

# Is it a bird, is it a plane and does it matter? STOPS, STarTs and the case for individualising treatment

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The STarT Back and Specific Treatment of Problems of the Spine (STOPS) back pain trials both evaluated the effect of individualising treatment to the specific features of each patient's presentation. The STarT Back trial did this based on psychosocial prognostic factors thought to predict long-term back pain, and the screening tool derived from that has been incorporated into the current NICE guidelines on the management of back pain. The STOPS trial is less well known and unique in that treatment was tailored to both specific psychosocial factors and clinically familiar pathoanatomical factors. Both studies had good results in terms of outcome.

The STOPS trial deserves closer attention and is the focus of this article because it provides, for the first time, evidence that a comprehensive and pragmatic application of pathoanatomical specific treatment is of value to back pain patients. Perhaps, more importantly, its results also challenge some long-standing assumptions about the importance of psychosocial factors in predicting chronic low back pain.

## LEARNING OUTCOMES

### TO SUPPORT PHYSIO FIRST QAP

- 1 Support your interventions with a more substantial literature base.
- 2 Improve clinical reasoning and interventional pragmatism in keeping with research findings.
- 3 Improve the accuracy of dialogue with patients about the likely course of their back pain.
- 4 Improve understanding of the more controversial approaches to back pain treatment.

More than ever before in my experience, the current guidelines for the management of low back pain have had a dramatic impact on the way physiotherapists conceptualise and treat patients with non-specific low back pain. The increased understanding of psychosocial factors in pain, and particularly in chronic pain, that has developed over the past few decades, formalised with the adoption of the STarT Back protocol ([startback.hfac.keele.ac.uk](http://startback.hfac.keele.ac.uk)) within

the current NICE guidelines (2017), has placed consideration of psychosocial factors at the heart of treatment of back pain. This is undoubtedly a good thing. Indicators such as fear / pain avoidance, depression, job dissatisfaction and ongoing litigation appear to have a negative effect on progress and prognosis, so programmes that address these factors should help (Besen *et al* 2015; Deyo *et al* 1998). As a relatively recent target for research, there is as yet sparse evidence of effect, but a Cochrane review of the behavioural treatments concluded that there may be some short-term benefit (Henschke *et al* 2010).

The question is whether enthusiasm for this approach has outpaced its validation at the expense of "traditional"

approaches. As Buchbinder *et al* (2020) comment that "...intensive pain and neuroscience education is popular, particularly among physiotherapists," but a recent high-quality trial showed that it was no more effective than sham education in patients already receiving standard first-line care (advice to stay active, avoid bed rest, option of spinal manipulation, and / or simple analgesics) (Traeger *et al* 2019). An increased awareness of psychosocial factors should give us an enhanced understanding of the complex multifactorial nature of back pain which should improve our ability to tailor treatment specifically and pragmatically to an individual's specific barriers to improvement. However, it is a concerning tendency of many researchers, clinicians

**"AN INCREASED AWARENESS OF PSYCHOSOCIAL FACTORS IN THE COMPLEX MULTIFACTORIAL NATURE OF BACK PAIN SHOULD IMPROVE OUR ABILITY TO TAILOR TREATMENT TO THE INDIVIDUAL"**

and commentators to reject the traditional skill and knowledge base of our profession in the promotion of a purely psychosocial model of back pain (Monie *et al* 2016; Hancock *et al* 2011). This is despite a systematic review of chronic low back pain research evaluating the influence of psychosocial factors on outcome to be less than 25% (Wessels *et al* 2006).

One of the casualties in this rejection of established and recognised practice is the consideration, differentiation and treatment of anatomical sources of pain (Monie *et al* 2016; Moore & Jull 2000). For various reasons, we are told that the consideration of pathoanatomical sources of pain is unnecessary or unhelpful. Clinical guidelines do not recommend classification or specific management based on pathoanatomical principles apart from the exclusion of red flags (Ford & Hahne 2013). Guidelines from the CSP make no mention of pathoanatomical differentiation, and those from the American Physical Therapy Association (2001) explicitly state that it is neither appropriate nor useful. Some commentators go further, hypothesising that providing a low back pain patient with a pathoanatomical diagnosis may be counterproductive as it reinforces an excessive “somatic focus” (Deyo *et al* 2009; Fourney *et al* 2011; Nicholas & George 2011).

