## Understanding and managing chronic low back pain - Mythsbusting facts and figures

Wim Dankaerts





www.pvmtdankaerts.be



# LEUVEN



Flexchair<sup>®</sup> RBT evaluation in patients with LBP versus healthy controls: discriminative validity of PAR-test

> Door Lien Tahon en Laura Van Lommel

o.l.v. prof. dr. W. Dankaerts, promotor

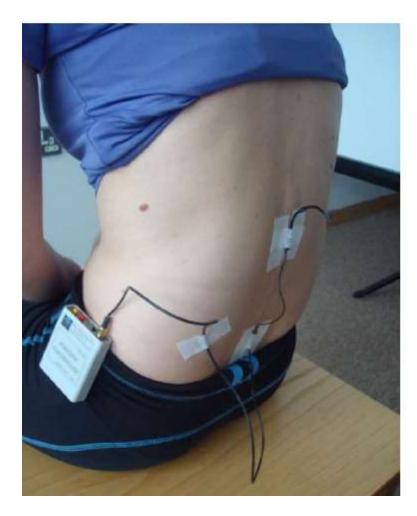
Effect of exercises performed on the Flexchair on trunk muscle activation and low back posture

### Kieran O'Sullivan & Wim Dankaerts



- ethical approval & written informed consent
- 10 young painfree participants (6M/4F)
  - age = 22 (1) years
  - height = 174(9)cm
  - mass = 70(11)kg
  - BMI= 23(4) kg/m<sup>2</sup>
  - excluded: previous LBP, aged < 18, were on any current pain medications, previous postural control training

## **Methods: Spinal Motion**

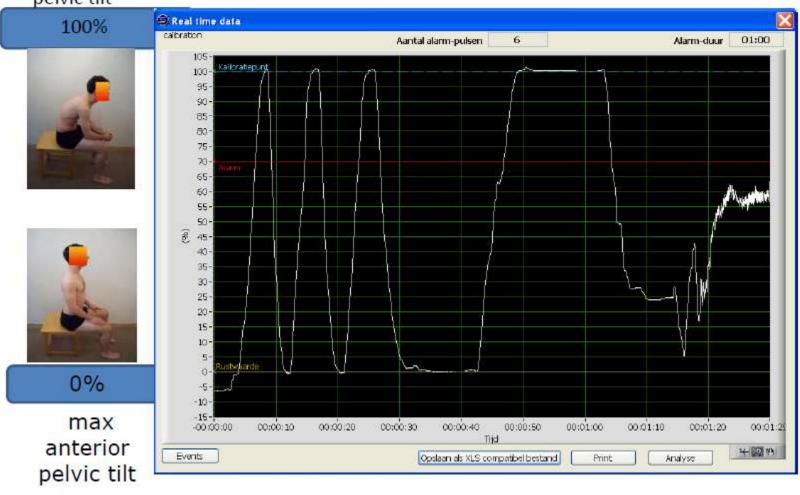


- BodyGuard<sup>™</sup>
- www.sels-instruments.be
- strain gauge
- reliable (O'Sullivan et al 2010)
- valid (O'Sullivan et al 2010)
- applied in slumped sitting position
- lower Lx (L3  $\rightarrow$  S2)
- secured with tape
- 20Hz

## **Posture: calibration**

posture expressed % relative to ROM

max posterior pelvic tilt



## **Trunk Muscle Activity**

- Non-invasive surface electromyography (EMG)
- %MVIC



## EMG

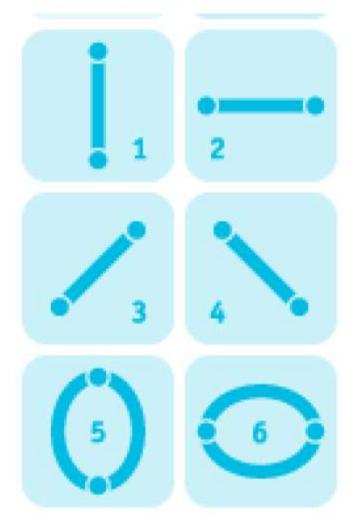
- Rectus abdominis (RA)
- External oblique (EO)
- Internal oblique (IO)
- Lumbar multifidus (sLM)
- Iliocostalis lumborum pars thoracis (ICLT)
- Thoracic erector spinae (TES)
- Right side of trunk

