Effective Delivery Styles and Content for Self-management Interventions for Chronic Musculoskeletal Pain

A Systematic Literature Review

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Objectives: The objective of the study was to report the evidence for effectiveness of different self-management course characteristics and components for chronic musculoskeletal pain.

Methods: We searched 9 relevant electronic databases for randomized, controlled trials (RCTs). Two reviewers selected studies against inclusion criteria and assessed their quality. We classified RCTs according to type of course delivery (group, individual, mixed or remote), tutor (healthcare professional, lay or mixed), setting (medical, community or occupational), duration (more or less than 8 weeks), and the number and type of components (psychological, lifestyle, pain education, mind body therapies, and physical activity). We extracted data on pain intensity, physical function, self-efficacy, global health, and depression and compared these outcomes for self-management and usual care or waiting list control. We used random effects standardized mean difference meta-analysis. We looked for patterns of clinically important and statistically significant beneficial effects for courses with different delivery characteristics and the presence or absence of components across outcomes over 3 follow-up intervals.

Results: We included 46 RCTs (N = 8539). Group-delivered courses that had healthcare professional input showed more beneficial effects. Longer courses did not necessarily give better outcomes. There was mixed evidence of effectiveness for components of courses, but data for courses with a psychological component showed slightly more consistent beneficial effects over each follow-up period.

Discussion: Serious consideration should be given to the development of short (<8 weeks) group and healthcare professional-delivered interventions but more research is required to establish the most effective and cost-effective course components.

Key Words: chronic pain, self-management, characteristics, components, systematic review

The growing worldwide burden of chronic conditions, including chronic pain, is well recognized.[1–3] One response to this burden has been a recognition of the importance of promoting and improving the way patients self-manage their conditions,[4–6] resulting in a proliferation of self-management education interventions.[7] In the absence of a universally agreed definition of self-management, the US Institute of Medicine has proposed that self-management is "the tasks that individuals must undertake to live with 1 or more chronic conditions. These tasks include having the confidence to deal with medical management, role management, and emotional management of their conditions."[8] This holistic definition of self-management suggests that interventions aimed at improving self-management may require several different components.

Among people experiencing chronic musculoskeletal pain, or chronic conditions whose principal symptom is pain, previous systematic reviews have identified that psychological approaches (such as cognitive-behavioral therapy)[9,10] and exercise and activity[10,11] are beneficial, whereas patient education on its own has minimal or no effect,[12,13] and data for mind-body therapies (such as relaxation) are equivocal.[14,15] Self-management education courses or programs, for chronic musculoskeletal pain may combine some or all of these approaches, but the evidence to date suggests that the overall effects of such courses are modest.[16,17]

As the contents and characteristics of interventions promoting self-management for chronic pain vary considerably, we argue that there is a need to determine which components and course characteristics of these complex interventions[18] are most likely to be beneficial. To date, there have been few attempts to dissect the functional detail of multicomponent, self-management programs for chronic pain.[19,20] The aim of this study was to review the literature to examine the effectiveness of different components within multicomponent courses, or "programs," for chronic musculoskeletal pain systematically, and to identify the optimal means of course delivery (or characteristics) to inform future course design and improve outcomes.

METHODS

Literature Search

We searched MEDLINE, EMBASE, PsychINFO, CINAHL, AMED, the Social Sciences Citation Index and the Cochrane Library (Cochrane Database of Systematic Reviews, Database of Abstracts of Reviews of Effects, and the Cochrane Central Register of Controlled Trials). As understanding of both self-management and chronic pain has changed significantly in recent years, our search was limited to the last 15 years (January 1994 to April 2009). We designed a filter to identify randomized, controlled trials (RCTs) and systematic reviews based on those used by the Scottish Intercollegiate Guidelines Network.[21]

We based our search strategies on MeSH indexing terms and free text terms. Search terms included chronic musculoskeletal pain, back pain, neck pain, shoulder pain, knee pain, hip pain, fibromyalgia, and osteoarthritis. These were combined with searches using self-management, self-care, self-efficacy, self-help, self-improvement, patient education, patient teaching, patient training, expert patient, lay-led, peer-led, and professionally-led. We used alternative spellings and truncations as appropriate. We also tracked citations in identified systematic reviews. Only studies published in English were included.

Inclusion Criteria

Two reviewers (K.H. and C.M.) shared the sifting of titles and abstracts according to the inclusion criteria. We checked interrater reliability on a random sample of 10% of the studies with a third reviewer (D.C.) resolving any disagreement (2 papers only).

Study Design

We included peer-reviewed published articles of RCTs.

Study Population

The primary condition was chronic musculoskeletal pain in adults (≥ 18 years). We defined chronic as pain lasting longer than 3 months.[22] We included studies with participants who had unexplained pain manifesting in the musculoskeletal system, osteoarthritis, or fibromyalgia. We excluded studies exclusively concerned with rheumatoid arthritis because this inflammatory condition is treated differently. Where studies included patients with a mixture of chronic conditions, we only included those studies where at least of 80% of participants had chronic musculoskeletal pain.

