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Use of Functional Capacity Evaluation for the
assessment of Residual Work Capacity

Michiel Reneman



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Liverpool 2008



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Disclosure: **no COI**

Michiel Reneman

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Professor – Pain and Work
PT & Movement Scientist

Other activities

- Pijn Alliance Netherlands (PAIN)
- Fit for Work platform
- Development center Pain Rehabilitation
- Working group Pain Rehabilitation Netherlands
- Network 'Early Intervention' / Vroege Interventie
- FCE trainer and course
- Editorial board Eur J Pain / J Occupational Rehabilitation
- EFIC – SIP societal Impact of Pain




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FCE-research Groningen


- 10 PhD theses
- >50 international publications
- CLBP > healthy > OA hip, knee, hand > WAD & neck > single arm
- Topics
 - Safety, reliability, construct validity, usability, reference values, definitions



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Use of Functional Capacity Evaluation for the assessment of
Residual Work Capacity

FCE definition and positioning

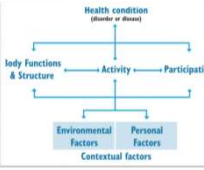


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Towards Consensus in Operational Definitions in Functional Capacity Evaluation: a Delphi Survey

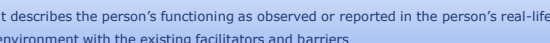
Remko Soer, Coen van der Schure, Johan Groothoff, Jan Geertman, Michiel Reneman, Journal of Occupational Rehabilitation 2008, 18(4): 389 – 400.

An FCE is an **evaluation of capacity of activities that is used to make recommendations for participation in work**, while considering the person's body functions and structures, environmental factors, personal factors and health status

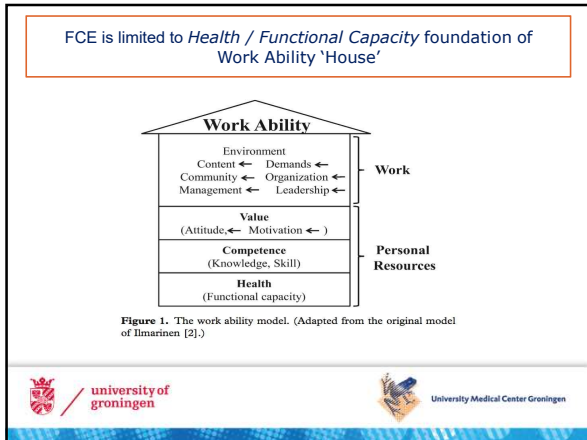


Capacity ... The highest probable functioning of a person ... at a given point in time, in a standardized environment

Performance ... what a person actually does in her or his current environment. It describes the person's functioning as observed or reported in the person's real-life environment with the existing facilitators and barriers



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FCE ≠ 'a buch of tests' or 'a machine'
FCE = clinical reasoning

1. Diagnosis
2. History - health
3. History - work
4. questionnaires
5. Physical examination
6. Tests
7. Observations
8. Analysis deficiencies
9. Analysis reasons
10. Recommendations

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Functional Capacity Evaluation
FCE tests

- 12-50, depending on protocol
- Lifting and carrying
- Posture tolerance: bending, overhead work
- Repetitive work / reaching: sideways, low, overhead
- Hand functions: grip strength, vinger strength, fine motor functions UE and hand
- All tests > hours
- 1 or few tests

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low	Technology	high
low	Marketing	high
high	Research	low

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Example low tech test materials

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FCE: different shapes and forms