## Methods: Flexchair



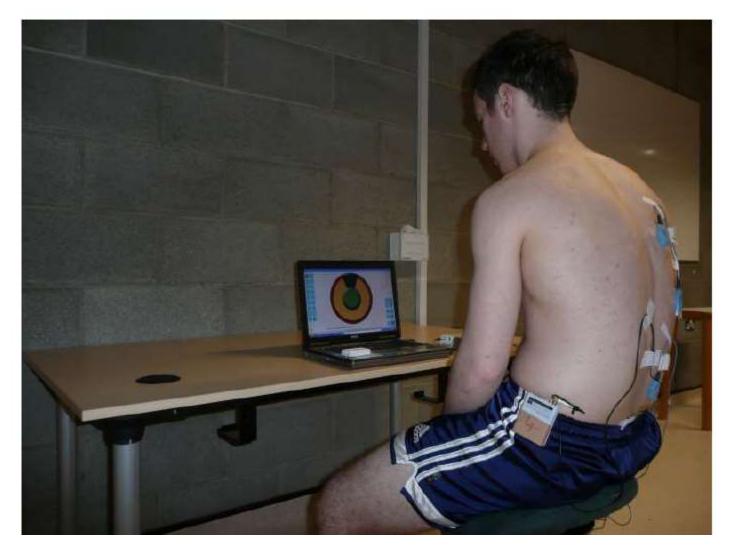


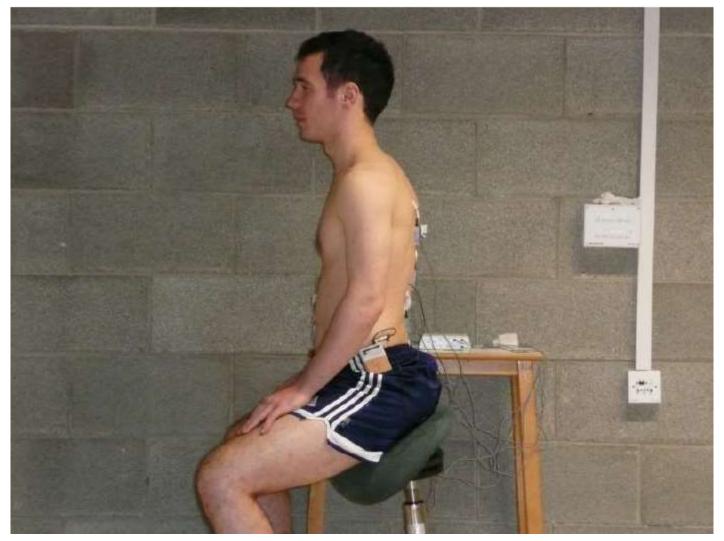
## Methods: 6 exercises

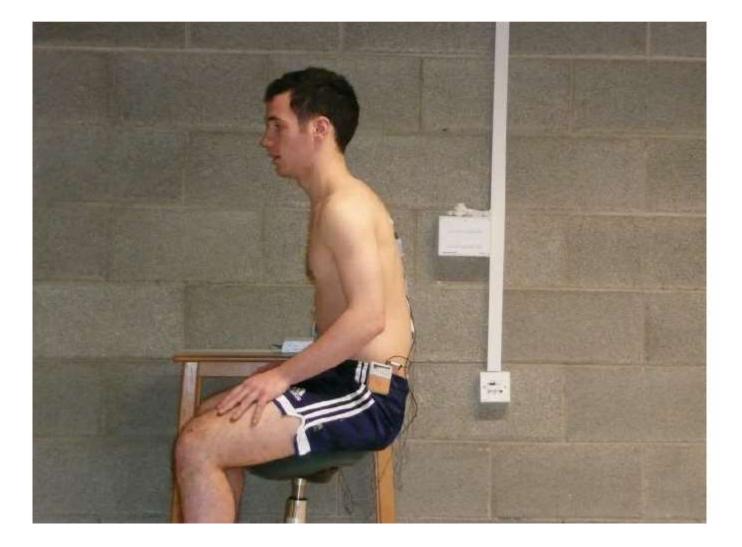


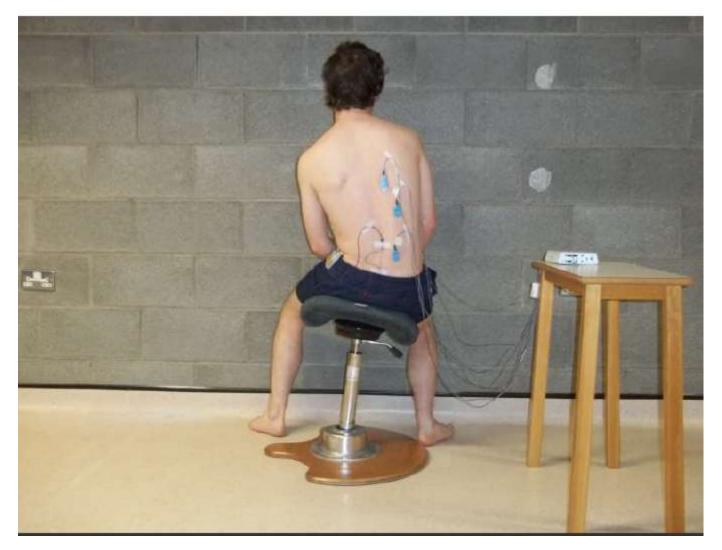