Intervention

We defined a self-management program as a structured, taught, or self-taught course with distinct components principally aimed at patients (rather than carers) with the goal of improving the participants' health status or quality of life by teaching them skills to apply to everyday situations.

The program had to contain at least 2 components from the following 5 groups identified and agreed by our steering group: psychological (including behavioral or cognitive therapy), mind-body therapies (including relaxation, meditation, or guided imagery), physical activity (including any form of exercise), lifestyle (such as dietary advice and sleep management), and pain education (such as understanding their condition and how to take medication effectively). We identified components using investigators descriptions of interventions from their published reports and classified course content into the 5 groups by consensus. We excluded studies in which the course components were single-component interventions such as psychotherapy, simple patient education leaflets, manual therapy, acupuncture, and other passive treatments, or studies in which they were not clearly described. We considered the effectiveness of self-management courses against waiting list control patients or usual care. Studies that only compared 2 or more active interventions were excluded.

Outcome Measures

We included the following outcomes: pain intensity, physical function, general mental health, depression, anxiety, social function, healthcare use, global health measures, self-efficacy, and quality of life, but only examined outcome measures with published evidence of validity and reliability.

Quality Assessment

Two reviewers (K.H. and C.M.) quality assessed the studies. Interrater reliability was checked on a random sample of 10% of the studies, no disagreements were noted. We assessed the risk of bias by examining randomization method, allocation concealment, attrition, masked outcome assessment, and intention-to-treat analyses as recommended in the Cochrane handbook.[23] We considered studies, in our selected sample, that met 4 criteria or more to be of higher quality and those that met 3 or less to be of lower quality. We rejected RCTs using pseudorandomization methods and those described as pilot studies.

Data Extraction

We extracted data on country, population, sample size, setting (classified as medical, community, or occupational), delivery mode (classified as group, individual, mixed, or remote, that is, internet, mail, telephone), course leader [healthcare professional (HCP), lay person or a combination], and duration.

For each included study, we identified and grouped the intervention components into 1 of the 5 category groupings described above. We extracted final value data and change from baseline scores for the intervention arm and the control arm for each of our included outcomes and grouped them into 3 follow-up intervals: short-term (<4 months), medium-term (4 to 8 months), and long-term (>8 months). Where some studies had more than 1 type of self-management intervention arm, we included both arms in the meta-analyses. This meant that there was some double counting for the sample size in the control arms (for self-efficacy and depression in the short-term). This inclusive approach can result in unit of analysis of errors[23] so we tested the impact of including the multiple study arms by performing a sensitivity analysis excluding these studies. We also conducted sensitivity analyses for high-quality and low-quality RCTs and for studies using final value data and change from baseline data.

Data Analysis

We grouped studies by characteristic (delivery mode, course leader, course setting, duration), and components/content (courses with and without psychological approaches, pain education, lifestyle guidance, physical activity, and MBTs) at each of 3 follow-up intervals, short-term (<4 months), medium- (between 4 and 8 months), and long-term (>8 months). We produced a pooled "effect size" for each outcome across studies by combining the final

value data in the intervention and control arm for each study and calculating standardized mean differences (SMD) using Review Manager v 5 software (Hedges' adjusted g). We took a simple pragmatic approach to this meta-analysis by exploring the effects of the presence or absence of different courses components and characteristics on outcomes by comparing the pooled SMDs for studies over the 3 follow-up periods.

The pooled SMDs were interpreted using Cohen's *d* proposal in which an effect size of <0.2 is considered minor, ≥ 0.2 to 0.5 is considered small, ≥ 0.5 to 0.8 is considered moderate, and Z0.8 is considered large.[24] To assess heterogeneity or variability between studies, I^2 statistics were interpreted following the recommendations in the Cochrane Handbook,[23] in which $I^2 \geq 50\%$, with a statistically significant *P* value of <0.05 for the w^2 test, indicates substantial to considerable heterogeneity.

Assessment of Potential Publication Bias

We generated a funnel plot (scatter diagram) of SMDs against the standard error for the SMD to illustrate data distribution and explore potential publication bias.

RESULTS

Studies Selected

We identified 67 RCTs testing self-management programs compared with a waiting-list or usual-care control group with 53 (N = 11,170 participants) of these reporting outcome data. Seven studies (N = 2631) reported change from baseline scores and 46 (N = 8539) provided final value data (Fig. 1 and Table 1).

We fully analyzed final value data for each of our 5 outcomes to maximize our yield for analysis for each of our different characteristics and components. We performed a sensitivity analysis on the most commonly reported outcomes (pain intensity and self-efficacy) to examine the difference between meta-analyses using the studies reporting change scores against studies using final value data. We found the patterns of effect sizes to be similar.