In the same way treatment in clinical practice associated with such specific diagnoses, in particular manual therapy, is criticised as being incompatible with a biopsychosocial framework to practice. There are fears of the same excessive “somatic focus”, as well as concerns that such treatments encourage dependence upon the treating therapist. Studies that have empirically tested this found no evidence of such adverse outcomes (Ash *et al* 2008; Kleinstuck *et al* 2006), but it seems a common view among physiotherapists.

One quite reasonable argument for rejecting a pathoanatomical basis for treatment is that research has failed to show that it improves outcome (van Dillen

SUBGROUP NAME	SUBGROUPING CRITERIA
Disc herniation with associated radiculopathy (n=54)	Referred leg symptoms, at least one clinical examination sign suggestive of radiculopathy (positive straight leg raise or reduced lower limb reflexes, sensation or strength), and CT or MRI demonstrating a comparable disc herniation
Reducible discogenic pain (n=78)	At least four out of nine clinical features indicative of discogenic pain and a directional preference in response to repeated or sustained movements/postures (mechanical loading strategies)
Non-reducible discogenic pain (n=96)	At least four out of nine clinical features indicative of discogenic pain and an absence of a directional preference in response to mechanical loading strategies
Zygapophyseal joint pain (n=64)	At least three of the following features: presence of unilateral low back pain, pain reproduction with extension and ipsilateral lateral flexion, localised pain on ipsilateral passive posteroanterior pressure to the transverse process or zygapophyseal joint, and improvement in pain and/or movement following a one-min trial of manual therapy directed at the zygapophyseal joint
Multifactorial persistent pain (n=8)	Absence of membership in one of the above pathoanatomical subgroups and an Örebro Musculoskeletal Pain Questionnaire score of greater than 105/210

**TABLE 1: Subgroup definitions in the STOPS trial**

*et al* 2003; Chou *et al* 2007), although this might be a problem with the research rather than with the concept. The frustrating thing about back pain research is that while many treatments have been shown to be better than placebo, comparisons between treatments rarely demonstrate clinically meaningful differences (van Tulder *et al* 2006; Chou *et al* 2009; Keller *et al* 2007), implying that it doesn't matter what is done to the patient. One possible explanation for this is that studies have not adequately accounted for participant heterogeneity. Anyone working with back pain knows that patients present and respond very individually, even within the parameters of our ability to assess such things in the clinic. Given the multidimensional heterogeneity of back pain, it is an extraordinarily complex task to research individualised treatment packages, which may go some way to explain the less-than-stunning results of low back pain research. The STarT Back trial (Hill *et al* 2011) and the more recent Sciatica Outcomes in Primary Care (SCOPiC) research into sciatica management (Konstantinou *et al* 2020) are recent attempts to study subgrouped treatment, in these cases subgrouped on predictors of prognosis. To date, the STOPS trial is the only study that has attempted to do this on the basis of a pathoanatomical classification of low back pain (Hahne *et al* 2011; Ford *et al* 2016).

## The STOPS trial

This study was conducted at 16 primary care physiotherapy practices in Melbourne, Australia and involved 300 participants with low back and side / or referred leg pain with symptom duration of between six weeks and six months. In order to be included in the trial, participants had to report a level of pain greater than two on a 0-10 numerical rating scale.

The aim of the STOPS trial was to investigate the effectiveness of clinically familiar and commonly used methods to subgroup and treat low back pain patients. Criteria for subgroup identification were developed and treatment protocols created that aimed to be consistent with commonly used methods and models. Where possible, these were based on evidence that was able to be accurately reproduced and generalised to a broad patient population. The five subgroups were:

- Disc herniation with associated radiculopathy
- Reducible discogenic pain
- Non-reducible discogenic pain
- Zygapophyseal joint pain
- Multifactorial persistent pain (Ford *et al* 2016).

The defining diagnostic criteria for each group is shown in table 1. ➔

The prescribed intervention was specific to the pathoanatomical or other classification of the group. However, all groups were also given two 30-minute sessions of advice and information as promoted by clinical guidelines for low back pain, e.g. NICE guidelines. The content was found to be of benefit in earlier research (Indahl *et al* 1995) and included “a pathological explanation of the participant’s pain, reassurance regarding the generally favourable prognosis of their condition, advice to remain active and instruction regarding correct lifting technique.” The control (advice) group received only these sessions of information, therefore any difference in the outcomes of the groups can be attributed to the effect of the specific intervention.

