect in favour of multidisciplinary rehabilitation over physical treatment.

Note that further results, including secondary outcomes, sensitivity analyses, and subgroup analyses can be accessed in the full version of this review.[20]

Multidisciplinary rehabilitation versus usual care

Sixteen randomised controlled trials compared the effects of multidisciplinary rehabilitation and usual care interventions (fig 3⇓).[21-38] Usual care meant that patients received care at the discretion and direction of their healthcare provider, generally a general practitioner or medical specialist. The actual treatment received varied across the studies, depending on where the study was conducted (see appendix 2).

For long term pain (seven trials; n=821), we found moderate quality evidence that multidisciplinary rehabilitation was more effective than usual care (standardised mean difference 0.21, 95% confidence interval 0.04 to 0.37). For long term disability (six trials; n=722), we found moderate quality evidence that multidisciplinary rehabilitation was more effective (standardised mean difference 0.23, 0.06 to 0.40). Summary effect sizes for pain and disability were generally larger in the short and medium term than in the long term. For work absence in the long term (seven trials; n=1360), we found moderate quality evidence that multidisciplinary rehabilitation had no effect above that of usual care (odds ratio 1.04, 95% confidence interval 0.73 to 1.47); the results were similar in the short and medium term. Statistical heterogeneity was low, with τ^2 values from 0.01 to 0.06 and I^2 values from 19% to 31% for the long term outcomes (fig 3⇓).

No studies reported adverse events in a manner that enabled comparison between groups. Sensitivity analyses suggested that inclusion of studies at high risk of bias did not result in overestimation of the effectiveness of multidisciplinary rehabilitation. Too few studies were categorised as high symptom severity for us to draw conclusions regarding the influence of this variable. Intervention intensity did not seem to have a substantial influence on the summary effect size. Meta-analyses of secondary outcomes of quality of life, catastrophising, and fear avoidance included only a few randomised controlled trials and yielded imprecise estimates.

Multidisciplinary rehabilitation versus physical treatment

Nineteen randomised controlled trials compared the effect of multidisciplinary rehabilitation and physical treatments (fig 4⇓).[29-59] Physical treatments included heat and electrotherapeutic modalities; aerobic, stretching, and strengthening exercises; manual therapies; and education interventions such as back school. For long term pain (nine trials; n=872), we found low quality evidence of a sizeable effect that marginally failed to

reach statistical significance (standardised mean difference 0.51, −0.01 to 1.04). For long term disability (10 trials; n=1169), we found low quality evidence that multidisciplinary rehabilitation was more effective (standardised mean difference 0.68, 0.16 to 1.19). High statistical heterogeneity was present in the meta-analyses for pain and disability, with τ^2 values higher than 0.5 and I^2 values higher than 90%. These were particularly influenced by one study that reported a very large effect size.[49] For work in the long term (eight trials; n=1006), we found moderate quality evidence that multidisciplinary rehabilitation was more effective than physical treatment (odds ratio 1.87, 1.39 to 2.53).

Only one study reported adverse events (increased low back or leg pain), and rates did not differ between groups. Sensitivity analyses suggested that inclusion of studies at high risk of bias did not result in overestimation of the effectiveness of multidisciplinary rehabilitation. Too few studies were categorised as high symptom intensity for us to draw conclusions regarding the influence of this variable. The influence of intervention intensity was not clear from the results (data not shown). Meta-analyses on secondary outcomes of quality of life, healthcare visits, depression, anxiety, coping, and self efficacy included few studies and yielded imprecise estimates.

Multidisciplinary rehabilitation versus surgery

Two randomised controlled trials compared multidisciplinary rehabilitation with surgical treatments and reported on pain and disability in the long term (n=423)[60 61]; only one reported a work outcome. We found low quality evidence of no difference between multidisciplinary rehabilitation and surgery for pain (standardised mean difference 0.25, −0.04 to 0.53), disability (standardised mean difference 0.25, −0.08 to 0.57), or work (odds ratio 0.67, 0.31 to 1.45). More adverse events were reported in the surgery groups (odds ratio 28.25, 3.77 to 211.93), but the estimate is very imprecise owing to the low absolute rates, as indicated by the width of the confidence interval. We did not do sensitivity and subgroup analyses because of the low number of trials.