## Protocol

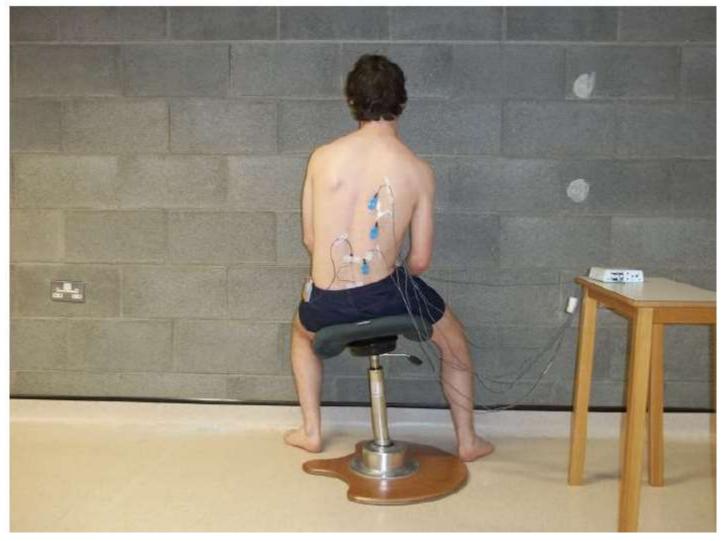
- Each exercise performed for 1 minute
- 2 minute break between each exercise
- EMG recording for 15 secs during exercise
- Quality of mvt: >90% accuracy for test
- EMG: RMS analysis