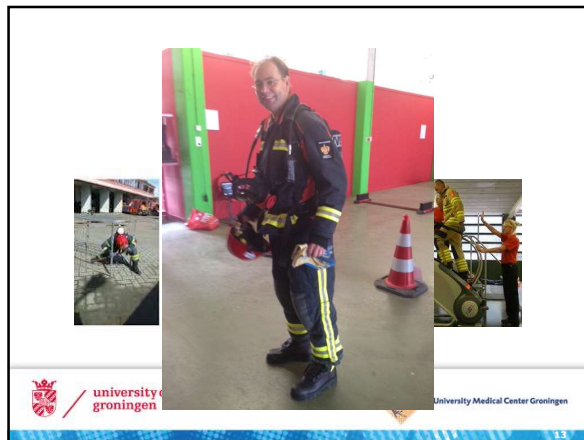
FCE en WCE

- FCE = standardized
- WCE = tailored to work
Examples: police, firefighters

Protocols: generic and specific, short and long, 1 or 2 days, 1-4 hour
Choice of tests: question, diagnosis, work
Report: (ultra) short - very long

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Scientific developments FCE 20 years – 1 sheet summary

1. We can measure FC safe and reliable
2. We are getting better grip on validity
3. We can use FCE to predict work status

And:

1. (ultra) short protocols (1-5 tests; lifting test)
2. Relevant references – criterion references (work load)

But:

- Grip on validity ≠ 'it is valid'
- Individual variation in test results substantial and insufficiently explained
 - Individual interaction with B-P-S factors

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REVIEW

Int Arch Occup Environ Health
DOI 10.1007/s00420-011-0659-y

Are performance-based measures predictive of work participation in patients with musculoskeletal disorders? A systematic review

P. P. F. M. Kuijer · V. Gouttebarge · S. Brouwer · M. F. Reneman · M. H. W. Frings-Dresen

Conclusions Strong evidence exists that a number of performance-based measures are predictive of work participation in patients with MSDs, especially lifting tests. Overall, the explained variance was modest.

More studies should evaluate the predictive validity of promising job-specific performance and complementary non-performance based measures.

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Validity of FCE for RTW

It may be questioned whether FCEs by themselves will ever be found valid for the prediction of a safe and lasting RTW...

*The construct of 'workability' is multidimensional. Whether a patient successfully returns to work or not, depends on more than functional capacity by itself. It is critical to understand that an instrument measuring a single dimension cannot be expected to assess a multidimensional construct. It is, therefore, by definition incorrect to suggest or to claim that the results of an FCE should be able to predict a person's work ability, or even more complex, a successful return to work. At best, one may expect an FCE, ... , to measure an individual's immediate functional ability to perform work-related activities. This should be seen as **one** of the prerequisites for a successful return to work.*

Reneman, Wittink, Goss, AMA, 2008

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FCE ≠ tests
FCE = clinical reasoning

1. Diagnosis	6. Tests
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Testresults or capacity?

FCE: we measure test output - behavioural measure

Test behaviour: part of capacity that a person is willing and/or able to muster, based on B-P-S factors


Question:

- How to disentangle 'physical' from other factors during FCE?

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Indicators described in FCE literature

- Consistency – clinical reasoning
- Waddell Non-Organic Signs
- Correlation pain intensity / performances / heartrate
- CV – coefficient of variation
- REG – Rapid Exchange Grip
- Grip strength curve
- Heartrate / performances

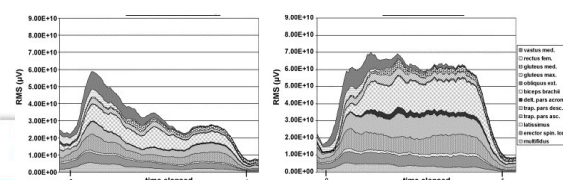


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Appendix 1. IWS FCE Observational Criteria for Level of Effort

	Light	Moderate	Heavy	Maximal
Muscle recruitment	Primer movers only, no accessory muscles, no trunk and neck stabilizers	Recruitment of accessory muscles and trunk and neck stabilizers	Pronounced recruitment of accessory muscles and trunk and neck stabilizers	Bulging of accessory muscles and trunk and neck stabilizers
Base of support	Natural stance	Stable base	Wider base	Very solid base
Posture	Upright posture	Beginning of counter balance	Increasing counter balance	Marked counter balance
Control and movement pattern	Easy movement patterns	Smooth movements	Begins to use momentum. Difficult but not maximal	Uses momentum in controlled manner. Unable to control if weight is added.



