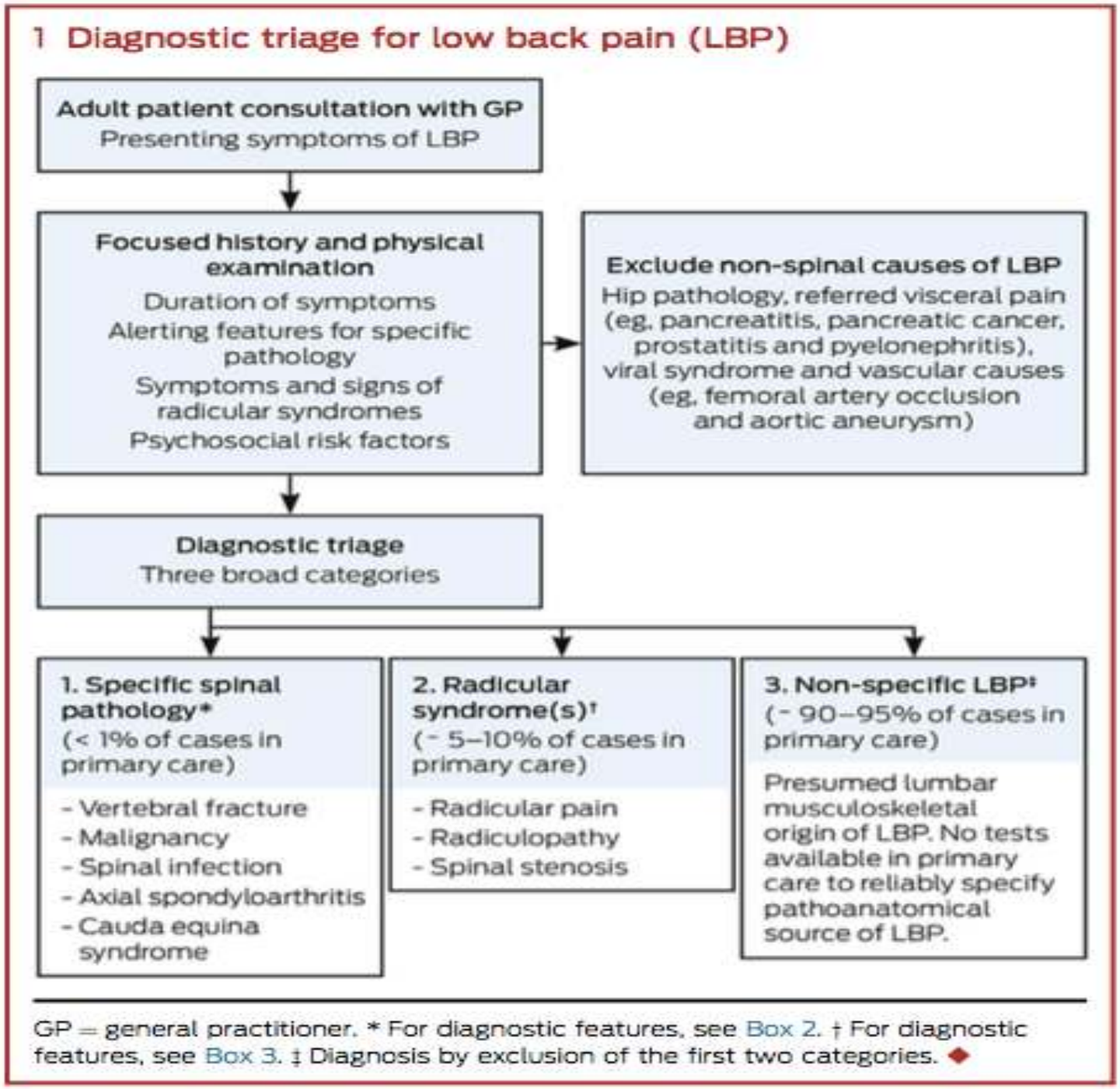
Lower Back Pain & exercise/movement

Prevention of Low Back Pain

"The current evidence suggests that exercise alone or in combination with education is effective for preventing LBP. Other interventions, including education alone, back belts, and shoe insoles, do not appear to prevent LBP"

A Systematic Review and Meta-analysis - Steffens et al JAMA 2016



Bardin, et al 2017

"I've been studying back pain for the past 50 yrs, and if anyone says they know where back pain comes from, they're full of shit."