Of the 46 studies reporting final value scores, 18 RCTs were from North America, 22 from Europe, 3 from Asia, 2 from the Middle East, and 1 study from South America. Of these studies, 13 of 46 (28%) were for osteoarthritis (hip or knee), 12 (26%) were for low back pain, 5 (11%) were for fibromyalgia, and the remaining 17 (35%) were for for mixed chronic pain conditions. The mean age of partici-

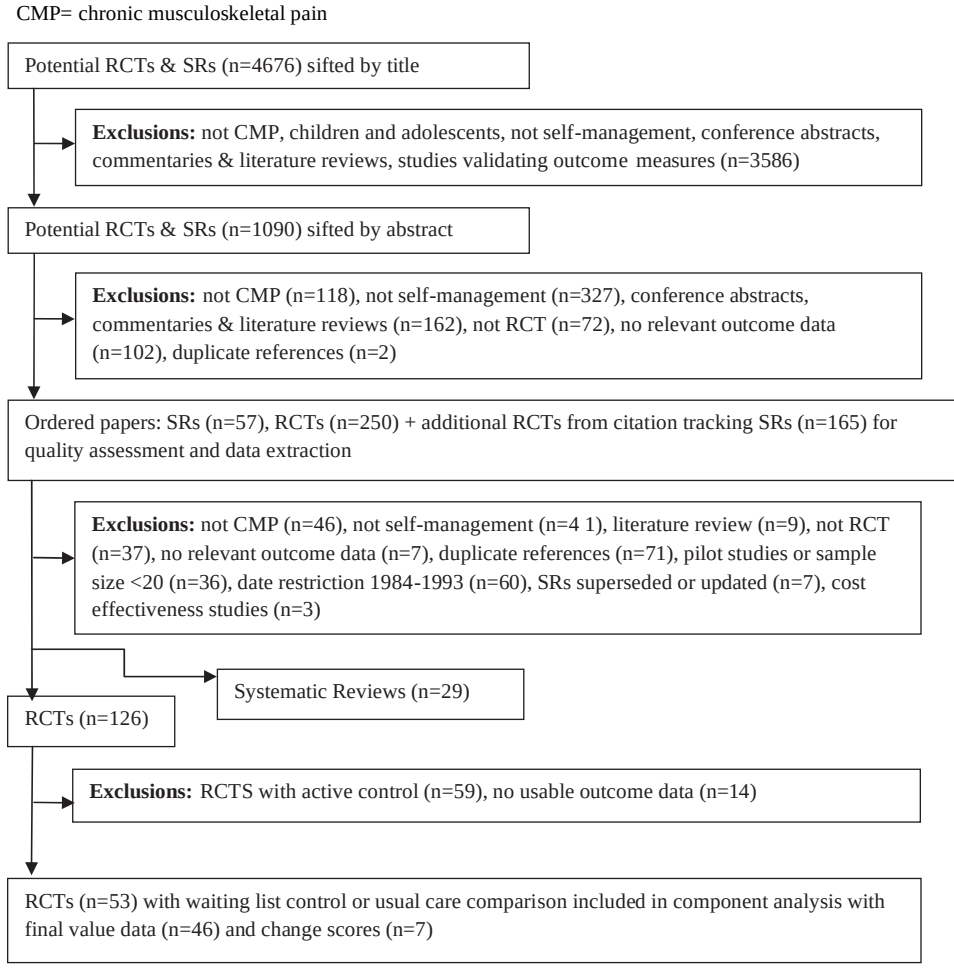

FIGURE 1. Study flow chart: selection of systematic reviews (SRs) and randomized, controlled trials (RCTs) following database search. CMP indicates chronic musculoskeletal pain.

pants in the 44 studies reporting age was 55 years (range, 38 to 82 years). In the 41 studies reporting sex, 72% of participants were female.

Quality Assessment

Eleven of the 46 studies were considered of higher quality than the rest. We performed a sensitivity analysis comparing higher quality to lower quality studies for our 5 outcomes of interest. The analysis showed some evidence of reduced effect size among the higher quality studies compared with the lower quality studies, but the direction of effects were unchanged.

Effect Sizes

We meta-analyzed data for the effect sizes for the most commonly reported outcomes (pain intensity, physical function, self-efficacy, global health status, and depression) and we present SMD values for effect sizes (with 95% confidence intervals) that were statistically significant and "small" or more. There were many comparisons where there were no statistically significant or only minor detectable significant differences in effect size between intervention and control arms and many comparisons were not possible because there were no data. None of our analyses showed the control group to be superior to the intervention group. Our results are summarized in Tables 2 and 3 and described below for each of our selected areas of interest for course characteristics and course components. Detailed tables can be accessed in the supplemental data available online (Supplemental Digital Content 1, http://links.lww.com/CJP/A26, and Supplemental Digital Content 2, http://links.lww.com/CJP/A27).