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Observing effort

Strong evidence: therapists *can* identify 'physical' sub-max performance (LBP, lifting)

- biomechanics, physiology

No evidence FCE can detect 'malingering' or judge (in)sincerity

Reason submax:

- depression, FCE done in non-native language, etc
- Biopsychosocial framework

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Observations of pain behavior

- Pain behavior: acts we understand to communicate pain
- FCE: differentiate pain behavior from 'physical activity' behavior (biomechanics physiology)
- Standardized – modified PBS scale (not validated for FCE)
- Interpretation: influence of PB on test results
- Biopsychosocial framework
- Central Sensitization?

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Analyses deficiencies

Workload = reference

Comparison capacity to workload



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Reference values

- Workload = reference / criterion
- Assessment workload time consuming and scientifically challenging
- Reference for FCE: FC of good functioning healthy workers
- Compare FC patient to FC of good functioning workers with similar workload
 - Patient FC = worker FC: OK
 - Patient FC < worker FC: ?

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Reference values Netherlands

Table 1: Physical Demand Characteristics of Work

Physical Demand Level	Occasional* 0%-20% of the Workday	Frequent* 20%-40% of the Workday	Constant* 40%-100% of the Workday
DOT 1: Sedentary	4.5 kg	Negligible	Negligible
DOT 2: Light	9.1 kg	4.5 kg	Negligible
DOT 3: Medium	22.7 kg	9.1 kg	4.5 kg
DOT 4: Heavy/very heavy	45.4 kg	22.7 kg	9.1 kg

NOTE: Examples of DOT 1: medical secretary, manager branch (any industry), clinical psychologist; DOT 2: teacher elementary school, receptionist, computer operator; DOT 3: nurse (general duty), maintenance engineer (any industry), carpenter, car mechanic; DOT 4: baker, bricklayer, farm worker (general).
*Amount of force exerted to lift, carry, push, pull, or otherwise move objects, including the human body.

702 workers
184 professions
12 tests

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Manager - DOT 1
40 kg: decile 6
8 kg: decile 1
5 kg: decile 0

Brick layer - DOT 4
40 kg: decile 1-2
20 kg: decile 1
5 kg: decile 0

Table 3: Normative Values for Material Handling (in kg) for the Different DOT Categories

	Lifting Low (kg)				Lifting High (kg)				Carrying (kg)			
	DOT 1	DOT 2	DOT 3	DOT 4	DOT 1	DOT 2	DOT 3	DOT 4	DOT 1	DOT 2	DOT 3	DOT 4
Mean ± SD	36±15	31±16	41±14	63±14	16±6	17±8	18±6	24±5	38±14	40±14	43±13	53±11
Range	6-75	10-55	10-55	20-70	4-30	4-25	5-34	10-20	10-20	10-20	10-20	10-20

NOTE: DOT categories: 1 (sedentary); 2 (light); 3 (medium); 4 (heavy/very heavy work).

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Table 4: Normative Values for Postural Work for the Different DOT Categories

	Overhead Work Test (h)				Forward Bend Test (h)			
	DOT 1	DOT 2	DOT 3	DOT 4	DOT 1	DOT 2	DOT 3	DOT 4
Mean ± SD	36±15	31±16	41±14	63±14	16±6	17±8	18±6	24±5
Range	6-75	10-55	10-55	20-70	4-30	4-25	5-34	10-20

NOTE: DOT categories: 1 (sedentary); 2 (light); 3 (medium); 4 (heavy/very heavy work).

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Matching physical work demands with functional capacity in healthy workers: Can it be more efficient?

