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Bibliographic Data	
Authors	Mary O'Keeffe, Helen Purtill, Norelee Kennedy, and et al.
Title	Comparative Effectiveness of Conservative Interventions for Nonspecific Chronic Spinal Pain: Physical, Behavioral/Psychologically Informed, or Combined? A Systematic Review and Meta-Analysis
PMID	26844416
Citation	*The Journal of Pain*, Vol 17, No 7 (July), 2016: pp 755-774.
Other information if relevant	The review was registered on the PROSPERO database (Registration number CRD42013005757).

Methods	
Aim of study	To assess the comparative effectiveness of physical, behavioral/psychologically informed, and combined interventions on pain and disability in patients with nonspecific chronic spinal pain (NSCSP).
Design	Systematic review and meta-analyses of randomized clinical trials

PICOS	
Population from which participants are drawn	Studies including participants with NSCSP (neck, thoracic, low back, or pelvic) >12 weeks duration and between 18 and 65 years of age. Participants with previous spinal surgery (>6 months previously) were eligible. Studies that involved participants with specific pathologies/conditions (e.g. pregnancy, fibromyalgia or ''red flag'' disorders (e.g. spinal cord injury, neoplasm, fracture) were excluded.
Intervention being evaluated	Three interventions: active physical, behavioral/psychologically informed, and a combined intervention including both. Physical interventions aim to enhance physical capacity by using methods such as exercise, manual therapy, and ergonomics. Behavioral/psychologically informed interventions aim to enhance behaviors, cognitions, or mood by using methods such as relaxation and cognitive behavioral therapy. Combined interventions aim to target both a physical component and also behavioral/psychological factors.
Comparison or control intervention	Studies were required to involve a head-to-head comparison between 2 of the 3 interventions being evaluated. Interventions could not be from the same domain.

Outcomes	Primary outcomes were pain (10 point VAS), and functional disability. Outcome data were assessed at 3 time periods: short-term follow-up (12 weeks to <6 months), medium-term follow-up (6 months to <12 months) and long-term follow-up (≥ 12 months).
Study types	Only RCTs published in full in peer-reviewed journals with a minimum follow up period of 12 weeks after completion of treatment.

Study selection	
Search date of literature review	January 2013
Databases in literature search	Academic Search Complete, MedLine, Cinahl, SPORTDiscus, Biomedical Reference Collection, AMED, PsycINFO, PsycARTICLES, Embase, and Web of Science.
How authors assessed study quality (risk of bias and other considerations	Cochrane risk of bias tool using the 12 criteria recommended by the Cochrane Back Review Group. The 12 criteria are: random sequence generation, allocation concealment, blinding of participants, blinding of personnel/care providers, blinding of outcome assessor, incomplete outcome data, selective reporting, group similarity at baseline, co-interventions, intention-to-treat analysis, timing of outcome assessment, and any other bias not covered elsewhere. A low risk of bias high quality study was defined as fulfilling 6 or more of the 12 internal validity criteria.
Additional information if relevant	

Results	
Number of studies screened	12,720 RCTS were screened from the electronic searches and checking reference lists
Number of studies selected for analysis of results	24 RCTS were selected. Included studies were published between 1990 and 2012. Sample sizes ranged from 30 to393. Eighteen studies investigated patients with chronic LBP, and 6 studies investigated participants with chronic neck pain. Five studies compared physical and behavioral/psychologically informed interventions. Twenty studies compared physical and combined interventions. Only 1 study compared a behavioral/psychologically informed and combined intervention.