Effect Sizes for Course Delivery Mode

Twenty-seven (57%) of the studies involved group interventions, 5 of 46 (11%) involved remote interventions, and 5 involved individually delivered interventions, whereas the remaining 9 (20%) studies involved a mix of both group-delivered and individually delivered interventions (Table 1). There was evidence that courses delivered to groups had statistically significant beneficial effects compared with control for pain intensity and self-efficacy across all time points, although data were sparse for other delivery methods (Table 2).

Effect Sizes for Type of Course Leader

The majority 36 of 46 (78%) of courses were delivered by HCPs, 6 of 46 (13%) were delivered by a combination of HCPs and lay people, and 4 (9%) were exclusively lay-led (Table 1). In the short term, there was evidence that courses led by HCPs showed statistically significant beneficial effects for pain intensity, physical function, and self-efficacy (Table 2).

Effect Sizes for Course Setting

Twenty-seven (59%) studies were held in medical settings, 16 of 46 (35%) studies were held in community settings, and 3 studies (7%) were conducted in occupational settings (Table 1). There was evidence of benefit for courses held in medical settings for all outcomes in the short term. Courses in community settings showed statistically significant beneficial effects for self-efficacy across all time points. Occupational settings were too rarely reported to make inferences about their effect (Table 2).

Effect Sizes for Course Duration

The majority of the courses lasted 8 weeks or less (74%), whereas 12 of 46 studies lasted longer (Table 1). There was more evidence of benefit for courses of less than 8 weeks than for those of more than 8 weeks (Table 2).

Effectiveness of Self-management Courses That Include a Psychological Component

Caution with the interpretation of results is required as most, 38 (82%), of the included studies examined the effect of an intervention with a psychological component. There was evidence of benefit in having a psychological component across most outcomes in the short and medium-term (Table 3).

Effectiveness of Self-management Courses That Include a Lifestyle Component

The majority of study interventions (85%) included a lifestyle component (Table 1). The data illustrated statistically significant beneficial effects both with and without lifestyle components for most outcomes in the short-to-medium term apart from depression (Table 3).

Effectiveness of Self-management Courses That Include a Pain Education Component

Most, 35 (76%), interventions included a pain education component (Table 1). In the short term, self-management was favored for most outcomes irrespective of the presence of a pain education component, but in the medium-term there was more evidence in favor of including it (Table 3).

Effectiveness of Self-management Courses That Include a Physical Activity Component

As with the previous components, the distribution of studies was heavily weighted toward courses with a physical activity component (87%), so little can be inferred from the pattern of effect sizes for each outcome (Table 3).

Effectiveness of Self-management Courses That Include a Mind-Body Therapy Component

Twenty-six (57%) of the included studies had a mind-body therapy component (Table 1). The majority of comparisons show no statistically significant or minor differences between courses with and without mind-body therapies, but most evidence of benefit was seen for courses without this component (Table 3).

Studies With More Than 1 Self-management Study Arm

Two studies had more than 1 intervention arm and we included both arms in the meta-analyses.[45,67] Our sensitivity analysis showed that the removal of these studies did not alter our conclusions.

Heterogeneity and Publication Bias

Overall reasonable heterogeneity was shown, but substantial heterogeneity was shown in 23% of the different subgroup group effect size analyses in which heterogeneity was calculable (37 of 164). The funnel plot symmetry suggested publication bias was unlikely and that no further exploration was needed to explain the distribution of our standardized mean differences (N = 26 studies).

TABLE 1. Study Characteristics of RCTs Included in the Final Value Data Meta-analysis