Multidisciplinary rehabilitation versus waiting list

Four randomised controlled trials compared multidisciplinary rehabilitation with waiting list controls who subsequently received multidisciplinary rehabilitation and thus could not provide data on long term outcomes.[56-63] On the basis of three trials, we found very low quality evidence that multidisciplinary rehabilitation decreased pain (standardised mean difference 0.73, 0.24 to 1.22) and low quality evidence that it reduced disability (0.49, 0.22 to 0.76) in the short term compared with waiting list.

Other studies

Twelve randomised controlled trials compared two multidisciplinary rehabilitation interventions against each other.[21-66] A description of these studies appears in appendix 2, but we did not analyse comparative effectiveness as this did not inform the main research question of this review.

Discussion

This systematic review provides evidence that multidisciplinary rehabilitation programmes are more effective than usual care (moderate quality evidence) and physical treatments (low quality evidence) in decreasing pain and disability in people with chronic low back pain. For work outcomes, multidisciplinary rehabilitation seems to be more effective than physical treatment but not more effective than usual care. To put the findings in perspective, the pooled standardised mean difference comparing multidisciplinary rehabilitation with usual care (about 0.2) corresponds to approximately 0.5 points on a 0-10 pain scale and 1.5 points on a 24 point Roland-Morris scale. The effect on work equates to a person having roughly double the odds of being at work after 12 months if they received a multidisciplinary rehabilitation programme rather than a physical treatment.

These effects are over and above the improvement seen in the control groups, which also received credible treatments; the population included in most studies had a generally poor prognosis[67]; and many patients had already failed a period of conservative treatment. On the other hand, multidisciplinary rehabilitation programmes can be costly, time consuming, and resource intensive. This imposes a considerable financial burden on the patient and the healthcare system. That being the case, understanding of cost effectiveness of multidisciplinary rehabilitation is important. A review of cost effectiveness analyses of multidisciplinary rehabilitation is underway.

The two studies that compared multidisciplinary rehabilitation with surgery suggest that no difference exists in effects on pain, disability, and work and that surgery comes with an increased risk of adverse events. This finding adds support to the contention that surgical management of patients with chronic non-specific low back pain is appropriate only in carefully selected cases.[68] Three studies provided low to very low quality evidence that multidisciplinary rehabilitation is more effective than waiting list on pain and disability in the short term.

Strengths and weaknesses

This systematic review was conducted using best practice methods as recommended by the Cochrane Collaboration[6 13]; important decisions on study selection, analyses, and data synthesis were made in advance of the searches being conducted. Risk of bias assessments were conducted independently by two raters and were incorporated into interpretation of the quality of the evidence. These factors, along with the relatively large number of studies and participants, provide confidence in the reported effect estimates. Although the methodological quality of the studies was mixed, sensitivity analyses suggest that effect estimates were not unduly influenced by studies at high risk of bias.

As with any systematic review, a degree of clinical heterogeneity was present among the studies contributing to the pooled estimates. A further weakness is in the measurement and reporting of work outcomes. Work productivity losses account for a large proportion of the indirect costs of chronic low back pain and should arguably be a core outcome in studies in this population. Work absenteeism was inconsistently measured, making definitive conclusions regarding this outcome difficult. The vast majority of the studies were conducted in Europe, and some caution is warranted in applying the results to other healthcare settings.

The comparisons of multidisciplinary rehabilitation with physical treatments for pain and disability had a large degree of statistical heterogeneity, as indicated by the large τ^2 and I^2 statistics. This could be related to the marked heterogeneity among interventions classified as physical treatment, which included passive modalities such as heat and transcutaneous electrical nerve stimulation; aerobic, motor control, and strengthening exercises; and education including back school

programmes. When such considerable heterogeneity exists, the magnitude of effects in individual studies may be very different from the summary (average) effect from the meta-analysis. We based the decision as to which studies should be included in the same meta-analyses on our determination of sufficient clinical homogeneity. As always, the merit of such subjective decisions can be debated. We took the decision to perform and report meta-analyses regardless of statistical heterogeneity but to downgrade the quality of the evidence where substantial heterogeneity was present.

One study with low risk of bias reported an effect size much larger than any of the other included studies.[49] This study compared multidisciplinary rehabilitation with a five week programme involving mobilisation, stretching, strengthening, and motor control exercises, and why it showed such a large effect is not clear. As expected, exclusion of this study from the meta-analyses substantially reduces heterogeneity and the magnitude of the summary effect sizes.