A Nachemson

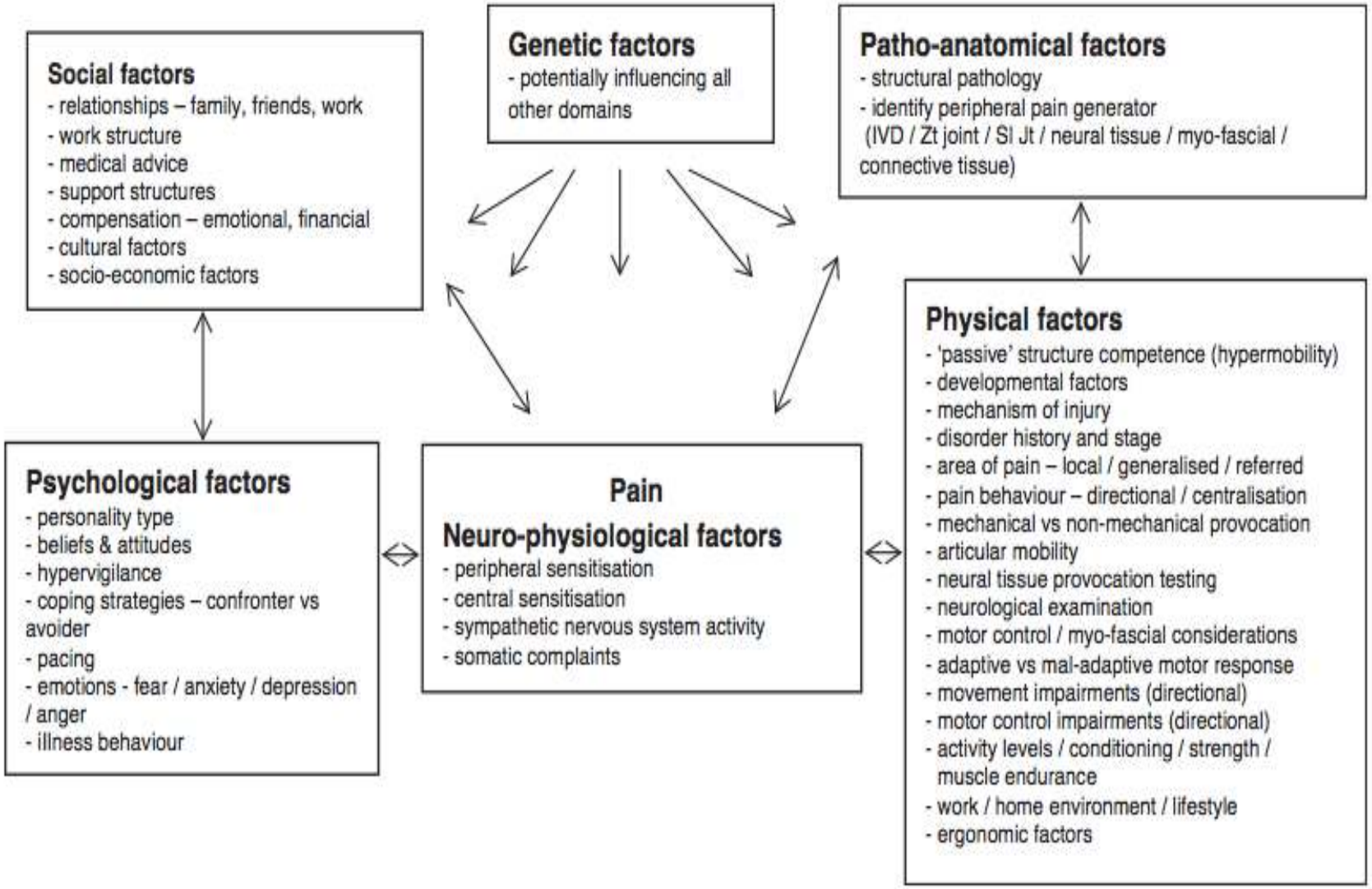


Fig. 1. Factors that need consideration within a biopsychosocial framework, for the diagnosis and classification of CLBP disorders.

- Stress
- Sleep
- Beliefs
- Previous experiences
- Emotions
- Social and work factors
- Predicted expectation of recovery

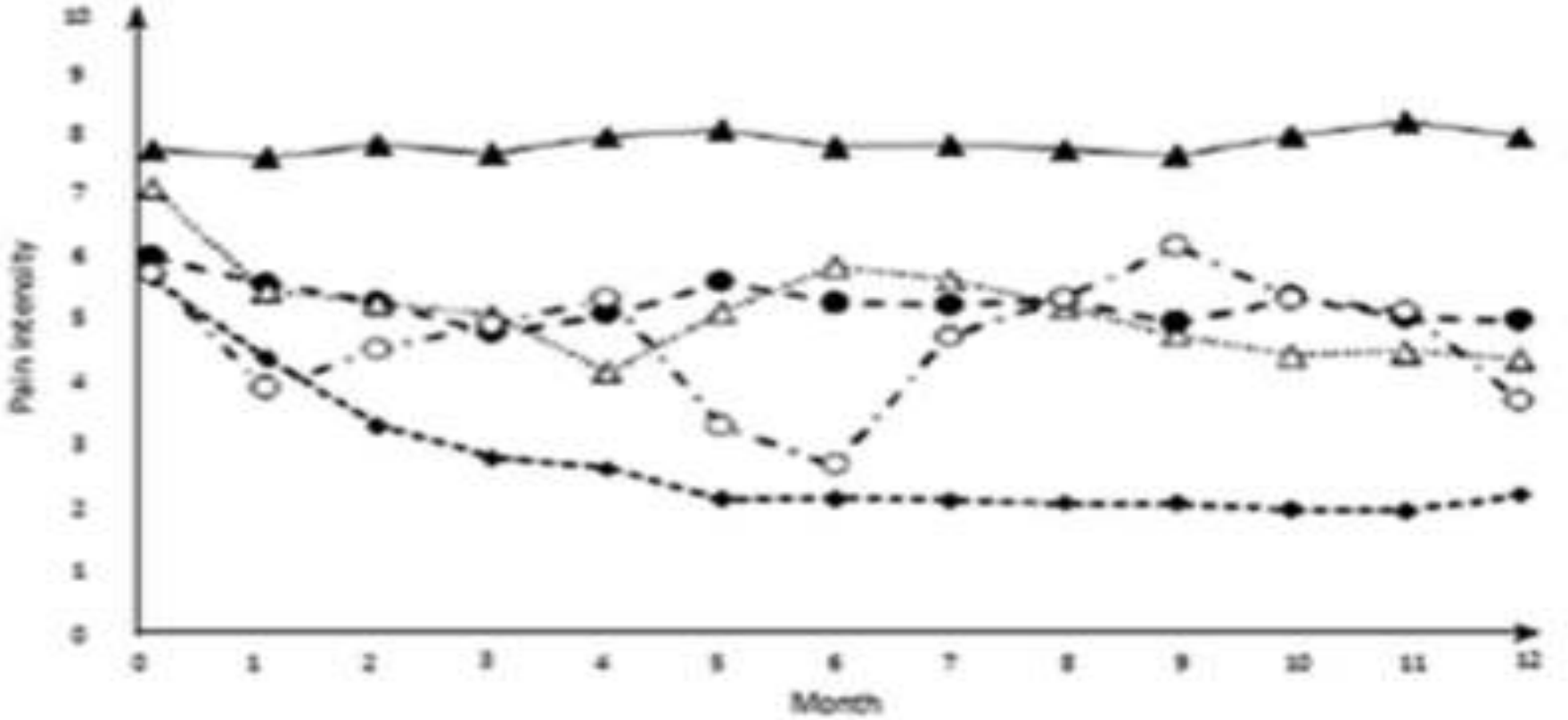
What have we learned from ten years of trajectory research in low back pain?

Kongsted BMC 2016

- Non-specific low back pain (LBP) is often categorised as acute, subacute or chronic by focusing on the duration of the current episode.

- limitation of that concept is that it does not differentiate between a recent onset episode experienced for the first time and a recent flare-up of recurrent LBP

- Investigations of trajectories underpin the notion that differentiation between acute and chronic LBP is overly simplistic, and we believe it is time to shift from this paradigm to one that focuses on trajectories over time



Macedo 2014

- Look at long term trajectory
- By treating people acutely with LBP do we keep them chronic?

Beliefs around exercise and movement.

Practitioner and person!

Beliefs about the back pain

Ben Darlow. 2016

- 69% of people believe they should take it easy
- 59% believe if an activity causes pain it should be avoided in the future
- 55% believe exercise risk outweighs the benefit
- 35% believe bed rest is mainstay of therapy

This is a PROBLEM for an active approach to back pain!

People are WEAK!

- The results of 26 prospective cohort studies

- Investigate if there is evidence that low muscle strength, low muscle endurance, or reduced spinal mobility are predictors of future low back or neck/shoulder pain

- Inconclusive evidence for a relationship between physical capacity measures and the risk of neck/shoulder pain

A systematic review of the relation between physical capacity and future low back and neck/shoulder pain

Hamburg van Reenen – Pain 2007

Something needs to change to get better

- The findings do not support the notion that the treatment effects of exercise therapy in cLBP are directly attributable to changes in the musculoskeletal system.