Study	Country	Population	Total N	Self-management Components	Ctrl arm	Course Delivery Mode	Course Leader
Alp et al[25]	Turkey	Osteoporosis	50	P+PA+LS+ED	UC	Group	HCP+Lay
Basler et al[26]	Germany	LBP	94	P+M+PA+LS+ED	UC	Group	HCP
Bernaards et al[27]	Netherlands	Upper limb pain	314	P+PA+LS	UC	Group	HCP
Brattberg [28]	Sweden	Mixed pain	60	P+LS	WLC	Remote	HCP+Lay
Buhrman et al[29]	Sweden	LBP	56	P+M+PA+LS	WLC	Remote	HCP
Cedraschi et al[30]	Switzerland	Fibromyalgia	164	P+M+PA+LS	WLC	Group	HCP
Corey et al[31]	Canada	Mixed pain	200	P+M+PA+LS+ED	UC	Group	HCP
Currie et al[32]	Canada	Mixed pain	60	P+M+LS	WLC	Group	HCP
Dworkin et al[33]	USA	TMD	124	P+M+LS+ED	UC	Individual	HCP
Ersek et al[34]	USA	Mixed pain	256	P+M+PA+LS+ED	UC	Group	HCP
Fries et al[35]	USA	OA+RA	809	M+PA+LS+ED	WLC	Remote	HCP
Haas et al[36]	USA	LBP	109	P+M+PA+LS+ED	WLC	Group	Lay
Haldorsen et al[37]	Norway	Mixed pain	469	P+M+PA+LS+ED	UC	Grp+Indiv	HCP
Haugli et al[38]	Norway	Mixed pain	174	P+M+PA+ED	UC	Group	HCP
Heuts et al[39]	Netherlands	OA	273	P+M+PA+LS+ED	UC	Group	HCP
Hopman-Rock and Westhoff [40]	Netherlands	OA	120	P+M+PA+LS+ED	UC	Group	HCP
Hughes et al[41]	USA	OA	150	P+PA	UC	Group	HCP+Lay
Hurley et al[42]	UK	Knee	418	P+M+PA+LS+ED	UC	Grp+Indiv	HCP
Johnson et al[43]	UK	LBP	234	P+M+PA+LS+ED	UC	Group	HCP
Keller et al[44]	Germany	LBP	65	P+M+PA+ED	WLC	Grp+Indiv	HCP
King et al[45]	Canada	Fibromyalgia	124	P+PA+LS+ED P+LS+ED	WLC	Group	HCP
Laforest et al[46]	Canada	OA+RA	113	P+M+LS+ED	WLC	Individual	HCP
LeFort et al[47]	Canada	Mixed pain	110	P+M+PA+LS+ED	WLC	Group	HCP
Li et al[48]	China	Mixed pain	64	P+LS+ED	WLC	Grp+Indiv	HCP
Lonn et al[49,50]	Norway	LBP	81	PA+LS+ED	UC	Group	HCP
Lorig et al[51]	USA	OA+RA	855	P+M+PA+LS+ED	UC	Remote	Lay
Mannerkorpi et al[52]	Sweden	Fibromyalgia	69	P+M+PA+LS+ED	UC	Group	HCP
Martire et al[53]	USA	OA	143	P+PA+ED	UC	Group	Lay
Mazzuca et al[54]	USA	OA	211	P+PA+LS+ED	UC	Individual	HCP
Mazzuca et al[55]	USA	OA	186	PA+LS+ED	WLC	Individual	HCP
Moore et al[56]	USA	LBP	266	P+PA+LS+ED	UC	Grp+Indiv	HCP
Nuñez et al[57]	Spain	OA	100	P+PA+LS	UC	Grp+Indiv	HCP
Oliver et al[58]	USA	Fibromyalgia	400	P+M+PA+LS+ED	UC	Group	HCP+Lay
Pariser and O'Hanlon 2005[59]	USA	OA	92	P+M+PA+LS+ED	UC	Remote	HCP
Quilty et al[60]	UK	OA	87	PA+LS	UC	Individual	HCP
Ribeiro et al[61]	Brazil	LBP	60	PA+ED	UC	Group	HCP
Smeets et al[62]	Netherlands	LBP	111	P+PA	WLC	Grp+Indiv	HCP
Tak et al[63]	Netherlands	OA	109	PA+LS	UC	Grp+Indiv	HCP
Tavafian et al[64]	Iran	LBP	102	P+M+PA+LS+ED	UC	Group	HCP
Van der Hulst et al[65]	Netherlands	LBP	163	P+PA	WLC	Group	HCP
Victor et al[66]	UK	OA	193	P+M+PA+LS+ED	WLC	Grp+Indiv	HCP
Vlaeyen et al[67]	Netherlands	Fibromyalgia	131	P+M+PA+LS M+PA+LS	WLC	Group	HCP
Von Korff et al[68]	USA	LBP	255	P+PA+LS+ED	UC	Group	Lay
Williams et al[69]	UK	Mixed pain	78	P+M+PA+LS+ED	WLC	Group	HCP
Yip et al[70]	China	OA	182	PA+LS+ED	UC	Group	HCP+Lay
Yip et al[71]	China	OA	95	PA+LS+ED	UC	Group	HCP+Lay

Comm indicates community; D, depression; ED, pain education; F, functional capability; FU, follow-up interval; GH, global health status; HCP, healthcare professional; Indiv, individual; LBP, low back pain; LS, lifestyle; LT, long-term; M, mind-body therapy; MT, medium-term; NS, no statistically significant difference between self-management and control; OA, osteoarthritis; Occup, occupational; P, psychological; PA, physical activity; PI, pain intensity; RA, rheumatoid arthritis; SE, self-efficacy; ST, short-term; TMD, temporomandibular disorder; UC, usual care; WLC, waiting-list control.

DISCUSSION

We carried out a rigorous meta-analysis and identified some features that characterized the most effective programs. Our novel approach enabled us to extrapolate the features associated with better outcomes, although we do not claim that we have produced an exhaustive list and we also acknowledge that there is a clear need for further methodological research in this area. Sparse data for some outcomes illustrated the difficulties ascertaining the influence of particular characteristics or components and classifying components from author descriptions was also challenging.

Overall, we found that courses in a group setting that were HCP led, less than 8 weeks duration with a psychological component showed more beneficial effects for different outcomes and, or, had stronger beneficial effect sizes.