Remko Soer^{A,B,C,*}, Niek Hollak^{A,B}, Marieke Deijs^A, Lucas H. van der Woude^{A,B,D}, Michiel F. Reneman^A

Validity reference values

Hypothesis: FCE>WL

Methods: Standardized WL assessment at workplace

Results

- S/L work: 10th percentile correct 98%
- M/H work: 30th percentile correct in 88%

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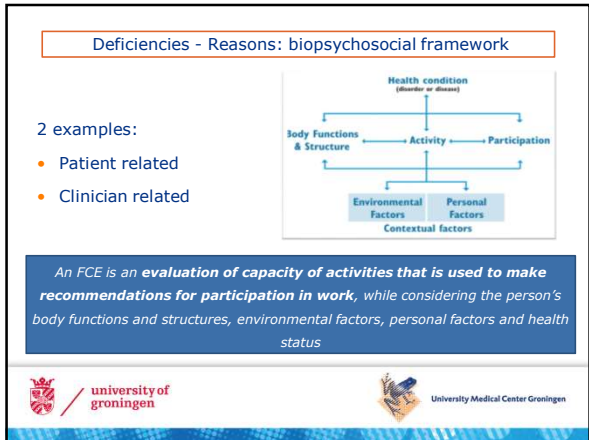
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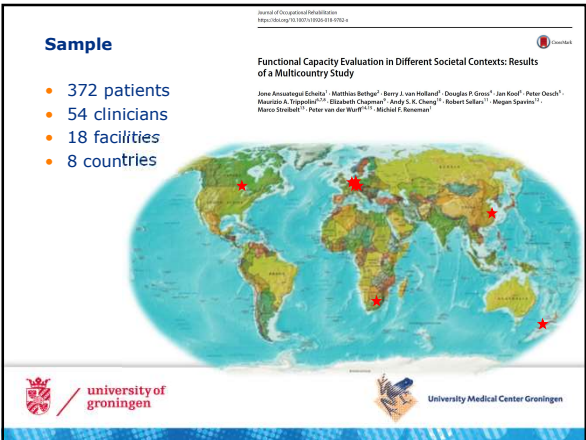
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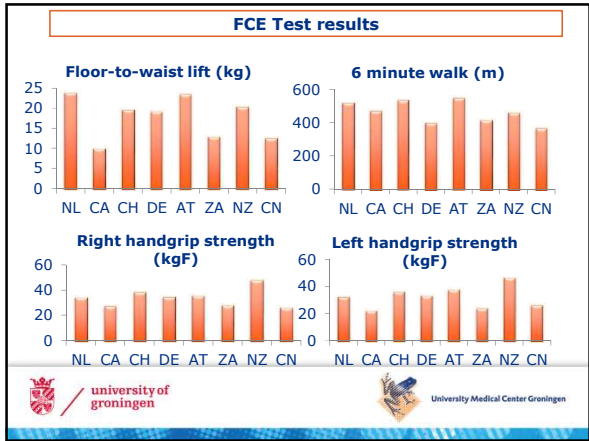
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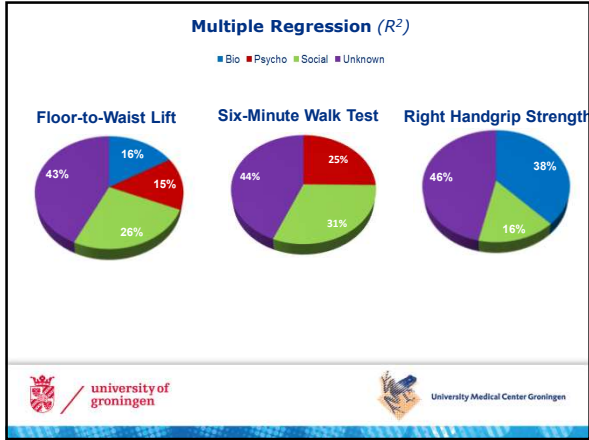
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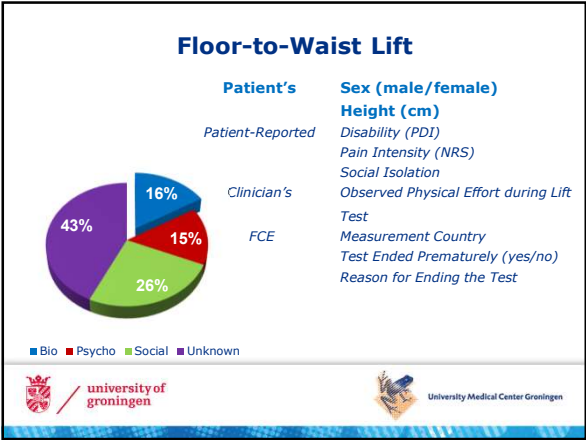
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Take Home

- >50% explained variance in all models
- FCE results related to BPS factors, AND these factors differ per test

And so ...