- Future research aimed at increasing the effectiveness of exercise therapy in cLBP should explore the coincidental factors influencing symptom improvement.

Is a positive clinical outcome after exercise therapy for chronic non-specific low back pain contingent upon a corresponding improvement in the targeted aspect(s) of performance? A systematic review

That there is a magic exercise

- Despite it being the most commonly used form of physiotherapy treatment within the UK there is a lack of positive evidence to support its use.
- 29 studies were included
- There is strong evidence stabilisation exercises are not more effective than any other form of active exercise in the long term.
- The low levels of heterogeneity and large number of high methodological quality of available studies, at long term follow-up, strengthen our current findings, and further research is unlikely to considerably alter this conclusion.

Smith et al**. An update of stabilisation exercises for low back pain: a systematic review with meta-analysis** BMC Musculoskeletal Disorders 2014

Its some physical factor!

- Size of the lumbar lordosis
- Pelvic tilt
- Leg length discrepancy
- Length of abdominal, hamstring, and iliopsoas muscles
- Endurance of the back extensor muscles had the highest association with LBP
- Muscle endurance and weakness are associated with LBP

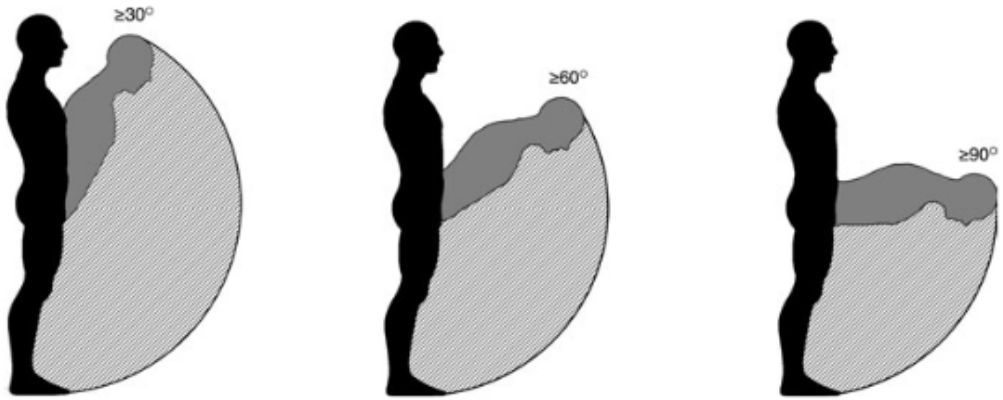
Relationship between mechanical factors and incidence of low back pain
Nourbakhsh et al. JOSPT – 2002

Bending is bad

- 198 Danish blue-collar workers
- ≥ 30°, ≥ 60° and ≥ 90°
- Results of multi-adjusted logistic regressions indicated no significant positive associations between forward bending and LBP intensity.
- On the contrary, higher duration of forward bending of ≥ 30° was associated with lower LBP intensity during all day

Are forward bending of the trunk and low back pain associated among Danish blue-collar workers?

Villumsen Ergonomics 2014



People just need more movement/load

- Being physically active is often suggested to be important in the prevention and management of low back pain. This simple view does not take into account that the relation between the level of activity and back pain may be a U-shaped curve - i.e. both inactivity and excessive activities present an increased risk

- A moderate increased risk for CLBP was found for both participants with a sedentary lifestyle and for those being involved in physical strenuous activities

Physical activity and low back pain: a U-shaped relation?

Heneweer et al - Pain 2009

- A longitudinal cohort study over one year including 124 patients with sub-acute LBP.

- Results showed that only in a subgroup of patients a decrease had occurred after the onset of pain, whereas no signs of physical deconditioning were found.

- assumption that patients with CLBP suffer from disuse and physical deconditioning empirical evidence is still lacking.

Disuse and physical deconditioning in the first year after the onset of back pain

Bousema 2007

That we can use generalised physical interventions for specific problems

- None of the objective measures of physical activity were associated with fear of movement − Inactivity not associated.
- Fear of movement was associated with disability (Roland-Morris)
- Suggests that people DO use their bodies APART from specific movements
- Generalised use of the body may not have an further effect

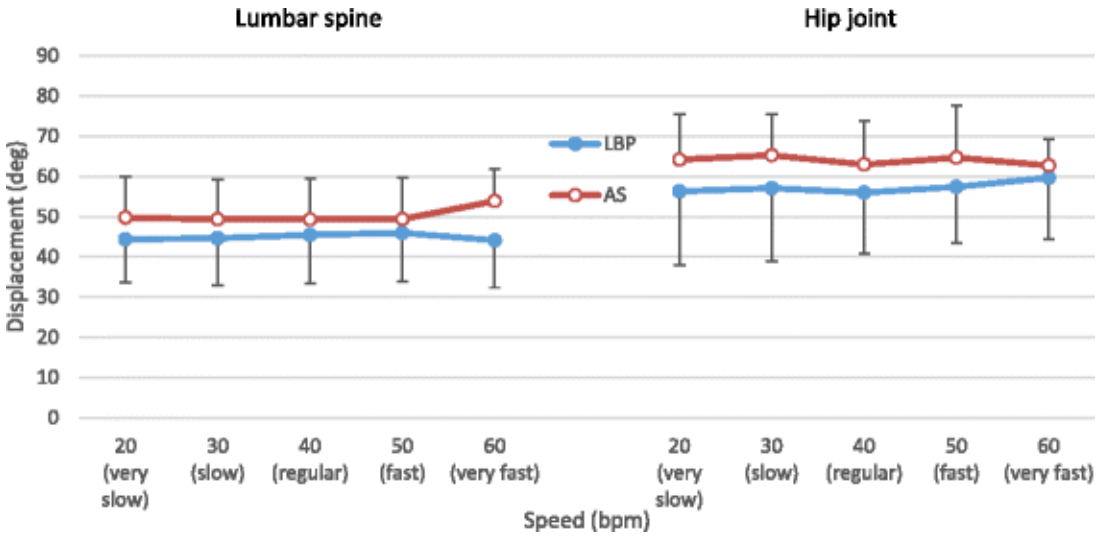
Fear of movement is not associated with objective and subjective physical activity levels in chronic non-specific low back pain

Carvalho 2016 APMR

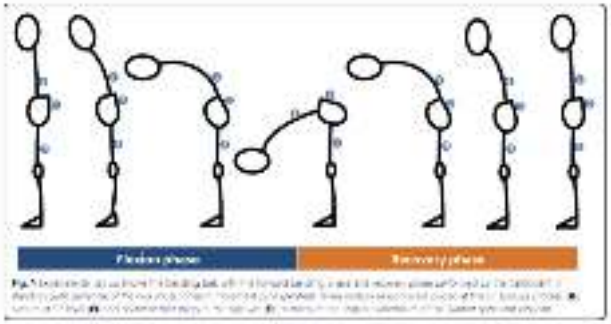
Do people with lower back pain have different movement habits?