TABLE 1. (*continued*)

Course Setting	Course Duration	FU	Outcomes Reported	QA Score
Medical	5 wk	ST MT	PI, F, GH PI, F, GH	2
Medical	12 wk	MT	PI	1
Occup	24 wk	MT LT	PI PI	2
Comm	20 wk	ST LT	PI, F, D, GH D	1
Comm	8 wk	ST	PI, SE, D	2
Medical	6 wk	MT	F, GH	3
Medical	4 wk	LT	PI	2
Medical	7 wk	ST	PI, D	3
Medical	6 wk	ST MT LT	PI PI PI	2
Comm	7 wk	ST MT LT	PI, F, SE, D PI, F PI, F, SE, D	2
Comm	52 wk	MT	PI, F	2
Comm	6 wk	MT	PI, SE, GH	4
Medical	4 wk	LT	PI	3
Occup	45 wk	ST LT	PI, SE PI, SE	2
Medical	6 wk	LT	PI, SE, GH	4
Medical	6 wk	ST MT	PI PI	2
Comm	8 wk	ST MT LT	PI, F, SE PI, F, SE PI, F, SE	2
Medical	6 wk	MT	PI, F, D	4
Comm	6 wk	ST LT	PI, F PI, F	3
Medical	6 wk	ST	PI, F, D	1
Comm	12 wk	ST	SE	4
Comm	6 wk	ST	PI	3
Comm	6 wk	ST	PI, F, SE, D, GH	3
Occup	3 wk	ST	PI, F, GH	3
Medical	13 wk	LT	PI	3
Comm	6 wk	MT LT	PI, F, SE PI, F, SE	2
Comm	24 wk	MT	PI, F, SE, D, GH	2
Comm	6 wk	ST MT	PI, F, SE, D PI, F, SE, D	2
Medical	6 wk	MT LT	PI, F PI, F	2
Medical	4 wk	ST MT LT	PI, F PI, F PI, F	1
Medical	3 wk	ST MT LT	F F F	2
Medical	12 wk	LT	PI, F, GH	2
Comm.	52 wk	LT	SE, D	1
Comm	6 wk	ST	PI, SE	0
Comm	10 wk	MT LT	PI, F PI, F	4
Medical	5 wk	ST MT	PI, F, D, GH PI, F, D, GH	4
Medical	10 wk	ST	PI, F, D	5
Medical	8 wk	ST	PI	4
Medical	4 d	ST	PI, F, GH	2
Medical	7 wk wk	ST MT	F F	3
Medical	4 wk	ST LT	PI, F, GH PI, F, GH	2
Medical	6 wk	ST	D	1
Medical	4 wk	ST MT LT	F F F	3
Medical	8 wk	ST	PI, SE, D	3
Medical	6 wk	ST MT	PI, F, SE PI, F, SE	4
Medical	6 wk	ST MT LT	PI, F, SE, GH PI, F, SE, GH PI, F, SE, GH	4

We surmise that group delivery may build confidence, increase social interaction and integration into society, but other systematic reviews have indicated individual approaches can also show good outcomes.[13,72,73] Previous research also supports our finding that courses with HCP involvement show beneficial effects particularly for pain outcomes.[72,74] Our findings about setting were inconclusive; it may be that other factors such as familiarity or convenience for public transport and car parking are more important. Our analyses suggested that short courses may be more effective than longer ones, but evidence from other studies support both long-term and short-term programs.[16,75,76] If there is little difference in outcome between long and short courses, financially it would be sensible to opt for shorter duration ones. We would have liked to explore the effect of contact hours and attendance, but these data were generally poorly reported. Contact time was often given as ranges or as minimum or maximum contact hours; and most studies did not report attendance rates or, if they did, reported them in different ways making comparison difficult. We know that attendance is an issue for self-management programs,[17] and we hypothesize that shorter courses may have better attendance, thus giving greater learning opportunities and increasing the potential to motivate and activate participants. In the field of mental health research, there is

TABLE 2. Delivery Methods That Showed Beneficial Outcomes for Self-management Against Control

