

Search title:	Lifestyle Medicine for Chronic Pain: Exercise
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Date:	29 Aug 2022

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Search Summary and History

<p>Databases searched (see search history below)</p>	<p>1. Medline (Ovid)</p> <p>Ovid MEDLINE(R) ALL <1946 to August 26, 2022></p> <p>1 exp Exercise/ 235369</p> <p>2 exp Physical Exertion/ 57341</p> <p>3 lifestyle medicine.ti. 306</p> <p>4 exercise.ti. 123992</p> <p>5 physical activity.ti. 47336</p> <p>6 physical exertion.ti. 756</p> <p>7 exp Chronic Pain/pc, rh, th [Prevention & Control, Rehabilitation, Therapy] 6460</p> <p>8 chronic pain.ti. 14435</p>
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	9	1 or 2 or 3 or 4 or 5 or 6	346336
	10	7 or 8	18753
	11	9 and 10	646
	12	limit 11 to (humans and (clinical trial or comparative study or evaluation study or meta analysis or multicenter study or observational study or randomized controlled trial or "systematic review" or twin study or validation study) and last 10 years)	
			298
	Results (apart from reviews and meta-analyses) were manually checked for relevance and geographic location to include only studies that took place in the UK and Europe.		

Guidelines

NICE (2021) Chronic pain (primary and secondary) in over 16s: assessment of all chronic pain and management of chronic primary pain. [E] Evidence review for exercise for chronic primary pain NICE guideline NG193: Intervention evidence review underpinning recommendations 1.2.1 to 1.2.2 in the NICE guideline. Available at:

<https://www.nice.org.uk/guidance/ng193/evidence/e-exercise-for-chronic-primary-pain-pdf-9071987010> .

NICE (2014). Chronic pain (primary and secondary) in over 16s: assessment of all chronic pain and management of chronic primary pain [NICE guideline [NG193]. Available at:

<https://www.nice.org.uk/guidance/ng193/chapter/Recommendations#managing-chronic-primary-pain> .

NICE (2014). Behaviour change: individual approaches. Public health guideline [PH49].

Available at: <https://www.nice.org.uk/guidance/ph49> .

NICE (2014). Physical activity: exercise referral schemes. Public health guideline [PH54].

Available at: <https://www.nice.org.uk/guidance/ph54> .

NICE (2017). Low back pain and sciatica in over 16s. Quality standard [QS155]. Available at: <https://www.nice.org.uk/guidance/qs155> .

NICE (2016). Low back pain and sciatica in over 16s: assessment and management NICE guideline [NG59]. Available at: <https://www.nice.org.uk/guidance/ng59> .

Reviews

1.

Aerobic Physical Exercise for Pain Intensity, Aerobic Capacity, and Quality of Life in Patients With Chronic Pain: A Systematic Review and Meta-Analysis. [Review]

Garcia-Correa HR, Sanchez-Montoya LJ, Daza-Arana JE, Ordonez-Mora LT

Journal of Physical Activity & Health. 18(9):1126-1142, 2021 09 01.

[Journal Article. Meta-Analysis. Research Support, Non-U.S. Gov't. Review. Systematic Review]

UI: 34352728

BACKGROUND: Currently, chronic pain is a disabling condition that is difficult to manage, which generates a high burden on health systems. The objective is to determine the effects of aerobic physical exercise in adults with chronic pain.

METHODS: A systematic review of searches in databases including MEDLINE, LILACS, ScienceDirect, PEDro, OTseeker, The Cochrane Library, EBSCO, and Google Scholar was conducted. The search process was carried out until July 31, 2020, and the study selection process was independently carried out through a criteria analysis for each phase. Outcome measures were chosen: aerobic capacity, physical function, quality of life, and pain.

RESULTS: Twenty-seven studies were included in which aerobic exercise was considered as an option to treat chronic pain. These studies showed significant results compared with other treatment options in terms of pain measurements (-0.22 [-0.42 to -0.03]) and aerobic capacity. For quality of life, there were significant improvements in the physical function component over the mental health component evaluated with the short form health survey-36/12.

CONCLUSION: Aerobic exercise is a nonpharmacological therapeutic option for treatment. Also, aerobic capacity and endurance improved when this type of exercise was prescribed, thus resulting in a substantial improvement in the quality of life of people suffering from chronic pain.

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2.

Aerobic vs. resistance exercise for chronic non-specific low back pain: A systematic review and meta-analysis.

Wewege MA, Booth J, Parmenter BJ

Journal of Back & Musculoskeletal Rehabilitation. 31(5):889-899, 2018.

[Comparative Study. Journal Article. Meta-Analysis. Systematic Review]

UI: 29889056

BACKGROUND/OBJECTIVE: This meta-analysis compared progressive aerobic training (PAT) to progressive resistance training (PRT) for pain, disability and quality of life (QoL) in people with chronic non-specific low back pain (CNSLBP).

METHODS: Five electronic databases were systematically searched up to 1 March 2016. Randomised controlled trials included land-based PAT, PRT or combined PRT and PAT, versus usual care for CNSLBP. Exercise interventions were supervised a minimum of once per week and performed 2 days/week for 6 weeks. Outcome measurements were pain intensity, disability, and QoL. Standardised mean difference (SMD) and mean difference (MD) were calculated using Review Manager 5.3.

RESULTS: Six studies were included, comprising 333 participants (94 PRT, 93 PAT, 146 usual care; 66% female; age = 44 +/- 6 years; duration of pain = 7 +/- 6 years). Exercise significantly reduced pain intensity (SMD = -0.42 [-0.80, -0.03]; $p < 0.03$) although neither mode proved superior. PRT significantly improved the Short Form Health Survey-Mental Component Score (SF-MCS) (MD = 5.74 [2.02, 9.47]; $p = 0.002$).

CONCLUSIONS: PAT and PRT decreased pain intensity in individuals with CNSLBP although neither mode was superior. Resistance exercise improved psychological wellbeing. High-quality RCTs comparing PAT, PRT, and PAT + PRT, are required.

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3.

The effectiveness of generic self-management interventions for patients with chronic musculoskeletal pain on physical function, self-efficacy, pain intensity and physical activity: A systematic review and meta-analysis.

Elbers S, Wittink H, Pool JJM, Smeets RJEM

European Journal of Pain. 22(9):1577-1596, 2018 10.

[Journal Article. Meta-Analysis. Research Support, Non-U.S. Gov't. Systematic Review]

UI: 29845678

Generic self-management programs aim to facilitate behavioural adjustment and therefore have considerable potential for patients with chronic musculoskeletal pain. Our main objective was to collect and synthesize all data on the effectiveness of generic self-management interventions for patients with chronic musculoskeletal pain in terms of physical function, self-efficacy, pain intensity and physical activity. Our secondary objective was to describe the content of these interventions, by means of classification according to the Behaviour Change Technique Taxonomy. We searched PubMed, CENTRAL, Embase and Psycinfo for eligible studies. Study selection, data extraction and risk of bias were assessed by two researchers independently. Meta-analyses were only performed if the studies were sufficiently homogeneous and GRADE was used to determine the quality of evidence. We identified 20 randomized controlled trials that compared a self-management intervention to any type of control group. For post-intervention results, there was moderate quality evidence of a statistically significant but clinically unimportant effect for physical function and pain intensity, both favouring the self-management group. At follow-up, there was moderate quality evidence of a small clinically insignificant effect for self-efficacy, favouring the self-management group. All other comparisons did not indicate an effect. Classification of the behaviour change techniques showed large heterogeneity across studies. These results indicate that generic self-management interventions have a marginal benefit for patients with chronic musculoskeletal pain in the short-term for physical function and pain intensity and for self-efficacy in the long-term, and vary considerably with respect to intervention content.

SIGNIFICANCE: This study contributes to a growing body of evidence that generic self-management interventions have limited effectiveness for patients with chronic musculoskeletal pain. Furthermore, this study has identified substantial differences in both content and delivery mode across self-management interventions.

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4.

The Effect of Occupational Engagement on Lifestyle in Adults Living with Chronic Pain: A Systematic Review and Meta-analysis. [Review]

Nielsen SS, Skou ST, Larsen AE, Bricca A, Sondergaard J, Christensen JR

Occupational Therapy International. 2022:7082159, 2022.

[Journal Article. Meta-Analysis. Review. Systematic Review]

UI: 35814357

Background: Healthy lifestyle is important to decrease health risks in individuals living with chronic pain. From an occupational therapy perspective, human health and lifestyle are linked to occupational engagement in meaningful everyday activities. This study is aimed at investigating the effect of including occupational engagement in chronic pain interventions on lifestyle.

Methods: In this systematic review (PROSPERO reg. CRD42020159279), we included randomized controlled trials (RCTs) on interventions involving occupational engagement (i.e., occupational performance based on involvement, choice, positive meaning, and commitment) and assessing modifiable lifestyle factors: physical activity, body anthropometrics, alcohol consumption, smoking, stress, and sleep. We sought the databases Ovid MEDLINE, Embase, PsycINFO, CINAHL, Cochrane, Scopus, Web of Science, OTseeker, ClinicalTrials.gov, OpenGrey, and the web engine Google Scholar and citations and references of relevant publications. We evaluated methodological quality with the Cochrane risk-of-bias tool 2.0, determined the overall evidence certainty using the GRADE methodology, and performed meta-analysis when two or more trials reported on the outcomes.

Results: Of the 9526 items identified, 286 were full text screened. We included twelve articles with eleven RCTs comprising 995 adults and assessing physical activity, sleep quality, stress, and Body Mass Index. Sufficient data for meta-analysis was only available for physical activity and sleep quality. The meta-analysis suggested a moderate increase in physical activity after behavioral interventions for fibromyalgia and musculoskeletal pain (SMD = 0.69 (0.29; 1.09)) and a small increase in sleep quality up to 6 months after multidisciplinary self-management of fibromyalgia (SMD = 0.35 (95% CI 0.08; 0.61)). The overall certainty of the evidence was deemed low.

Conclusion: Including occupational engagement in chronic pain interventions may increase short-term physical activity and long-term sleep quality. Due to the few available RCTs including occupational engagement in chronic pain treatment for adults living with chronic pain, further high-quality RCTs are needed and will likely change the conclusion.

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5.

Core Stability Exercise Versus General Exercise for Chronic Low Back Pain. [Review]

Coulombe BJ, Games KE, Neil ER, Eberman LE

Journal of Athletic Training. 52(1):71-72, 2017 Jan.

[Comparative Study. Journal Article. Meta-Analysis. Review]

UI: 27849389

Reference: Wang XQ, Zheng JJ, Yu ZW, et al. A meta-analysis of core stability exercise versus general exercise for chronic low back pain. PLoS One. 2012;7(12):e52082. Clinical Questions: Is core stability exercise more effective than general exercise in the treatment of patients with nonspecific low back pain (LBP)?

DATA SOURCES: The authors searched the following databases: China Biological Medicine disc, Cochrane Library, Embase, and PubMed from 1970 through 2011. The key medical subject headings searched were chronic pain, exercise, LBP, lumbosacral region, and sciatica.

STUDY SELECTION: Randomized controlled trials comparing core stability exercise with general exercise in the treatment of chronic LBP were investigated. Participants were male and female adults with LBP for at least 3 months that was not caused by a specific known condition. A control group receiving general exercise and an experimental group receiving core stability exercise were required for inclusion in the meta-analysis. Core stability was defined as the ability to ensure a stable neutral spine position, but the type of exercise was not specified. Outcome measures of pain intensity, back-specific functional status, quality of life, and work absenteeism were recorded at 3-, 6-, and 12-month intervals.

DATA EXTRACTION: The study design, participant information, description of interventions in the control and experimental groups, outcome measures, and follow-up period were extracted. The mean difference (MD) and 95% confidence interval (CI) were calculated to evaluate statistical significance. Risk of bias was assessed using the Cochrane Collaboration Recommendations, and all articles were rated as high risk for other bias with no further explanation given.

MAIN RESULTS: Five studies involving 414 patients were included. Four studies assessed pain intensity using the visual analog scale or numeric rating scale. In the core stability exercise group, the reduction in pain was significant at 3 months (MD = -1.29, 95% CI = -2.47, -0.11; P = .003) but not at 6 months (MD = -0.50, 95% CI = -1.36, 0.35; P = .26). Functional status was improved at 3 months (MD = -7.14, 95% CI = -11.64, -2.65; P = .002) but not at 6 months (MD = -0.50, 95% CI = 0.36, 0.35; P = .26) or 12 months (MD = -0.32, 95% CI = -0.87, 0.23; P = .25). All of the included studies assessed back-specific functional status: 4 used the Oswestry Disability Index and 1 used the Roland-Morris Disability

Questionnaire. Patients in the core stability exercise groups experienced improved functional status versus the general exercise group at 3 months (MD = -7.14, 95% CI = -11.64, -2.65; P = .002); no results were recorded at 6 or 12 months.

CONCLUSIONS: In the short term, core stability exercise was more effective than general exercise for decreasing pain and increasing back-specific functional status in patients with LBP.

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6.

Effects of physical exercise on low back pain and cortisol levels: a systematic review with meta-analysis of randomized controlled trials.

Barros Dos Santos AO, Pinto de Castro JB, Lima VP, da Silva EB, de Souza Vale RG

Pain Management. 11(1):49-57, 2021 Jan.

[Journal Article. Meta-Analysis. Systematic Review]

UI: 33073695

Aim: To verify the effects of physical exercise on low back pain (LBP) and serum cortisol levels in individuals with chronic LBP. **Materials & methods:** Randomized controlled trials evaluating the effects of exercise on LBP perception and cortisol levels in adults with nonspecific chronic LBP were included.

Results: Four randomized controlled trials were included, with a total of 85 participants in the exercise group and 84 in the control group. The interventions reduced -1.61 (95% CI: -2.36 to -0.85) with inconsistency I² = 72% (p = 0.031) the LBP level and increased 1.05 (95% CI: 0.22-2.32) with inconsistency I² = 86% (p < 0.0001) the cortisol levels. **Conclusion:** The practice of physical exercise for 6 weeks or more reduced LBP levels, whereas the rate of progression of an exercise-training program in people with chronic LBP is greater than 4 weeks, but increased the cortisol serum levels in individuals with LBP.

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7.

The Effects of Exercise Dosage on Neck-Related Pain and Disability: A Systematic Review With Meta-analysis.

Wilhelm MP, Donaldson M, Griswold D, Learman KE, Garcia AN, Learman SM, Cleland JA

Journal of Orthopaedic & Sports Physical Therapy. 50(11):607-621, 2020 11.

[Journal Article. Meta-Analysis. Systematic Review]

UI: 33131392

OBJECTIVE: To (1) evaluate whether exercise therapy is effective for managing neck pain, and (2) investigate the relationship between exercise therapy dosage and treatment effect.

DESIGN: Intervention systematic review with meta-analysis and meta-regression.

LITERATURE SEARCH: An electronic search of 6 databases was completed for trials assessing the effects of exercise therapy on neck pain.

STUDY SELECTION CRITERIA: We included randomized controlled trials that compared exercise therapy to a no-exercise therapy control for treating neck pain. Two reviewers screened and selected studies, extracted outcomes, assessed article risk of bias, and rated the quality of evidence using the Grading of Recommendations Assessment, Development and Evaluation (GRADE) approach.

DATA SYNTHESIS: Data were pooled using random-effects meta-analysis. We used meta-regression to analyze the effect of exercise dosage on neck pain and disability.

RESULTS: Fourteen trials were included in the review. Seven trials were at high risk of bias, 4 were at unclear risk of bias, and 3 were at low risk of bias. Exercise therapy was superior to control for reducing pain (visual analog scale mean difference, -15.32 mm) and improving disability (Neck Disability Index mean difference, -3.64 points). Exercise dosage parameters did not predict pain or disability outcomes.

CONCLUSION: Exercise was beneficial for reducing pain and disability, regardless of exercise therapy dosage. Therefore, optimal exercise dosage recommendations remain unknown. We encourage clinicians to use exercise when managing mechanical neck pain. J Orthop Sports Phys Ther 2020;50(11):607-621. doi:10.2519/jospt.2020.9155.

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8.

Physical activity and exercise for chronic pain in adults: an overview of Cochrane Reviews. [Review]

Geneen LJ, Moore RA, Clarke C, Martin D, Colvin LA, Smith BH

Cochrane Database of Systematic Reviews. 4:CD011279, 2017 04 24.

[Journal Article. Meta-Analysis. Review. Systematic Review]

UI: 28436583

BACKGROUND: Chronic pain is defined as pain lasting beyond normal tissue healing time, generally taken to be 12 weeks. It contributes to disability, anxiety, depression, sleep disturbances, poor quality of life, and healthcare costs. Chronic pain has a weighted mean prevalence in adults of 20%. For many years, the treatment choice for chronic pain included recommendations for rest and inactivity. However, exercise may have specific benefits in reducing the severity of chronic pain, as well as more general benefits associated with improved overall physical and mental health, and physical functioning. Physical activity and exercise programmes are increasingly being promoted and offered in various healthcare systems, and for a variety of chronic pain conditions. It is therefore important at this stage to establish the efficacy and safety of these programmes, and furthermore to address the critical factors that determine their success or failure.

OBJECTIVES: To provide an overview of Cochrane Reviews of adults with chronic pain to determine (1) the effectiveness of different physical activity and exercise interventions in reducing pain severity and its impact on function, quality of life, and healthcare use; and (2) the evidence for any adverse effects or harm associated with physical activity and exercise interventions.

METHODS: We searched the Cochrane Database of Systematic Reviews (CDSR) on the Cochrane Library (CDSR 2016, Issue 1) for systematic reviews of randomised controlled trials (RCTs), after which we tracked any included reviews for updates, and tracked protocols in case of full review publication until an arbitrary cut-off date of 21 March 2016 (CDSR 2016, Issue 3). We assessed the methodological quality of the reviews using the AMSTAR tool, and also planned to analyse data for each painful condition based on quality of the evidence. We extracted data for (1) self-reported pain severity, (2) physical function (objectively or subjectively measured), (3) psychological function, (4) quality of life, (5) adherence to the prescribed intervention, (6) healthcare use/attendance, (7) adverse events, and (8) death. Due to the limited data available, we were unable to directly compare and analyse interventions, and have instead reported the evidence qualitatively.

MAIN RESULTS: We included 21 reviews with 381 included studies and 37,143 participants. Of these, 264 studies (19,642 participants) examined exercise versus no exercise/minimal intervention in adults with chronic pain and were used in the qualitative analysis. Pain conditions included rheumatoid arthritis, osteoarthritis, fibromyalgia, low back pain, intermittent claudication, dysmenorrhoea, mechanical neck disorder, spinal cord injury, postpolio syndrome, and patellofemoral pain. None of the reviews assessed 'chronic pain' or 'chronic widespread pain' as a general term or specific condition.