We used the follow-up scores, unadjusted for differences between groups at baseline, for meta-analyses. Although statistical methods such as analysis of covariance can be useful in adjusting for any such imbalances, most included studies did not report sufficient data. We assessed baseline imbalance during the risk of bias assessment and then fed it into our determination of the quality of evidence. Although 10 studies were rated as being at high or unclear risk owing to inadequate baseline comparability, this was not the case for the study with a very large effect mentioned in the previous paragraph. Four of these studies contributed data to the meta-analyses of the primary outcomes, but in most cases the single study effects were close to the pooled estimate. In one case in which the effects were different, the single study contributed less than 8% to the pooled mean effect. Between group differences at baseline seem unlikely to have had a substantial influence on the findings of the meta-analyses.

Interpretation of the finding that multidisciplinary rehabilitation positively influenced work outcomes compared with physical treatment, but not compared with usual care, is difficult. The studies included in the usual care comparison may have enrolled participants with less work impairment, or possibly the provision of physical treatment alone reinforced perceptions of the "sick role" and hampered attainment of occupational goals.

We aimed to tackle two sources of heterogeneity in our subgroup analyses—symptom severity and the intensity of the multidisciplinary rehabilitation intervention. Very few studies recruited a sample that met our a priori threshold for high symptom severity, limiting our ability to draw firm conclusions. The a priori threshold was defined arbitrarily and may have been too high. Although the tested multidisciplinary rehabilitation interventions involved a range of intensity in terms of hours of contact with patients, a pattern of influence whereby more intense programmes were more effective was not clear.

Comparison with other studies

The previous version of this review included 10 randomised controlled trials and concluded that multidisciplinary rehabilitation programmes were effective for pain and disability outcomes and that intensive interventions with functional restoration seemed to provide better outcomes; the evidence was unclear for work outcomes.[11] This review confirmed the effectiveness of multidisciplinary rehabilitation for pain and disability and added robust estimates of the long term effect sizes. However, we could not substantiate the finding that more intensive interventions provided better outcomes. We did not

assess whether the functional restoration approach, rather than intensity, was responsible for the earlier finding. A recent systematic review that sought to directly estimate the influence of dose on the effectiveness of multidisciplinary rehabilitation was also unable to provide a conclusive estimate of the effect of intervention intensity.[69] Thus the optimal dose of multidisciplinary rehabilitation remains unknown.

Other characteristics of multidisciplinary rehabilitation besides total contact time are likely to influence its efficacy. These may include the rehabilitation philosophy or specific model underlying the programme, the relative intensity of individual components of the intervention, and the skills and experience of the clinicians delivering the intervention.

Other recent systematic reviews used levels of evidence syntheses and reported conflicting evidence of the effect on pain, disability, and work outcomes.[70 71] Neither of these reviews did a meta-analysis. Nordlund et al did a quantitative synthesis but included only three studies in their meta-analysis of chronic low back pain.[72] They showed no effect of multidisciplinary rehabilitation on work outcomes. A review that focused directly on dose of multidisciplinary rehabilitation found that it was more effective than control interventions (most commonly usual care or physiotherapy) for short term disability, but the results were conflicting regarding work participation and quality of life.[69] The differences in our findings compared with these reviews are most likely due to the inclusion of different studies. Our review included the largest number of randomised controlled trials and participants, and it is the only one to provide quantitative estimates of the size of the effect of multidisciplinary rehabilitation on the key outcomes of pain, disability, and work absenteeism in the long term.

Implications for practice

Referral of a patient with chronic low back pain for multidisciplinary rehabilitation as opposed to usual care or a physical treatment is likely to confer a benefit in terms of reduced pain and disability that endures beyond one year. Compared with physical treatments, multidisciplinary rehabilitation is also likely to confer a benefit in terms of likelihood of being at work a year later.

These modest effects should be weighed against the monetary costs and time commitments associated with multidisciplinary rehabilitation programmes. Although our subgroup analysis regarding the influence of symptom severity was inconclusive, referring only those patients with major physical and psychological effects of low back pain to multidisciplinary rehabilitation would seem reasonable, given the intervention costs.

Multidisciplinary rehabilitation is an umbrella term applied to programmes that adhere to the biopsychosocial conceptualisation of chronic pain and include more than just a physical treatment. Substantial variation may exist in the approach used by a particular clinic or programme, the intensity of each component, and the skill and experience of the clinicians delivering the programme. Our findings show that a coordinated intervention covering several domains of the biopsychosocial model and delivered by clinicians from different backgrounds is more likely to benefit patients with chronic low back pain in the long term than is usual care or physical treatment alone. We recognise that access to dedicated centres that offer quality multidisciplinary rehabilitation programmes is limited in many healthcare settings.