It is worth remembering that two previous UK studies undertook a similar comparison to the one performed in the STOPS trial, i.e. comparing a physiotherapy treatment package with a simple package of education, and found no benefit in adding physiotherapy treatment to education. Hay *et al* (2005) compared psychosocial pain education with the same education plus physiotherapy treatment that included manual therapy with stabilisation and strengthening exercises at the discretion of the treating physiotherapists. The study involved 402 patients and no difference was found between groups on any measure at three and 12 months follow-up. The low-risk group in the STarT Back trial compared similar interventions and resulted in the same lack of difference at follow-up (Hill *et al* 2011).

The active treatment group in STOPS received 10 sessions of physiotherapy that included manual therapy, directional preference management, postural re-education, motor control training and graded functional exercise. The intervention was tailored to the patient presentation. Techniques aimed to reproduce normal and familiar clinical practice, i.e. if repeated movements caused a centralisation of pain, that directional preference was used as a

treatment technique in line with the McKenzie approach, or if there appeared to be a compressive mechanism of pain implying a zygapophyseal origin, targeted mobilisation and manipulation was used as the first line of treatment.

Patients in the disc herniation with radiculopathy group, and in the non-reducible discogenic group received a graded functional exercise programme modified for the presence of discogenic pathology with a focus on specific motor control training targeting the local stabilising muscles. The multi-factorial persistent pain subgroup received graded functional exercises with a focus on neurophysiological and psychosocial factors comprising:

- education in relation to the neurophysiology of pain
- progressive exercises
- goal setting
- cognitive restructuring and behavioural strategies targeting key psychosocial barriers.

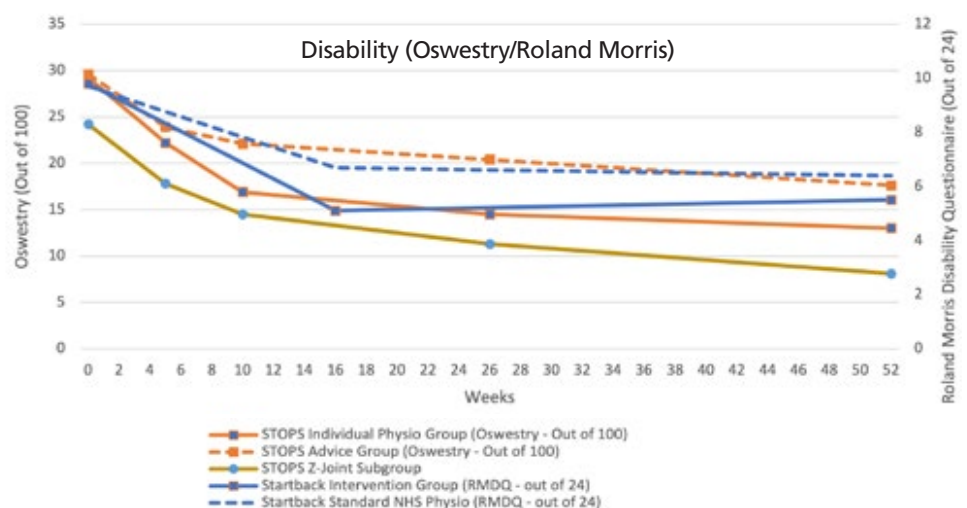
The primary interventions for each group were compulsory but the physiotherapists could add other optional treatment modalities at their discretion. For example, in the zygapophyseal group mobilisation and manipulation of comparable segments along with education were compulsory and optional elements included such things as sleep and relaxation strategies, discussion about psychosocial barriers to improvement, pain management

strategies and posture and ergonomic advice. Training was provided to maintain consistency of delivery.