Interventions included aerobic, strength, flexibility, range of motion, and core or balance training programmes, as well as yoga, Pilates, and tai chi. Reviews were well performed and reported (based on AMSTAR), and included studies had acceptable risk of bias (with inadequate reporting of attrition and reporting biases). However the quality of evidence was low due to participant numbers (most included studies had fewer than 50 participants in total), length of intervention and follow-up (rarely assessed beyond three to six months). We pooled the results from relevant reviews where appropriate, though results should be interpreted with caution due to the low quality evidence. Pain severity: several reviews noted favourable results from exercise: only three reviews that reported pain severity found no statistically significant changes in usual or mean pain from any intervention. However, results were inconsistent across interventions and follow-up, as exercise did not consistently bring about a change (positive or negative) in self-reported pain scores at any single point. Physical function: was the most commonly reported outcome measure. Physical function was significantly improved as a result of the intervention in 14 reviews, though even these statistically significant results had only small-to-moderate effect sizes (only one review reported large effect sizes). Psychological function and quality of life: had variable results: results were either favourable to exercise (generally small and moderate effect size, with two reviews reporting significant, large effect sizes for quality of life), or showed no difference between groups. There were no negative effects. Adherence to the prescribed intervention: could not be assessed in any review. However, risk of withdrawal/dropout was slightly higher in the exercising group (82.8/1000 participants versus 81/1000 participants), though the group difference was non-significant. Healthcare use/attendance: was not reported in any review. Adverse events, potential harm, and death: only 25% of included studies (across 18 reviews) actively reported adverse events. Based on the available evidence, most adverse events were increased soreness or muscle pain, which reportedly subsided after a few weeks of the intervention. Only one review reported death separately to other adverse events: the intervention was protective against death (based on the available evidence), though did not reach statistical significance.

AUTHORS' CONCLUSIONS: The quality of the evidence examining physical activity and exercise for chronic pain is low. This is largely due to small sample sizes and potentially underpowered studies. A number of studies had adequately long interventions, but planned follow-up was limited to less than one year in all but six reviews. There were some favourable effects in reduction in pain severity and improved physical function, though these were mostly of small-to-moderate effect, and were not consistent across the reviews. There were variable effects for psychological function and quality of life. The available evidence suggests physical activity and exercise is an intervention with few adverse events that may improve pain severity and physical function, and consequent quality of life. However, further research is required and should focus on increasing participant numbers, including participants with a broader spectrum of pain severity, and lengthening both the intervention itself, and the follow-up period.

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9.

Walking, Cycling, and Swimming for Nonspecific Low Back Pain: A Systematic Review With Meta-analysis. [Review]

Pocovi NC, de Campos TF, Christine Lin CW, Merom D, Tiedemann A, Hancock MJ

Journal of Orthopaedic & Sports Physical Therapy. 52(2):85-99, 2022 Feb.

[Journal Article. Meta-Analysis. Review. Systematic Review]

UI: 34783263

OBJECTIVE: To investigate the effectiveness of walking/running, cycling, or swimming for treating or preventing nonspecific low back pain (LBP).

DESIGN: Intervention systematic review.

LITERATURE SEARCH: Five databases were searched to April 2021.

STUDY SELECTION CRITERIA: Randomized controlled trials evaluating walking/running, cycling, or swimming to treat or prevent LBP were included.

DATA SYNTHESIS: We calculated standardized mean differences (SMDs) and 95% confidence intervals (CIs). Certainty of evidence was evaluated with the Grading of Recommendations Assessment, Development and Evaluation (GRADE) approach.

RESULTS: No trials assessed LBP prevention or addressed acute LBP. Nineteen trials (2362 participants) assessed treatment of chronic/recurrent LBP. Low-certainty evidence suggests that walking/running was less effective than alternate interventions in reducing pain in the short term (8 trials; SMD, 0.81; 95% CI: 0.28, 1.34) and medium term (5 trials; SMD, 0.80; 95% CI: 0.10, 1.49). High-certainty evidence suggests that walking/running was less effective than alternate interventions at reducing disability in the short term (8 trials; SMD, 0.22; 95% CI: 0.06, 0.38) and medium term (4 trials; SMD, 0.28; 95% CI: 0.05, 0.51). There was high-certainty evidence of a small effect in favor of walking/running compared to minimal/no intervention for reducing pain in the short term (10 trials; SMD, -0.23; 95% CI: -0.35, -0.10) and medium term (6 trials; SMD, -0.26; 95% CI: -0.40, -0.13) and disability in the short term (7 trials; SMD, -0.19; 95% CI: -0.33, -0.06). Scarcity of trials meant few conclusions could be drawn regarding cycling and swimming.

CONCLUSION: Although less effective than alternate interventions, walking/running was slightly more effective than minimal/no intervention for treating chronic/recurrent LBP. J Orthop Sports Phys Ther 2022;52(2):85-99. Epub 16 Nov 2021. doi:10.2519/jospt.2022.10612.

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10.

Some types of exercise are more effective than others in people with chronic low back pain: a network meta-analysis.

Hayden JA, Ellis J, Ogilvie R, Stewart SA, Bagg MK, Stanojevic S, Yamato TP, Saragiotto BT
Journal of Physiotherapy. 67(4):252-262, 2021 10.

[Journal Article. Meta-Analysis. Research Support, Non-U.S. Gov't. Systematic Review]

UI: 34538747

QUESTION: What are the effects of specific types of exercise treatments on pain intensity and functional limitation outcomes for adults with chronic low back pain?

DESIGN: Systematic review with network meta-analysis of randomised controlled trials.

PARTICIPANTS: Adults with non-specific low back pain for \geq 12 weeks.

INTERVENTION: Exercise treatments prescribed or planned by a health professional that involved conducting specific activities, postures and/or movements with a goal to improve low back pain outcomes.

OUTCOME MEASURES: Pain intensity (eg, visual analogue scale or numerical rating scale) and back-related functional limitations (eg, Roland Morris Disability Questionnaire or Oswestry Disability Index), each standardised to range from 0 to 100.

RESULTS: This review included 217 randomised controlled trials with 20,969 participants and 507 treatment groups. Most exercise types were more effective than minimal treatment for pain and functional limitation outcomes. Network meta-analysis results were compatible with moderate to clinically important treatment effects for Pilates, McKenzie therapy, and functional restoration (pain only) and flexibility exercises (function only) compared with minimal treatment, other effective treatments and other exercise types. The estimated mean differences for these exercise types compared with minimal treatment ranged from -15 to -19 for pain and from -10 to -12 for functional limitation.

CONCLUSION: This review found evidence that Pilates, McKenzie therapy and functional restoration were more effective than other types of exercise treatment for reducing pain intensity and functional limitations. Nevertheless, people with chronic low back pain should be encouraged to perform the exercise that they enjoy to promote adherence.

REGISTRATION: DOI:10.1002/14651858.CD009790.

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11.

Prescription of exercises for the treatment of chronic pain along the continuum of nociplastic pain: A systematic review with meta-analysis. [Review]

Ferro Moura Franco K, Lenoir D, Dos Santos Franco YR, Jandre Reis FJ, Nunes Cabral CM, Meeus M
European Journal of Pain. 25(1):51-70, 2021 01.

[Journal Article. Meta-Analysis. Research Support, Non-U.S. Gov't. Review. Systematic Review]

UI: 32976664

BACKGROUND AND OBJECTIVE: To compare different exercise prescriptions for patients with chronic pain along the continuum of nociplastic pain: fibromyalgia, chronic whiplash-associated disorders (CWAD), and chronic idiopathic neck pain (CINP).

DATABASES AND DATA TREATMENT: Randomized controlled trials comparing different exercise parameters were included. The search was performed in the databases Cochrane Central Register of Controlled Trials, MEDLINE, EMBASE, CINAHL and PEDro. Data on the parameters for the physical exercise programs for pain management were extracted for analysis.

RESULTS: Fifty studies with 3,562 participants were included. For fibromyalgia, both aerobic strengthening exercises were similar and better than stretching exercises alone. Exercises could be performed in 50- to 60-min supervised sessions, 2 to 3 times a week, for 13 weeks or more. For CWAD, body awareness exercises were similar to combined exercises, and there was no difference in adding sling exercises to a strengthening exercise program. The exercises could be performed in 90-min supervised sessions, twice a week, for 10 to 16 weeks. For CINP, motor control exercises and nonspecific muscle strengthening had a similar effect. Exercises could be performed in 30- to 60-min supervised sessions, 2 to 3 times a week, for 7 to 12 weeks.

CONCLUSIONS: The choice of parameters regarding exercises should emphasize global exercises in nociplastic pain conditions (such as fibromyalgia and CWAD) and specific exercises in non-nociplastic pain conditions (such as CINP) and be based on patient's preference and therapist's skills.

PROSPERO REGISTRATION NUMBER: CRD42019123271.

SIGNIFICANCE: The pain mechanism must be considered to optimize exercise prescription in patients with different chronic pain profiles. The main message of this article is that low to moderate intensity global exercises performed for a long period of treatment should be performed in patients with

nociceptive pain predominance. Additionally, focused and intense exercises for a short period of treatment can be prescribed for patients with nociceptive pain predominance.

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12.

Physical activity interventions, chronic pain, and subjective well-being among persons with spinal cord injury: a systematic scoping review. [Review]

Todd KR, Lawrason SVC, Shaw RB, Wirtz D, Martin Ginis KA

Spinal Cord. 59(2):93-104, 2021 Feb.

[Journal Article. Review. Systematic Review]

UI: 32948846

STUDY DESIGN: Scoping review of experimental and quasi-experimental studies.

OBJECTIVE: To systematically synthesize research testing the effects of leisure time physical activity (LTPA) interventions on chronic pain and subjective well-being (SWB) among adults with spinal cord injury (SCI).

METHODS: Literature searches were conducted using multiple databases (Web of Science, Embase, CINAHL, Medline, PsychINFO and SPORTDiscus) to identify studies involving persons with SCI that measured and reported the effects of LTPA interventions on both chronic pain and at least one measure of SWB (e.g., affect, life satisfaction, satisfaction with various life domains). Relevant data were extracted from the studies and synthesized.

RESULTS: A total of 3494 articles were screened. Fifteen published articles, consisting of 12 different studies met the review inclusion criteria. Four different patterns of findings were observed regarding the effect of LTPA on chronic pain and SWB outcomes: (1) increased chronic pain, decreased SWB (1 article); (2) decreased chronic pain, improved SWB (12 articles); (3) increased chronic pain, improved SWB (1 article); and (4) unchanged levels of pain, improved SWB (1 article).

CONCLUSIONS: Results of most articles included in this scoping review suggest that LTPA interventions can reduce chronic pain and improve SWB for persons with SCI. Further research is

needed to identify the mechanisms by which LTPA affects pain and SWB, in order to formulate LTPA prescriptions that maximize improvements in these outcomes.

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13.

Yoga compared to non-exercise or physical therapy exercise on pain, disability, and quality of life for patients with chronic low back pain: A systematic review and meta-analysis of randomized controlled trials.

Zhu F, Zhang M, Wang D, Hong Q, Zeng C, Chen W

PLoS ONE [Electronic Resource]. 15(9):e0238544, 2020.

[Comparative Study. Journal Article. Meta-Analysis. Research Support, Non-U.S. Gov't. Systematic Review]

UI: 32870936

BACKGROUND: Chronic low back pain (CLBP) is a common and often disabling musculoskeletal condition. Yoga has been proven to be an effective therapy for chronic low back pain. However, there are still controversies about the effects of yoga at different follow-up periods and compared with other physical therapy exercises.

OBJECTIVE: To critically compare the effects of yoga for patients with chronic low back pain on pain, disability, quality of life with non-exercise (e.g. usual care, education), physical therapy exercise.

METHODS: This study was registered in PROSPERO, and the registration number was CRD42020159865. Randomized controlled trials (RCTs) of online databases included PubMed, Web of Science, Cochrane Central Register of Controlled Trials, Embase which evaluated effects of yoga for patients with chronic low back pain on pain, disability, and quality of life were searched from inception time to November 1, 2019. Studies were eligible if they assessed at least one important outcome, namely pain, back-specific disability, quality of life. The Cochrane risk of bias tool was used to assess the methodological quality of included randomized controlled trials. The continuous outcomes were analyzed by calculating the mean difference (MD) or standardized mean difference (SMD) with 95% confidence intervals (CI) according to whether combining outcomes measured on different scales or not.

RESULTS: A total of 18 randomized controlled trials were included in this meta-analysis. Yoga could significantly reduce pain at 4 to 8 weeks (MD = -0.83, 95% CI = -1.19 to -0.48, $p < 0.00001$, $I^2 = 0\%$), 3

months (MD = -0.43, 95% CI = -0.64 to -0.23, $p < 0.0001$, $I^2 = 0\%$), 6 to 7 months (MD = -0.56, 95% CI = -1.02 to -0.11, $p = 0.02$, $I^2 = 50\%$), and was not significant in 12 months (MD = -0.52, 95% CI = -1.64 to 0.59, $p = 0.36$, $I^2 = 87\%$) compared with non-exercise. Yoga was better than non-exercise on disability at 4 to 8 weeks (SMD = -0.30, 95% CI = -0.51 to -0.10, $p = 0.003$, $I^2 = 0\%$), 3 months (SMD = -0.31, 95% CI = -0.45 to -0.18, $p < 0.00001$, $I^2 = 30\%$), 6 months (SMD = -0.38, 95% CI = -0.53 to -0.23, $p < 0.00001$, $I^2 = 0\%$), 12 months (SMD = -0.33, 95% CI = -0.54 to -0.12, $p = 0.002$, $I^2 = 9\%$). There was no significant difference on pain, disability compared with physical therapy exercise group. Furthermore, it suggested that there was a non-significant difference on physical and mental quality of life between yoga and any other interventions.

CONCLUSION: This meta-analysis provided evidence from very low to moderate investigating the effectiveness of yoga for chronic low back pain patients at different time points. Yoga might decrease pain from short term to intermediate term and improve functional disability status from short term to long term compared with non-exercise (e.g. usual care, education). Yoga had the same effect on pain and disability as any other exercise or physical therapy. Yoga might not improve the physical and mental quality of life based on the result of a merging.

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14.

Effectiveness of Exercise Interventions for Pain Reduction in People With Multiple Sclerosis: A Systematic Review and Meta-analysis of Randomized Controlled Trials.

Demaneuf T, Aitken Z, Karahalios A, Leong TI, De Livera AM, Jelinek GA, Weiland TJ, Marck CH

Archives of Physical Medicine & Rehabilitation. 100(1):128-139, 2019 01.

[Journal Article. Meta-Analysis. Research Support, Non-U.S. Gov't. Systematic Review]

UI: 30240593

OBJECTIVE: To systematically review the evidence of the effect of exercise compared with passive control on pain in people with multiple sclerosis.

DATA SOURCE AND STUDY SELECTION: Five electronic databases were searched for randomized controlled trials published up to March 2017 that recruited people with multiple sclerosis where exercise was the intervention and pain was an outcome (PROSPERO registration number CRD42017060489).

STATISTICAL ANALYSIS: A random-effects meta-analysis was conducted to estimate the standardized mean difference of the effect of exercise on pain between treatment and control groups.

We assessed risk of bias, fitted meta-regression models to explore heterogeneity between studies, and assessed small study effects.

DATA SYNTHESIS: Ten studies met the inclusion criteria (total sample size=389), and all studies were at high risk of bias. We found that exercise interventions were associated with less pain compared with passive control groups (standardized mean difference=-.46; 95% CI, -.92 to .00). There was high between-study heterogeneity ($I^2=77.0\%$), which was not explained by the prespecified study characteristics. There was also some evidence of small study effects.

CONCLUSION: This is the first systematic review of the effect of exercise interventions on pain in people with multiple sclerosis, a chronic neurological disorder that affects 2.5 million people. We found some evidence that exercise compared with passive control alleviates pain in this population, but there were limitations in reporting and study quality with high risk of bias of individual studies and heterogeneity between studies.

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15.

Non-pharmacological interventions for treating chronic prostatitis/chronic pelvic pain syndrome. [Review]

Franco JV, Turk T, Jung JH, Xiao YT, Iakhno S, Garrote V, Vietto V

Cochrane Database of Systematic Reviews. 5:CD012551, 2018 05 12.

[Journal Article. Meta-Analysis. Research Support, Non-U.S. Gov't. Review. Systematic Review]

UI: 29757454

BACKGROUND: Chronic prostatitis/chronic pelvic pain syndrome (CP/CPPS) is a common disorder in which the two main clinical features are pelvic pain and lower urinary tract symptoms. There are currently many approaches for its management, using both pharmacological and non-pharmacological interventions. The National Institute of Health - Chronic Prostatitis Symptom Index (NIH-CPSI) score is a validated measure commonly used to measure CP/CPPS symptoms.

OBJECTIVES: To assess the effects of non-pharmacological therapies for chronic prostatitis/chronic pelvic pain syndrome (CP/CPSP).

SEARCH METHODS: We performed a comprehensive search using multiple databases, trial registries, grey literature and conference proceedings with no restrictions on the language of publication or publication status. The date of the latest search of all databases was August 2017.

SELECTION CRITERIA: We included randomised controlled trials. Inclusion criteria were men with a diagnosis of CP/CPSP. We included all available non-pharmacological interventions.

DATA COLLECTION AND ANALYSIS: Two review authors independently classified studies and abstracted data from the included studies, performed statistical analyses and rated quality of evidence (QoE) according to the GRADE methods.