Whether authors elected to perform meta-analysis to pool study results statistically and type of meta-analysis done (fixed effect or random effects, heterogeneity, etc)	22 studies were included in the meta-analyses. Pooled 95% confidence intervals (CIs) were computed for MD and SMD and CIs excluding 0 were considered statistically significant. Random-effects models were used to quantify pooled treatment effect sizes. Substantial heterogeneity was determined using the cutoff, $I^2 \geq 50\%$. Clinical relevance was determined using the following effect size classifications: 1) small: MD < 1 (e.g. <10% of the 10-mm VAS); SMD (Cohen d) of 0.2; 2) medium: MD < 2, SMD of .5; and 3) large: MD $\geq$ 2, SMD (Cohen d) of .8.
Quality of studies as assessed by authors	21 studies had a low risk of bias, meeting 6 or more of the criteria. Four studies scored between 9 and 12. Three studies had a high risk of bias. Common methodological limitations identified across studies included lack of information on co-interventions, blinding, and compliance to treatment. By the nature of the interventions, blinding was not possible.
Effect sizes reported for primary outcomes (mean differences, standardized mean differences, response ratios, etc)	- No statistically significant difference was found for pain intensity between the physical and behavioral/psychologically informed groups at short-term (2 studies, n = 272; MD = .03; 95% CI -.52 to .57; $I^2 = 0\%$) and at medium-term (3 studies, n = 278; MD = -.50; 95% CI -1.38 to 0.38; $I^2 = 19\%$) follow-up. One study measured pain in the long term and also found no statistically significant difference. - No statistically significant difference was found for functional disability between the physical and behavioral/psychologically informed groups at short-term (2 studies, n = 272; MD = .02; 95% CI, -0.23 to 0.27; $I^2 = 4\%$), and at medium-term (3 studies, n = 278; SMD = -.05; 95% CI, -.29 to .18; $I^2 = 0\%$) follow-up. One study measured functional disability in the long term and also found no statistically significant difference. - A statistically significant difference was found for pain between the physical and combined interventions groups (favoring the combined group) at short term (5 studies, n = 529; MD = 0.52; 95% CI, 0.16 to 0.88; $I^2 = 4\%$), and at long-term (15 studies, n = 1,453; MD = 0.47; 95% CI, 0.13 to 0.81; $I^2 = 35\%$) follow-up. This equates to a small effect size. No statistically significant difference was found for pain between physical and combined interventions at medium-term (15 studies, n = 1,535; MD = 0.14; 95% CI, -0.10 to 0.39; $I^2 = 0\%$) follow-up. - A statistically significant difference was found for functional disability between the physical and combined interventions groups (favoring the combined group) at short-term (5 studies, n = 529; SMD = 0.27; 95% CI, .01 to 0.54; $I^2 = 56\%$), and at long-term (13 studies, n = 1,189; SMD = 0.25; 95% CI, 0.07 to 0.43; $I^2 = 54\%$) followup. This equates to a small effect size. No statistically significant difference was found for functional disability between physical and combined interventions at medium-term follow-up (13 studies, n = 1,206; SMD = 0.12; 95% CI, -0.06 to 0.30; $I^2 = 55\%$. - No statistically significant differences were found for pain and disability between the behavioral/psychologically informed intervention and combined groups (one study).

Effect sizes reported for additional outcomes (mean differences, standardized mean differences, response ratios, etc)	Only primary outcomes were reported for this review.
Additional information if relevant –summary of results	

Authors' Conclusions	
Key conclusions of study authors	- No statistically significant differences were found for pain and disability between physical and behavioral/psychologically informed groups in the short and medium term. - No statistically significant differences were found for pain and disability in the single study comparing behavioral/psychologically informed and combined interventions. - Although a small statistically significant difference was found for pain and disability between the physical and combined group, favoring the combined group, in the short and long term, this difference was small. - This suggests that there are only small differences between physical, behavioral/psychologically informed, and combined interventions for reducing pain and disability in nonspecific chronic spinal pain patients (NSCSP). - Although it may appear surprising that these very different interventions show such similar effects for NSCSP, it is clear that simply combining them offers only a small additional benefit. Consequently, choosing the most cost-efficient rehabilitation choice, which is acceptable to patients and also feasible for a health care service to provide, should be considered. - One possible reason for the lack of differences in the interventions is that physical and behavioral/psychologically informed interventions may have similar mechanisms of effect such as changes in cognitive and psychological factors. Another possibility is that other important ‘‘nonspecific factors’’ such as clinician support, empathy, and ability to motivate and encourage patients' treatment preferences and expectations may be common to these seemingly different interventions. - Another potential reason for the similar effectiveness of these conservative interventions is that the interventions are insufficiently tailored to the needs of patients. Some patient profiles may benefit from combined physical and psychological support more than others, and identification of these patients should be the focus of future research.