Duration of Effect	Outcome	Course Delivery Mode				Course Leader	
		Group	Individual	Mixed	Remote	HCP led	Lay led
Short-term, <4 mo	Pain intensity	0.24 (0.12,0.35)	NS	0.59 (0.03,1.15)	NS	0.27 (0.14,0.39)	NS
	Physical function	0.25 (0.09,0.40)	NS #	NS	NS #	0.28 (0.10,0.47)	NS
	Self-efficacy	0.37 (0.25,0.50)	—	—	NS	0.38 (0.23, 0.52)	0.37 # (0.03,0.71)
	Global health	0.45 (0.17, 0.73)	—	NS	0.61 # (0.07,1.15)	NS	—
	Depression	Minor	—	NS #	NS	NS	NS #
Medium-term, 4-8 mo	Pain intensity	0.25 (0.02, 0.47)	0.20 (0.02, 0.37)	0.29 # (0.06, 0.51)	0.22 (0.12, 0.32)	Minor	Minor
	Physical function	Minor	NS	0.26 (0.09, 0.44)	Minor	Minor	Minor
	Self-efficacy	0.29 (0.08, 0.50)	—	—	0.29 # (0.13, 0.44)	0.37 (0.16, 0.59)	NS
	Global health	0.54 (0.21, 0.88)	—	—	Minor	0.67 (0.20, 1.15)	Minor
	Depression	NS	—	NS #	—	NS	NS #
Long-term, >8 mo	Pain intensity	0.20 (0.04, 0.36)	NS	NS	NS #	Minor	Minor
	Physical function	Minor	NS	NS	Minor	NS	Minor
	Self-efficacy	0.23 (0.10, 0.35)	—	—	0.29 # (0.13, 0.44)	0.25 (0.10, 0.40)	0.29 # (0.13, 0.44)
	Global health	NS	—	NS	NS #	NS	NS #
	Depression	NS	—	—	NS #	NS #	—

Effect size: Pooled random effect SMD (confidence interval 95%).

# indicates data from one study only; —, effect sizes were nonestimable due to lack of studies; Minor, effect size of <0.2; NS, no statistically significant differences; SMD, standardized mean difference.

evidence that brief/intensive interventions can be effective and are often preferred.[77–79]

Our analyses of course components were largely inconclusive due to a shortage of studies without the particular component to compare against, but like others, we observed that the presence of a psychological component seemed to boost effectiveness of self-management courses for some outcomes.[9,14,80] More evidence for courses without this component is required to substantiate this finding.

There are some limitations to our review that need to be considered. With respect to data quality, few of our studies were classed as "higher" quality but over a third of the quality criteria for the studies were classed as unclear so it is not possible to know whether this higher-lower quality classification distinguished robust methodological quality or simply good reporting.

In terms of data extraction, our definition of self-management was broad to allow us to include a range of types of courses and draw upon much more data than previous systematic reviews. However, distinguishing the components from the reported intervention descriptions was difficult. Others have acknowledged this issue and have

TABLE 3. Course Components That Showed Beneficial Outcomes for Self-management Against Control

Duration of effect	Outcome	Psychological		Lifestyle	
		With	Without	With	Without
Short-term, <4 mo	Pain intensity	0.28 (0.16, 0.41)	NS	0.20 (0.09, 0.32)	0.36 (0.10, 0.62)
	Physical function	0.34 (0.18, 0.50)	NS	0.22 (0.04, 0.39)	0.36 (0.17, 0.55)
	Self-efficacy	0.41 (0.25, 0.56)	NS	0.41 (0.24, 0.57)	0.31 (0.09, 0.52)
	Global health	NS	0.53 (0.18, 0.88)	0.29 (0.02, 0.56)	0.69 # (0.15, 1.24)
	Depression	Minor	NS	NS	NS
Medium-term, 4-8 mo	Pain intensity	0.29 (0.11, 0.48)	0.22 (0.11, 0.33)	0.22 (0.09, 0.35)	NS
	Physical function	0.21 (0.12, 0.30)	NS	Minor	0.25 (0.06, 0.44)
	Self-efficacy	0.30 (0.09, 0.52)	NS	0.23 (0.06, 0.40)	0.46 (0.20, 0.73)
	Global health	0.45 (0.10, 0.79)	0.52 (0.10, 0.95)	0.42 (0.13,0.70)	0.77 # (0.22, 1.32)
	Depression	NS	NS #	NS	NS
Long-term, >8 mo	Pain intensity	Minor	NS	Minor	NS
	Physical function	Minor	NS	Minor	NS #
	Self-efficacy	0.25 (0.15, 0.34)	NS #	0.22 (0.12, 0.33)	0.45 (0.16, 0.73)
	Global health	NS	NS #	NS	NS #
	Depression	NS	—	NS	—

Effect size: Pooled random effect SMD (confidence interval 95%).

# indicates data from one study only; —, effect sizes were non estimable due to lack of studies; Minor, effect size of <0.2; NS, no statistically significant difference between self-management and control; SMD, standardized mean difference.