MAIN RESULTS: We included 38 unique studies with 3290 men with CP/CPSP across 23 comparisons. 1. Acupuncture: (three studies, 204 participants) based on short-term follow-up, acupuncture probably leads to clinically meaningful reduction in prostatitis symptoms compared with sham procedure (mean difference (MD) in total NIH-CPSI score -5.79, 95% confidence interval (CI) -7.32 to -4.26, high QoE). Acupuncture may result in little to no difference in adverse events (low QoE). Acupuncture may not reduce sexual dysfunction when compared with sham procedure (MD in the International Index of Erectile Function (IIEF) Scale -0.50, 95% CI -3.46 to 2.46, low QoE). Acupuncture may also lead to a clinically meaningful reduction in prostatitis symptoms compared with standard medical therapy (MD -6.05, 95% CI -7.87 to -4.24, two studies, 78 participants, low QoE). We found no information regarding quality of life, depression or anxiety. 2. Lifestyle modifications: (one study, 100 participants) based on short-term follow-up, lifestyle modifications may be associated with a reduction in prostatitis symptoms compared with control (risk ratio (RR) for improvement in NIH-CPSI scores 3.90, 95% CI 2.20 to 6.92, very low QoE). We found no information regarding adverse events, sexual dysfunction, quality of life, depression or anxiety. 3. Physical activity: (one study, 85 participants) based on short-term follow-up, a physical activity programme may cause a small reduction in prostatitis symptoms compared with control (NIH-CPSI score MD -2.50, 95% CI -4.69 to -0.31, low QoE). This programme may not reduce anxiety or depression (low QoE). We found no information regarding adverse events, sexual dysfunction or quality of life. 4. Prostatic massage: (two studies, 115 participants) based on short-term follow-up, we are uncertain whether the prostatic massage reduces or increases prostatitis symptoms compared with control (very low QoE). We found no information regarding adverse events, sexual dysfunction, quality of life, depression or anxiety. 5. Extracorporeal shockwave therapy: (three studies, 157 participants) based on short-term follow-up, extracorporeal shockwave therapy reduces prostatitis symptoms compared with control (NIH-CPSI score MD -6.18, 95% CI -7.46 to -4.89, high QoE). These results may not be sustained at medium-term follow-up (low QoE). This treatment may not be associated with a greater incidence of adverse events (low QoE). This treatment probably improves sexual dysfunction (MD in the IIEF Scale MD 3.34, 95% CI 2.68 to 4.00, one study, 60 participants, moderate QoE). We found no information regarding quality of life, depression or anxiety. 6. Transrectal thermotherapy compared to medical therapy: (two studies, 237 participants) based on short-term follow-up, transrectal thermotherapy alone or in combination with medical therapy may decrease prostatitis symptoms slightly when compared with medical therapy alone (NIH-CPSI score MD -2.50, 95% CI -3.82 to -1.18, low QoE). One included study reported that participants may experience transient adverse events. We found no information regarding sexual dysfunction, quality of life, depression or anxiety. 7. Other interventions: there is uncertainty about the effects of most of the other interventions included in this review. We found no information regarding psychological support or prostatic surgery.

AUTHORS' CONCLUSIONS: Based on the findings of moderate quality evidence, this review found that some non-pharmacological interventions such as acupuncture and extracorporeal shockwave therapy are likely to result in a decrease in prostatitis symptoms and may not be associated with a greater incidence of adverse event. The QoE for most other comparisons was predominantly low. Future clinical trials should include a full report of their methods including adequate masking, consistent assessment of all patient-important outcomes including potential treatment-related adverse events and appropriate sample sizes.

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16.

Pain sensitivity is reduced by exercise training: Evidence from a systematic review and meta-analysis. [Review]

Belavy DL, Van Oosterwijck J, Clarkson M, Dhondt E, Mundell NL, Miller CT, Owen PJ

Neuroscience & Biobehavioral Reviews. 120:100-108, 2021 01.

[Journal Article. Meta-Analysis. Research Support, Non-U.S. Gov't. Review. Systematic Review]

UI: 33253748

BELAVY, D. L., J. Van Oosterwijck, M. Clarkson, E. Dhondt, N. L. Mundell, C. Miller and P. J. Owen. NEUROSCI BIOBEHAV REV 21(1) XXX-XXX, 2020. Exercise training is capable of reducing pain in chronic pain syndromes, yet its mechanisms are less well established. One mechanism may be via the impact of exercise on increasing a person's pain threshold. Here we show, via meta-analysis of fifteen exercise training studies in pain syndromes that exercise training leads to increased pressure pain thresholds (low to moderate quality evidence). We also find low to moderate quality evidence exists that exercise training was more effective than non-exercise interventions, such as pain education, massage and stress management for improving pain sensitivity. Further, the effect of exercise was greater locally at the site of pain and less so at remote regions. These findings suggest that adaptations in central inhibition occur over time with exercise training and, more widely, add to the mechanistic understanding of how effective interventions can improve pain in chronic pain syndromes.

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17.

Exercise Intervention for Chronic Pain Management, Muscle Strengthening, and Functional Score in Obese Patients with Chronic Musculoskeletal Pain: A Systematic Review and Meta-analysis.

Tamin TZ, Murdana N, Pitoyo Y, Safitri ED

Acta Medica Indonesiana. 50(4):299-308, 2018 Oct.

[Journal Article. Meta-Analysis. Systematic Review]

UI: 30630994

BACKGROUND: obesity and osteoarthritis have strong inter-relationship with multi-factorial mechanism that caused pain and leads to decreased quality of life. Exercise has been identified as prevention and management against obesity and joint pain. This systematic review aims to assess the effect between exercises compared to diet group for chronic pain management, physical and mental function in obese patients with chronic musculoskeletal problem.

METHODS: we performed a systematic search of Randomized Control Trial studies from Cochrane Central Register of Controlled Trials (CENTRAL); MEDLINE; EBSCO; SCIENCEDIRECT (Elsevier); SCOPUS, grey literature, trial registry, ongoing study for published studies, and from the ClinicalTrial.gov, thesis of rehabilitation medicine in RSCM, and proceeding books for unpublished studies that was last updated on November 2016. Risk of bias was assessed using Cochrane risk-of-bias tool and data were analyzed using Review Manager 2014.

RESULTS: one study showed no difference in pain reduction (assessed using VAS) between two groups. Two studies showed improvement in physical function measured using 6MWT in exercise group at 6 and 18 months with mean difference 28.12 [11.20, 45.04] and 26.21 [9.01, 43.41]. There was no significant effects observed for Mental and Physical Function based on SF-36 after 6 months (1 study) and 18 months (2 studies) observation, with mean difference 1.10 [-0.79, 2.99] and 0.08 [-1.53, 1.70] respectively for Mental Function score and -0.30 [-2.54, 1.94] and -0.36 [-2.30, 1.57] respectively for Physical Function score.

CONCLUSION: exercise can improve physical function objectively, but could not reduce pain in obese patients with chronic musculoskeletal problem subjectively.

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18.

The effects of walking intervention in patients with chronic low back pain: A meta-analysis of randomized controlled trials. [Review]

Sitthipornvorakul E, Klinsophon T, Sihawong R, Janwantanakul P

Musculoskeletal Science & Practice. 34:38-46, 2018 04.

[Journal Article. Meta-Analysis. Research Support, Non-U.S. Gov't. Review]

UI: 29257996

OBJECTIVE: The aim of this meta-analysis of randomized controlled trials was to gain insight into the effectiveness of walking intervention on pain, disability, and quality of life in patients with chronic low back pain (LBP) at post intervention and follow ups.

METHOD: Six electronic databases (PubMed, Science Direct, Web of Science, Scopus, PEDro and The Cochrane library) were searched from 1980 to October 2017. The following keywords were used: Walk* or Pedometer* or Accelerometer* or Treadmill* paired with "Back pain", "Low back pain", "Chronic low back pain", "LBP", or "Backache". Randomized controlled trials in patients with chronic LBP were included if they compared the effects of walking intervention to non-pharmacological interventions. Pain, disability, and quality of life were the primary health outcomes.

RESULTS: Nine studies were suitable for meta-analysis. Data was analyzed according to the duration of follow-up (short-term, < 3 months; intermediate-term, between 3 and 12 months; long-term, > 12 months). Low- to moderate-quality evidence suggests that walking intervention in patients with chronic LBP was as effective as other non-pharmacological interventions on pain and disability reduction in both short- and intermediate-term follow ups.

CONCLUSIONS: Unless supplementary high-quality studies provide different evidence, walking, which is easy to perform and highly accessible, can be recommended in the management of chronic LBP to reduce pain and disability.

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19.

What Are the Mechanisms of Action of Cognitive-Behavioral, Mind-Body, and Exercise-based Interventions for Pain and Disability in People With Chronic Primary Musculoskeletal Pain?: A Systematic Review of Mediation Studies From Randomized Controlled Trials.

Alaiti RK, Castro J, Lee H, Caneiro JP, Vlaeyen JWS, Kamper SJ, da Costa MF

Clinical Journal of Pain. 38(7):502-509, 2022 07 01.

[Journal Article. Systematic Review. Research Support, Non-U.S. Gov't]

UI: 35686580

OBJECTIVES: This systematic review examined studies that used mediation analysis to investigate the mechanisms of action of cognitive-behavioral, mind-body, and exercise-based interventions for pain and disability in people with chronic primary musculoskeletal pain.

MATERIALS AND METHODS: We searched 5 electronic databases for articles that conducted mediation analyses of randomized controlled trials to either test or estimate indirect effects.

RESULTS: We found 17 studies (n=4423), including 90 mediation models examining the role of 22 putative mediators on pain or disability, of which 4 had partially mediated treatment effect; 8 had mixed results, and 10 did not mediate treatment effect. The conditions studied were chronic whiplash-associated pain, chronic low back pain, chronic knee pain, and mixed group of chronic primary musculoskeletal pain.

DISCUSSION: We observed that several of the studies included in our systematic review identified similar mechanisms of action, even between different interventions and conditions. However, methodological limitations were common. In conclusion, there are still substantial gaps with respect to understanding how cognitive-behavioral, mind-body, and exercise-based interventions work to reduce pain and disability in people with chronic primary musculoskeletal pain.

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20.

Attempting to Separate Placebo Effects from Exercise in Chronic Pain: A Systematic Review and Meta-analysis.

Miller CT, Owen PJ, Than CA, Ball J, Sadler K, Piedimonte A, Benedetti F, Belavy DL

Sports Medicine. 52(4):789-816, 2022 Apr.

[Journal Article. Meta-Analysis. Systematic Review]

UI: 34453277

BACKGROUND: Pain is the most disabling characteristic of musculoskeletal disorders, and while exercise is promoted as an important treatment modality for chronic musculoskeletal conditions, the relative contribution of the specific effects of exercise training, placebo effects and non-specific effects such as natural history are not clear. The aim of this systematic review and meta-analysis was to determine the relative contribution of these factors to better understand the true effect of exercise training for reducing pain in chronic primary musculoskeletal pain conditions.

DESIGN: Systematic review with meta-analysis **DATA SOURCES:** MEDLINE, CINAHL, SPORTDiscus, EMBASE and CENTRAL from inception to February 2021. Reference lists of prior systematic reviews.

ELIGIBILITY CRITERIA: Randomised controlled trials of interventions that used exercise training compared to placebo, true control or usual care in adults with chronic primary musculoskeletal pain. The review was registered prospectively with PROSPERO (CRD42019141096).

RESULTS: We identified 79 eligible trials for quantitative analysis. Pairwise meta-analysis showed very low-quality evidence (GRADE criteria) that exercise training was not more effective than placebo (g [95% CI]: 0.94 [- 0.17, 2.06], $P = 0.098$, $I^2 = 92.46\%$, studies: $n = 4$). Exercise training was more effective than true, no intervention controls (g [95% CI]: 0.99 [0.66, 1.32], $P < 0.001$, $I^2 = 92.43\%$, studies: $n = 42$), usual care controls (g [95% CI]: 0.64 [0.44, 0.83], $P < 0.001$, $I^2 = 76.52\%$, studies: $n = 33$), and when all controls combined (g [95% CI]: 0.84 [0.64, 1.04], $P < 0.001$, $I^2 = 90.02\%$, studies: $n = 79$).

CONCLUSIONS: There is very low-quality evidence that exercise training is not more effective than non-exercise placebo treatments in chronic pain. Exercise training and the associated clinical encounter are more effective than true control or standard medical care for reductions in pain for adults with chronic musculoskeletal pain, with very low quality of evidence based on GRADE criteria.

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21.

Exercise therapy for whiplash-associated disorders: a systematic review and meta-analysis.

Chrcanovic B, Larsson J, Malmstrom EM, Westergren H, Haggman-Henrikson B

Scandinavian Journal of Pain. 22(2):232-261, 2022 04 26.

[Journal Article. Meta-Analysis. Systematic Review. Research Support, Non-U.S. Gov't]

UI: 34561976

OBJECTIVES: Acute as well as chronic pain syndromes are common after whiplash trauma and exercise therapy is proposed as one possible intervention strategy. The aim of the present systematic review was to evaluate the effect of exercise therapy in patients with Whiplash-Associated Disorders for the improvement of neck pain and neck disability, compared with other therapeutic interventions, placebo interventions, no treatment, or waiting list.

CONTENT: The review was registered in Prospero (CRD42017060356) and conducted in accordance with the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) guidelines. A literature search in PubMed, Scopus and Cochrane from inception until January 13, 2020 was combined with a hand search to identify eligible randomized controlled studies. Abstract screening, full text assessment and risk of bias assessment (Cochrane RoB 2.0) were conducted by two independent reviewers.

SUMMARY: The search identified 4,103 articles. After removal of duplicates, screening of 2,921 abstracts and full text assessment of 100 articles, 27 articles that reported data for 2,127 patients were included. The included articles evaluated the effect of exercise therapy on neck pain, neck disability or other outcome measures and indicated some positive effects from exercise, but many studies lacked control groups not receiving active treatment. Studies on exercise that could be included in the random-effect meta-analysis showed significant short-term effects on neck pain and medium-term effects on neck disability.

OUTLOOK: Despite a large number of articles published in the area of exercise therapy and Whiplash-Associated Disorders, the current evidence base is weak. The results from the present review with

meta-analysis suggests that exercise therapy may provide additional effect for improvement of neck pain and disability in patients with Whiplash-Associated Disorders.

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22.

Best Exercise Options for Reducing Pain and Disability in Adults With Chronic Low Back Pain: Pilates, Strength, Core-Based, and Mind-Body. A Network Meta-analysis. [Review]

Fernandez-Rodriguez R, Alvarez-Bueno C, Cavero-Redondo I, Torres-Costoso A, Pozuelo-Carrascosa DP, Reina-Gutierrez S, Pascual-Morena C, Martinez-Vizcaino V

Journal of Orthopaedic & Sports Physical Therapy. 52(8):505-521, 2022 Aug.

[Journal Article. Meta-Analysis. Review. Systematic Review]

UI: 35722759

OBJECTIVE: To determine which type of exercise is best for reducing pain and disability in adults with chronic low back pain (LBP).

DESIGN: Systematic review with a network meta-analysis (NMA) of randomized controlled trials (RCTs).

LITERATURE SEARCH: Six electronic databases were systematically searched from inception to July 2021.

STUDY SELECTION CRITERIA: RCTs testing the effects of exercise on reducing self-perceived pain or disability in adults (aged 18-65 years) with chronic LBP.

DATA SYNTHESIS: We followed the PRISMA-NMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses, incorporating NMAs of health care interventions) statement when reporting our NMA. A frequentist NMA was conducted. The probability of each intervention being the most effective was conducted according to surface under the cumulative ranking curve (SUCRA) values.

RESULTS: We included 118 trials (9710 participants). There were 28 head-to-head comparisons, 7 indirect comparisons for pain, and 8 indirect comparisons for disability. Compared with control, all types of physical exercises were effective for improving pain and disability, except for stretching exercises (for reducing pain) and the McKenzie method (for reducing disability). The most effective interventions for reducing pain were Pilates, mind-body, and core-based exercises. The most effective interventions for reducing disability were Pilates, strength, and core-based exercises. On SUCRA analysis, Pilates had the highest likelihood for reducing pain (93%) and disability (98%).

CONCLUSION: Although most exercise interventions had benefits for managing pain and disability in chronic LBP, the most beneficial programs were those that included (1) at least 1 to 2 sessions per week of Pilates or strength exercises; (2) sessions of less than 60 minutes of core-based, strength, or mind-body exercises; and (3) training programs from 3 to 9 weeks of Pilates and core-based exercises. *J Orthop Sports Phys Ther* 2022;52(8):505-521. Epub: 19 June 2022. doi:10.2519/jospt.2022.10671.

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23.

Effectiveness of walking versus mind-body therapies in chronic low back pain: A systematic review and meta-analysis of recent randomized controlled trials.

Nduwimana I, Nindorera F, Thonnard JL, Kossi O

Medicine. 99(35):e21969, 2020 Aug 28.

[Comparative Study. Journal Article. Meta-Analysis. Systematic Review]

UI: 32871946

PURPOSE: Walking and mind-body therapies (MBTs) are commonly recommended to relieve pain and improve function in patients with chronic low back pain (CLBP). The purpose of this study was to compare the effectiveness of walking and MBTs in CLBP.

METHODS: We included randomized controlled trials (RCTs) comparing walking or MBTs to any other intervention or control in adults with CLBP. Studies were identified through PubMed, Cochrane Library, PsycINFO, Scopus, and ScienceDirect databases. The research was limited to studies published in English and French between January 2008 and December 2018. Two reviewers independently selected the studies, extracted data, and assessed studies quality using the Physiotherapy Evidence Database (PEDro) scale. Statistical analyses were performed under a random-effects model. We

analyzed pain and activity limitation, with the calculation of standardized mean differences and 95% confidence intervals for the different treatment effects.

RESULTS: Thirty one randomized controlled trials involving 3193 participants were analyzed. Walking was as effective as control interventions in the short-term and slightly superior in the intermediate term with respect to pain (Standardized mean differences (SMD) = -0.34; 95% CI, -0.65 to -0.03; P = .03) and activity limitation (SMD = -0.30; 95% CI, -0.50 to -0.10; P = .003). In contrast, yoga was more effective than control interventions in the short term in terms of pain (SMD = -1.47; 95% CI, -2.26 to -0.68; P = .0003) and activity limitation (SMD = -1.17; 95% CI, -1.80 to -0.55; P = .0002). Yoga was no longer superior to the control interventions for pain at the 6-month follow-up.

CONCLUSION: MBTs, especially yoga, seem to be more effective in the short term, and walking seems to be more effective in the intermediate term, for the relief of pain and activity limitation in patients with CLBP. A combination of walking and MBTs fits the biopsychosocial model and might be valuable therapy for CLBP throughout follow-up due to combined effects.

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24.

Effectiveness of movement control exercise on patients with non-specific low back pain and movement control impairment: A systematic review and meta-analysis. [Review]

Luomajoki HA, Bonet Beltran MB, Careddu S, Bauer CM

Musculoskeletal Science & Practice. 36:1-11, 2018 08.

[Journal Article. Meta-Analysis. Review]

UI: 29631119

BACKGROUND: Patients with low back pain (LBP) and movement control impairment (MVCI) show altered spinal movement patterns. Treatment that aims to change movement behaviour could benefit these patients.

OBJECTIVE: To assess the effectiveness of movement control exercise (MVCE) in terms of clinically relevant measures (disability and pain) on patients with NSLBP.