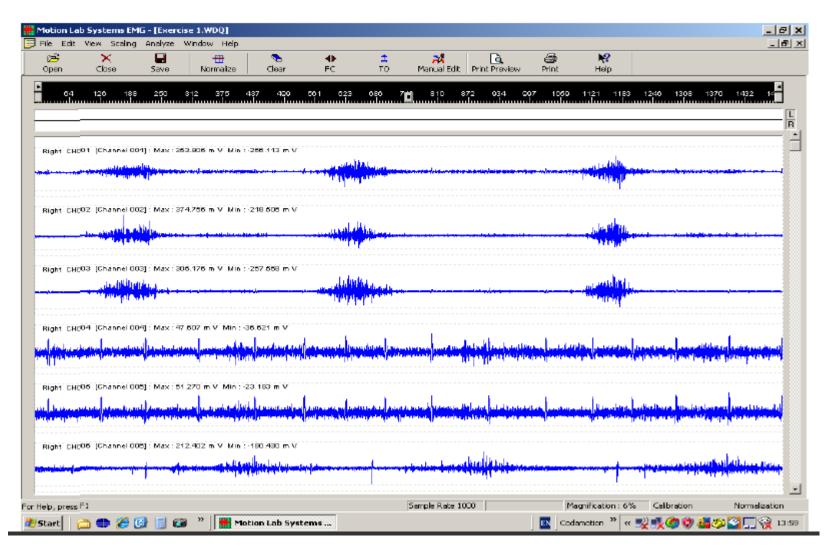








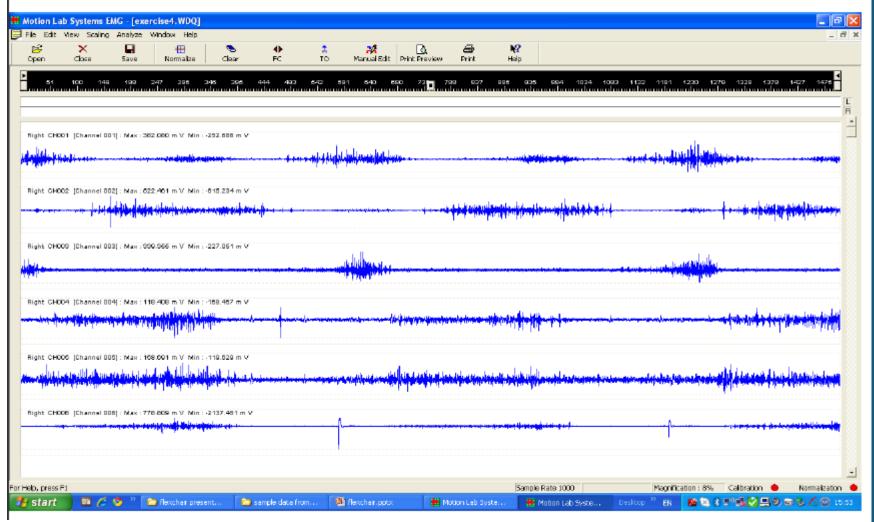




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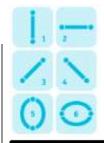
## Methods: Data analysis

SPSS 16.0.

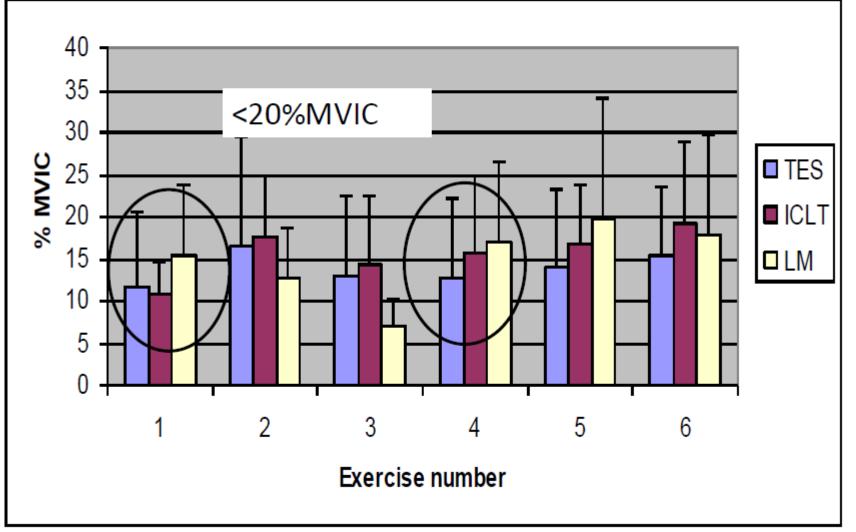
- Data were normally distributed
- Rep Measures ANOVA (LSD post-hoc)
- p<0.05.
- Posture data (simply ensuring full ROM)