- Much lower levels of variability with LBP
- The ability to regulate the lumbo-pelvic movement pattern during the bending task that executed at various speed levels was shown only in pain-free individuals but not in those with low back pain (over 3 months)
- Individuals with low back pain moved with a stereotyped strategy at their lumbar spine and hip joints
- Contribute to maintenance and chronicity

The effects of bending speed on the lumbo-pelvic kinematics and movement pattern during forward bending in people with and without low back pain



Tsang - BMC 2017



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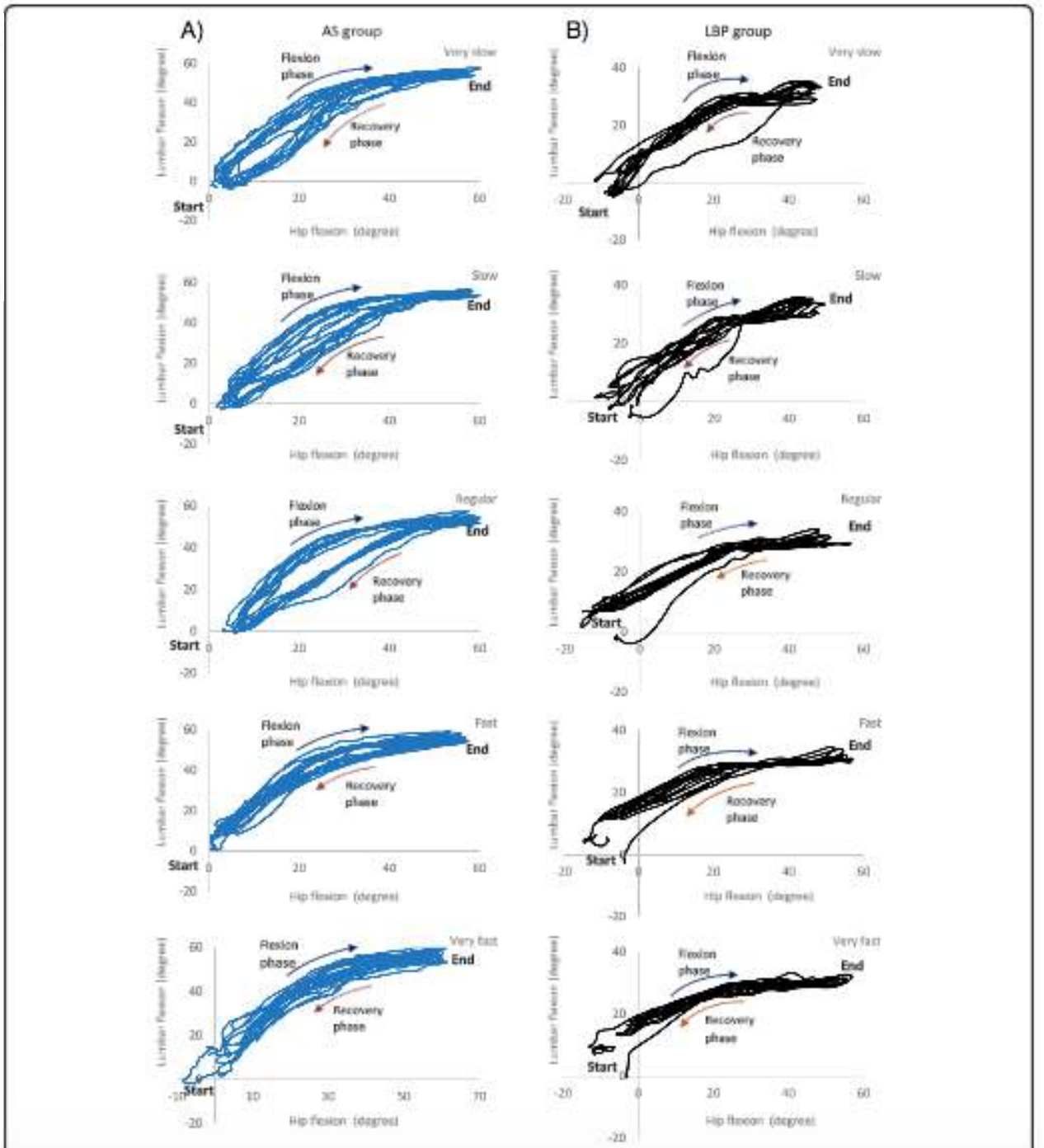
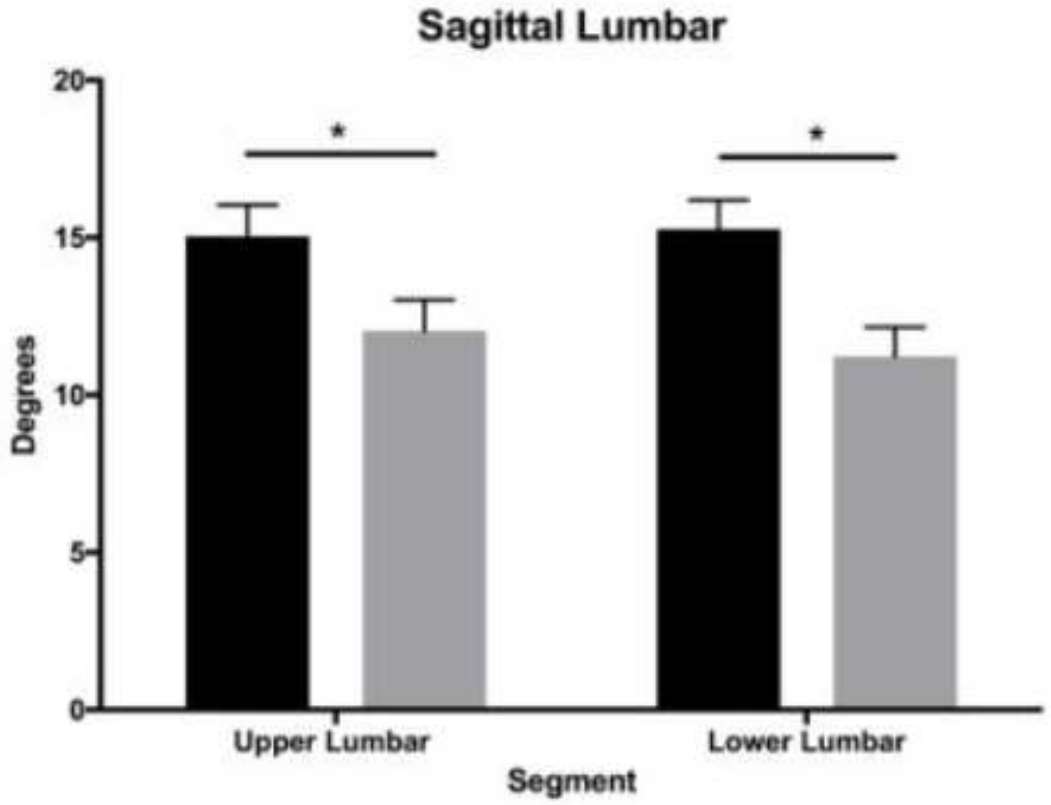