METHODS: A systematic review and meta-analysis were conducted. CINAHL, MEDLINE, PUBMED and PEDro databases were searched for RCT's evaluating MVCE treatment in patients with NSLBP from review inception to April 2017. Authors were contacted to obtain missing data and outcomes. PEDro was used to assess methodological quality of the studies and the GRADE approach was used to assess the overall quality of evidence Data were combined using a random effects meta-analysis and reported as standardized mean differences (SMD).

RESULTS: Eleven eligible RCT's including a total of 781 patients were found. Results show 'very low to moderate quality' evidence of a positive effect of MVCE on disability, both at the end of treatment and after 12 months (SMD -0.38 95%CI -0.68, -0.09 respectively 0.37 95%CI -0.61,-0.04). Pain intensity was significantly reduced after MVCE at the end of treatment (SMD -0.39 95%CI -0.69, -0.04), but not after 12 months (SMD -0.27, 95%CI -0.62, 0.09).

CONCLUSIONS: MVCE intervention for people with NSLBP and MVCI appears to be more effective in improving disability compared to other interventions, both over the short and long term. Pain was reduced only in the short term. An important factor is the initial identification of patients with MVCI. Registration of the study: The study protocol registration number is CRD42016036662 on PROSPERO.

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25.

Multimodal Interventions Including Rehabilitation Exercise for Older Adults With Chronic Musculoskeletal Pain: A Systematic Review and Meta-analyses of Randomized Controlled Trials.

Kechichian A, Lafrance S, Matifat E, Dube F, Lussier D, Benhaim P, Perreault K, Filiatrault J, Rainville P, Higgins J, Rousseau J, Masse J, Desmeules F

Journal of Geriatric Physical Therapy. 45(1):34-49, 2022 Jan-Mar 01.

[Journal Article. Meta-Analysis. Research Support, Non-U.S. Gov't. Systematic Review]

UI: 34928239

BACKGROUND AND PURPOSE: Musculoskeletal disorders (MSKDs) are the most common causes of disabilities for older adults. The aim of this systematic review and meta-analysis is to assess the effectiveness of multimodal interventions including exercise rehabilitation for older adults with chronic MSKDs.

METHODS: A literature search was conducted up to February 2019 in 5 bibliographical databases to identify randomized controlled trials (RCTs) that compared multimodal interventions including exercise rehabilitation with usual medical care or no intervention. Randomized controlled trials were assessed with the Cochrane risk-of-bias tool. Meta-analyses were performed and pooled mean differences (MDs) or standardized mean differences (SMDs) were calculated.

RESULTS: Sixteen RCTs (n = 2322 participants) were included. One RCT was considered at low risk of bias, 8 had some concerns of bias, and 7 had a high risk of bias. Participants suffered from hip or knee osteoarthritis (OA) (n = 12 RCTs), low back pain (LBP) (n = 2 RCTs) and generalized chronic pain (GCP) (n = 2 RCTs). Multimodal interventions were significantly more effective than usual care to decrease pain (visual analog scale, out of 10 points) in the short term, MD: -0.71 (95% confidence interval [CI] -1.08 to -0.34, n = 900), and in the long term: MD: -0.52 (95% CI -0.98 to -0.05, n = 575), but these differences are not considered clinically important. In terms of disabilities, multimodal interventions were also significantly more effective than usual care. The SMDs were -0.47 (95% CI -0.61 to -0.34, n = 903) and -0.29 (95% CI -0.46 to -0.13, n = 568) for OA trials in the short and long terms, respectively, and -0.47 (95% CI -0.81 to -0.12, n = 211) for LBP and GCP trials in the short term. The magnitude of these effects may be considered as small to moderate.

CONCLUSION: Multimodal intervention including exercise rehabilitation combined with usual medical care is an efficacious therapeutic option to reduce disabilities in older adults with chronic MSKDs. A significant but not clinically important effect was observed for pain. The most beneficial component of the multimodal interventions in terms of education, exercises, or medication remains to be determined.

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26.

Effectiveness of motor control exercise on non-specific chronic low back pain, disability and core muscle morphological characteristics: a meta-analysis of randomized controlled trials. [Review]

Zhang C, Li Y, Zhong Y, Feng C, Zhang Z, Wang C

European journal of physical & rehabilitation medicine.. 57(5):793-806, 2021 Oct.

[Journal Article. Meta-Analysis. Review]

UI: 33960180

INTRODUCTION: Chronic low back pain (CLBP) has been recognized as the leading cause of disability. Up to 90% of patients with CLBP are classified as having non-specific CLBP (NSCLBP). Motor control exercise (MCE) is one of the most popular and widespread treatment options, and has many advantages in alleviating pain and disability. This meta-analysis is aimed to investigate the effectiveness of MCE on NSCLBP, disability, and core muscles reported in randomized controlled trials (RCTs).

EVIDENCE ACQUISITION: PubMed, Web of Science, and EMBASE were searched from inception to August 2020. Articles were eligible if they were RCTs that evaluated MCE against sham or other treatments in isolation and measured outcomes including pain intensity and disability or core muscles morphologic characteristics.

EVIDENCE SYNTHESIS: Two authors independently extracted the data. Eighteen studies of 894 studies with a total of 1333 individuals with NSCLBP were retained for the meta-analysis. Compared with other conservative treatments, MCE was better in reducing pain and disability posttreatment and was better in reducing pain at the 6-month follow-up period. However, it had comparable effects on pain reduction at 12-month and 24-month follow-up period, and on disability at the 6-month, 12-month and 24-month follow-up period. MCE resulted in comparable effects to other treatments in improving the core muscle thickness posttreatment.

CONCLUSIONS: Low to very low quality of evidence supported that MCE resulted in a greater reduction of pain and disability posttreatment, and a greater reduction of pain at the 6-month follow-up than other treatments for NSCLBP. The findings in this review further support that MCE may be more effective than other treatments at short-term follow-ups, and at least has equivalent long-term effects to other forms of treatments in NSCLBP.

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27.

General Exercise Does Not Improve Long-Term Pain and Disability in Individuals With Whiplash-Associated Disorders: A Systematic Review. [Review]

Griffin A, Leaver A, Moloney N

Journal of Orthopaedic & Sports Physical Therapy. 47(7):472-480, 2017 Jul.

[Journal Article. Review. Systematic Review]

UI: 28622749

Study Design Systematic review of randomized controlled trials. **Background** General exercise, defined as purposeful physical activity involving repetitive exercises and incorporating multiple muscle groups, is frequently used in the management of whiplash-associated disorders (WADs). Evidence supporting its efficacy is not well established.

Objectives To determine whether general exercise is effective in reducing pain and disability in people with WAD. **Methods** Studies published in English in peer-reviewed journals between January 1990 and May 2015 were eligible if they evaluated a general exercise intervention compared with a different intervention or control. Studies were required to evaluate pain and disability at medium-term (6-14 weeks) and long-term (52 weeks) follow-ups. The mean +/- SD and sample size were recorded for follow-up scores and for change scores from baseline to follow-up. **Results** Of the 3 high-quality studies that were eligible for inclusion, none investigated general exercise alone. There were no clinically meaningful differences between comprehensive exercise programs, which included general exercise, and minimal intervention controls in the medium and long term. No studies directly compared general exercise with a no-treatment control. All included studies used different control interventions, preventing meta-analysis. **Conclusion** A lack of significant long-term improvements from general exercise interventions in individuals with WAD was identified. This finding differs from the positive benefits of general exercise for other musculoskeletal conditions. This may, in part, relate to the complexity of whiplash conditions. This may also reflect the challenge of exercise prescription in this population, where the need for sufficient intensity is balanced against the impact that exercise has on pain. **Level of Evidence** Therapy, level 1a. J Orthop Sports Phys Ther 2017;47(7):472-480. Epub 16 Jun 2017. doi:10.2519/jospt.2017.7081.

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28

Effectiveness of Pilates exercise in treating people with chronic low back pain: a systematic review of systematic reviews. [Review]

Wells C, Kolt GS, Marshall P, Hill B, Bialocerkowski A

BMC Medical Research Methodology. 13:7, 2013 Jan 19.

[Comparative Study. Journal Article. Review. Systematic Review]

UI: 23331384

BACKGROUND: Systematic reviews provide clinical practice recommendations that are based on evaluation of primary evidence. When systematic reviews with the same aims have different conclusions, it is difficult to ascertain which review reported the most credible and robust findings.

METHODS: This study examined five systematic reviews that have investigated the effectiveness of Pilates exercise in people with chronic low back pain. A four-stage process was used to interpret findings of the reviews. This process included comparison of research questions, included primary studies, and the level and quality of evidence of systematic reviews. Two independent reviewers assessed the level of evidence and the methodological quality of systematic reviews, using the National Health and Medical Research Council hierarchy of evidence, and the Revised Assessment of Multiple Systematic Reviews respectively. Any disagreements were resolved by a third researcher.

RESULTS: A high level of consensus was achieved between the reviewers. Conflicting findings were reported by the five systematic reviews regarding the effectiveness of Pilates in reducing pain and disability in people with chronic low back pain. Authors of the systematic reviews included primary studies that did not match their questions in relation to treatment or population characteristics. A total of ten primary studies were identified across five systematic reviews. Only two of the primary studies were included in all of the reviews due to different inclusion criteria relating to publication date and status, definition of Pilates, and methodological quality. The level of evidence of reviews was low due to the methodological design of the primary studies. The methodological quality of reviews varied. Those which conducted a meta-analysis obtained higher scores.

CONCLUSION: There is inconclusive evidence that Pilates is effective in reducing pain and disability in people with chronic low back pain. This is due to the small number and poor methodological quality of primary studies. The Revised Assessment of Multiple Systematic Reviews provides a useful method of appraising the methodological quality of systematic reviews. Individual item scores, however, should be examined in addition to total scores, so that significant methodological flaws of systematic reviews are not missed, and results are interpreted appropriately. (348 words).

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29.

The clinical effectiveness of self-care interventions with an exercise component to manage knee conditions: A systematic review. [Review]

Button K, Roos PE, Spasic I, Adamson P, van Deursen RW

Knee. 22(5):360-71, 2015 Oct.

[Journal Article. Research Support, Non-U.S. Gov't. Review. Systematic Review]

UI: 26056046

OBJECTIVE: Treatment of knee conditions should include approaches to support self-care and exercise based interventions. The most effective way to combine self-care and exercise has however not been determined

sufficiently. Therefore the aim was to evaluate the clinical effectiveness of self-care programmes with an exercise component for individuals with any type of knee conditions.

METHODS: A keyword search of Medline, CINAHL, Amed, PsycInfo, Web of Science, and Cochrane databases was conducted up until January 2015. Two reviewers independently assessed manuscript eligibility against inclusion/exclusion criteria. Study quality was assessed using the Downs and Black quality assessment tool and the Cochrane Risk of Bias Tool. Data were extracted about self-care and exercise intervention type, control intervention, participants, length of follow-up, outcome measures, and main findings.

RESULTS: From the 7392 studies identified through the keyword search the title and abstract of 5498 were screened. The full text manuscripts of 106 studies were retrieved to evaluate their eligibility. Twenty-one manuscripts met the inclusion/exclusion criteria.

CONCLUSION: The treatment potential of combined self-care and exercise interventions has not been maximised because of limitations in study design and failure to adequately define intervention content. Potentially the most beneficial self-care treatment components are training self-management skills, information delivery, and goal setting. Exercise treatment components could be strengthened by better attention to dose and progression. Modern technology to streamline delivery and support self-care should be considered. More emphasis is required on using self-care and exercise programmes for chronic condition prevention in addition to chronic condition management.

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30.

**Effects of Pilates exercise programs in people with chronic low back pain: a systematic review.
[Review]**

Patti A, Bianco A, Paoli A, Messina G, Montalto MA, Bellafiore M, Battaglia G, Iovane A, Palma A

Medicine. 94(4):e383, 2015 Jan.

[Journal Article. Review. Systematic Review]

UI: 25634166

The Pilates method has recently become a fast-growing popular way of exercise recommended for healthy individuals and those engaged in rehabilitation. Several published studies have examined the effects of Pilates method in people with chronic low back pain (LBP). The objective of this study is to describe and provide an extensive overview of the scientific literature comparing the effectiveness of the Pilates method on pain and disability in patients with chronic nonspecific LBP. The study is based on the data from the following sources: MEDLINE-NLM, MEDLINE-EBSCO, Scopus Elsevier, Cochrane, DOAJ, SciELO, and PLOS ONE. Original articles and systematic reviews of adults with chronic nonspecific LBP that evaluated pain and/or disability were included in this study; studies in which the primary treatment was based on Pilates method exercises compared with no treatment, minimal intervention, other types of intervention, or other types of exercises. The Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) were adopted. The literature search included 7 electronic databases and the reference list of relevant systematic reviews and original articles to July 2014. Two independent investigators conducted the literature search and performed the synthesis as follows: Study Design;

Sample (n); Disability measure; Intervention; and Main results. The searches identified a total of 128 articles. From these, 29 were considered eligible and were included in the analysis. The items were stratified as follows: Pilates method versus other kind of exercises (n = 6 trials) and Pilates method versus no treatment group or minimal intervention for short-term pain (n = 9 trials); the therapeutic effect of the Pilates method in randomized cohorts (n = 5); and analysis of reviews (n = 9). We found that there is a dearth of studies that clearly demonstrates the efficacy of a specific Pilates exercise program over another in the treatment of chronic pain. However, the consensus in the field suggests that Pilates method is more effective than minimal physical exercise intervention in reducing pain. These conclusions need to be supported by other proper investigations.

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31.

**The effectiveness of Pilates exercise in people with chronic low back pain: a systematic review.
[Review]**

Wells C, Kolt GS, Marshall P, Hill B, Bialocerkowski A

PLoS ONE [Electronic Resource]. 9(7):e100402, 2014.

[Journal Article. Review. Systematic Review]

UI: 24984069

OBJECTIVE: To evaluate the effectiveness of Pilates exercise in people with chronic low back pain (CLBP) through a systematic review of randomised controlled trials (RCTs).

DATA SOURCES: A search for RCTs was undertaken using Medical Search Terms and synonyms for "Pilates" and "low back pain" within the maximal date range of 10 databases. Databases included the Cumulative Index to Nursing and Allied Health Literature; Cochrane Library; Medline; Physiotherapy Evidence Database; ProQuest: Health and Medical Complete, Nursing and Allied Health Source, Dissertation and Theses; Scopus; Sport Discus; Web of Science.

STUDY SELECTION: Two independent reviewers were involved in the selection of evidence. To be included, relevant RCTs needed to be published in the English language. From 152 studies, 14 RCTs were included.

DATA EXTRACTION: Two independent reviewers appraised the methodological quality of RCTs using the McMaster Critical Review Form for Quantitative Studies. The author(s), year of publication, and details regarding participants, Pilates exercise, comparison treatments, and outcome measures, and findings, were then extracted.

DATA SYNTHESIS: The methodological quality of RCTs ranged from "poor" to "excellent". A meta-analysis of RCTs was not undertaken due to the heterogeneity of RCTs. Pilates exercise provided statistically significant improvements in pain and functional ability compared to usual care and physical activity between 4 and 15 weeks, but not at 24 weeks. There were no consistent statistically significant differences in improvements in pain and functional ability with Pilates exercise, massage therapy, or other forms of exercise at any time period.

CONCLUSIONS: Pilates exercise offers greater improvements in pain and functional ability compared to usual care and physical activity in the short term. Pilates exercise offers equivalent improvements to massage therapy and other forms of exercise. Future research should explore optimal Pilates exercise designs, and whether some people with CLBP may benefit from Pilates exercise more than others.

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32.

**Chronic neck pain and exercise interventions: frequency, intensity, time, and type principle.
[Review]**

O'Riordan C, Clifford A, Van De Ven P, Nelson J

Archives of Physical Medicine & Rehabilitation. 95(4):770-83, 2014 Apr.

[Journal Article. Meta-Analysis. Review]

UI: 24333741

OBJECTIVE: To identify the most effective components in an active exercise physiotherapy treatment intervention for chronic neck pain based on the frequency, intensity, time, and type (FITT) exercise method of tailoring physical activity recommendations to the individual needs and goals of patients.

DATA SOURCES: Databases, including the Allied and Complementary Medicine Database, Cumulative Index to Nursing and Allied Health, MEDLINE, SPORTDiscus, Biomedical Reference Collection, and Academic Search Premier, were searched for relevant articles.

STUDY SELECTION: Quantitative design studies that included active exercise as part of a multimodal or stand-alone approach were selected. Only studies scoring ≥ 6 on the Physiotherapy Evidence Database Scale were included in the review because this reflected a good level of evidence.

DATA EXTRACTION: Study methodologies and relevant outcome measures, including isometric strength, Neck Disability Index scores, and pain scores, were extracted from relevant articles and grouped together for appraisal and synthesis.

DATA SYNTHESIS: Evidence from selected articles was synthesized according to the FITT exercise principal to determine the most effective exercise type, frequency, and intensity in the treatment of chronic neck pain.

CONCLUSIONS: Physiotherapy interventions using a multimodal approach appear to produce more beneficial outcomes in terms of increased strength, improved function, and health-related quality of life and reduced pain scores. Active strengthening exercises appear to be beneficial for all of these outcomes; the inclusion of additional stretching and aerobic exercise components appear to enhance the benefits of an exercise intervention.

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33.

Effectiveness of Pilates exercise: A quality evaluation and summary of systematic reviews based on randomized controlled trials. [Review]

Kamioka H, Tsutani K, Katsumata Y, Yoshizaki T, Okuizumi H, Okada S, Park SJ, Kitayuguchi J, Abe T, Mutoh Y
Complementary Therapies in Medicine. 25:1-19, 2016 Apr.

[Journal Article. Research Support, Non-U.S. Gov't. Review. Systematic Review]

UI: 27062942

OBJECTIVE: The objective of this review were to summarize evidence for the effectiveness of Pilates exercise (PE) and to assess the quality of systematic review (SRs) based on randomized controlled trials (RCTs).

STUDY DESIGN: A systematic review of SRs based on RCTs.

METHODS: Studies were eligible if they were RCTs. Studies included those with one treatment group in which PE was applied. We searched the following databases from 1995 up to August 20, 2014: MEDLINE via PubMed, CINAHL, Web of Science, Global Health Library, and Ichushi-Web. We also searched All Cochrane Database and Campbell Systematic Reviews up to August 20, 2014. Based on the International Classification of Diseases-10 (ICD-10), we identified a disease targeted for each article.

RESULTS: Nine studies met all inclusion criteria. As a whole, the quality of the articles was good. Seven studies were about "Musculoskeletal system and connective tissue (M5456)". There were two studies in "Factors influencing health status and contact with health services (Z723)". The traits of participants were for females and the comparatively young- and middle-aged. Five SRs for chronic low back pain (CLBP) concluded that there was pain-relief and functional improvement of the intervention in the short term, but two SRs were inconclusive about the effectiveness of PE. There were no adverse events described in any of the studies.