- With an FCE we do not only measure Physical Capacity
- A patient's FC should be interpreted within a **biopsychosocial framework**

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biopsychosocial framework

FCE clinician as reason

Safety should be ensured during

Nocebo: negative expectation

Opposite of placebo

Popular: 'Fear makes sick'

First, do no harm

Nocebic words

What did your words do for someone today?

You have joints like an 80 year old

Asymmetric

Bad posture

Rotated pelvis

Slipped disc

Long length discrepancy

Unstable

Trigger point

Deviation

Twisted pelvis

Wear and tear

Wrong sitting posture

You have to live with this for the rest of your life

You have a weak spot

Knots in your muscles

Crooked back

Worn down

Hypermobile

Weak core stability

Misaligned

You have a scoliosis

Weakness

Inactive muscles

Impingement syndrome

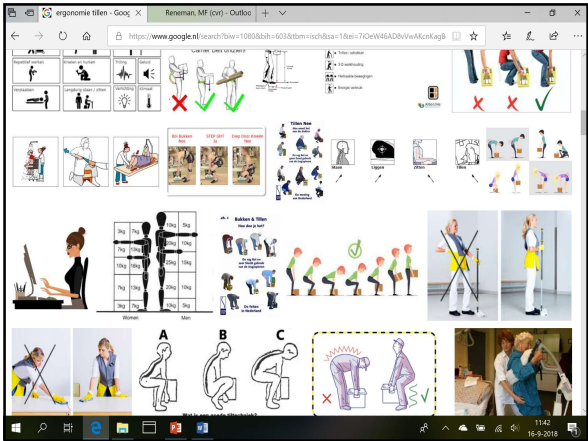
Protracted shoulders

Your back is damaged

Facial restriction

Avoid lifting and bending

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Disabling chronic low back pain as an iatrogenic disorder: a qualitative study in Aboriginal Australians

Key messages

- Contrary to previous research negative beliefs, including an anatomical/structural cause of pain and pessimistic future outlook, were common.
- Negative beliefs originated from interactions with healthcare practitioners suggesting disabling LBP may be partly iatrogenic.
- Biomedical-orientated management approaches to LBP are far reaching, highlighting the need for healthcare practitioners to positively influence beliefs as part of LBP care in all settings.

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HCPs – part of the problem?

More / longer sick-listing issued by HCP when:

- HCP holds high fear avoidance beliefs (A)
- HCP believes that discussing RTW disrupts relationship (B)

Physicians' Determinants for Sick-listing LBP Patients A Systematic Review

Erik L. Werner, MD, PhD*

Pierre Côté, D.C, PhD,†‡

Brona M. Fullen, BSc, PhD§

Jill A. Hayden, L

Clin J Pain • Volume 28, Number 4, May 2012

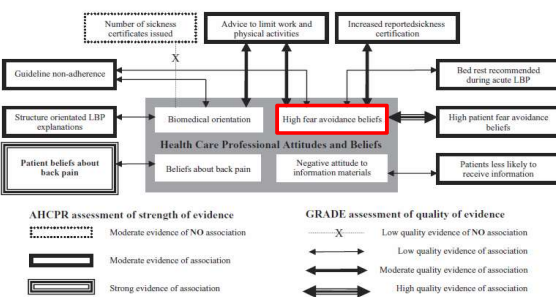
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REVIEW ARTICLE

The association between health care professional attitudes and beliefs and the attitudes and beliefs, clinical management, and outcomes of patients with low back pain: A systematic review

B. Darlow^{1,2}, B.M. Fullen³, S. Dean⁴, D.A. Hurley³, G.D. Baxter², A. Dowell¹

Eur J Pain 16 (2012) 3–17 © 2011



AHCPR assessment of strength of evidence

Moderate evidence of NO association

Moderate evidence of association

Strong evidence of association

GRADE assessment of quality of evidence

Low quality evidence of NO association


Low quality evidence of association

Moderate quality evidence of association

High quality evidence of association


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PAIN
Pain 124 (2005) 180-185
Editorial
Are we "fear-avoidant"?