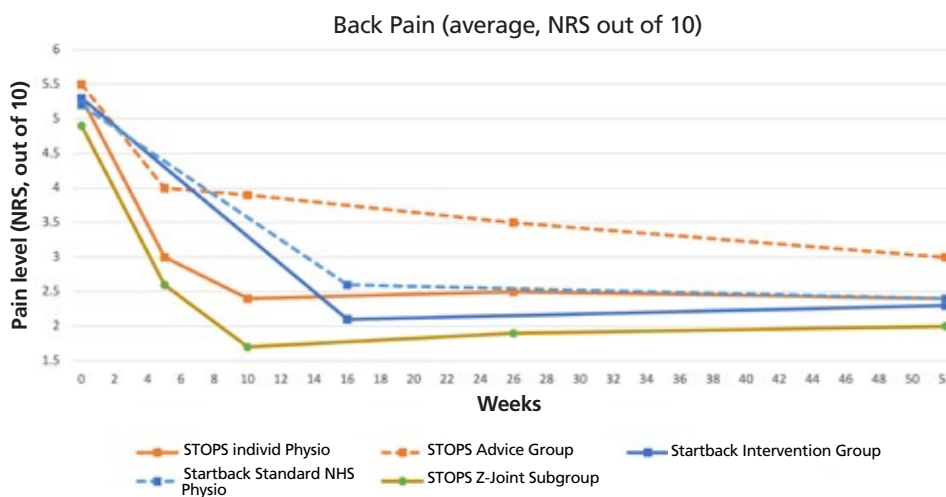
## RESULTS

Individualised physiotherapy resulted in significantly better outcomes than education on the Oswestry disability scale (figure 1). It also resulted in better outcomes on back and leg pain at 5, 10 and 26 weeks (Ford *et al* 2016). Mean differences between groups were statistically significant in 71% of the primary and secondary outcomes measured in the trial. Participants receiving individualised physiotherapy achieved the same reduction in pain rating in between five to eight weeks that those receiving advice only took 12 months to achieve (Ford *et al* 2019). Further, despite the increased costs of providing 10 sessions of physiotherapy compared to two sessions of education, overall healthcare costs were found to be similar due to factors such as the additional healthcare costs required for the advice group, and lower incidence of work absence in the active treatment group (Hahne *et al* 2017a).

Participants receiving individualised physiotherapy had between 1.8-1.6 times the chance of improving by at least 50% baseline on back and leg pain respectively, and 1.5 times the chance of improving by 50% baseline on the Oswestry disability questionnaire. Those receiving individual physiotherapy had



**FIGURE 1:** Improvement in disability for the STOPS trial (Oswestry disability scale) and the STarT Back trial (Roland Morris disability questionnaire)



**FIGURE 2:** Pain drop in the back pain score for both the STOPS and STarT Back intervention groups

between 1.3-4.1 times the chance of achieving a clinically important change in their condition (Ford *et al* 2019a).

### Comparison with the STarT Back trial

Given the STarT Back protocol’s central place in the UK’s NICE guidelines on back pain, it seems relevant to compare the results to the STOPS trial. The premise of the STarT Back trial was in many ways similar to STOPS with patients being subgrouped and receiving individualised or “stratified” care. In the STarT Back trial, the “stratification” of care was based on a questionnaire of physical and psychological factors shown to affect prognosis. The focus was to tailor more psychological aspects of care to those scoring highly on a psychological subscale. This stratification of care and the addition of psychologically informed physiotherapy gave cost savings and better outcomes in terms of

disability when compared to standard UK NHS physiotherapy care. When the intervention was repeated in a US healthcare setting, however, it was found to be “a resource-intensive intervention” that had “no effect on patient outcomes or healthcare use” (Cherkin *et al* 2018).

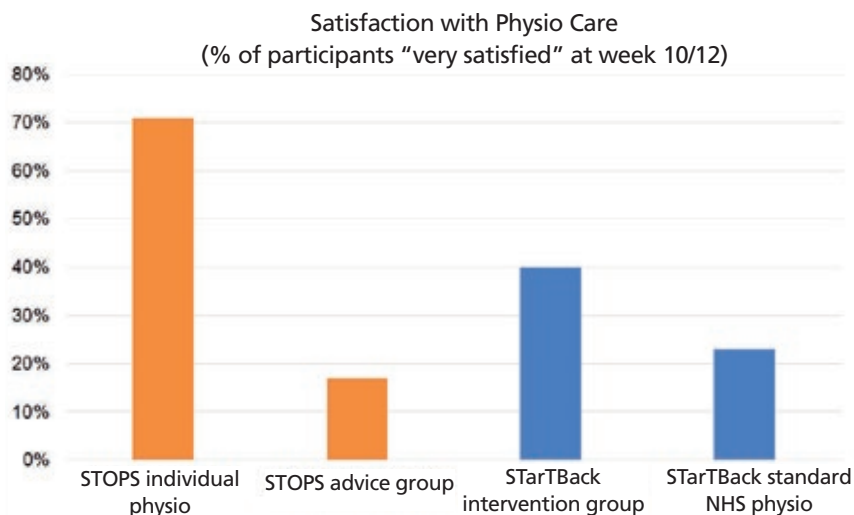
The STOPS trial applied a subgrouping strategy that included physical, psychological and pathoanatomical factors.