CONCLUSION: Although no SR reported any adverse effect or harm by PE, there was pain-relief and functional improvement attributed to PE in the short term in participants with CLBP. There was also evidence of improved flexibility and dynamic balance, and of enhanced muscular endurance in healthy people in the short term. In addition, there may have been an effect on body composition in the short term.

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34.

Does walking improve disability status, function, or quality of life in adults with chronic low back pain? A systematic review. [Review]

Lawford BJ, Walters J, Ferrar K

Clinical Rehabilitation. 30(6):523-36, 2016 Jun.

[Journal Article. Review. Systematic Review]

UI: 26088673

OBJECTIVE: To establish the effectiveness of walking alone and walking compared to other non-pharmacological management methods to improve disability, quality of life, or function in adults with chronic low back pain.

DATA SOURCES: A systematic search of the following databases was undertaken: Medline, Embase, CINAHL, Scopus, Pedro, SportDiscus, Cochrane Central Register of Controlled Trials. The following keywords were used: 'back pain' or 'low back pain' or 'chronic low back pain' and 'walk*' or 'ambulation' or 'treadmill*' or 'pedometer*' or 'acceleromet*' or 'recreational' and 'disability' or 'quality of life' or 'function*'.

REVIEW METHODS: Primary research studies with an intervention focus that investigated walking as the primary intervention compared to no intervention or any other non-pharmacological method in adults with chronic low back pain (duration >3 months).

RESULTS: Seven randomised controlled trials involving 869 participants were included in the review. There was no evidence that walking was more effective than other management methods such as usual care, specific strength exercises, medical exercise therapy, or supervised exercise classes. One study found over-ground walking to be superior to treadmill walking, and another found internet-mediated walking to be more beneficial than non-internet-mediated walking in the short term.

CONCLUSION: There is low quality evidence to suggest that walking is as effective as other non-pharmacological management methods at improving disability, function, and quality of life in adults with chronic low back pain.

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35.

Exercise interventions for the treatment of chronic low back pain: a systematic review and meta-analysis of randomised controlled trials. [Review]

Searle A, Spink M, Ho A, Chuter V

Clinical Rehabilitation. 29(12):1155-67, 2015 Dec.

[Journal Article. Meta-Analysis. Review. Systematic Review]

UI: 25681408

OBJECTIVE: To determine, for adults with chronic low back pain, which exercise interventions are the most effective at reducing pain compared to other treatments.

DATA SOURCES: A search of MEDLINE, CINAHL, EMBASE, SPORTDiscus, PsycINFO and The Cochrane Library was conducted up to October 2014.

REVIEW METHODS: Databases were searched for published reports of randomised trials that investigated the treatment of chronic low back pain of non-specific origin with an exercise intervention. Two authors independently reviewed and selected relevant trials. Methodological quality was evaluated using the Downs and Black tool.

RESULTS: Forty-five trials met the inclusion criteria and thirty-nine were included in the meta-analysis. Combined meta-analysis revealed significantly lower chronic low back pain with intervention groups using exercise compared to a control group or other treatment group (Standard Mean Deviation (SMD) =-0.32, CI 95% -0.44 to -0.19, P<0.01). Separate exploratory subgroup analysis showed a significant effect for strength/resistance and coordination/stabilisation programs.

CONCLUSIONS: Our results found a beneficial effect for strength/resistance and coordination/stabilisation exercise programs over other interventions in the treatment of chronic low back pain and that cardiorespiratory and combined exercise programs are ineffective.

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36.

Motor Control Exercise for Nonspecific Low Back Pain: A Cochrane Review. [Review]

Saragiotto BT, Maher CG, Yamato TP, Costa LOP, Costa LCM, Ostelo RWJG, Macedo LG

Spine. 41(16):1284-1295, 2016 Aug 15.

[Journal Article. Review. Systematic Review]

UI: 27128390

STUDY DESIGN: A systematic review.

OBJECTIVE: The aim of this review was to evaluate the effectiveness of motor control exercise (MCE) in patients with nonspecific low back pain (LBP).

SUMMARY OF BACKGROUND DATA: MCE is a common form of exercise used for managing LBP. MCE focuses on the activation of the deep trunk muscles and targets the restoration of control and coordination of these muscles, progressing to more complex and functional tasks integrating the activation of deep and global trunk muscles.

METHODS: We conducted electronic searches of CENTRAL, MEDLINE, EMBASE, five other databases, and two trials registers from their inception up to April 2015. Two independent review authors screened the search results, assessed risk of bias, and extracted the data. A third reviewer resolved any disagreement. We included randomized controlled trials comparing MCE with no treatment, another treatment, or as a supplement to other interventions in patients with nonspecific LBP. Primary outcomes were pain intensity and disability. We assessed risk of bias using the Cochrane Back and Neck (CBN) Review Group 12-item criteria. We combined results in a meta-analysis expressed as mean difference and 95% confidence interval. We assessed the overall quality of the evidence using the GRADE approach.

RESULTS: We included 32 trials (n = 2628). Most included trials had a low risk of bias. For acute LBP, low to moderate quality evidence indicates no clinically important differences between MCE and spinal manipulative therapy or other forms of exercise. There is very low-quality evidence that the addition of MCE to medical management does not provide clinically important improvements. For recurrence at one year, there is very low-quality evidence that MCE and medical management decrease the risk of recurrence. For chronic LBP, there is low to moderate quality evidence that MCE is effective for reducing pain compared with minimal intervention. There is low to high-quality evidence that MCE is not clinically more effective than other exercises or manual therapy. There is very low to low quality evidence that MCE is clinically more effective than exercise and electrophysical agents (EPAs) or telerehabilitation for pain and disability.

CONCLUSION: MCE is probably more effective than a minimal intervention for reducing pain, but probably does not have an important effect on disability, in patients with chronic LBP. There was no clinically important difference between MCE and other forms of exercises or manual therapy for acute and chronic LBP.

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Studies

1.

Exercise Intensity Matters in Chronic Nonspecific Low Back Pain Rehabilitation.

Verbrugghe J, Agten A, Stevens S, Hansen D, Demoulin C, O Eijnde B, Vandenabeele F, Timmermans A

Medicine & Science in Sports & Exercise. 51(12):2434-2442, 2019 12.

[Journal Article. Randomized Controlled Trial. Research Support, Non-U.S. Gov't]

UI: 31269004

INTRODUCTION: Exercise therapy (ET) is advocated as a treatment for chronic nonspecific low back pain (CNSLBP). However, therapy effect sizes remain low. In other chronic disorders, training at higher intensity has resulted in greater improvements on both general health related and disease specific outcomes compared to lower-intensity ET. Possibly, high-intensity training also improves effect sizes in CNSLBP.

OBJECTIVE: To compare the effects of a high-intensity ET program with a similar moderate-intensity ET program on disability, pain, function, exercise capacity, and abdominal/back muscle strength in persons with CNSLBP.

METHODS: In a randomized controlled trial, persons with CNSLBP performed a 12-wk ET program (24 sessions, 1.5 h per session, twice per week) at high-intensity training (HIT) or moderate-intensity training (MIT). Questionnaires to assess disability (Modified Oswestry Index [MODI]), pain intensity (Numeric Pain Rating Scale), and function (Patient Specific Functioning Scale), a cardiopulmonary exercise test to assess exercise capacity (VO₂max, cycling time), and a maximum isometric muscle strength test to assess abdominal/back muscle strength (maximum muscle torque) were administered at baseline and after the training program.

RESULTS: Thirty-eight participants (HIT: n = 19, MIT: n = 19) were included (mean age, 44.1 yr, SD = 9.8, 12 males). Groups did not differ at baseline. Between group differences ($P < 0.01$) in favor of HIT were found for MODI, VO₂max, and cycling time. Within group improvements ($P < 0.01$) were found in both groups on MODI (HIT:-64%, MIT:-33%), Numeric Pain Rating Scale (HIT, -56%; MIT, -39%), Patient-Specific Functioning Scale (HIT:+37%, MIT:+39%), VO₂max (HIT:+14, MIT:+4%), cycling time (HIT:+18%, MIT:+13%), and back muscle strength (HIT:+10%, MIT:+14%).

CONCLUSIONS: High-intensity training proved to be a feasible, well tolerated, and effective therapy modality in CNSLBP. Moreover, it shows greater improvements on disability and exercise capacity than a similar ET performed at moderate intensity.

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A physical activity program versus usual care in the management of quality of life for pre-frail older adults with chronic pain: randomized controlled trial.

Otones P, Garcia E, Sanz T, Pedraz A

BMC Geriatrics. 20(1):396, 2020 10 08.

[Journal Article. Randomized Controlled Trial]

UI: 33032532

BACKGROUND: Exercise has shown being effective for managing chronic pain and preventing frailty status in older adults but the effect of an exercise program in the quality of life of pre-frail older adults with chronic pain remains unclear. Our objective was to evaluate the effectiveness of multicomponent structured physical exercise program for pre-frail adults aged 65 years or more with chronic pain to improve their perceived health related quality of life, compared with usual care.

METHODS: Open label randomized controlled trial. Participants were community-dwelling pre-frail older adults aged 65 years or older with chronic pain and non-dependent for basic activities of daily living attending a Primary Healthcare Centre. Forty-four participants were randomly allocated to a control group (n = 20) that received usual care or an intervention group (n = 24) that received an 8-week physical activity and education program. Frailty status (SHARE Frailty Index), quality of life (EuroQol-5D-5L), pain intensity (Visual Analogue Scale), physical performance (Short Physical Performance Battery) and depression (Yessavage) were assessed at baseline, after the intervention and after 3 months follow-up. The effect of the intervention was analysed by mean differences between the intervention and control groups.

RESULTS: The follow-up period (3 months) was completed by 32 patients (73%), 17 in the control group and 15 in the intervention group. Most participants were women (78.1%) with a mean age (standard deviation) of 77.2 (5.9) years and a mean pain intensity of 48.1 (24.4) mm. No relevant differences were found between groups at baseline. After the intervention, mean differences in the EuroQol Index Value between control and intervention groups were significant (- 0.19 95% CI(- 0.33- - 0.04)) and remained after 3 months follow-up (- 0.21 95% CI(- 0.37- -0.05)). Participants in the exercise group showed better results in pain intensity and frailty after the intervention, and an improvement in physical performance after the intervention and after 3 months.

CONCLUSIONS: An eight-week physical activity and education program for pre-frail older adults with chronic pain, compared with usual care, could be effective to improve quality of life after the intervention and after three-months follow-up.

STUDY REGISTRATION DETAILS: This study was retrospectively registered in ClinicalTrials.gov with the identifier NCT04045535 .

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Exercise interventions and patient beliefs for people with hip, knee or hip and knee osteoarthritis: a mixed methods review. [Review]

Hurley M, Dickson K, Hallett R, Grant R, Hauari H, Walsh N, Stansfield C, Oliver S

Cochrane Database of Systematic Reviews. 4:CD010842, 2018 04 17.

[Journal Article. Research Support, Non-U.S. Gov't. Review. Systematic Review]

UI: 29664187

BACKGROUND: Chronic peripheral joint pain due to osteoarthritis (OA) is extremely prevalent and a major cause of physical dysfunction and psychosocial distress. Exercise is recommended to reduce joint pain and improve physical function, but the effect of exercise on psychosocial function (health beliefs, depression, anxiety and quality of life) in this population is unknown.

OBJECTIVES: To improve our understanding of the complex inter-relationship between pain, psychosocial effects, physical function and exercise.

SEARCH METHODS: Review authors searched 23 clinical, public health, psychology and social care databases and 25 other relevant resources including trials registers up to March 2016. We checked reference lists of included studies for relevant studies. We contacted key experts about unpublished studies.

SELECTION CRITERIA: To be included in the quantitative synthesis, studies had to be randomised controlled trials of land- or water-based exercise programmes compared with a control group consisting of no treatment or non-exercise intervention (such as medication, patient education) that measured either pain or function and at least one psychosocial outcome (self-efficacy, depression, anxiety, quality of life). Participants had to be aged 45 years or older, with a clinical diagnosis of OA (as defined by the study) or self-reported chronic hip or knee (or both) pain (defined as more than six months' duration). To be included in the qualitative synthesis, studies had to have reported people's opinions and experiences of exercise-based programmes (e.g. their views, understanding, experiences and beliefs about the utility of exercise in the management of chronic pain/OA).

DATA COLLECTION AND ANALYSIS: We used standard methodology recommended by Cochrane for the quantitative analysis. For the qualitative analysis, we extracted verbatim quotes from study participants and synthesised studies of patients' views using framework synthesis. We then conducted an integrative review, synthesising the quantitative and qualitative data together.

MAIN RESULTS: Twenty-one trials (2372 participants) met the inclusion criteria for quantitative synthesis. There were large variations in the exercise programme's content, mode of delivery, frequency and duration, participant's symptoms, duration of symptoms, outcomes measured, methodological quality and reporting. Comparator groups were varied and included normal care; education; and attention controls such as home visits, sham gel and wait list controls. Risk of bias was high in one and unclear risk in five studies regarding the randomisation process, high for 11 studies regarding allocation concealment, high for all 21 studies regarding blinding, and high for three studies and unclear for five studies regarding attrition. Studies did not provide information on adverse effects. There was moderate quality evidence that exercise reduced pain by an absolute percent reduction of 6% (95% confidence interval (CI) -9% to -4%, (9 studies, 1058 participants), equivalent to reducing (improving) pain by 1.25 points from 6.5 to 5.3 on a 0 to 20 scale and moderate quality evidence that exercise improved physical function by an absolute percent of 5.6% (95% CI -7.6% to 2.0%; standardised mean difference (SMD) -0.27, 95% CI -0.37 to -0.17, equivalent to reducing (improving) WOMAC (Western Ontario and McMaster Universities Osteoarthritis Index) function on a 0 to 100 scale from 49.9 to 44.3) (13 studies, 1599 participants)). Self-efficacy was increased by an absolute percent of 1.66% (95% CI 1.08% to 2.20%), although evidence was low quality (SMD 0.46, 95% CI 0.34 to

0.58, equivalent to improving the ExBeliefs score on a 17 to 85 scale from 64.3 to 65.4), with small benefits for depression from moderate quality evidence indicating an absolute percent reduction of 2.4% (95% CI -0.47% to 0.5%) (SMD -0.16, 95% CI -0.29 to -0.02, equivalent to improving depression measured using HADS (Hospital Anxiety and Depression Scale) on a 0 to 21 scale from 3.5 to 3.0) but no clinically or statistically significant effect on anxiety (SMD -0.11, 95% CI -0.26 to 0.05, 2% absolute improvement, 95% CI -5% to 1% equivalent to improving HADS anxiety on a 0 to 21 scale from 5.8 to 5.4; moderate quality evidence). Five studies measured the effect of exercise on health-related quality of life using the 36-item Short Form (SF-36) with statistically significant benefits for social function, increasing it by an absolute percent of 7.9% (95% CI 4.1% to 11.6%), equivalent to increasing SF-36 social function on a 0 to 100 scale from 73.6 to 81.5, although the evidence was low quality. Evidence was downgraded due to heterogeneity of measures, limitations with blinding and lack of detail regarding interventions. For 20/21 studies, there was a high risk of bias with blinding as participants self-reported and were not blinded to their participation in an exercise intervention. Twelve studies (with 6 to 29 participants) met inclusion criteria for qualitative synthesis. Their methodological rigour and quality was generally good. From the patients' perspectives, ways to improve the delivery of exercise interventions included: provide better information and advice about the safety and value of exercise; provide exercise tailored to individual's preferences, abilities and needs; challenge inappropriate health beliefs and provide better support. An integrative review, which compared the findings from quantitative trials with low risk of bias and the implications derived from the high-quality studies in the qualitative synthesis, confirmed the importance of these implications.

AUTHORS' CONCLUSIONS: Chronic hip and knee pain affects all domains of people's lives. People's beliefs about chronic pain shape their attitudes and behaviours about how to manage their pain. People are confused about the cause of their pain, and bewildered by its variability and randomness. Without adequate information and advice from healthcare professionals, people do not know what they should and should not do, and, as a consequence, avoid activity for fear of causing harm. Participation in exercise programmes may slightly improve physical function, depression and pain. It may slightly improve self-efficacy and social function, although there is probably little or no difference in anxiety. Providing reassurance and clear advice about the value of exercise in controlling symptoms, and opportunities to participate in exercise programmes that people regard as enjoyable and relevant, may encourage greater exercise participation, which brings a range of health benefits to a large population of people.

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4.

Short-term effect of a chronic pain self-management intervention delivered by an easily accessible primary healthcare service: a randomised controlled trial.

Nost TH, Steinsbekk A, Bratas O, Gronning K

BMJ Open. 8(12):e023017, 2018 12 09.

[Journal Article. Randomized Controlled Trial. Research Support, Non-U.S. Gov't]

UI: 30530580

OBJECTIVES: To investigate the effects on persons with chronic pain after 3 months of a group-based chronic pain self-management course compared with a drop-in, low-impact outdoor physical group activity on patient activation and a range of secondary outcomes.

DESIGN: An open, pragmatic, parallel group randomised controlled trial. Analyses were performed using a two-level linear mixed model.

SETTING: An easily accessible healthcare service provided by Norwegian public primary healthcare.

PARTICIPANTS: A total of 121 participants with self-reported chronic pain for 3 months or more were randomised with 60 participants placed in the intervention group and 61 placed in the control group (mean age 53 years, 88% women, 63% pain for 10 years or more).

INTERVENTIONS: The intervention group was offered a group-based chronic pain self-management course with 2.5-hour weekly sessions for a period of 6 weeks. The sessions consisted of education, movement exercises and emphasised group discussions. The control group was offered a low-impact outdoor group physical activity in 1-hour weekly sessions that consisted of walking and simple strength exercises for a period of 6 weeks.

MAIN OUTCOMES: The primary outcome was patient activation assessed using the Patient Activation Measure. Secondary outcomes measured included assessments of pain, anxiety and depression, pain self-efficacy, sense of coherence, health-related quality of life, well-being and the 30 s chair to stand test.

RESULTS: There was no effect after 3 months of the group-based chronic pain self-management course compared with the control group for the primary outcome, patient activation (estimated mean difference: -0.5, 95% CI -4.8 to 3.7, $p=0.802$).

CONCLUSIONS: There was no support for the self-management course having a better effect after 3 months than a low-impact outdoor physical activity offered the control group.

TRIAL REGISTRATION NUMBER: NCT02531282; Results.