- Subjects with low back pain displayed less lumbar spine movement than controls across all three planes of movement

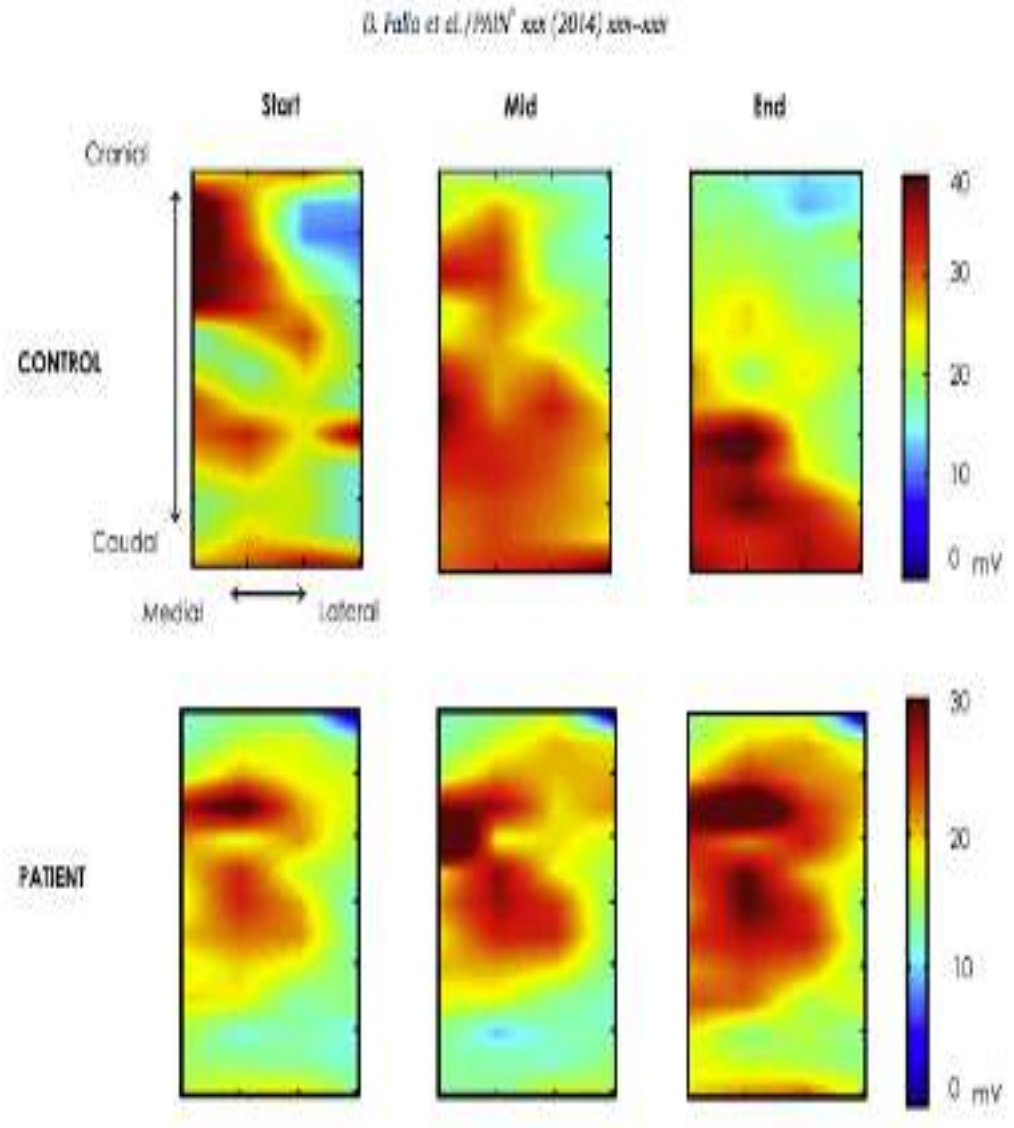
Differences in lumbar spine and lower extremity kinematics during a step down functional task in people with and people without low back pain