Unanswered questions

Further trials of multidisciplinary rehabilitation should look at additional unanswered questions, rather than just a comparison with usual care or a physical treatment. These might include determining which patients from the larger population of people with chronic low back pain should be referred, dissecting the effect of components of multidisciplinary rehabilitation, and assessing the long term cost-benefit of the interventions.

Clinical practice guidelines for low back pain recommend screening for psychosocial risk factors for poor outcome and referral to a suitably qualified clinician.[73 74] Although some promising research in this direction has been done in the primary care setting,[75] little good quality information is available on how to identify who will respond best to which treatment.[76 77]

Research into the mechanisms of action of the various treatment components for back pain is also sparse.[78] Smeets et al did a mediation analysis and found that the effect of multidisciplinary rehabilitation versus waiting list was mediated by a reduction in pain catastrophising,[79] but very little other work has been done in the area. Investigation into the mechanism of action has the potential to inform better design of multidisciplinary rehabilitation programmes, including questions about the specific components and disciplines required.

Conclusions

The patients recruited for the studies in this review had chronic low back pain and disability and a generally poor prognosis; in many cases they had already failed a course of conservative treatment. In these patients, multidisciplinary rehabilitation programmes resulted in better outcomes with respect to long term pain and disability compared with usual care (moderate quality evidence) or physical treatments (low quality evidence). These programmes probably also increased the likelihood of patients being at work in the long term compared with physical treatments.

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What is already known on this topic

Multidisciplinary biopsychosocial rehabilitation programmes are widely used for people with chronic low back pain

Published reviews provide conflicting evidence regarding effectiveness of the programmes and do not quantify the size of the effects on key outcomes of pain, disability, and work absence

What this study adds

Based on the largest collection of trials and participants reviewed to date, this study provides robust estimates of the effects of multidisciplinary biopsychosocial rehabilitation programmes

Patients participating in these programmes are likely to gain small, long term benefits in improved pain and disability compared with usual care or physical treatments

They also have increased odds of being at work compared with patients receiving physical treatment

Patients participating in these programmes are likely to have a similar outcome to those receiving surgery but are less likely to experience adverse events

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Figures
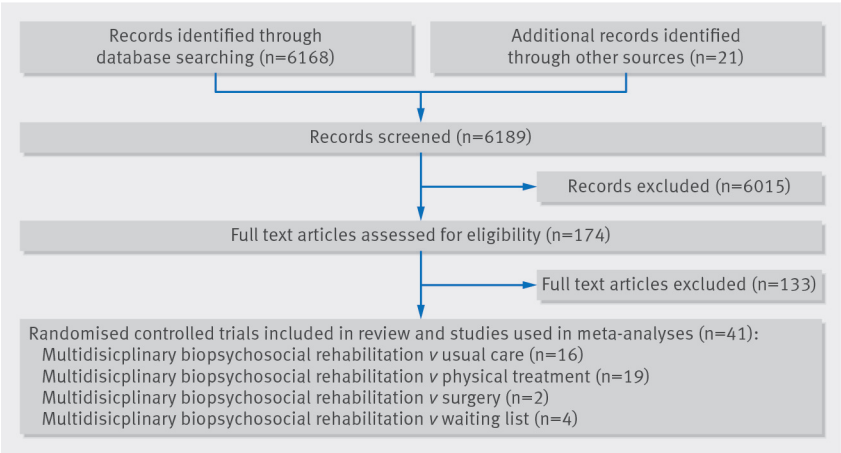
Fig 1 Flow of studies