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The feasibility and acceptability of a physical activity intervention for older people with chronic musculoskeletal pain: The iPOPP pilot trial protocol.

Healey EL, Jinks C, Foster NE, Chew-Graham CA, Pincus T, Hartshorne L, Cooke K, Nicholls E, Proctor J, Lewis M, Dent S, Wathall S, Hay EM, McBeth J

Musculoskeletal Care. 16(1):118-132, 2018 03.

[Clinical Trial Protocol. Journal Article. Randomized Controlled Trial. Research Support, Non-U.S. Gov't]

UI: 29218808

INTRODUCTION: This pilot trial will inform the design and methods of a future full-scale randomized controlled trial (RCT) and examine the feasibility, acceptability and fidelity of the Increasing Physical activity in Older People with chronic Pain (iPOPP) intervention, a healthcare assistant (HCA)-supported intervention to promote walking in older adults with chronic musculoskeletal pain in a primary care setting.

METHODS AND ANALYSIS: The iPOPP study is an individually randomized, multicentre, three-parallel-arm pilot RCT. A total of 150 participants aged ≥ 65 years with chronic pain in one or more index sites will be recruited and randomized using random permuted blocks, stratified by general practice, to: (i) usual care plus written information; (ii) pedometer plus usual care and written information; or (iii) the iPOPP intervention. A theoretically informed mixed-methods approach will be employed using semi-structured interviews, audio recordings of the HCA consultations, self-reported questionnaires, case report forms and objective physical activity data collection (accelerometry). Follow-up will be conducted 12 weeks post-randomization. Collection of the quantitative data and statistical analysis will be performed blinded to treatment allocation, and analysis will be exploratory to inform the design and methods of a future RCT. Analysis of the HCA consultation recordings will focus on the use of a checklist to determine the fidelity of the iPOPP intervention delivery, and the interview data will be analysed using a constant comparison approach in order to generate conceptual themes focused around the acceptability and feasibility of the trial, and then mapped to the Theoretical Domains Framework to understand barriers and facilitators to behaviour change. A triangulation protocol will be used to integrate quantitative and qualitative data and findings.

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6.

Resistance training vs general physical exercise in multidisciplinary rehabilitation of chronic neck pain: A randomized controlled trial.

Iversen VM, Vasseljen O, Mork PJ, Fimland MS

Journal of Rehabilitation Medicine. 50(8):743-750, 2018 Aug 22.

[Journal Article. Randomized Controlled Trial]

UI: 30132009

OBJECTIVE: To investigate whether progressive resistance training using elastic resistance bands improves neck-related disability more than general physical exercise in multidisciplinary rehabilitation of chronic neck pain.

DESIGN: Researcher-blinded, randomized controlled trial.

METHODS: A total of 59 patients with non-specific, chronic neck pain (mean age 46 years, disability (Neck Disability Index 0-100): 35.4, worst neck pain last 2 weeks (numerical pain rating scale 0-10): 6.3) were randomized to 3-week multidisciplinary rehabilitation including either general physical exercise or progressive resistance training with elastic bands. Participants were instructed to continue their respective home-based training programmes for 9 additional weeks. Outcomes were assessed at baseline, after 3 weeks and after 12 weeks. Primary outcome was the between-group difference in change in the Neck Disability Index from baseline to 12 weeks.

RESULTS: Thirty-four and 31 participants were followed up at 3 and 12 weeks, respectively. No between-group differences were observed, apart from a greater increase in shoulder abduction strength for the progressive resistance-training group at 12 weeks.

CONCLUSION: This study provides no evidence in favour of replacing general physical exercise with progressive resistance training using elastic resistance bands in multidisciplinary rehabilitation of chronic neck pain. We recommend clinicians to advise either of these exercise-types, based on the patient's interests and motivation.

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7.

Comparing AquaStretch with supervised land based stretching for Chronic Lower Back Pain.

Keane LG

Journal of Bodywork & Movement Therapies. 21(2):297-305, 2017 Apr.

[Journal Article. Randomized Controlled Trial]

UI: 28532872

OBJECTIVE: Chronic Lower Back Pain (CLBP) is a major health problem affecting 70-85% of the population in the UK. AquaStretch, a new form of assisted stretching in water, is compared with

supervised land based stretching (LBS) for subjects with CLBP looking at pain reduction, kinesiophobia and disability.

METHOD: 29 subjects were randomly allocated into three groups, LBS (N = 10), AquaStretch (N = 10) and Control (N = 9). Modified Oswestry Low Back Pain Questionnaire (MOLBPQ) and Tampa Scale of Kinesiophobia (TSK) questionnaires were completed in weeks 1, 6, and 12. Visual Analogue Scale (VAS) pain scores were collected weekly till week 12. Treatment groups received two 30 min sessions per week for 12 weeks, control group continued their normal physical activity.

RESULTS & CONCLUSION: Statistical significance ($p < 0.05$) was observed in the AquaStretch group for pain reduction ($P = 0.006$), kinesiophobia ($P = 0.029$), and perceived disability ($P = 0.001$). Both techniques are suggested to be beneficial for CLBP patients however AquaStretch has key additional benefits including time efficiency, cost effectiveness and the ability to be performed by qualified individuals other than physiotherapists. A reduction in pain post eight weeks of treatment using AquaStretch versus twelve weeks of land based stretching could result in potentially less treatment time needed and a possibility of less medication. Future research is recommended to determine the duration of AquaStretch benefits, and to compare AquaStretch with land based physical therapy programmes for CLBP and to research the potential reduction of Medication required for chronic pain conditions for both its relative clinical effectiveness together with potential health cost savings.

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8.

Results of a Pilates exercise program in patients with chronic non-specific low back pain: a randomized controlled trial.

Valenza MC, Rodriguez-Torres J, Cabrera-Martos I, Diaz-Pelegrina A, Aguilar-Ferrandiz ME, Castellote-Caballero Y

Clinical Rehabilitation. 31(6):753-760, 2017 Jun.

[Comparative Study. Journal Article. Randomized Controlled Trial]

UI: 27260764

OBJECTIVE: To investigate the effects of a Pilates exercise program on disability, pain, lumbar mobility, flexibility and balance in patients with chronic non-specific low back pain.

DESIGN: Randomized controlled trial.

SETTING: University laboratory.

PARTICIPANTS: A total of 54 patients with chronic non-specific low back pain.

INTERVENTION: Patients were randomly allocated to an experimental group (n=27) included in a Pilates exercise program or to a control group (n=27) receiving information in a form of a leaflet.

MAIN OUTCOME MEASURES: Disability (Roland-Morris Disability Questionnaire and Oswestry Disability Index), current, average and pain at it least and at its worst (Visual Analogue Scales), lumbar mobility (modified Shober test), flexibility (finger-to-floor test) and balance (single limb stance test) were measured at baseline and after the intervention.

RESULTS: A between-group analysis showed significant differences in the intervention group compared to the control group for both disability scores, the Rolland-Morris questionnaire (mean change+/-standard deviation of 5.31+/-3.37 and 2.40+/-6.78 respectively and between-groups mean difference of 3.2 +/- 4.12, p=0.003) and the Oswestry Disability Index (p<0.001), current pain (p=0.002) and pain at it least (p=0.033), flexibility (0.032) and balance (0.043).

CONCLUSIONS: An 8-week Pilates exercise program is effective in improving disability, pain, flexibility and balance in patients with chronic non-specific low back pain.

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9.

Clinical relevance of massage therapy and abdominal hypopressive gymnastics on chronic nonspecific low back pain: a randomized controlled trial.

Bellido-Fernandez L, Jimenez-Rejano JJ, Chillon-Martinez R, Lorenzo-Munoz A, Pinero-Pinto E, Rebollo-Salas M

Disability & Rehabilitation. 44(16):4233-4240, 2022 08.

[Journal Article. Randomized Controlled Trial]

UI: 33587856

PURPOSE: To determine the clinical relevance of the effects that Massage-Therapy (MT) and Abdominal-Hypopressive-Gymnastics (AHG) and the combination of both procedures have on the disability, pain intensity, quality of life, and lumbar mobility of patients with chronic nonspecific low back pain (CNSLBP).

METHODS: A randomized controlled-trial with parallel-groups, concealed allocation, assessor blinding, and intention-to-treat analysis was carried out. The sample included 60 adults with CNSLBP. The

participants received MT (n = 20), AHG (n = 20), or MT + AHG (n = 20). Each group received 8 interventions.

RESULTS: The ODI change scores were significantly higher ($p < 0.05$) in the MT + AHG group than in the other two groups. Significant differences were found in the results of NRS, Schober's test, and SF-12 PCS ($p < 0.05$) in each group. There were significant differences ($p < 0.05$) between the values of SF-12 MCS in AHG and MT + AHG groups.

CONCLUSIONS: Massage Therapy and Abdominal Hypopressive Gymnastics reduce pain levels, increase the mobility of the lumbar spine, and improve disability and quality of life (PCS) in patients with CNSLBP in the short term. Likewise, AHG and MT + AHG improve quality of life (MCS). The combination of both therapies provides more benefits in terms of lumbar disability in patients with CNSLBP in the short term. This improvement is clinically relevant.

TRIAL REGISTRATION: ClinicalTrials.gov (NCT02721914).

IMPLICATIONS FOR REHABILITATION Massage Therapy (MT) and Abdominal Hypopressive Gymnastics (AHG), reduce pain, improve mobility and quality of life, and reduce disability in the short term. These results are clinically relevant. The combination of manual and active therapy (MT + AHG) seems to be more effective and produces clinically relevant changes.

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10.

Pain Science Education Plus Exercise Therapy in Chronic Nonspecific Spinal Pain: A Systematic Review and Meta-analyses of Randomized Clinical Trials. [Review]

Bonatesta L, Ruiz-Cardenas JD, Fernandez-Azorin L, Rodriguez-Juan JJ

Journal of Pain. 23(4):535-546, 2022 04.

[Journal Article. Meta-Analysis. Review. Systematic Review]

UI: 34678468

Exercise therapy and education are recommended from several guidelines for managing symptoms in chronic nonspecific spinal pain (CNSP) patients. However, no systematic reviews have previously analyzed the effectiveness of pain science education (PSE) plus exercise therapy for managing CNSP related symptoms. Systematic searches were conducted on 10 databases looking for randomized control trials (RCTs) aimed to evaluate the effectiveness on pain, disability, kinesiophobia, and catastrophizing. Data were analyzed using random-effects meta-analyses and studies were appraised using the Cochrane ROB tool and GRADE. A total of eight RCTs (n = 622) were included in the qualitative-analysis and five were selected for meta-analysis. PSE plus exercise therapy showed improvements in pain (5RCTs: short-term: SMD: -0.53 [-0.86,-0.2]; 4RCTs: intermediate-term: SMD: -

0.57 [-1.01,-0.14]; low quality), disability (4RCTs: short-term: SMD: -0.24 [-0.53,0.05]; 4RCTs: intermediate-term: SMD: -0.93 [-1.08,-0.03]; low-to-very-low quality), kinesiophobia (3RCTs: short-term: SMD: -0.7 [-1.51,0.11]; 4RCTs: intermediate-term: SMD: -0.93 [-1.57,-0.30]; moderate-to-very-low quality), and catastrophizing (2RCTs: short-term: MD: -3.26 points [-6.15,-0.37]; 3RCTs: intermediate-term: MD: -4.94 points [-8.08,-1.81]; low-to-very-low quality) compared to exercise alone. A qualitative-analysis showed improvements in the experimental group compared to multimodal physiotherapy (1RCT; low-to-very-low quality), whereas no clear benefits were reported compared to PSE alone (1RCT; very-low quality) or no intervention (1RCT; very-low quality). There is low to very-low certainty of the evidence suggesting that PSE plus exercise therapy reduces CNSP related-symptoms. PERSPECTIVE: Based on low-quality data from small samples, PSE plus exercise therapy reduces CNSP related symptoms. The evidence requires further investigation due to the limited number of studies with short follow-up periods (CRD42020168968).

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11.

Effects of functional resistance training on fitness and quality of life in females with chronic nonspecific low-back pain.

Cortell-Tormo JM, Sanchez PT, Chulvi-Medrano I, Tortosa-Martinez J, Manchado-Lopez C, Llana-Belloch S, Perez-Soriano P

Journal of Back & Musculoskeletal Rehabilitation. 31(1):95-105, 2018 Feb 06.

[Journal Article. Randomized Controlled Trial]

UI: 28826168

BACKGROUND: Exercise is important as adjuvant in the chronic low back pain (CLBP) treatment. Functional training could involve benefits for low back pain (LBP) patients.

OBJECTIVE: To evaluate the effects of a 12-week period of functional resistance training on health-related quality of life (HRQOL), disability, body pain, and physical fitness in CLBP females.

METHODS: Nineteen females CLBP were recruited according to Paris Task Force on Back Pain criteria. Participants were randomly assigned to an exercise group (EG); and a control group (CG). Subjects were tested at baseline and at week 12 after 24 sessions, 2 days per week. Body pain was assessed using visual analog scale (VAS), disability with Oswestry Disability Index (ODI) and HRQOL

with Short Form 36 questionnaire. Physical fitness was measured using: flamingo test, back endurance test, side bridge test, abdominal curl-up tests, and 60-s squat test.

RESULTS: EG showed significant improvements in physical function (10%; $p < 0.05$), body pain (42%; $p < 0.05$), vitality (31%; $p < 0.05$), physical component scale (15%; $p < 0.05$), VAS (62.5%; $p < 0.01$), ODI (61.3%; $p < 0.05$), balance (58%; $p < 0.05$), curl-up (83%; $p < 0.01$), squat (22%; $p < 0.01$), static back (67%; $p < 0.01$), and side bridge (56%; $p < 0.01$).

CONCLUSION: Periodized functional resistance training decreased pain and disability and improved HRQOL, balance and physical fitness in females with CLBP, and can thus be used safely in this population.

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12.

Psychosocial effects of workplace physical exercise among workers with chronic pain: Randomized controlled trial.

Andersen LL, Persson R, Jakobsen MD, Sundstrup E

Medicine. 96(1):e5709, 2017 Jan.

[Journal Article. Randomized Controlled Trial]

UI: 28072707

While workplace physical exercise can help manage musculoskeletal disorders, less is known about psychosocial effects of such interventions. This aim of this study was to investigate the effect of workplace physical exercise on psychosocial factors among workers with chronic musculoskeletal pain. The trial design was a 2-armed parallel-group randomized controlled trial with allocation concealment. A total of 66 slaughterhouse workers (51 men and 15 women, mean age 45 years [standard deviation (SD) 10]) with upper limb chronic musculoskeletal pain were randomly allocated to group-based strength training (physical exercise group) or individual ergonomic training and education (reference group) for 10 weeks. Social climate was assessed with the General Nordic Questionnaire for Psychological and Social Factors at Work, and vitality and mental health were assessed with the 36-item Short Form Health Survey. All scales were converted to 0 to 100 (higher scores are better). Between-group differences from baseline to follow-up were determined using linear mixed models adjusted for workplace, age, gender, and baseline values of the outcome. Mean baseline scores of social climate, mental health, and vitality were 52.2 (SD 14.9), 79.5 (SD 13.7), and 53.9 (SD 19.7), respectively. Complete baseline and follow-up data were obtained from 30 and 31 from the physical exercise and reference groups, respectively. The between-group differences from baseline to follow-up between physical exercise and reference were 7.6 (95% CI 0.3 to 14.9), -2.3 (95% CI -10.3 to 5.8), and 10.1 (95% CI 0.6 to 19.5) for social climate, mental health, and vitality, respectively. For social climate

and vitality, this corresponded to moderate effect sizes (Cohen $d = 0.51$ for both) in favor of physical exercise. There were no reported adverse events. In conclusion, workplace physical exercise performed together with colleagues improves social climate and vitality among workers with chronic musculoskeletal pain. Mental health remained unchanged.

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13.

Physical activity with person-centred guidance supported by a digital platform for persons with chronic widespread pain: A randomized controlled trial.

Juhlin S, Bergenheim A, Gjertsson I, Larsson A, Mannerkorpi K

Journal of Rehabilitation Medicine. 53(4):jrm00175, 2021 Apr 01.

[Journal Article. Randomized Controlled Trial]

UI: 33576434

OBJECTIVE: To determine the effectiveness of a person-centred intervention, including advice on physical activity, for improving pain intensity, physical activity, and other health-related outcomes in persons with chronic widespread pain, when delivered with digital eHealth support compared with standard telephone follow-up.

DESIGN: Randomized controlled trial.

SUBJECTS: Individuals with chronic widespread pain ($n = 139$), aged 20-65 years, who had previously participated in a pain educational programme at primary healthcare units, were contacted during the period 2018-19 and randomized to an intervention group ($n = 69$) or an active control group ($n = 70$).

METHODS: Together with a physiotherapist, participants in both groups developed person-centred health plans for physical activity. The intervention group was supported via a digital platform for 6 months. The active control group received support via one follow-up phone call. Primary outcome was pain intensity. Secondary outcomes were physical activity and other health-related outcomes.

RESULTS: No significant differences were found between the groups after 6 months, except for a significant decrease in global fatigue in the active control group compared with the intervention group.

CONCLUSION: Future development of interventions supporting persons with chronic pain to maintain regular exercise is warranted.

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14.

Adapted exercises versus general exercise recommendations on chronic low back pain in industrial workers: A randomized control pilot study.

Cimarras-Otal C, Marcen-Cinca N, Rabal-Pelay J, Lacrcel-Tejero B, Alczar-Crevilln A, Villalba-Ruete J, Bataller-Cervero AV

Work. 67(3):733-740, 2020.

[Journal Article. Randomized Controlled Trial]

UI: 33164978

BACKGROUND: Exercise has been demonstrated as effective for the treatment of low back pain (LBP) in workers.

OBJECTIVE: The purpose of this study was to investigate whether an exercise program adapted to the characteristics of the workplace is a useful supplement to general exercise recommendations in assembly line workers with chronic LBP.

METHODS: Workers were randomly assigned to intervention group-adapted exercises plus general exercise recommendations (n = 10), and control group-general exercise recommendations (n = 8). Both received 8-week exercise program through a mobile application (APP) to manage the intervention. Outcome was based on lumbar disability (Oswestry Disability Index), interference and lumbar pain intensity (Brief Pain Inventory), and kinematic parameters.

RESULTS: Significant differences were obtained for the intervention group in the "pain interference" variable, in the "mood" and "enjoyment" sub-variables, as well as in "flexion angle" variable. For the control group, significant differences occurred in the "pain intensity" variable. Adapted exercise plus general recommendations seems more effective than the general recommendations for the improvement of lumbar flexion.