Hernandez 2017

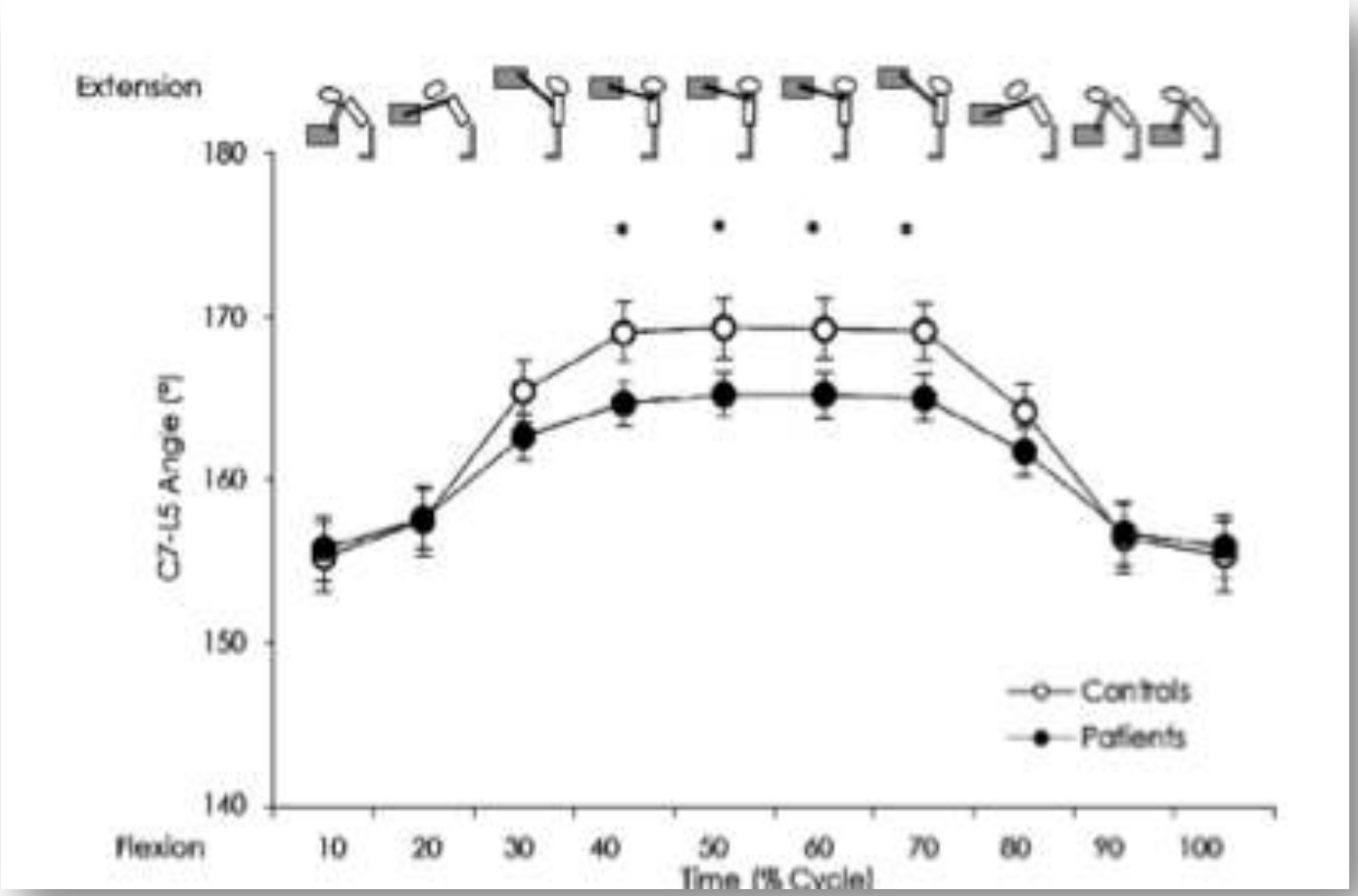


Reduced task-induced variations in the distribution of activity across back muscle regions in individuals with low back pain – Falla. Pain 2014

- A redistribution of activity to different regions of the lumbar erector spinae was observed when pain-free individuals performed a repetitive lifting task.
- People with LBP performed the repetitive task by increasing the activation of the same regions of the muscle over the duration of the task, that is, without variability in muscle activity”



COR-KINETIC
EVOLVING MOVEMENT



Comparing lumbo-pelvic kinematics in people with and without back pain: a systematic review and meta-analysis

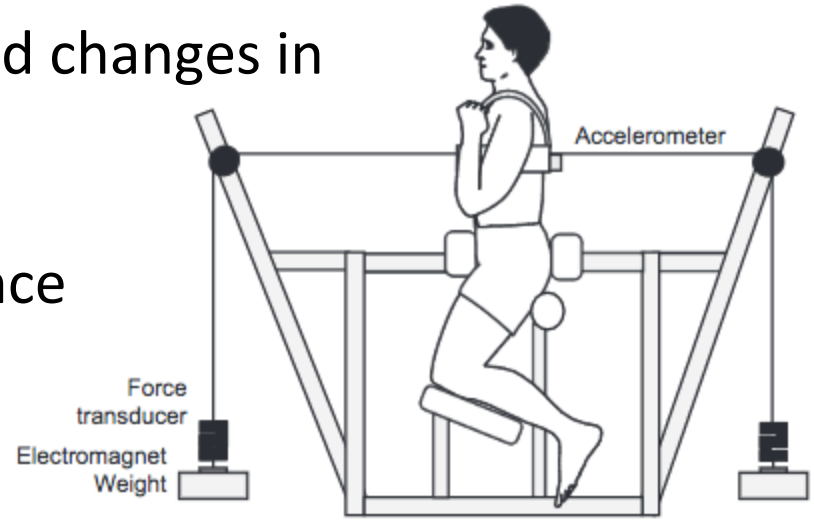
Laird BMC 2014

- 43 studies
- On average, people with LBP have reduced lumbar ROM and proprioception, and move more slowly compared to people without LBP.
- Whether these deficits exist prior to LBP onset is unknown

Changes in the mechanical properties of the trunk in low back pain may be associated with recurrence

Hodges 2009 J of Biomechanics

- N = 14 (Recurring LBP) N = 17 (healthy)
- LBP group trunk stiffness was increased
- Augmented trunk muscle activity and changes in reflex control of trunk muscles
- Consequences for pain and recurrence



Low back pain status affects pelvis-trunk coordination and variability during walking and running Seay et al Clin Biomech 2011

- Collected data during walking and running of coordination of thorax and pelvis in 3 planes.

3 groups

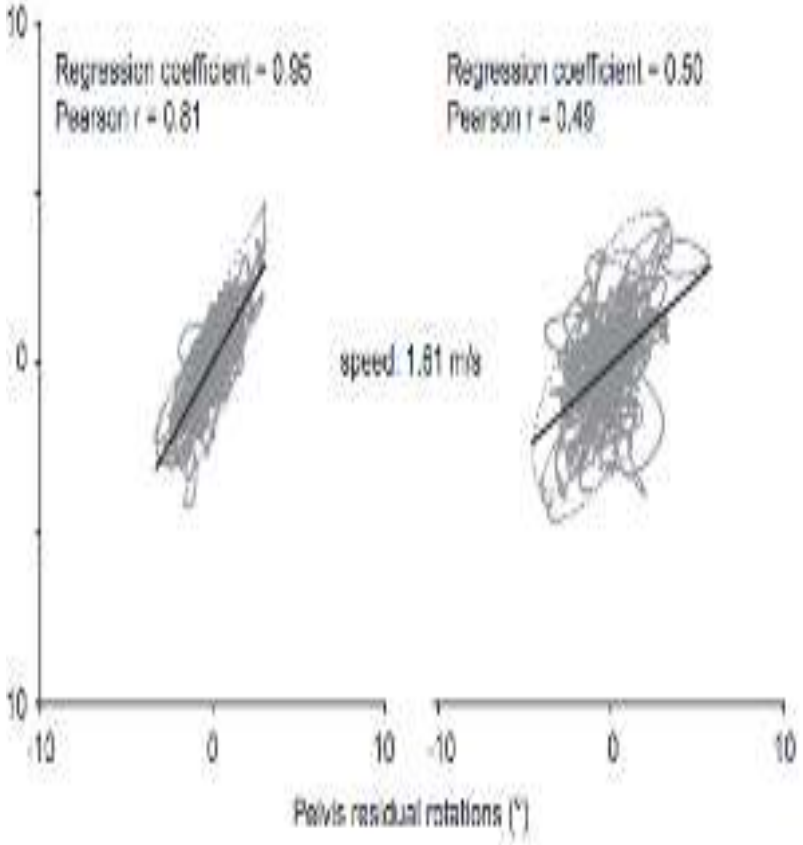
- Chronic LBP
- Single bout of back pain resolved
- No back pain

- They were able to identify each group by level of variability that decreased with chronicity

- Clinicians need to look beyond the resolution of pain when prescribing rehabilitation for low back pain

Pelvis-thorax coordination in the transverse plane during walking in persons with nonspecific low back pain – Lamoth 2002 Spine

- In comparison with healthy participants, the gait of patients with low back pain was characterized by a more rigid, less flexible pelvis-thorax coordination



Mechanical coupling between transverse plane pelvis and thorax rotations during gait is higher in people with low back pain – Van den Hoorn 2012

- These results support the argument that people with LBP adopt a protective movement strategy, possibly by increased trunk stiffness.