	- Although the findings of this review show that simply combining physical and behavioral/psychologically informed interventions does not increase effectiveness very much, there is a need for further studies investigating whether tailoring these rehabilitation options to the needs of individual patients can enhance effectiveness.
Additional information if relevant	

Comments by DOWC staff

- This review found that there was a small statistically significant difference for pain and disability between the physical and combined group, favoring the combined group, in the short and long term, but this difference was small. A recent systematic review (Kamper et al 2014) compared physical versus combined interventions and included some (5) of the same studies, and came to a similar conclusion: that the combined intervention was more effective than the physical in the medium term for pain, but not for disability, also with small effect sizes.
- Although a small statistically significant difference was found for pain and disability between the physical and combined group, favoring the combined group, in the short and long term, this difference was small. A mean difference of 0.52 and 0.47 for pain equates to a very small effect size. These pooled effect sizes for are not even half of the 1.7 point threshold for clinical importance on a 10 point VAS scale. The confidence intervals do not even include clinically important change. The SMDs for disability (0.27 and 0.25) also indicate very small effect sizes. In addition, the meta-analyses for disability reveal substantial heterogeneity (I^2 = 56% and 54%), so these results should be interpreted with caution. All of these results indicate clinically unimportant differences between these interventions in head-to head comparisons.
- Most studies (21out of 24) that were included were of adequate methodological quality meeting 6 or more of the risk of bias criteria. Four studies met at least 9 of the 12 criteria and would be considered high quality having a low risk of bias.
- Three of the 4 high quality studies found no significant difference in pain or disability between the 2 interventions they compared. Three compared physical to combined interventions and one compared behavioral/psychological to physical interventions.
- In this review, all the primary outcome measures were subjective self-report scales (pain or disability) and the primary outcome data assessors were the patients themselves which can often lead to a high risk of bias for both of these outcomes for all studies.
- Because it appears that most published studies of behavioral/psychological efficacy do not report group differences in terms of responders (percent of patients with 33% or 50% pain relief), these meta-analyses were constrained to report only comparisons of mean. It would have been useful to know the proportion of people that experienced a clinically relevant improvement to this type of intervention. Thus an important change on behalf of individual participants is unknown.
- The pooled analyses for disability resulted in substantial heterogeneity at least in part due to differences in the combined and the behavioral/psychologically informed interventions themselves. The interventions evaluated in the included studies differed from each other in a number of ways. There were differences in the number of face-to-face sessions and the intensity of the treatment, differences in the settings, differences in the balance of the interventions in terms of focus on physical, psychological and social factors, and differences in the backgrounds of the clinicians that administered the interventions. This clinical heterogeneity is likely due to varying definitions of the combined and the behavioral/psychologically informed interventions.
- From the results of the meta-analyses, it can be seen that physical and behavioral/psychological interventions for nonspecific chronic spinal pain generally results in small effect sizes. However, as these interventions can be considered inherently harmless, small benefits could be considered useful if they prove to be cost-effective.

Comments by DOWC staff

- A limitation of this review is the method used to group interventions; physical versus behavioral/psychologically informed versus combined. The authors chose these groupings on the basis of their subjective interpretation of the biopsychosocial model for the different interventions. Interventions cannot be easily differentiated and separated. This can result in misclassification of the data and the introduction of a lot of heterogeneity, making meaningful comparisons very difficult to interpret. Imprecise classifications of the interventions do not lead to precise results.
- No clinically significant differences were found for pain and disability between physical, behavioral/psychologically informed, and combined interventions for NSCSP. As a result, choosing the most cost-efficient, feasible rehabilitation option may be reasonable.

Assessment by DOWC staff	
Overall assessment as suitability of evidence for the guideline ☒ High quality ☐ Adequate ☐ Inadequate	High quality meta-analysis supporting good evidence that there are no clinically significant differences for pain and disability between physical, behavioral/psychologically informed, and combined interventions for nonspecific chronic spinal pain.
If inadequate, main reasons for recommending that the article not be cited as evidence	

Additional references if relevant
Kamper SJ, Apeldoorn AT, Chiarotto A, and et al. Multidisciplinary biopsychosocial rehabilitation for chronic low back pain. *Cochrane Database of Systematic Reviews* 2014, Issue 9. Art. No.: CD000963.