CONCLUSIONS: An adapted exercise program for assembly line workers with chronic LBP could be an effective treatment. Future studies with a larger sample size and with an exhaustive control of the exercise adherence are required to confirm the findings of this pilot study.

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15.

Effects of a behavioral medicine intervention on pain, health, and behavior among community-dwelling older adults: a randomized controlled trial.

Cederbom S, Leveille SG, Bergland A

Clinical Interventions In Aging. 14:1207-1220, 2019.

[Journal Article. Randomized Controlled Trial]

UI: 31308644

PURPOSE: The aim of the study was to evaluate the effects of an intervention, based on a behavioral medicine approach in physical therapy (BMPI), on pain-related disability and physical performance as well as on pain severity, pain catastrophizing, physical activity levels, falls efficacy, and health-related quality of life (HRQL) by comparing the effects to standard care.

PATIENTS AND METHODS: The study was a pragmatic randomized controlled trial with a two-group design and included measurements preintervention and postintervention and a 12-week follow-up. In total, 105 older adults, aged >75 years with chronic musculoskeletal pain living alone at home and dependent on formal care to manage their everyday lives, were included in the study. All statistical analyses were performed using an intention to treat approach.

RESULTS: The intervention, based on a behavioral medicine approach, compared to usual care, had a positive effect on pain-related disability, pain severity, level of physical activity, HRQL, management of everyday life, and self-efficacy.

CONCLUSION: BMPI can be a suitable evidence-based intervention for community-dwelling older adults, even for those who are very old and frail. BMPI can support and promote an active aging and "age in place" for the target population, which is currently the main goal of all interventions in this field.

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16.

Exercise-induced hypoalgesia: A meta-analysis of exercise dosing for the treatment of chronic pain.

Polaski AM, Phelps AL, Kostek MC, Szucs KA, Kolber BJ

PLoS ONE [Electronic Resource]. 14(1):e0210418, 2019.

[Journal Article. Meta-Analysis. Research Support, N.I.H., Extramural. Research Support, Non-U.S. Gov't]

UI: 30625201

OBJECTIVE: Increasing evidence purports exercise as a first-line therapeutic for the treatment of nearly all forms of chronic pain. However, knowledge of efficacious dosing respective to treatment modality and pain condition is virtually absent in the literature. The purpose of this analysis was to calculate the extent to which exercise treatment shows dose-dependent effects similar to what is seen with pharmacological treatments.

METHODS: A recently published comprehensive review of exercise and physical activity for chronic pain in adults was identified in May 2017. This report reviewed different physical activity and exercise interventions and their effectiveness in reducing pain severity and found overall modest effects of exercise in the treatment of pain. We analyzed this existing data set, focusing specifically on the dose of exercise intervention in these studies. We re-analyzed data from 75 studies looking at benefits of time of exercising per week, frequency of exercise per week, duration of intervention (in weeks), and estimated intensity of exercise.

RESULTS: Analysis revealed a significant positive correlation with exercise duration and analgesic effect on neck pain. Multiple linear regression modeling of these data predicted that increasing the frequency of exercise sessions per week is most likely to have a positive effect on chronic pain patients.

DISCUSSION: Modest effects were observed with one significant correlation between duration and pain effect for neck pain. Overall, these results provide insufficient evidence to conclude the presence of a strong dose effect of exercise in pain, but our modeling data provide tes predictions that can be used to design future studies to explicitly test the question of dose in specific patient populations.

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17.

Longer term follow-up on effects of Tailored Physical Activity or Chronic Pain Self-Management Programme on return-to-work: A randomized controlled trial.

Andersen LN, Juul-Kristensen B, Sorensen TL, Herborg LG, Roessler KK, Sogaard K

Journal of Rehabilitation Medicine. 48(10):887-892, 2016 Nov 11.

[Journal Article. Randomized Controlled Trial]

UI: 27786344

OBJECTIVE: To evaluate the longer term efficacy of the interventions Tailored Physical Activity (TPA) and Chronic Pain Self-management Program (CPSMP) against a reference group on return-to-work for sick-listed subjects with pain in the back or upper body.

DESIGN: A randomized controlled trial.

SUBJECTS: A total of 141 sick-listed subjects with pain in the back or upper body.

METHODS: All participants received health guidance for 1.5 h and were randomly assigned to TPA (n = 47), CPSMP (n = 47) or a reference group (n = 47). The primary end-point was the proportion of participants returning to work and the co-primary end-point was the duration of the sickness absence period retrieved 11 months after the first day on sick leave. Secondary outcomes were pain level, body mass index, aerobic capacity, work ability and kinesiophobia.

RESULTS: TPA and CPSMP were no more effective than the reference group as regards return-to-work. Compared with the reference group no other benefits of TPA and CPSMP were evident regarding pain, work ability, kinesiophobia or physical capacity.

CONCLUSION: After 11 months TPA, the reference group, and CPSMP show similar patterns of facilitating return-to-work. This is additional knowledge, compared with the 3-month findings reported previously, showing that TPA seems to facilitate a faster return-to-work.

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18.

A multidisciplinary rehabilitation programme improves disability, kinesiophobia and walking ability in subjects with chronic low back pain: results of a randomised controlled pilot study.

Monticone M, Ambrosini E, Rocca B, Magni S, Brivio F, Ferrante S

European Spine Journal. 23(10):2105-13, 2014 Oct.

[Journal Article. Randomized Controlled Trial. Research Support, Non-U.S. Gov't]

UI: 25064093

PURPOSE: To evaluate the effect of a multidisciplinary rehabilitation programme on disability, kinesiophobia, catastrophizing, pain, quality of life and gait disturbances in patients with chronic low back pain (CLBP).

METHODS: This was a parallel-group, randomised, superiority-controlled pilot study in which 20 patients were randomly assigned to a programme consisting of motor training (spinal stabilising exercises plus usual-care) and cognitive-behavioural therapy (experimental group, 10 subjects) or

usual-care alone (control group, 10 subjects). Before treatment, 8 weeks later (post-treatment), and 3 months after the end of treatment, the Oswestry Disability Index, the Tampa Scale for Kinesiophobia, the Pain Catastrophizing Scale, a pain numerical rating scale, and the Short-Form Health Survey were assessed. Spatio-temporal gait parameters were also measured by means of an electronic walking mat. A linear mixed model for repeated measures was used for each outcome measure.

RESULTS: The programme had significant group ($p = 0.027$), time ($p < 0.001$), and time-by-group interaction ($p < 0.001$) effects on disability, with the experimental group showing an improvement after training of about 61 % (25 % in the control group). The analyses of kinesiophobia, catastrophizing, and the quality of life also revealed significant time, group, and time-by-group interaction effects in favour of the experimental group, and there was a significant effect of time on pain. Both groups showed a general improvement in gait parameters, with the experimental group increasing cadence significantly more.

CONCLUSION: The multidisciplinary rehabilitation programme including cognitive-behavioural therapy was superior to the exercise programme in reducing disability, kinesiophobia, catastrophizing, and enhancing the quality of life and gait cadence of patients with CLBP.

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19.

Cognitive behavior therapy, exercise, or both for treating chronic widespread pain.

McBeth J, Prescott G, Scotland G, Lovell K, Keeley P, Hannaford P, McNamee P, Symmons DP, Woby S, Gkazinou C, Beasley M, Macfarlane GJ

Archives of Internal Medicine. 172(1):48-57, 2012 Jan 09.

[Journal Article. Multicenter Study. Randomized Controlled Trial. Research Support, Non-U.S. Gov't]

UI: 22082706

BACKGROUND: The clinical impact of telephone-delivered cognitive behavioral therapy (TCBT), exercise, or a combined intervention in primary care patients with chronic widespread pain (CWP) is unclear.

METHODS: A total of 442 patients with CWP (meeting the American College of Rheumatology criteria) were randomized to receive 6 months of TCBT, graded exercise, combined intervention, or treatment as usual (TAU). The primary outcome, using a 7-point patient global assessment scale of change in health since trial enrollment (range: very much worse to very much better), was assessed at baseline and 6 months (intervention end) and 9 months after randomization. A positive outcome was defined as "much better" or "very much better." Data were analyzed using logistic regression according to the intention-to-treat principle.

RESULTS: The percentages reporting a positive outcome at 6 and 9 months, respectively, were TAU group, 8% and 8%; TCBT group, 30% and 33%; exercise group, 35% and 24%; and combined intervention group, 37% and 37% ($P < .001$). After adjustment for age, sex, center, and baseline predictors of outcome, active interventions improved outcome compared with TAU: TCBT (6 months: odds ratio [OR], 5.0 [95% CI, 2.0-12.5]; 9 months: OR, 5.4 [95% CI, 2.3-12.8]), exercise (6 months: OR, 6.1 [95% CI, 2.5-15.1]; 9 months: OR, 3.6 [95% CI, 1.5-8.5]), and combined intervention (6 months: OR, 7.1 [95% CI, 2.9-17.2]; 9 months: OR, 6.2 [95% CI, 2.7-14.4]). At 6 and 9 months, combined intervention was associated with improvements in the 36-Item Short Form Health Questionnaire physical component score and a reduction in passive coping strategies. Conclusions on cost-effectiveness were sensitive to missing data.

CONCLUSION: TCBT was associated with substantial, statistically significant, and sustained improvements in patient global assessment.

TRIAL REGISTRATION: clinicaltrials.gov Identifier: ISRCTN67013851.

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20.

Can we predict which patients with patellofemoral pain are more likely to benefit from exercise therapy? A secondary exploratory analysis of a randomized controlled trial.

Lankhorst NE, van Middelkoop M, van Trier YD, van Linschoten R, Koes BW, Verhaar JA, Bierma-Zeinstra SM

Journal of Orthopaedic & Sports Physical Therapy. 45(3):183-9, 2015 Mar.

[Journal Article. Randomized Controlled Trial]

UI: 25627152

STUDY DESIGN: Secondary exploratory analysis of a randomized controlled trial comparing supervised exercise therapy to usual care in patients with patellofemoral pain (PFP).

OBJECTIVE: To explore which patients with PFP are more likely to benefit from exercise therapy.

BACKGROUND: Patellofemoral pain is a common condition for which exercise therapy is effective in reducing pain and improving function. However, not all patients benefit from exercise therapy.

METHODS: The present study explored patient characteristics that might interact with treatment effects of PFP in 131 patients treated with usual care or exercise therapy. These characteristics were tested

for interaction with treatment in a regression analysis. The primary outcomes were function and pain on activity at a 3-month follow-up.

RESULTS: None of the tested variables had a significant interaction with treatment. A positive trend was seen for females with PFP: they were more likely to report higher function scores with exercise therapy than with usual care compared to males with PFP (beta = 12.1; 95% confidence interval: 0.23, 24.0; P = .05). A positive trend was seen for patients with a longer duration of complaints (greater than 6 months); they were more likely to report higher function scores and to have less pain on activity with exercise therapy than with usual care compared to those with a shorter duration of complaints (beta = 12.3; 95% confidence interval: -0.08, 24.7; P = .05 and beta = -1.74; 95% confidence interval: -3.90, 0.43; P = .12, respectively).

CONCLUSION: Two factors, sex and duration of complaints, may have a predictive value for response to exercise therapy at 3-month follow-up. Due to the exploratory design of the study, future research should confirm this tendency.

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21.

Qigong versus exercise therapy for chronic low back pain in adults--a randomized controlled non-inferiority trial.

Blodt S, Pach D, Kaster T, Ludtke R, Icke K, Reissbauer A, Witt CM

European Journal of Pain. 19(1):123-31, 2015 Jan.

[Comparative Study. Journal Article. Randomized Controlled Trial. Research Support, Non-U.S. Gov't]

UI: 24902673

BACKGROUND: The value of qigong in the treatment of chronic low back pain is unclear. In a randomized controlled trial, we evaluated whether qigong is non-inferior to exercise therapy in patients with chronic low back pain.

METHODS: German outpatients (aged 46.7 +/- 10.4) with chronic low back pain [mean visual analogue scale (VAS), 53.9 +/- 12.5 mm] were enrolled and randomly allocated in a 1:1 ratio to receive either qigong (64 patients, 12 sessions with 1 x 90 min/week over 3 months) or exercise therapy (63 patients, 12 sessions 1 x 60 min/week). The primary outcome measure was the average pain intensity over the last 7 days on a VAS (0-100 mm, 0 = no pain, 100 = worst imaginable pain, non-inferiority margin = 5 mm) after 3 months. Follow-up was measured after 6 and 12 months.

RESULTS: The mean adjusted low back pain intensity after 3 months was 34.8 mm [95% confidence interval (CI) 29.5; 40.2] in the qigong group and 33.1 mm (95% CI 27.7; 38.4) in the exercise group.

Non-inferiority of the qigong group compared with the exercise group failed to show statistical significance ($p = 0.204$). In both groups, 10 patients reported suspected adverse reactions (e.g., muscle soreness, dizziness, pain) the total number was comparable in both groups (qigong $n = 40$, exercise $n = 44$).

CONCLUSIONS: Qigong was not proven to be non-inferior to exercise therapy in the treatment of chronic low back pain. Its role in the prevention of chronic low back pain might be addressed in further studies.

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22.

Randomized-controlled trial comparing yoga and home-based exercise for chronic neck pain.

Cramer H, Lauche R, Hohmann C, Ludtke R, Haller H, Michalsen A, Langhorst J, Dobos G

Clinical Journal of Pain. 29(3):216-23, 2013 Mar.

[Comparative Study. Journal Article. Randomized Controlled Trial. Research Support, Non-U.S. Gov't]

UI: 23249655

OBJECTIVES: Chronic neck pain is a significant public health problem with only very few evidence-based treatment options. There is growing evidence for the effectiveness of yoga for relieving musculoskeletal disorders. The aim of this study was to evaluate the effect of Iyengar yoga compared with exercise on chronic nonspecific neck pain.

METHODS: Patients were randomly assigned to either yoga or exercise. The yoga group attended a 9-week yoga course and the exercise group received a self-care manual on home-based exercises for neck pain relief. The main outcome measure was the present neck pain intensity (100 mm visual analog scale). Secondary outcome measures included functional disability (Neck Disability Index), pain at motion (visual analog scale), health-related quality of life (Short Form-36 questionnaire), cervical range of motion, proprioceptive acuity, and pressure pain threshold.

RESULTS: Fifty-one patients (mean age 47.8 y ; 82.4% female) were randomized to yoga ($n=25$) and exercise ($n=26$) intervention. After the study period, patients in the yoga group reported significantly less neck pain intensity compared with the exercise group [mean difference: -13.9 mm (95% CI, -26.4 to -1.4), $P=0.03$]. The yoga group reported less disability and better mental quality of life. Range of motion and proprioceptive acuity were improved and the pressure pain threshold was elevated in the yoga group.

DISCUSSION: Yoga was more effective in relieving chronic nonspecific neck pain than a home-based exercise program. Yoga reduced neck pain intensity and disability and improved health-related quality of life. Moreover, yoga seems to influence the functional status of neck muscles, as indicated by improvement of physiological measures of neck pain.

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23.

Strength Training Improves Fatigue Resistance and Self-Rated Health in Workers with Chronic Pain: A Randomized Controlled Trial.

Sundstrup E, Jakobsen MD, Brandt M, Jay K, Aagaard P, Andersen LL

BioMed Research International. 2016:4137918, 2016.

[Journal Article. Randomized Controlled Trial]

UI: 27830144

Chronic musculoskeletal pain is widespread in the working population and leads to muscular fatigue, reduced work capacity, and fear of movement. While ergonomic intervention is the traditional approach to the problem, physical exercise may be an alternative strategy. This secondary analysis of a randomized controlled trial investigates the effect of strength training on muscular fatigue resistance and self-rated health among workers with chronic pain. Sixty-six slaughterhouse workers with chronic upper limb pain and work disability were randomly allocated to 10 weeks of strength training or usual care ergonomic training (control). At baseline and follow-up, participants performed a handgrip muscular fatigue test (time above 50% of maximal voluntary contraction force) with simultaneous recording of electromyography. Additionally, participants replied to a questionnaire regarding self-rated health and pain. Time to fatigue, muscle strength, hand/wrist pain, and self-rated health improved significantly more following strength training than usual care (all $P < 0.05$). Time to fatigue increased by 97% following strength training and this change was correlated to the reduction in fear avoidance (Spearman's $\rho = -0.40$; $P = 0.01$). In conclusion, specific strength training improves muscular fatigue resistance and self-rated health and reduces pain of the hand/wrist in manual workers with chronic upper limb pain. This trial is registered with ClinicalTrials.gov NCT01671267.

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24.

Efficacy of Tailored Physical Activity or Chronic Pain Self-Management Programme on return to work for sick-listed citizens: A 3-month randomised controlled trial.

Andersen LN, Juul-Kristensen B, Sorensen TL, Herborg LG, Roessler KK, Sogaard K

Scandinavian Journal of Public Health. 43(7):694-703, 2015 Nov.

[Journal Article. Randomized Controlled Trial. Research Support, Non-U.S. Gov't]

UI: 26113171

OBJECTIVES: The aim was to evaluate the efficacy of 'Tailored Physical Activity' (TPA) and a 'Chronic Pain Self-management Programme' (CPSMP) compared with a reference group (REF) on return to work after 3 months as sick-listed citizens with pain related to the back or the upper body.

METHODS: Using a randomised controlled trial design all participants (n= 141) received health guidance for 1.5 hours and were randomised to TPA, CPSMP or REF. Characteristics of participants were collected from a questionnaire. The primary endpoint was proportion of participants returned to work as registered by the municipality and the co-primary endpoint was duration of the sickness absence period. Secondary outcomes consisted of pain, body mass index, aerobic capacity, grip strength, work ability and kinesiophobia. The trial was conducted in Sonderborg Municipality from March 2011 to October 2013.

RESULTS: TPA was more effective on return to work than REF, while CPSMP only tended to be more effective than REF, and the primary outcome was the only between-groups significant difference. TPA participants also reached a highly significant reduction in pain from baseline to follow-up with no similar effect seen in CPSMP or REF. In contrast, no benefit of TPA and CPSMP was evident regarding work ability, kinesiophobia or physical capacity after 3 months of follow-up.

CONCLUSIONS: The results suggest that TPA is a promising intervention to facilitate return to work and reduce pain among sick-listed citizens with pain related to the back or upper body compared to REF.

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25.

Effect of brief daily resistance training on occupational neck/shoulder muscle activity in office workers with chronic pain: randomized controlled trial.

Lidegaard M, Jensen RB, Andersen CH, Zebis MK, Colado JC, Wang Y, Heilskov-Hansen T, Andersen LL

BioMed Research International. 2013:262386, 2013.

