

Functional Exercise Prescription

Supporting rehabilitation in movement and sport

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Aim

Help the individual recover their functionality: the ability to carry out daily activities effectively, efficiently and comfortably

Constructing a personalised and recovery specific exercise management

Functional management – personalised

Process approach – recovery process specific

Functional management

Functional movement - the unique movement repertoire of an individual

Functional rehabilitation - helping a person recover their movement capacity by using their own movement repertoire (whenever possible).

Extra-functional – a movement pattern outside the individual's movement repertoire



Lederman E. 2010 Neuromuscular Rehabilitation in manual and physical therapists. Elsevier

The life gym

Shared + Unique



Which human activity is not an exercise?

All physical activity is exercise

Exercise:
The behaviour a person adopts in order to enhance or maintain their physical performance or health

Remedial exercise:
The behaviour a person adopts in order to recover their physical performance or health

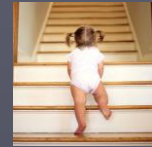
"Displacement" of health and recovery environment



Exercise



Not exercise?



Contextual constructs?

Exercise



Not Exercise



Exercise?

Work

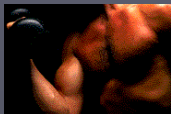


Exercise



Constructs

Good weight

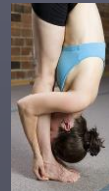


Bad weight



More constructs

Good healthy forward bend



Bad unhealthy forward bend



Yamato TP, Maher CC, Traeger AC, Williams CM, Kamper SJ. 2018 Do schoolbags cause back pain in children and adolescents? A systematic review. *Br J Sports Med*. 2018 Oct 22;52(12):1241-1246. van Gent G, Dolis JJ, de Rover CM, Hara Sing RA, de Vet HC. 2003 The weight of schoolbags and the occurrence of neck, shoulder, and back pain in young adolescents. *Saie (Phila Pa 1976)*. 2003 May 1;28(9):916-21.

Context only

Core exercise

Not core exercise

Not exercise

Loading in locomotion

Spinal loading in relation to standing:
 Walking 171%
 Ascending stairs 265%
 Descending stairs 225%

Balcioglu, I. et al Loads on a vertebral body replacement during locomotion measured in vivo. *Spine* 2014; 39(2): 750-5. doi: 10.1016/j.spinee.2013.10.010. Epub 2013 Oct 18.

No better than a daily walking program

Vs.

A six-week walk training programme was as effective as six weeks of specific strengthening exercises programme for the low back.

Stratfordman, I. Katz, Lester M An aerobic walking programme versus muscle strengthening programme for chronic low back pain: a randomised controlled trial. *BMC Musculoskelet Disord* 2013; 14: 101. doi: 10.1186/1471-2475-14-101. Epub 2013 Jul 31.

Wong, P. Do lumbar stabilising exercises reduce pain and disability in patients with recurrent low back pain? *Aust J Physiother* 2009; 55(2): 138.

Loading of knee in daily sports activities

From Lederman E 2022 Functional Exercise Prescription, Handspring, London

O'Lima DL, Saklani N, Pahl S, Colwell CW 2008 The Marx Criteria Award: in vivo knee forces during recreation and exercise after knee arthroplasty. *Clin Orthop Relat Res* 2008; 466(11): 2605-11. doi: 10.1007/s11998-008-0345-x. Epub 2008 Jun 15. Kutzner I, Heinke B, Grathen F, Bender A, Rohmann A, Helder A, Baser A, Bergmann G 2020 Loading of the knee joint during activities of daily living measured in vivo in five subjects. *Biometh* 2020 Aug 10; 4(8): 2194-79. doi: 10.1016/j.biometh.2020.03.046.

Shoulder joint loading levels during daily activities

From Lederman E 2022 Functional Exercise Prescription, Handspring, London

Bergmann, G. et al In vivo glenohumeral contact forces—measurements in the first patient 7 months postoperatively. *J Biomech* 2007; 40(10): 2139-49. Epub 2006 Dec 13.

Functionise, overall mortality and CVD

The benefit of physical activity was independent of the type of physical activity (recreational or non-recreational), a range of socioeconomic and CVD risk factors, and was similar in various countries with differing income levels

Lee SA, Hu W, Bangarajan S, et al The effect of physical activity on mortality and cardiovascular disease in 130 000 people from 17 high-income, middle-income, and low-income countries: the PURE study. *Lancet* 2017; 390: 2643-54.

Specificity

Tissue, motor, and physiological adaption is specific for the practiced task

Lederman E. 2010 Neuromuscular Rehabilitation in manual and physical therapists. Elsevier
 Goldspink, G. et al. (1992). Gene expression skeletal muscle in response to stretch and force generation. *American Journal of Physiology*, 262, R356-R363.
 ... 2009 Flexion length of leg muscles is greater in sprinters than distance runners. *Journal of Sports Sciences*, 27(1), 115-9

Process Approach

Lederman E 2013 Therapeutic stretching: towards a functional approach. Elsevier

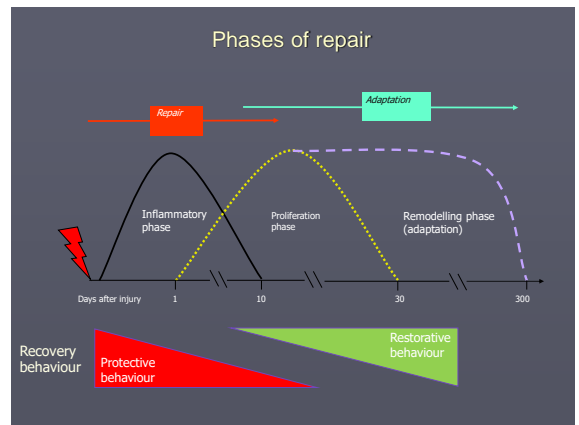
Recovery environments

Recovery processes in various conditions

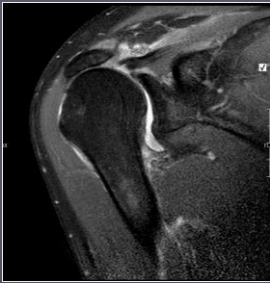
Lederman E 2013 Therapeutic stretching: towards a functional approach. Elsevier