In comparing the STOPS and STarT Back trials it is important to note that STarT Back patients were an average of five years older, and more of them presented with long-term pain, i.e. 46% of patients had a symptom duration beyond the six-month upper limit of the STOPS trial. In both trials there was a significant and early reduction in disability in the intervention group that lasted to 12-month follow-up, but differences in

measures preclude direct comparison. There was also an average pain drop from 5-6/10 to around 2/10 in the intervention group for both trials (figure 2). On the measured global rating of change and patient satisfaction, 71% of participants considered themselves “very satisfied” with their physiotherapy care in the STOPS trial at the 10-12 week mark compared with 40% of the intervention group in the STarT Back trial. Global rating of change of “much improved” or “completely recovered” was also reported by 71% of those participating in the STOPS trial versus the 40% in the STarT Back trial (figure 3).

The control groups of both trials also improved over the 12-month follow-up period with comparable improvements in pain and disability, but the two education sessions in STOPS outperformed in global change (53% better and above versus 35% respectively), the four treatment sessions (average) of standard UK NHS physiotherapy care, were used as the control in the STarT Back trial. There may, of course, be cultural explanations for this difference (figure 4).

One of the celebrated outcomes of the STarT Back trial was the cost benefits of the approach, when overall healthcare costs, including the cost of medication, medical appointments and interventions, are considered. Average savings of approximately £34 / US\$48 (12.5%) per patient per year accrued mostly on the basis that people in the low-risk category were offered one session of education and advice and no physiotherapy treatment. In the STOPS trial, 10 sessions of physiotherapy, a lot in a UK treatment context, were provided. Nevertheless, similarly calculated overall healthcare costs over a 12-month period showed only a 3% increase in the average cost of £23 / US\$30 per patient for the intervention group compared with the overall healthcare costs for the control group patients.



**FIGURE 3:** Satisfaction scale of physiotherapy intervention

### Challenging concepts of prognosis and back pain

As some people respond to treatment and some do not; some people get better ➔

and some go on to develop chronic pain, the prognosis of an individual presenting with back pain has been the focus of much research attention and is the basis of the STarT Back protocol. Patients who scored highly on a subscore of psychosocial factors were considered at high risk of chronicity (Hill *et al* 2008, 2010a, 2010b) and it was hoped that tailoring psychologically informed physiotherapy to this high-risk group might improve outcome and provide cost savings. In fact, the high-risk intervention group did show improvements in disability at four-month follow-up but it was not maintained at 12 months in comparison to the standard NHS physiotherapy group. There were, however, improvements in the intervention groups at 12 months in work attendance and scores for anxiety, depression and fear-avoidance.

The STOPS trial adds to this knowledge base and challenges some long-standing assumptions. Looking at indicators of good and bad responses in this intervention group, the influence of a comprehensive range of biomedical, including pathoanatomical, psychological and social prognostic factors were evaluated (Ford *et al* 2018), and it was interesting that the participants who gained the greatest benefit from individualised physiotherapy were exactly those with features that are generally considered to indicate a high risk of chronicity,

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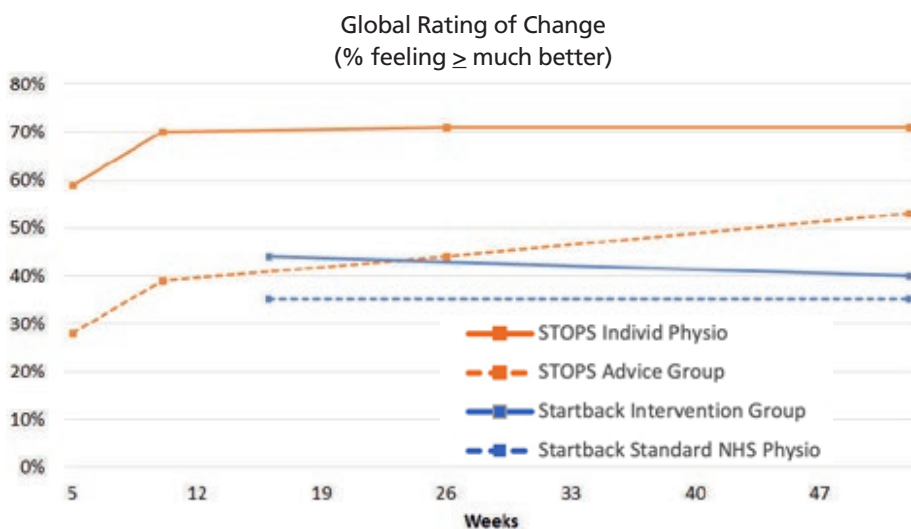
i.e. higher back pain intensity, high disability scores and a longer duration of symptoms. Further, other features normally considered to be associated with poor outcomes such as counterproductive beliefs, fear-avoidance, low expectations for recovery, work factors, age, psychological stress and depression, and poor general health, were not independently prognostic of poorer outcomes in their study. Nine of the 15 proven prognostic factors were pathoanatomical in nature, with only six psychosocial factors. The implication is, therefore, that if specific and comprehensive treatment is provided, these commonly assumed negative factors may not be as important to outcome as has been assumed.