[Journal Article. Randomized Controlled Trial. Research Support, Non-U.S. Gov't]

UI: 24490152

PURPOSE: This study investigates the acute and longitudinal effects of resistance training on occupational muscle activity in office workers with chronic pain.

METHODS: 30 female office workers with chronic neck and shoulder pain participated for 10 weeks in high-intensity elastic resistance training for 2 minutes per day (n = 15) or in control receiving weekly email-based information on general health (n = 15). Electromyography (EMG) from the splenius and upper trapezius was recorded during a normal workday.

RESULTS: Adherence to training and control interventions were 86% and 89%, respectively. Compared with control, training increased isometric muscle strength 6% (P < 0.05) and decreased neck/shoulder pain intensity by 40% (P < 0.01). The frequency of periods with complete motor unit relaxation (EMG gaps) decreased acutely in the hours after training. By contrast, at 10-week follow-up, training increased average duration of EMG gaps by 71%, EMG gap frequency by 296% and percentage time below 0.5%, and 1.0% EMGmax by 578% and 242%, respectively, during the workday in m. splenius.

CONCLUSION: While resistance training acutely generates a more tense muscle activity pattern, the longitudinal changes are beneficial in terms of longer and more frequent periods of complete muscular relaxation and reduced pain.

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26..

Supervised walking in comparison with fitness training for chronic back pain in physiotherapy: results of the SWIFT single-blinded randomized controlled trial (ISRCTN17592092).

Hurley DA, Tully MA, Lonsdale C, Boreham CAG, van Mechelen W, Daly L, Tynan A, McDonough SM
Pain. 156(1):131-147, 2015 Jan.

[Comparative Study. Journal Article. Randomized Controlled Trial. Research Support, Non-U.S. Gov't]
UI: 25599309

Effectiveness of brief/minimal contact self-activation interventions that encourage participation in physical activity (PA) for chronic low back pain (CLBP >12 weeks) is unproven. The primary objective of this assessor-blinded randomized controlled trial was to investigate the difference between an individualized walking programme (WP), group exercise class (EC), and usual physiotherapy (UP, control) in mean change in functional disability at 6 months. A sample of 246 participants with CLBP aged 18 to 65 years (79 men and 167 women; mean age +/- SD: 45.4 +/- 11.4 years) were recruited from 5 outpatient physiotherapy departments in Dublin, Ireland. Consenting participants completed self-report measures of functional disability, pain, quality of life, psychosocial beliefs, and PA were randomly allocated to the WP (n = 82), EC (n = 83), or UP (n = 81) and followed up at 3 (81%; n = 200), 6 (80.1%; n = 197), and 12 months (76.4%; n = 188). Cost diaries were completed at all follow-ups. An intention-to-treat analysis using a mixed between-within repeated-measures analysis of covariance found significant improvements over time on the Oswestry Disability Index (Primary Outcome), the Numerical Rating Scale, Fear Avoidance-PA scale, and the EuroQol EQ-5D-3L Weighted Health Index (P < 0.05), but no significant between-group differences and small between-group effect sizes (WP: mean difference at 6 months, 6.89 Oswestry Disability Index points, 95% confidence interval [CI] -3.64 to -10.15; EC: -5.91, CI: -2.68 to -9.15; UP: -5.09, CI: -1.93 to -8.24). The WP had the lowest mean costs and the highest level of adherence. Supervised walking provides an effective alternative to current forms of CLBP management.

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27..

Evaluation of pain and function after two home exercise programs in a clinical trial on women with chronic neck pain - with special emphasises on completers and responders.

Karlsson L, Takala EP, Gerdle B, Larsson B

BMC Musculoskeletal Disorders. 15:6, 2014 Jan 08.

[Comparative Study. Journal Article. Randomized Controlled Trial. Research Support, Non-U.S. Gov't]

UI: 24400934

BACKGROUND: Different types of exercises can help manage chronic neck pain. Supervised exercise interventions are widely used, but these protocols require substantial resources. The aim of this trial, which focused on adherence, was to evaluate two home exercise interventions.

METHODS: This parallel group randomized controlled trial included 57 women randomly allocated into two groups - a strength training group (STRENGTH, 34 subjects) and a stretching group (STRETCH, 23 subjects). The interventions focused on the neck and shoulder muscles and lasted for 12 months. The STRENGTH group performed weight training and ended each session with stretching exercises. These stretching exercises constituted the entirety of the STRETCH group's training session. Both groups were instructed to exercise three times per week. All the participants kept an exercise diary. In addition, all participants were offered support via phone and e-mail. The primary outcomes were pain intensity and function. The trial included a four- to six-month and a twelve-month follow-up. A completer in this study exercised at least 1,5 times per week during eight unbroken weeks. A responder in this study reported clinically significant improvements on pain and function. The statistical analyses used the Mann Whitney U-test, Wilcoxon signed-rank test, and X2 test.

RESULTS: At four- to six-months, the numbers of completers were 19 in the STRENGTH group and 17 in the STRETCH group. At twelve months, the corresponding numbers were 11 (STRENGTH) and 10 (STRETCH). At four- to six-months, the proportions of subjects reporting clinically important changes (STRENGTH and STRETCH) were for neck pain: 47% and 41%, shoulder pain: 47% and 47%, function: 37% and 29%. At twelve months, the corresponding numbers were for neck pain: 45% and 40%, shoulder pain: 55% and 50%, function: 55% and 20%.

CONCLUSIONS: No differences in the two primary outcomes between the two interventions were found, a finding that may be due to the insufficient statistical power of the study. Both interventions based on home exercises improved the two primary outcomes, but the adherences were relatively low. Future studies should investigate ways to improve adherence to home exercise treatments.

TRIAL REGISTRATION: ClinicalTrials.gov Id: NCT01876680.

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Effects of behavioural exercise therapy on the effectiveness of a multidisciplinary rehabilitation for chronic non-specific low back pain: study protocol for a randomised controlled trial.

Hofmann J, Peters S, Geidl W, Hentschke C, Pfeifer K

BMC Musculoskeletal Disorders. 14:89, 2013 Mar 11.

[Comparative Study. Journal Article. Multicenter Study. Randomized Controlled Trial. Research Support, Non-U.S. Gov't]

UI: 23496822

BACKGROUND: In Germany, a multidisciplinary rehabilitation named "behavioural medical rehabilitation" (BMR) is available for treatment of chronic low back pain (clbp). A central component of BMR is standard exercise therapy (SET), which is directed mainly to improve physical fitness. There is a need to address psychosocial factors within SET and therefore to improve behavior change with a focus on the development of self-management skills in dealing with clbp. Furthermore, short-term effectiveness of BMR with a SET has been proven, but the impact of a behavioural exercise therapy (BET) for improvement of the long-term effectiveness of BMR is unclear.

METHODS/DESIGN: To compare the effectiveness of two exercise programs with different approaches within BMR on the effects of BMR a prospective randomized controlled trial (RCT) in two rehabilitation centres will be performed. 214 patients aged 18-65 with clbp will be, based on an "urn randomisation"-algorithm, randomly assigned to a BMR with SET (function-oriented, n=107) and BMR with BET (behaviour-oriented, n=107). Both exercise programs have a mean duration of 26 hours in three weeks and are delivered by a limited number of not-blinded study therapists in closed groups with six to twelve patients who will be masked regarding study group. The main differences of BET lie in its detailed manualised program with a theory-based, goal-orientated combination of exercise, education and behavioural elements, active participation of patients and consideration of their individual preferences and previous experiences with exercise. The primary outcome is functional ability assessed with the Hannover Functional Ability Questionnaire directly before and after the rehabilitation program, as well as a six and twelve-month follow-up.

DISCUSSION: This RCT is designed to explore the effects of BET on the effectiveness of a BMR compared to a BMR with SET in the management of patients with clbp. Methodological challenges arise from conducting a RCT within routine health care as well as from ensuring high treatment integrity. Findings of this study might contribute to a better understanding of the mechanism of action of BMR and the special effects of BET and may be used to improve the quality of these interventions in routine care, therefore reducing the burden to patients with disabling clbp.

TRIAL REGISTRATION: Current controlled trials NCT01666639.

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29.

Pedometer-driven walking for chronic low back pain: a feasibility randomized controlled trial.

McDonough SM, Tully MA, Boyd A, O'Connor SR, Kerr DP, O'Neill SM, Delitto A, Bradbury I, Tudor-Locke C, Baxter GD, Hurley DA

Clinical Journal of Pain. 29(11):972-81, 2013 Nov.

[Journal Article. Randomized Controlled Trial]

UI: 23446066

OBJECTIVES: To evaluate the feasibility of an RCT of a pedometer-driven walking program and education/advice to remain active compared with education/advice only for treatment of chronic low back pain (CLBP).

METHODS: Fifty-seven participants with CLBP recruited from primary care were randomly allocated to either: (1) education/advice (E, n=17) or (2) education/advice plus an 8-week pedometer-driven walking program (EWP, n=40). Step targets, actual daily step counts, and adverse events were recorded in a walking diary over the 8 weeks of intervention for the EWP group only. All other outcomes (eg, functional disability using the Oswestry Disability Questionnaire (ODQ), pain scores, physical activity (PA) measurement etc.) were recorded at baseline, week 9 (immediately post-intervention), and 6 months in both groups.

RESULTS: The recruitment rate was 22% and the dropout rate was lower than anticipated (13% to 18% at 6 mo). Adherence with the EWP was high, 93% (n=37/40) walked for ≥ 6 weeks, and increased their steps/day (mean absolute increase in steps/d, 2776, 95% confidence interval [CI], 1996-3557) by 59% (95% CI, 40.73%-76.25%) from baseline. Mean percentage adherence with weekly step targets was 70% (95% CI, 62%-77%). Eight (20%) minor-related adverse events were observed in 13% (5/40) of the participants. The EWP group participants demonstrated an 8.2% point improvement (95% CI, -13 to -3.4) on the ODQ at 6 months compared with 1.6% points (95% CI, -9.3 to 6.1) for the E group (between group $d=0.44$). There was also a larger mean improvement in pain ($d=0.4$) and a larger increase in PA ($d=0.59$) at 6 months in EWP.

DISCUSSION: This preliminary study demonstrated that a main RCT is feasible. EWP was safe and produced a real increase in walking; CLBP function and pain improved, and participants perceived a greater improvement in their PA levels. These improvements require confirmation in a fully powered RCT.

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30.

Effectiveness of an 8-week exercise programme on pain and specificity of neck muscle activity in patients with chronic neck pain: a randomized controlled study.

Falla D, Lindstrom R, Rechter L, Boudreau S, Petzke F

European Journal of Pain. 17(10):1517-28, 2013 Nov.

[Journal Article. Randomized Controlled Trial]

UI: 23649799

BACKGROUND: Although exercise can be effective for relief of neck pain, little is known about the effect of exercise on the neural control of neck muscles.

METHODS: A randomized controlled trial was conducted on 46 women with chronic neck pain to investigate the immediate effectiveness of an 8-week exercise programme on pain and directional specificity of neck muscle activity. At baseline, the patients completed questionnaires including the neck disability index (NDI) and performed a circular contraction of their head in the horizontal plane at 15 N force, with continuous change in force direction in the range 0-360degree. Electromyography (EMG) was recorded from the sternocleidomastoid (SCM) and splenius capitis (SCap) muscles. Tuning curves of the EMG amplitude were computed, which depicts muscle activity over a range of force directions. The mean point of the tuning curves defined a directional vector, which determined the specificity of muscle activity. Patients were randomly assigned either to a training or control group.

RESULTS: A significant between-group difference in the change in NDI was observed. A reduction in NDI was observed following training (pre: 18.2 +/- 7.4; post: 14.1 +/- 6.5; $p < 0.01$) but not for the control group (pre: 17.5 +/- 6.3; post: 16.6 +/- 7.4). The training group showed higher specificity of muscle activity post-intervention (pre: 18.6 +/- 9.8%, post: 24.7 +/- 14.3%; $p < 0.05$), whereas no change occurred for the control group (pre: 19.4 +/- 11.9%, post: 18.2 +/- 10.1%).

CONCLUSION: An exercise programme that aims to enhance motor control of the cervical spine improves the specificity of neck muscle activity and reduces pain and disability in patients with neck pain.

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31.

Aquatic exercise and pain neurophysiology education versus aquatic exercise alone for patients with chronic low back pain: a randomized controlled trial.

Pires D, Cruz EB, Caeiro C

Clinical Rehabilitation. 29(6):538-47, 2015 Jun.

[Comparative Study. Journal Article. Randomized Controlled Trial]

UI: 25200879

OBJECTIVE: The aim of this study was to compare the effectiveness of a combination of aquatic exercise and pain neurophysiology education with aquatic exercise alone in chronic low back pain patients.

DESIGN: Single-blind randomized controlled trial.

SETTING: Outpatient clinic.

SUBJECTS: Sixty-two chronic low back pain patients were randomly allocated to receive aquatic exercise and pain neurophysiology education (n = 30) or aquatic exercise alone (n = 32).

INTERVENTIONS: Twelve sessions of a 6-week aquatic exercise programme preceded by 2 sessions of pain neurophysiology education. Controls received only 12 sessions of the 6-week aquatic exercise programme.

MAIN MEASURES: The primary outcomes were pain intensity (Visual Analogue Scale) and functional disability (Quebec Back Pain Disability Scale) at the baseline, 6 weeks after the beginning of the aquatic exercise programme and at the 3 months follow-up. Secondary outcome was kinesiophobia (Tampa Scale of Kinesiophobia).

RESULTS: Fifty-five participants completed the study. Analysis using mixed-model ANOVA revealed a significant treatment condition interaction on pain intensity at the 3 months follow-up, favoring the education group (mean SD change: -25.4+/- 26.7 vs -6.6 +/- 30.7, P < 0.005). Although participants in the education group were more likely to report perceived functional benefits from treatment at 3 months follow-up (RR=1.63, 95%CI: 1.01-2.63), no significant differences were found in functional disability and kinesiophobia between groups at any time.

CONCLUSIONS: This study's findings support the provision of pain neurophysiology education as a clinically effective addition to aquatic exercise.

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32.

Effect of strength training in addition to general exercise in the rehabilitation of patients with non-specific neck pain. A randomized clinical trial.

Rolving N, Christiansen DH, Andersen LL, Skotte J, Ylinen J, Jensen OK, Nielsen CV, Jensen C
European journal of physical & rehabilitation medicine.. 50(6):617-26, 2014 Dec.

[Journal Article. Randomized Controlled Trial. Research Support, Non-U.S. Gov't]

UI: 24955503

BACKGROUND: The optimal type of exercise protocol in the physical rehabilitation of non-specific neck pain has not yet been established. Furthermore, the role of fear-avoidance belief in the maintenance of pain and disability has been highlighted. Research indicates that exercise may be a means to reduce fear-avoidance belief, but evidence is scarce.

AIM: To compare the effect of two different exercise programs on pain, strength and fear-avoidance belief.

DESIGN: Randomized clinical trial.

SETTING: A specialized outpatient hospital clinic in Denmark.

POPULATION: Twenty-three men and 60 women on sick leave due to non-specific neck pain.

METHODS: Participants were randomized to either general physical activity (GPA group) or GPA and additional strength training of the neck and shoulder (SST group). The primary outcome was pain intensity. Secondary outcomes were muscle strength of the neck and shoulder and fear-avoidance belief.

RESULTS: Pain was significantly reduced within groups with a median of -1 (IQR: -3 to 0, $P<0.001$) in the SST group and -1 (IQR: -4 to 1, $P=0.046$) in the GPA group. The difference between groups was not significant. Changes in strength did not differ between groups. Both groups experienced significant increases in neck flexion strength of 14.7 N (IQR: -1 to 28.4, $P=0.001$) in the SST group and 6.9 N (IQR: -4.9 to 18.6, $P=0.014$) in the GPA group. Furthermore, the SST group achieved an increase of 18.6 N (IQR: -2.6 to 69.7, $P=0.005$) in neck extension. Fear-avoidance beliefs improved with 6 (IQR: 3 to 12, $P<0.001$) in the SST group, while the GPA group improved with 3 (IQR: 0 to 8, $P=0.004$). This between-group difference was significant ($P=0.046$).

CONCLUSION AND REHABILITATION IMPACT: This study indicates that in rehabilitation of subjects severely disabled by non-specific neck pain, there is no additional improvement on pain or muscle strength when neck exercises are given as a home-based program with a minimum of supervision. However, strength training of the painful muscles seems to be effective in decreasing fear-avoidance beliefs.

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33.

Effect of two contrasting interventions on upper limb chronic pain and disability: a randomized controlled trial.

Sundstrup E, Jakobsen MD, Andersen CH, Jay K, Persson R, Aagaard P, Andersen LL

Pain Physician. 17(2):145-54, 2014 Mar-Apr.

[Journal Article. Randomized Controlled Trial. Research Support, Non-U.S. Gov't]

UI: 24658475

BACKGROUND: Chronic pain and disability of the arm, shoulder, and hand severely affect labor market participation. Ergonomic training and education is the default strategy to reduce physical exposure and thereby prevent aggravation of pain. An alternative strategy could be to increase physical capacity of the worker by physical conditioning.

OBJECTIVES: To investigate the effect of 2 contrasting interventions, conventional ergonomic training (usual care) versus resistance training, on pain and disability in individuals with upper limb chronic pain exposed to highly repetitive and forceful manual work.

STUDY DESIGN: Examiner-blinded, parallel-group randomized controlled trial with allocation concealment.

SETTING: Slaughterhouses located in Denmark, Europe.

METHODS: Sixty-six adults with chronic pain in the shoulder, elbow/forearm, or hand/wrist and work disability were randomly allocated to 10 weeks of specific resistance training for the shoulder, arm, and hand muscles for 3 x 10 minutes per week, or ergonomic training and education (usual care control group). Pain intensity (average of shoulder, arm, and hand, scale 0 - 10) was the primary outcome, and disability (Work module of DASH questionnaire) as well as isometric shoulder and wrist muscle strength were secondary outcomes.

RESULTS: Pain intensity, disability, and muscle strength improved more following resistance training than usual care ($P < 0.001$, $P = 0.05$, $P < 0.0001$, respectively [corrected]). Pain intensity decreased by 1.5 points (95% confidence interval -2.0 to -0.9) following resistance training compared with usual care, corresponding to an effect size of 0.91 (Cohen's d).

LIMITATIONS: Blinding of participants is not possible in behavioral interventions. However, at baseline outcome expectations of the 2 interventions were similar.

CONCLUSION: Resistance training at the workplace results in clinical relevant improvements in pain, disability, and muscle strength in adults with upper limb chronic pain exposed to highly repetitive and forceful manual work.

TRIAL REGISTRATION: NCT01671267.

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