## Results

- Clear activn (& relaxn) of trunk muscles
- Intensity of activation low-moderate → suitable for MC rehab > strength training
- Evidence that exercise requiring cognitive training improve motor control
- Considerable variation between exercises
- Potential to match exercises to clinical situation
- Rehab tool √ (user skill, esp clinical skill)

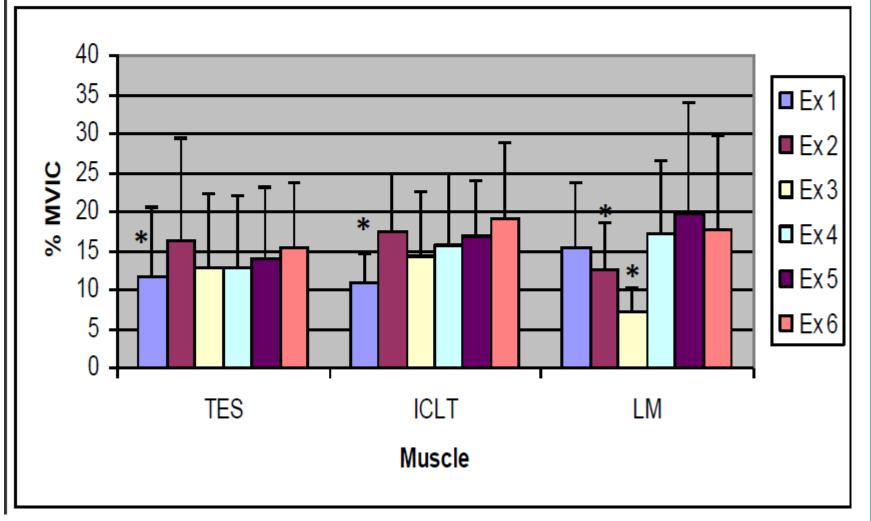


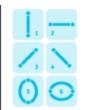
### **Back muscles**



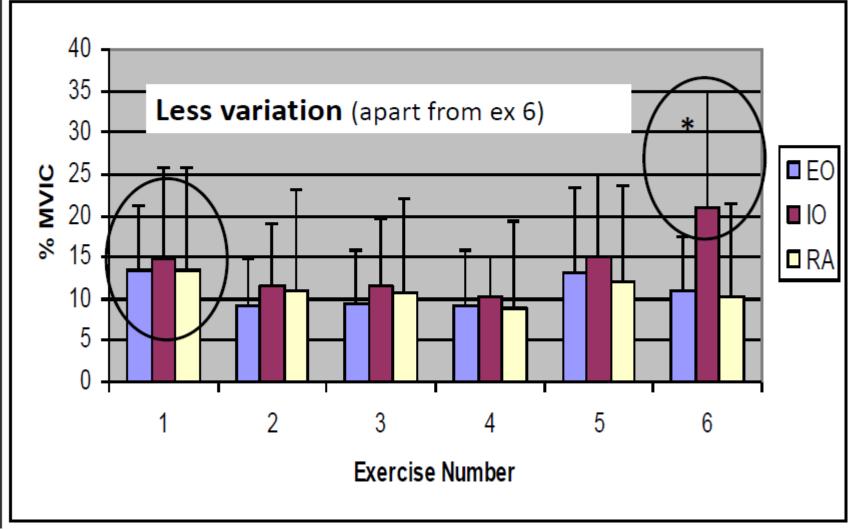


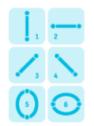
## **Back muscles**



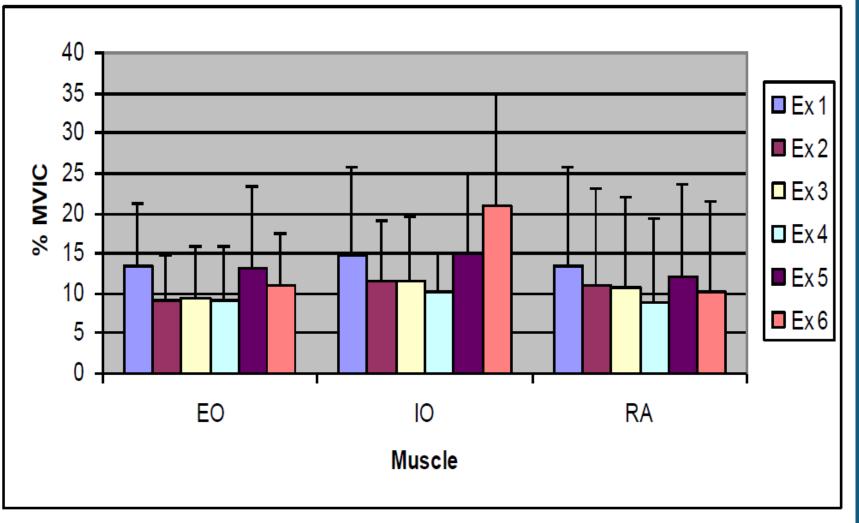


## Abdominal muscles

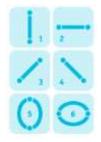




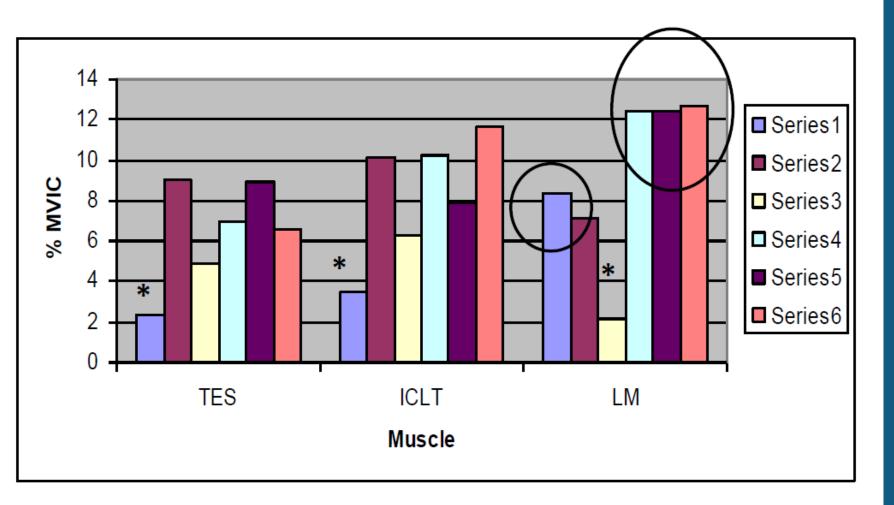
## **Abdominal muscles**

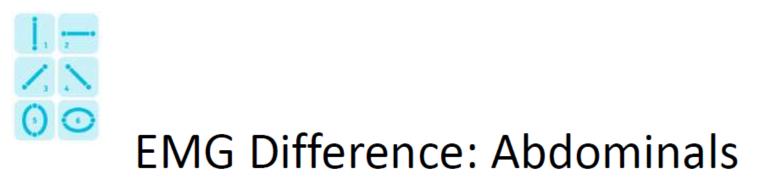


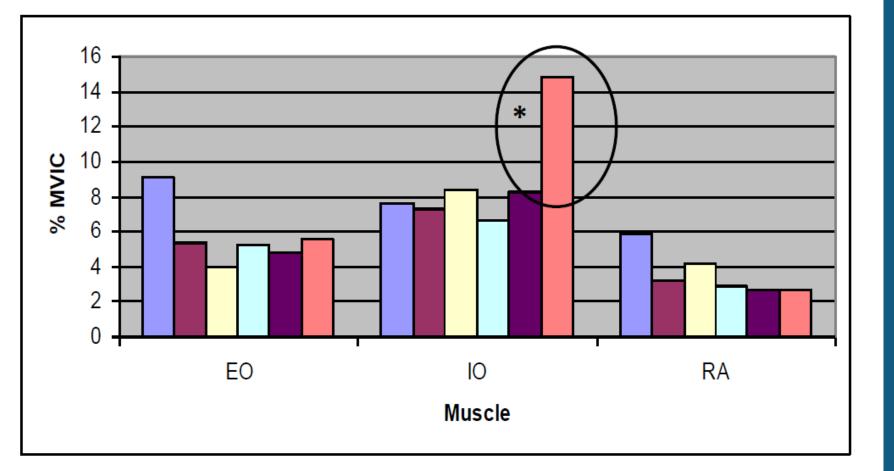
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## EMG Difference: Back