Fig 2 Risk of bias summary

Study or subgroup	Multidisciplinary biopsychosocial rehabilitation			Usual care			Standardised mean difference, inverse variance, random (95% CI)	Weight (%)	Standardised mean difference, inverse variance, random (95% CI)
	Mean	SD	Total	Mean	SD	Total			
Pain									
Abbassi 2012	3.7	2.5	12	4.3	1.4	11		3.7	-0.28 (-1.10 to 0.54)
Bendix 1996/1998	6.0	2.2	50	6.5	2.2	49		13.3	-0.23 (-0.62 to 0.17)
Lambeek 2010	4.2	2.7	59	4.5	2.7	60		15.4	-0.11 (-0.47 to 0.24)
Linton 2005	2.9	2.0	61	4.1	2.6	47		13.8	-0.52 (-0.91 to -0.14)
Lukinmaa 1989	47.3	20.5	86	44.6	20.5	72		18.7	0.13 (-0.18 to 0.44)
Strand 2001	37.2	20.5	81	42.5	20.5	36		13.4	-0.26 (-0.65 to 0.14)
Von Korff 2005	4.0	2.3	99	4.7	2.1	98		21.6	-0.32 (-0.60 to -0.04)
Total			448			373		100.0	-0.21 (-0.37 to -0.04)

Test for heterogeneity: $\tau^2=0.01$, $\chi^2=7.96$, df=6, P=0.24, $I^2=25\%$

Test for overall effect: z=2.49, P=0.01

Favours multidisciplinary — Favours usual

Study or subgroup	Mean	SD	Total	Mean	SD	Total	Standardised mean difference, inverse variance, random (95% CI)	Weight (%)	Standardised mean difference, inverse variance, random (95% CI)
Disability									
Abbassi 2012	8.8	5.9	12	10.4	6.2	11		4.0	-0.26 (-1.08 to 0.57)
Lambeek 2010	7.5	6.2	59	10.6	6.5	60		17.3	-0.49 (-0.85 to -0.12)
Linton 2005	3.4	4.0	61	4.0	4.7	47		16.1	-0.14 (-0.52 to 0.24)
Lukinmaa 1989	8.0	5.7	86	8.3	5.7	72		21.9	-0.05 (-0.37 to 0.26)
Strand 2001	42	12.9	81	48.8	12.9	36		14.9	-0.52 (-0.92 to -0.13)
Von Korff 2005	8.4	7.0	99	9.1	6.3	98		25.8	-0.10 (-0.38 to 0.17)
Total			398			324		100.0	-0.23 (-0.40 to -0.06)

Test for heterogeneity: $\tau^2=0.01$, $\chi^2=6.20$, df=5, P=0.29, $I^2=19\%$

Test for overall effect: z=2.70, P=0.007

Favours multidisciplinary — Favours usual

Study or subgroup	Events	Total	Events	Total	Odds ratio, Mantel-Haenszel, random (95% CI)	Weight (%)	Odds ratio, Mantel-Haenszel, random (95% CI)
Work							
Bendix 1996/1998	26	50	25	49		13.8	1.04 (0.47 to 2.29)
Linton 2005	57	61	36	43		6.2	2.77 (0.76 to 10.14)
Lukinmaa 1989	70	86	61	72		12.6	0.79 (0.34 to 1.83)
Mitchell 1994	214	271	211	271		28.9	1.07 (0.71 to 1.61)
Skouen 2002	35	57	40	86		16.8	1.83 (0.93 to 3.62)
Strand 2001	38	81	21	36		13.7	0.63 (0.29 to 1.40)
Von Korff 2005	89	99	93	98		8.1	0.48 (0.16 to 1.46)
Total	529	705	487	655		100.0	1.04 (0.73 to 1.47)

Test for heterogeneity: $\tau^2=0.06$, $\chi^2=8.65$, df=6, P=0.19, $I^2=31\%$

Test for overall effect: z=0.21, P=0.83

Favours usual — Favours multidisciplinary

Fig 3 Multidisciplinary rehabilitation versus usual care in long term

Study or subgroup	Multidisciplinary biopsychosocial rehabilitation			Physical treatment			Standardised mean difference, inverse variance, random (95% CI)	Weight (%)	Standardised mean difference, inverse variance, random (95% CI)
	Mean	SD	Total	Mean	SD	Total			
Pain									
Bendix 1995/1998	3.3	2.6	38	5.3	2.6	31		11.3	-0.76 (-1.25 to -0.27)
Bendix 2000	5.1	2.6	48	5.7	2.6	50		11.7	-0.23 (-0.63 to 0.17)
Kaapa 2006	3.6	2.7	53	3.4	2.5	54		11.7	0.08 (-0.30 to 0.46)
Mangels 2009	16.3	5.7	111	17.3	6.1	131		12.1	-0.17 (-0.42 to 0.08)
Monticone 2013	1.4	1.1	45	5.3	1.2	45		10.5	-3.41 (-4.07 to -2.76)
Nicholas 1991	2.7	1.1	9	3.2	0.7	11		9.1	-0.61 (-1.52 to 0.29)
Roche 2007/2011	2.9	2.4	64	3.5	2.3	48		11.8	-0.25 (-0.63 to 0.12)
Smeets 2006/2008	52.9	24.5	53	47.2	27.5	51		11.7	0.21 (-0.17 to 0.60)
Turner 1990	18.2	13.3	14	14.9	7.9	16		10.1	0.30 (-0.43 to 1.02)
Total			435			437		100.0	-0.51 (-1.04 to 0.01)