### Conclusion

The STOPS trial adds to the work of the STarT Back trial in attempting to tailor care specifically to subgroups of patients. While the STarT Back process involves the evaluation of physical and psychosocial factors, STOPS also considered pathoanatomical ones and shows that pathoanatomic specific care

results in significantly better outcomes than two sessions of guideline based advice and education for disability at 10, 26 and 52 weeks, and for pain at five, 10 and 26 weeks. In contrast, similar previous UK studies comparing standard NHS physiotherapy care to guideline based care showed no difference in outcome (Hill *et al* 2011; Hay *et al* 2005).

Pathoanatomical diagnosis has been criticised as being unnecessary, unhelpful or counterproductive. The treatments associated in clinical practice with pathoanatomical diagnosis, such as manual therapy, have been criticised as being incompatible with efforts to encourage self-efficacy in patients because they are seen as “passive” and encouraging dependence upon the treating therapist. These appear to be widespread beliefs that encourage a reductionist view of pain, considering only psychosocial factors of management and seeing intervention through the lens only of its psychological impact. The inherent rejection of traditional skills and practices inevitably leads to deskilling in the fundamental practice of physiotherapy (Monie *et al* 2016; Moore & Jull 2000; Hancock *et al* 2011), whereas we should surely be embracing this important knowledge of the biopsychosocial nature of pain into our normal practice to complement rather than replace our existing skill-base. There is little evidence that considering pathoanatomy has adverse effects (Ford & Hahne 2013) and the STOPS trial subgroup that received the most “manual” of therapies, e.g. the zygapophyseal group received mobilisation and manipulation as core interventions, responded significantly well both in terms of pain and disability, and in activity levels and their degree of psychosocial distress, with no indication of reduced self-efficacy



**FIGURE 4:** Global rate of change improvement for all patient groups

(Ford *et al* 2019b). The STOPS trial encourages us, therefore, not to discount pathoanatomical considerations.

Perhaps one of the most interesting outcomes of the STOPS trial is its analysis of prognostic factors. The results challenge the conventional wisdom, finding that only six of the 15 factors proven to be prognostic were psychosocial in nature, with the rest being of a pathoanatomical nature. The provision of specific and comprehensive care may eliminate the prognostic influence of such things as low expectations, fear-avoidance and depression, among others.

Pain is complex and, as always, more research is needed and with a depth and breadth not yet seen in order to establish subgroup differences. Nevertheless, both the STarT Back and STOPS trials add to evidence that superior outcomes may be achievable with a pragmatic, individualised, comprehensively multimodal treatment approach.

## QAP REVIEW

This is a really interesting discussion with detailed evidence about treatment modalities and outcomes in patients presenting with low back pain; a condition that is in the highest percentage of patients seen in private physiotherapy practices as evidenced by the data inputted in Data for Impact (Dfi).

It reinforces the clinical reasoning behind the use of manual therapy techniques and why it is a modality that shows in the data as leading to good outcomes for patients, something that is against the conventional wisdom of avoiding hands-on techniques in favour of activity and exercise based intervention. The modalities talked about in this article are all relevant in the treatment of low back pain and would assist any MSK practitioner in working towards and achieving QAP status using the strategies outlined from evidence-based research.