## Results

- Clear activn (& relaxn) of trunk muscles
- Intensity of activation low-moderate → suitable for MC rehab > strength training
- Evidence that exercise requiring cognitive training improve motor control
- Considerable variation between exercises
- Potential to match exercises to clinical situation
- Rehab tool √ (user skill, esp clinical skill)

## Limitations

- Young, painfree participants
- Closely supervised (<u>no cheating!</u>)
- Sagital posture monitoring only
- NSCLBP: multifactorial / biopsychosocial (McCarthy et al 2004; Linton et al 2007)

## Discussion

- Transfer to usual sitting "real-world"?
- Transfer to other postures and tasks
- Apply within BPS framework....not just for the sake of novelty
- Language we use with patients?



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Flexchair<sup>®</sup> RBT evaluation in patients with LBP versus healthy controls: discriminative validity of PAR-test

> Door Lien Tahon en Laura Van Lommel

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Flexchair<sup>®</sup> RBT evaluation in patients with sitting related LBP & healthy controls: discriminative validity of the PARtest



### Door Lien Tahon en Laura Van Lommel

o.l.v. prof. dr. W. Dankaerts, promotor





## Research Questions (RQs)

RQ1: Is there a difference in PAR-score between patients with LBP versus healthy controls?

RQ2: Does a change in PAR-score is associated with a change in primary (pain and disability) and secondary outcome (physical activity and kinesiophobia) measurements?

## PAR<sup>®</sup>-test Methods: materials

- 6 coordination exercises
- > difficulty
- before every exercise 15" to prepare
- 2' to complete figure

   as much as possible
   20 cycles = maximum score
- online registration Veldon database