Test for heterogeneity: $\tau^2=0.58$, $\chi^2=104.71$, df=8, P<0.001, $I^2=92\%$

Test for overall effect: z=1.90, P=0.06

Favours multidisciplinary — Favours physical

Study or subgroup							Standardised mean difference, inverse variance, random (95% CI)	Weight (%)	Standardised mean difference, inverse variance, random (95% CI)
	Mean	SD	Total	Mean	SD	Total			
Disability									
Alaranta 1994	29.4	23.5	149	35.5	24.8	138		11.0	-0.25 (-0.48 to -0.02)
Henchoz 2010	26.2	18.0	49	38.0	18.4	25		10.2	-0.64 (-1.14 to -0.15)
Kaapa 2006	18.9	12.2	53	18.5	12.4	54		10.6	0.03 (-0.35 to 0.41)
Mangels 2009	22.6	16.0	111	20.6	13.5	131		11.0	0.14 (-0.12 to 0.39)
Monticone 2013	1.3	1.6	45	11.0	2.0	45		8.4	-5.32 (-6.21 to -4.42)
Nicholas 1991	12.8	8.6	9	25.2	8.1	11		7.9	-1.42 (-2.43 to -0.42)
Roche 2007/2011	31.4	22.9	64	39.1	21.9	49		10.6	-0.34 (-0.72 to 0.03)
Smeets 2006/2008	11.8	5.8	53	10.9	5.7	51		10.6	0.14 (-0.24 to 0.53)
Streibelt 2009	27.7	16.5	55	31.1	16.5	47		10.6	-0.20 (-0.59 to 0.19)
Turner 1990	4.8	3.4	14	4.7	7.9	16		9.2	0.00 (-0.71 to 0.72)
Total			602			567		100.0	-0.68 (-1.19 to -0.16)

Test for heterogeneity: $\tau^2=0.61$, $\chi^2=146.28$, df=9, P<0.001, $I^2=94\%$

Test for overall effect: z=2.57, P=0.01

Favours multidisciplinary — Favours physical

Study or subgroup	Events	Total	Events	Total	Odds ratio, Mantel-Haenszel, random (95% CI)	Weight (%)	Odds ratio, Mantel-Haenszel, random (95% CI)
Work							
Alaranta 1994	134	149	116	138		18.3	1.69 (0.84 to 3.42)
Bendix 1995/1998	34	38	18	31		5.7	6.14 (1.75 to 21.60)
Bendix 2000	36	48	35	51		11.6	1.37 (0.57 to 3.31)
Henchoz 2010	31	40	21	27		6.6	0.98 (0.30 to 3.18)
Kaapa 2006	33	53	30	54		15.1	1.32 (0.61 to 2.86)
Kool 2007	49	82	35	84		23.6	2.08 (1.12 to 3.86)
Roche 2007/2011	60	64	41	48		5.4	2.56 (0.70 to 9.31)
Streibelt 2009	35	54	19	45		13.6	2.52 (1.12 to 5.69)
Total	412	528	315	478		100.0	1.87 (1.39 to 2.53)