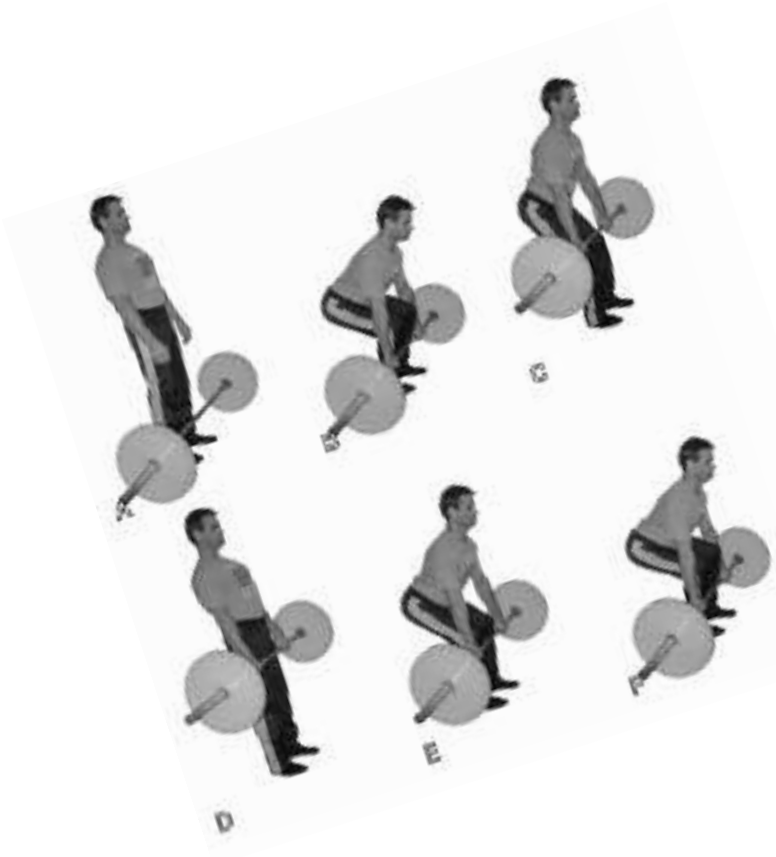
Take homes

- People with chronic back pain appear to move differently
- This is characterised by less variation & less movement
- More likely to be an effect rather than a cause
- Could this maintain the problem? Conditioned behaviors and coupled pain?
- Especially as strength/conditioning/activity may not be the problem for many people

So what do we do with this info?

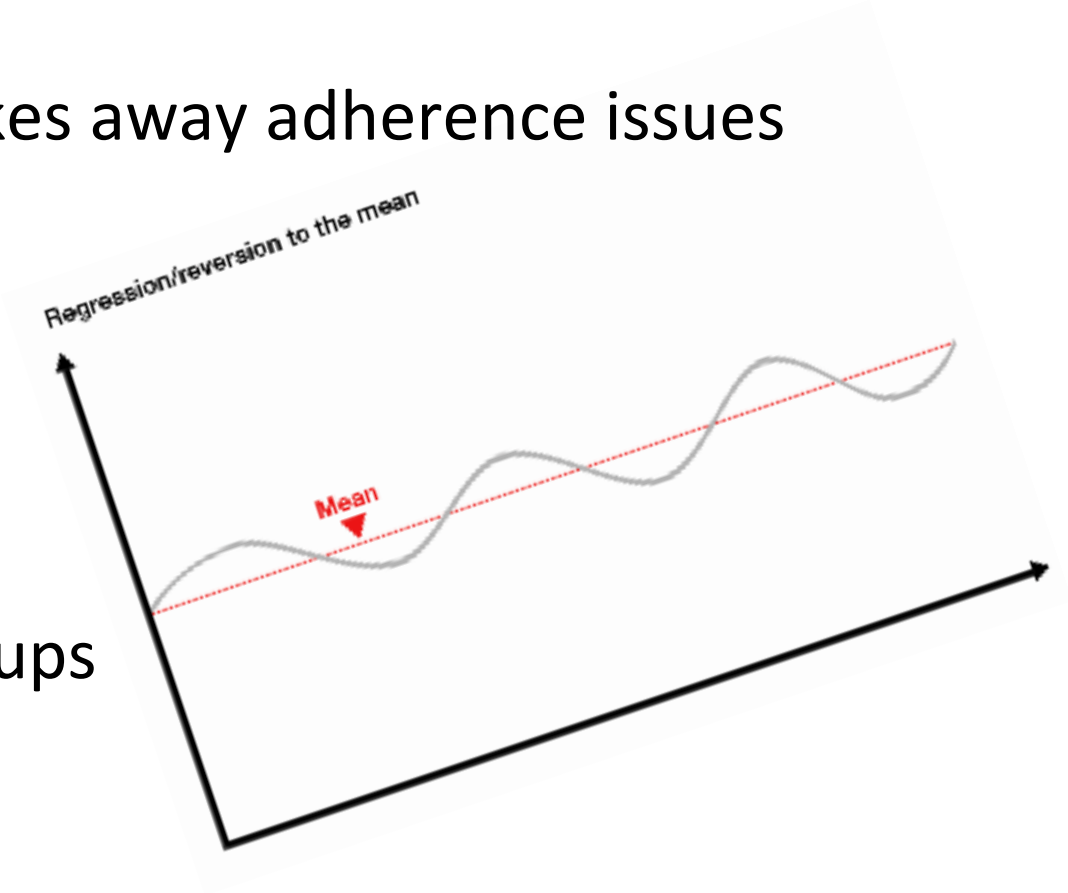
- Encourage relaxed, free, flowing movement & varied movement tasks?
- Look at pre movement behaviors such as bracing
- Don’t try and measure or worry about changing – It may not matter!

Which exercise works best for lower back pain?



Criticisms

- Test 2 exercises with no control − Regression to the mean
- External validity − Takes away adherence issues
- Single factor thinking
- Can be sedentary groups



Exercise interventions for the treatment of chronic low back pain: a systematic review and meta-analysis of randomised controlled trials – Clinical rehabilitation 2015

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

- Combined meta-analysis revealed significantly lower chronic low back pain with intervention groups using exercise compared to a control group or other treatment group

- 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

- Individually addressed the participant's thoughts and beliefs about their LBP in relation to movement.