Reviewer  
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## Additional resources

<https://startback.hfac.keele.ac.uk/>  
- STarT Back information on evidence-based implementation of stratified care

## References

- American Physical Therapy Association. Guide to physical therapist practice. 2nd edn. *Physical Therapy* 2001;81(1):9e746
- Ash LM, Modic MT, Obuchowski NA, Ross JS, *et al*. Effects of diagnostic information, per se, on patient outcomes in acute radiculopathy and low back pain. *American Journal of Neuroradiology* 2008;29(6):1098e103
- Besen E, Young AE, Shaw WS. Returning to work following low back pain: towards a model of individual psychosocial factors. *Occupational Rehabilitation* 2015;25:25-37
- Buchbinder R, Underwood M, Hartvigsen J, Maher CG. The Lancet Series call to action to reduce low value care for low back pain: an update. *Pain* 2020;161:S57-S64 doi: 10.1097/j.pain.0000000000001869
- Chan AYP, Ford JJ, Surkitt LD, Richards MC *et al*. Individualised functional restoration plus guideline-based advice vs advice alone for non-reducible discogenic low back pain: a randomised controlled trial. *Physiotherapy* 2017;103(2):121-130 doi: 10.1016/j.physio.2016.08.001
- Cherkin D, Balderson B, Wellman R, Hsu C *et al*. Effect of low back pain risk-stratification strategy on patient outcomes and care processes: the MATCH randomized trial in primary care. *General Internal Medicine* 2018;33(8):1324-1336 doi: 10.1007/s11606-018-4468-9
- Chou R, Atlas SJ, Stanos SP, Rosenquist RW. Nonsurgical interventional therapies for low back pain: a review of the evidence for an American Pain Society clinical practice guideline. *Spine* 2009;34(10):1078-1093
- Chou R, Qaseem A, Snow V, Casey D, Cross Jr J, Shekelle P *et al*. Diagnosis and treatment of low back pain: a joint clinical practice guideline from the American College Of Physicians and the American Pain Society. *Annals of Internal Medicine* 2007;147(7):478e91
- Deyo RA, Battie M, Beurskens AJ, Bombardier C, Croft P *et al*. Outcome measures for low back pain research. A proposal for standardized use. *Spine* 1998;23:2003-2013
- Deyo R, Mirza S, Turner J, Martin B. Overtreating chronic back pain: time to back off? *Journal of the American Board of Family Medicine* 2009;22(1):62e8
- Ford JJ, Hahne AJ. Pathoanatomy and classification of low back pain disorders. *Manual Therapy* 2013;18:165-168
- Ford JJ, Slater SL, Richards MC, Surkitt LD *et al*. Individualised manual therapy plus guideline-based advice vs advice alone for people with clinical features of lumbar zygapophyseal joint pain: a randomised controlled trial. *Physiotherapy* 2019a;105(1):53-64
- Ford JJ, Hahne AJ, Surkitt LD, Chan AYP *et al*. Individualised manual therapy plus guideline-based advice vs advice alone for people with clinical features of lumbar zygapophyseal joint pain: a randomised controlled trial. *Physiotherapy* 2019b;105(1):53-64
- Ford JJ, Hahne AJ, Surkitt LD, Chan AYP *et al*. Individualised physiotherapy as an adjunct to guideline-based advice for low back disorders in primary care: a randomised controlled trial. *Sports Medicine* 2016;50:237-245 doi:10.1136/bjsports-2015-095058
- Ford JJ, Richards MC, Surkitt LD, Chan AYP *et al*. Development of a multivariate prognostic model for pain and activity limitation in people with low back disorders receiving physiotherapy. *Archives of Physical Medicine & Rehabilitation* 2018;99(12):2504-2512.e12 doi: 10.1016/j.apmr.2018.04.026
- Fourney DR, Dettori JR, Hall H, Hartl R, McGirt MJ, Daubs MD. A systematic review of clinical pathways for lower back pain and introduction of the Saskatchewan spine pathway. *Spine* 2011;36(21):S164e71
- Hahne AJ, Ford JJ, Surkitt LD, Richards M *et al*. Individualized physical therapy is cost-effective compared with guideline-based advice for people with low back disorders. 