## Methods: materials

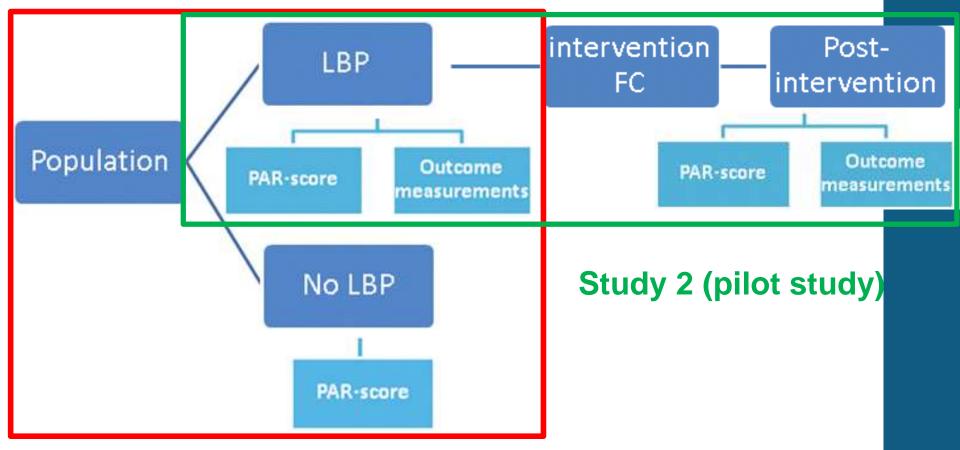
### PAR<sup>®</sup>-test

- total PAR<sup>®</sup> -score
  - rates lumbar motor control in sitting
  - based on quality and quantity of movement
  - °6 subscores



## Methods: research design

### Study 1



## **Experimental group: LBP**

Inclusion criteria	Exclusion criteria
Non-specific LBP >3m	Specific diagnosis (Spondylolisthesis, Bechterew,)
Mechanical pain	LBP and/or radiation during PAR-test
	Previous testing and/or intervention with FC– RBT because of LBP
	Non-mechanical pain
	Previous spine surgery, pelvic surgery or abdominal surgery
	Red flags or dominant yellow flags
	BMI > 35
	Pregnancy or 6m postpartum
	Vision or hearing problems

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## Control group: no LBP

#### **Exclusion criteria**

#### LBP in previous 2 years

- No medication
- No consultation with a health professional
- No intervention
- No days off work for LBP

BMI > 35

Vision or hearing problems

Previous spine surgery, pelvic surgery or abdominal surgery

Previous testing and/or intervention with FC-RBT because of LBP

age and gender matched control group ~ experimental group)

## Pre-test

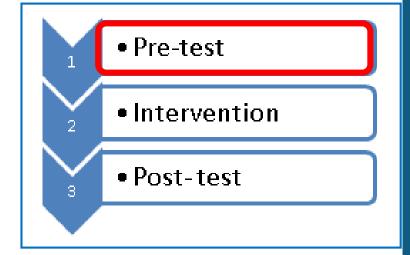
### **PAR-test**

Personal data:

- Age gender height/weight
- LBP data: location? aggravating/easing factors? time course? ...

### Outcome measurements:

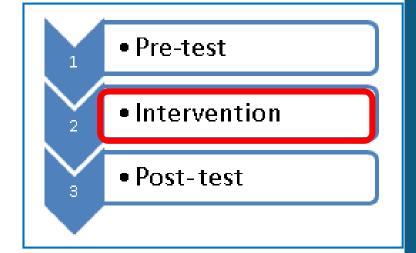
- Pain
  - VAS (0-10)
- Disability
  - ODI (%)
  - PSFS (0-30/50)
  - SBST (low/medium/high risk)
- Physical activity (PA)
  - Baecke (16-80)
- Kinesiophobia
  - TSK (17-68)



## Intervention

### **Pilot Study**

- LBP group : Flexchair<sup>®</sup>RBT intervention and usual care
- Choice therapist:
  - Usual care (content)
  - Flexchair<sup>®</sup> training program
  - # treatment sessions / stop treatment

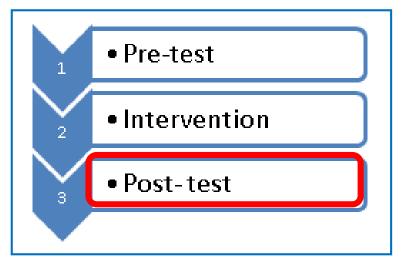


## Post-test

### **PAR-test**

#### Outcome measurements:

- Pain
  - VAS (0-10)
- Disability
  - ODI (%)
  - PSFS (0-30/50)
  - SBST (low/medium/high risk)
- Physical activity (PA)
  - Baecke (16-80)
- Kinesiophobia
  - TSK (17-68)



## **Questions?**