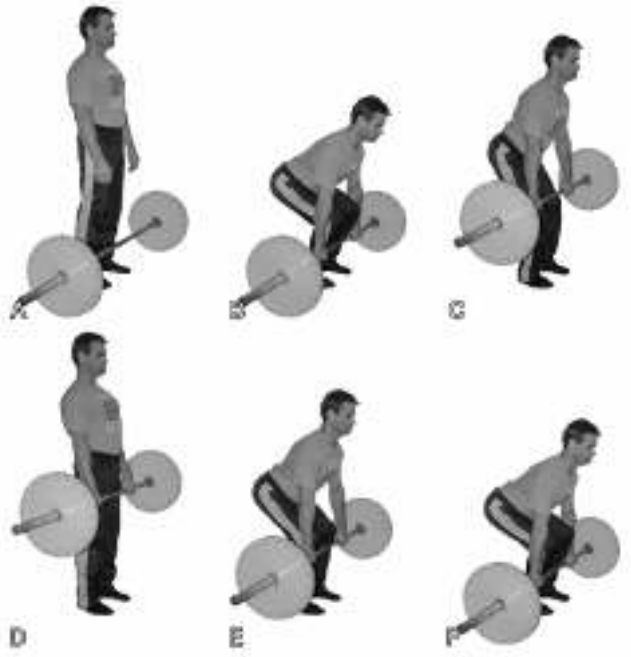
- Both interventions reduced pain intensity and increase performance in tests of lift strength and some tests of trunk muscle endurance, over time with no difference.

- Training with a high-load lifting exercise, the deadlift, seems beneficial mainly to patients with an initially lower pain intensity and higher performance.

Deadlift training for patients with mechanical low back pain

A comparison of the effects of a high-load lifting exercise and individualized low-load motor control Exercises.

Lars Berglund 2015



- Compared to general exercise, core stability exercise is more effective in decreasing pain and may improve physical function in patients with chronic LBP in the short term.

- However, no significant long-term differences in pain severity were observed between patients who engaged in core stability exercise versus those who engaged in general exercise.

- Why not long term?

- Expectation of a clinically meaningful treatment?

Wang X et al. A meta-analysis of core stability exercise versus general exercise for chronic low back pain. PLoS One. 2012

An aerobic walking programme versus muscle strengthening programme for chronic low back pain: a randomized controlled trial

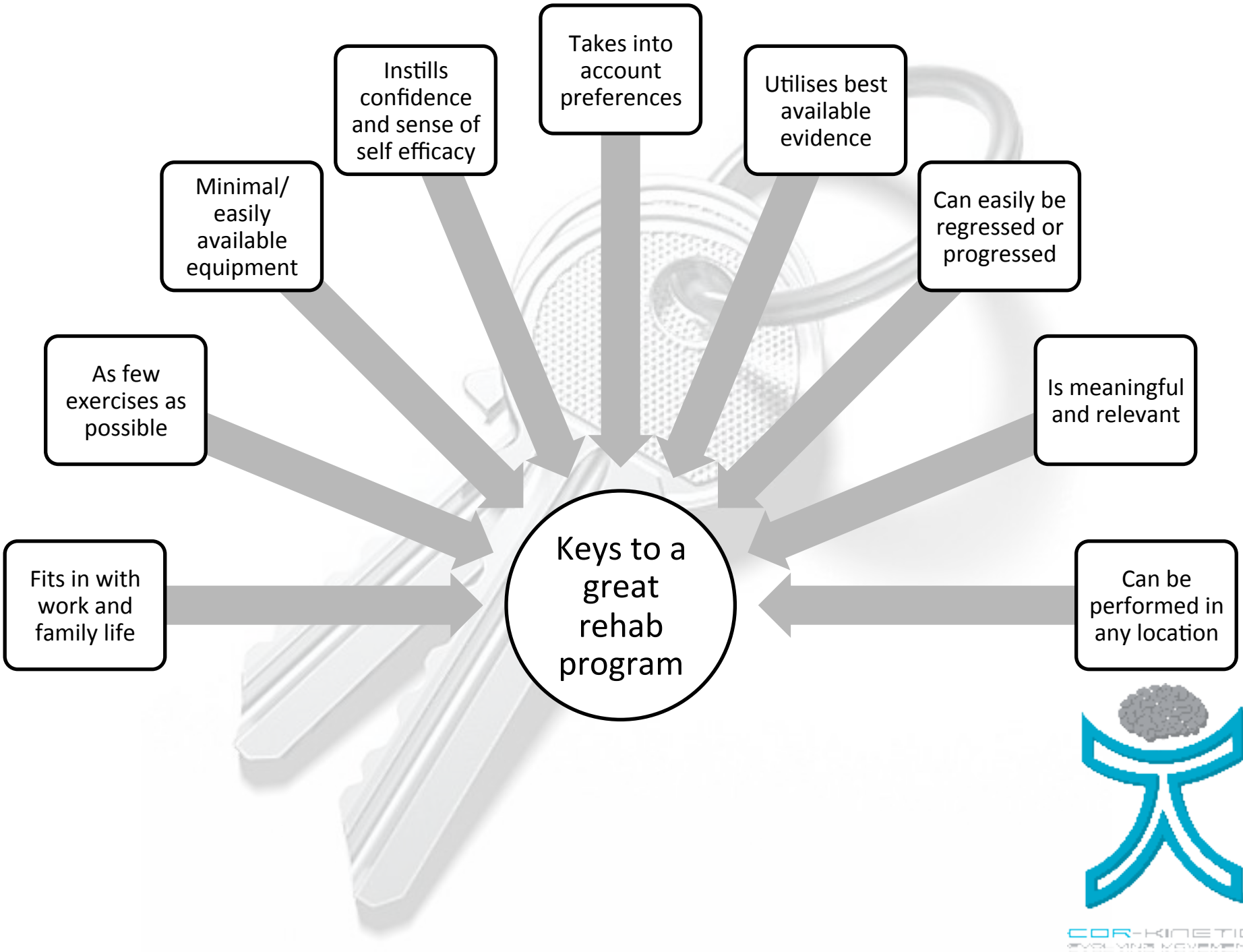
Shaynaderman – 2013

- Fifty-two sedentary patients, aged 18-65 years with chronic low back pain.
- Moderate intense treadmill walking; control 'exercise' group: specific low back exercise; both, twice a week for six weeks.
- Six-minute walking test, Fear-Avoidance Belief Questionnaire, back and abdomen muscle endurance tests, Oswestry Disability Questionnaire, Low Back Pain Functional Scale (LBPFS)
- Significant improvements were noted in all outcome measures in both groups with non-significant difference between groups.
- A six-week walk training programme was as effective as six weeks of specific strengthening exercises programme for the low back

No CLEAR superiority

- What activities do people ENJOY?
- How easy is it for them to do?
- How relevant is it to their functional outcome measures?
- Are they easily able to access the necessary equipment or need specialist instruction?

How many rehab programs end up just like THIS?


Takes into account preferences
Instills confidence and sense of self efficacy
Utilises best available evidence
Minimal/ easily available equipment
Can easily be regressed or progressed
As few exercises as possible
Is meaningful and relevant
Keys to a great rehab program
Fits in with work and family life
Can be performed in any location