Test for heterogeneity: $\tau^2=0.00$, $\chi^2=6.78$, df=7, P=0.45, $I^2=0\%$

Test for overall effect: z=4.09, P<0.001

Favours physical — Favours multidisciplinary
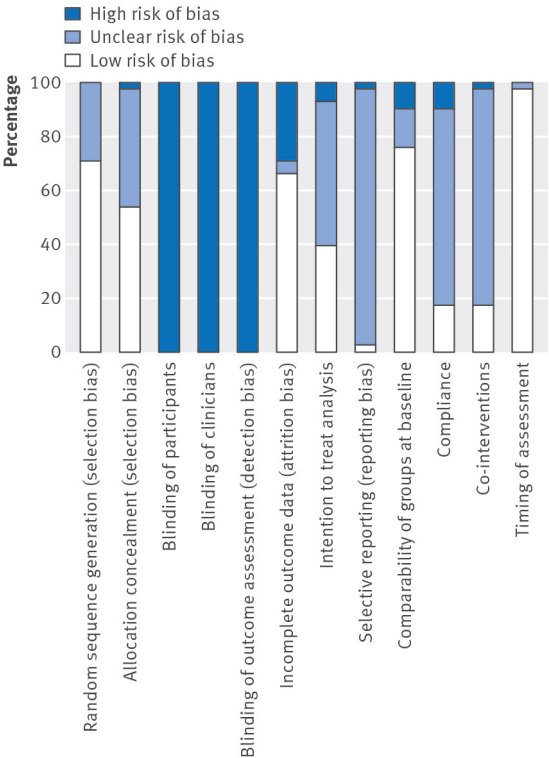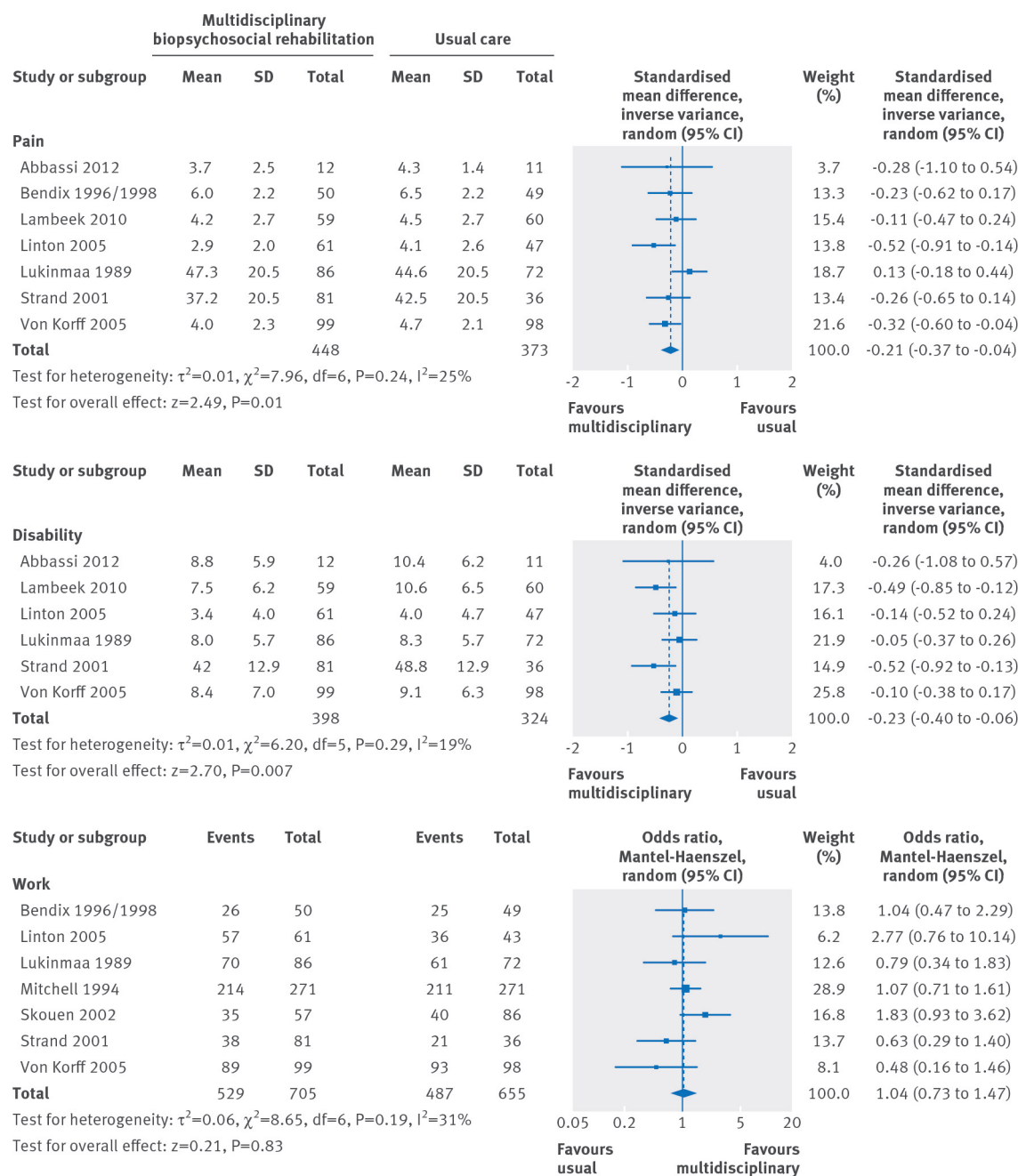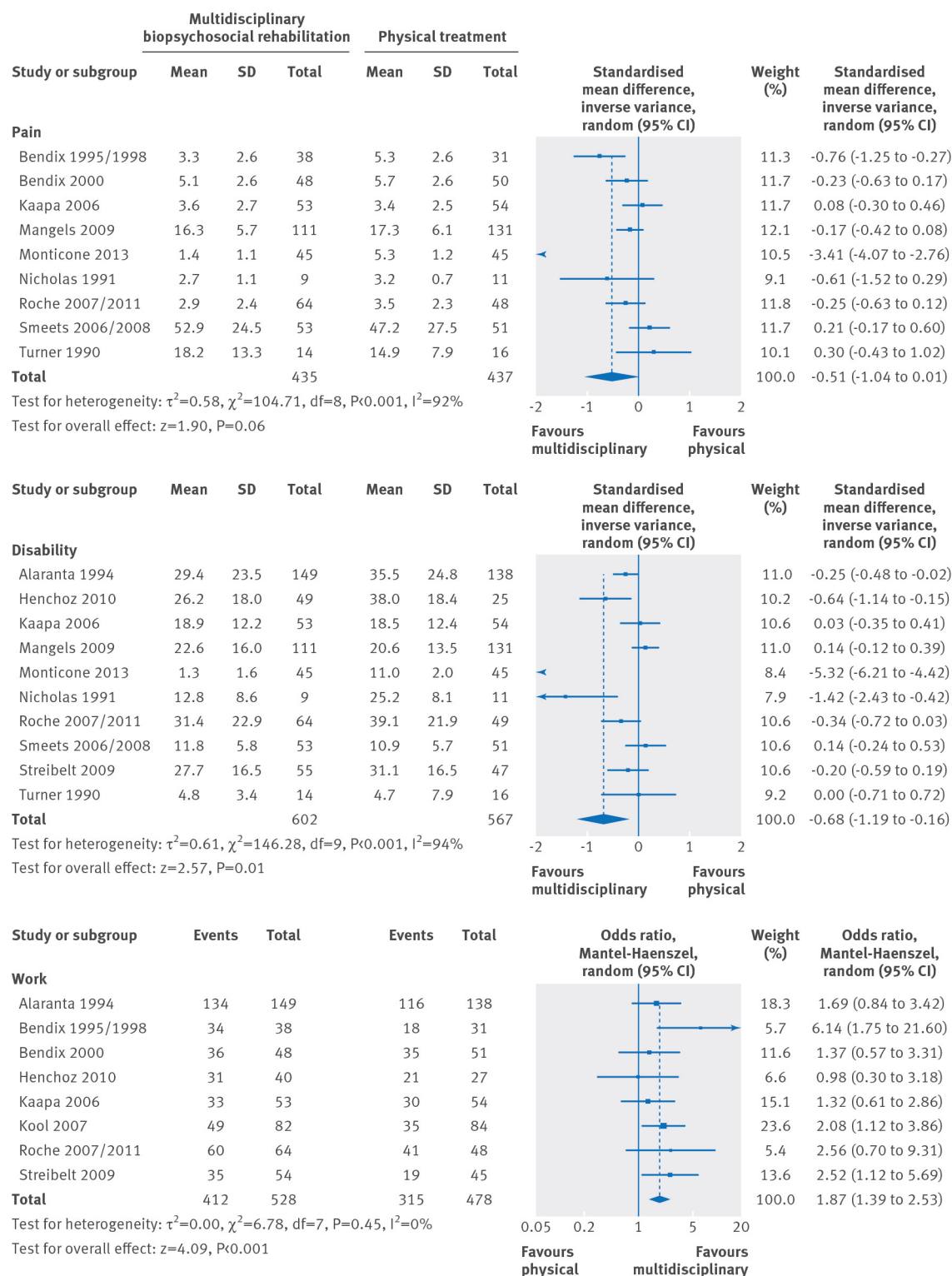
Fig 4 Multidisciplinary rehabilitation versus physical treatment in long term