- Spine 2017a;42(3):E169-E176. doi: 10.1097/BRS.0000000000001734
- Hahne AJ, Ford JJ, Hinman RS, Richards MC *et al.* Individualized functional restoration as an adjunct to advice for lumbar disc herniation with associated radiculopathy. A preplanned subgroup analysis of a randomized controlled trial. *Spine* 2017b;17(3):346-359 doi: 10.1016/j.spinee.2016.10.004
- Hahne AJ, Ford JJ, Surkitt LD *et al.* Specific treatment of problems of the spine (STOPS): design of a randomised controlled trial comparing specific physiotherapy versus advice for people with subacute low back disorders. *BioMed Central Musculoskeletal Disorders* 2011;12:104
- Hancock M, Maher C, Laslett M, Hay E, Koes B. Discussion paper: what happened to the 'bio' in the bio-psycho-social model of low back pain? *European Spine Journal* 2011;20:2105-2110
- Hay EM, Mullis R, Lewis M, Vohora K *et al.* Comparison of physical treatments versus a brief pain-management programme for back pain in primary care: a randomised clinical trial in physiotherapy practice. *The Lancet* 2005;365(9476):2024-2030 doi: 10.1016/S0140-6736(05)66696-2
- Henschke N, Ostelo RW, van Tulder MW *et al.* Behavioural treatment for chronic low back pain. *Cochrane Database Systematic Review* 2010;(7):CD002014 doi: 10.1002/14651858.CD002014.pub3
- Hill JC, Dunn KM, Lewis M, Mullis R *et al.* A primary care back pain screening tool: identifying patient subgroups for initial treatment. *Arthritis & Rheumatism* 2008;59:632-641
- Hill JC, Dunn KM, Main CJ, Hay EM. Subgrouping low back pain: a comparison of the STarT Back Tool with the Orebro Musculoskeletal Pain Screening Questionnaire. *European Journal of Pain* 2010a;14:83-89
- Hill JC, Vohora K, Dunn KM, Main CJ, Hay EM. Comparing the STarT Back Screening tool's subgroup allocation of individual patients with that of independent clinical experts. *Clinical Journal of Pain* 2010b;26:783-787
- Hill JC, Whitehurst DGT, Lewis M, Bryan S *et al.* Comparison of stratified primary care management for low back pain with current best practice (STarT Back): a randomised controlled trial. *The Lancet* 2011;378(9802):1560-1571 [https://doi.org/10.1016/S0140-6736\(11\)60937-9](https://doi.org/10.1016/S0140-6736(11)60937-9)
- Indahl A, Velund L, Reikeraas O. Good prognosis for low back pain when left untampered. A randomized clinical trial. *Spine* 1995;20(4):473-477
- Keller A, Hayden J, Bombardier C, van Tulder M. Effect sizes of nonsurgical treatments of non-specific low-back pain. *European Spine* 2007;16(11):1776-1788
- Kleinstuck F, Dvorak J, Mannion AF. Are "structural abnormalities" on magnetic resonance imaging a contraindication to the successful conservative treatment of chronic nonspecific low back pain? *Spine* 2006;31(19):2250e7
- Konstantinou K, Lewis M, Dunn KM, Ogollah R *et al.* Stratified care versus usual care for management of patients presenting with sciatica in primary care (SCOPIC): a randomised controlled trial. *The Lancet Rheumatology* 2020;2(7):E401-E411
- Monie AP, Fazey JP, Singer KP. Low back pain misdiagnosis or missed diagnosis: core principles. *Manual Therapy* 2016;22:68-71
- Moore A, Jull G. Fads and Fashion. *Manual Therapy* 2000;5:197
- NICE. Low back pain and sciatica: summary of NICE guidance. *British Medical Journal* 2017;356:i6748
- Nicholas MK, George SZ. Psychologically informed interventions for low back pain: an update for physical therapists. *Physical Therapy* 2011;91(5):765e76
- Surkitt LD, Ford JJ, Chan AYP, Richards MC, Slater SL *et al.* Effects of individualised directional preference management versus advice for reducible discogenic pain: A pre-planned secondary analysis of a randomised controlled trial. *Manual Therapy* 2016;(25):69-80 doi: 10.1016/j.math.2016.06.002
- Traeger AC, Lee H, Hubscher M, Skinner IW *et al.* Effect of intensive patient education vs placebo patient education on outcomes in patients with acute low back pain: a randomized clinical trial. *JAMA Neurology* 2019;76:161-169
- van Dillen L, Sahrman S, Norton B, Caldwell C, McDonnell M, Bloom N. Movement system impairment-based categories for low back pain: stage 1 validation. *Orthopaedic and Sports Physical Therapy* 2003;33(3):126e42
- van Tulder MW, Koes B, Malmivaara A. Outcome of non-invasive treatment modalities on back pain: an evidence-based review. *European Spine* 2006;15(1):S64-81
- Wessels T, van Tulder M, Sigl T, Ewert T, Limm H, Stucki G. What predicts outcome in non-operative treatments of chronic low back pain? A systematic review. *European Spine Journal* 2006;15(11):1633e44 ❌