What if the **FCE-clinician** is fear-avoidant?



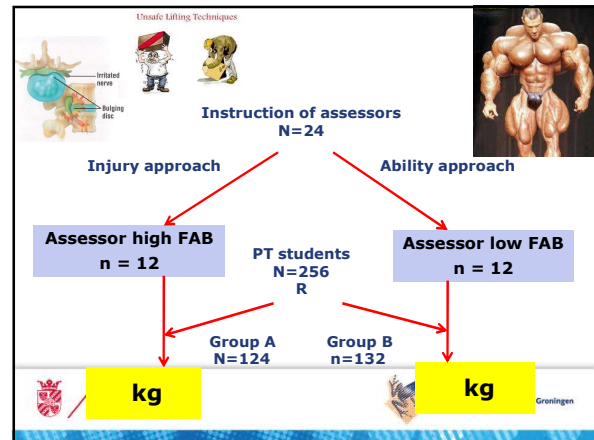


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Unsafe Lifting Techniques



**Lifting →
back pain**



1. Guarding behavior
2. Verbal: Injuries
3. Verbal: Avoidance
4. Intense coach

Unsafe Lifting Techniques



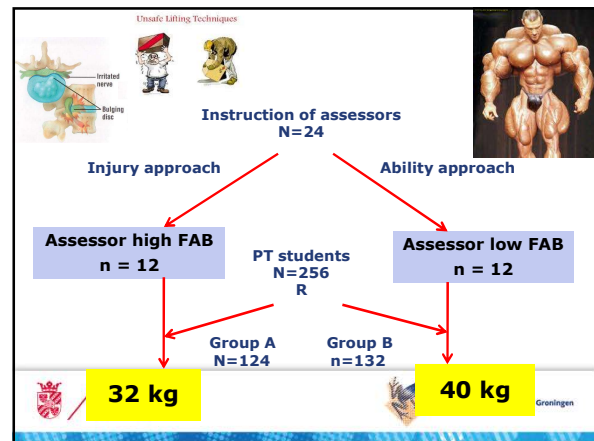
**Lifting →
healthy**



1. No Guarding behavior
2. Verbal: No injuries
3. Verbal: No Avoidance
4. Easy coach




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Conclusion


Disclaimer: PT students and healthy young adults

Clinician beliefs / behaviors do influence FCE results


Discussion

- ✓ Safety paradox?
- ✓ More pain orientation than needed / guidelines?
- ✓ The opposite as to what we are aiming to accomplish?

Take home: make sure you are not part of the problem



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Analysis – putting it all together

1. What do the results 'mean'?
 - Maximal capacity - BPS?
 - Collaboration / therapeutic relationship
 - Consistency / discrepancy between results and observations
 - Can you make sense of it all?
2. Relate results to reference values
 - FC < = > WL
 - Deficiency: when FC < WL
3. If deficiency: why?
4. Are discrepancy modifiable? How? By whom? Prognosis?
5. Conclusion / recommendations -



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Effectiveness of Workplace Interventions in Return-to-Work for Musculoskeletal, Pain-Related and Mental Health Conditions: An Update of the Evidence and Messages for Practitioners

non studies that involve workers with MSK or pain-related conditions and MH conditions. We recommend implementing multi-domain interventions (i.e. with healthcare provision, service coordination, and work accommodation components) to help reduce lost time for MSK or pain-related conditions and MH conditions. Practitioners should also consider implementing these programs to help improve work functioning and reduce costs associated with work disability.

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Learn more?
2-day course EB FCE

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Thank you
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