TABLE 2. (*continued*)

Course Leader	Course Setting			Course Duration	
Mixed	Medical	Community	Occupational	≤ 8 wk	> 8 wk
NS	0.28 (0.11, 0.45)	Minor	0.46 (0.11, 0.81)	0.24 (0.12, 0.36)	0.22 (0.03, 0.42)
NS	0.24 (0.03,0.45)	0.21 (0.07, 0.34)	0.78 # (0.27, 1.29)	0.26 (0.10, 0.41)	NS
—	0.37 (0.07, 0.66)	0.41 (0.26, 0.57)	NS #	0.39 (0.25, 0.54)	NS
0.56 (0.26,0.86)	0.42 (0.05, 0.80)	NS	NS #	0.30 (0.03, 0.58)	0.61 # (0.07, 1.15)
NS #	0.25 (0.04, 0.46)	NS	—	Minor	NS
NS	0.24 (0.01, 0.47)	Minor	NS #	0.25 (0.08, 0.42)	Minor
NS	NS	Minor	—	Minor	NS
—	NS	0.30 (0.09, 0.52)	—	0.27 (0.11, 0.43)	NS #
NS	0.54 (0.22, 0.87)	NS	—	0.36 (0.12, 0.6)	1.08 # (0.52, 1.64)
—	NS	NS	—	NS	0.76 # (0.22, 1.30)
NS #	0.26 (0.15, 0.36)	NS	NS	Minor	0.23 (0.03, 0.42)
NS #	NS	Minor	—	Minor	NS
NS #	0.26 (0.01, 0.52)	0.23 (0.11, 0.36)	0.39 # (0.02, 0.76)	0.26 (0.14, 0.37)	0.23 (0.04, 0.42)
NS #	NS	NS #	—	NS	NS #
NS	—	NS	—	NS #	NS

grouped self-management components in slightly different ways.[19,81,82]

Outcome data reported as change from baseline scores would have been the preferred measure but only 7 (13%) potential studies reported these compared with 46 studies reporting final value data, so we chose to the latter to meta-analyze. This decision was supported by our sensitivity analysis. We used a simple model of standardized mean difference meta-analyses and subgrouping to assess effectiveness and, though others have used methods that provide more sophisticated detail on combinations and interactions,[72,82] we felt that the quality and quantity of our data were not sufficient to warrant this kind of analysis.

To interpret our results we used Cohen's *d* as a measure of effect size. We adopted this approach as it has been used in several Cochrane reviews despite the difficulties of relating this scale to a clinical setting.[17,24,83] Therefore we chose not to infer any meaning to the size of the effect sizes and the differences in effect sizes between outcomes; we do report significance and consistency of significance over each time period and whether these effect sizes are based on one or more studies. We also found substantial to considerable heterogeneity for 23% of our meta-analyses, in which it was calculable among subgroups. The differences between interventions and the measurement instruments offer some explanation for this.

Further research is required to consider the timing of exposure to self-management interventions for those with chronic pain and further methodological research is needed to explore and isolate the interactions and effects of

TABLE 3. (*continued*)

Pain education		Physical activity		Mind body therapies	
With	Without	With	Without	With	Without
0.21 (0.09, 0.33)	0.38 (0.17, 0.59)	0.23 (0.11, 0.35)	0.28 (0.04, 0.51)	0.21 (0.06, 0.36)	0.28 (0.12, 0.44)
NS	0.24 (0.10, 0.38)	0.22 (0.08,0.36)	0.65 (0.28, 1.02)	NS	0.24 (0.10, 0.38)
0.35 (0.21, 0.48)	0.56 (0.18, 0.94)	0.39 (0.25,0.52)	NS #	0.42 (0.17, 0.67)	0.35 (0.19, 0.51)
0.30 (0.03, 0.58)	0.61 # (0.07, 1.15)	0.34 (0.02,0.66)	NS	NS	0.48 (0.24,0.72)
NS	NS	NS	NS	NS	NS
0.22 (0.09,0.35)	NS	0.20 # (0.08, 0.33)	NS #	Minor	0.30 (0.05,0.55)
Minor	NS	Minor	—	Minor	Minor
0.26 (0.12, 0.40)	0.58 # (0.16, 1.00)	0.29 (0.14, 0.44)	—	NS	0.36 (0.17,0.55)
0.51 (0.17,0.85)	NS #	0.46 (0.19, 0.73)	—	0.33 (0.01, 0.65)	0.67 (0.26,1.09)
0.25 # (0.03, 0.47)	—	0.25 # (0.03, 0.47)	—	NS	NS
Minor	NS	Minor	NS #	NS	0.20 (0.07, 0.34)
Minor	NS	Minor	—	Minor	NS
0.24 (0.14, 0.33)	0.52 # (0.09, 0.96)	0.25 (0.15, 0.35)	—	0.23 (0.13, 0.33)	0.47 (0.13, 0.81)
NS	NS #	NS	—	NS	NS
NS	NS #	NS	NS #	NS	NS #

multicomponent therapies and complex interventions. We would also recommend that authors of future trials consider reporting intervention duration, attrition, and actual exposure to the intervention and change scores, as opposed to final value scores, from their chosen outcome measures.

CONCLUSIONS

These results provide some useful information to the clinician deciding what type of self-management approach might help patients with chronic musculoskeletal pain. Group-delivered courses with HCP input had potential to produce better outcomes than other types of courses. Longer courses did not necessarily give better outcomes. There was mixed evidence of effectiveness for the different course components. Serious consideration should be given to the development of short, group, and HCP-delivered interventions but more research is required to establish the most effective content and cost-effectiveness.

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