Recovery environments: management considerations

Process	Condition	Specific management	Shared management
Repair	All acute conditions, max 8 weeks: All tissue damage, Joint & muscle sprains, post surgery, blunt trauma, first phase of frozen shoulder,	Moderate cyclical and repetitive loading Applied locally to affected area Gradual loading Pain-free / tolerable movement Can be either active or passive Any movement pattern but preferably functional. Extra-functional is OK	Psychological Ease movement pain related anxieties, catastrophising, support, reassurance, comfort, Sooth and calm Therapeutic relationship - trust, non-judgmental, empathic... Contextual factors Cognitive Inform Plan set goals Provide choice Behavioural Support recovery behaviour Raise awareness to avoidance behaviour
Adaptation	All chronic conditions: Post immobilisation contracture, ROM rehab, postural and movement re-education/rehab, CNS damage/rehab, structural/biomechanical change, enhance/recover human performance	Active Task specific whole and goal movement Functional Repetition Overloading Discomfort likely and generally OK	Physical Functional movement Frequent exposure to activity
Alleviation of symptoms	Acute/Chronic pain/discomfort Acute/chronic stiffness	Many treatment modalities may be beneficial depending on patient expectations... Sleep regulation & relaxation Physically: Active may be better than passive movement Cyclical movement may be better than static approaches Functional or extra-functional	



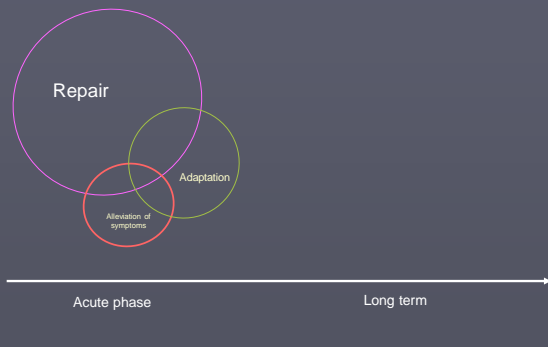
A clinical example



6 weeks later



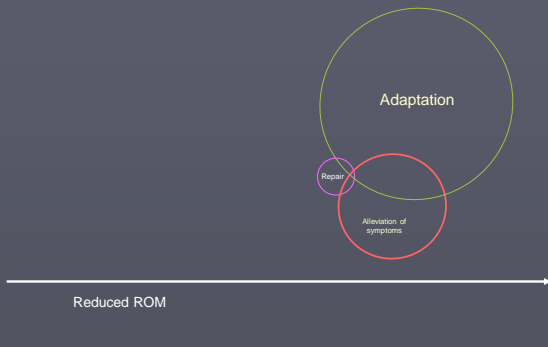
Treatment strategy acute injuries



Consider this management

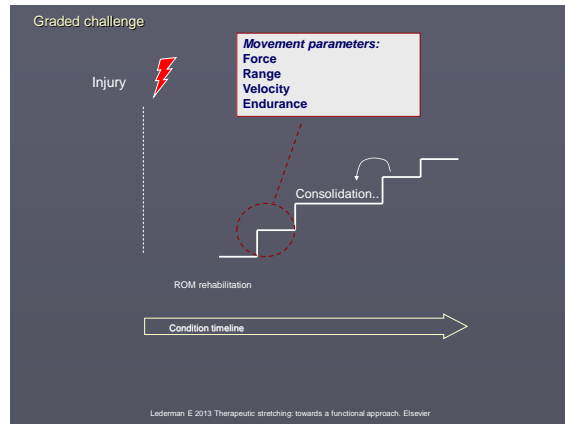
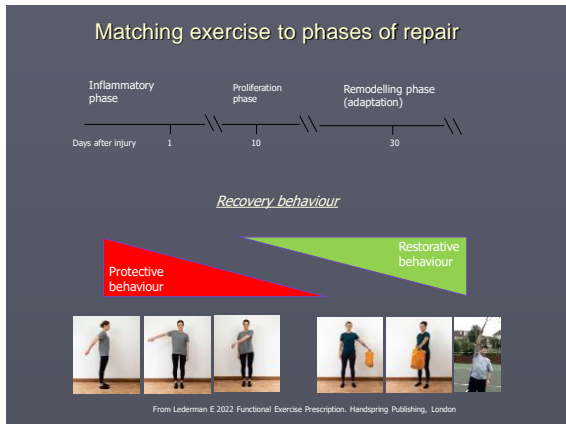
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Adaptation			
Alleviation of symptoms			

Post immobilisation / contractures



Consider this management

Process	Condition	Specific management	Shared management
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Alleviation of symptoms			



Graded challenge

Date: _____
Name: _____

	Week 1	Week 2	Week 3	Week 4	Week 5	Week 6	Week 7	Week 8	Week 9
Tennis	Distance from wall: 2m Duration: 3 sets Frequency: X 3	Distance from wall: 4m Duration: 4 sets Frequency: X 3	Distance from wall: 6m Duration: 5 sets Frequency: X 3	Distance from wall: 8m Duration: 10 min Frequency: X 3	Distance from wall: 10m Duration: 15 min Frequency: X 3	Distance from wall: 12m Duration: 20 min Frequency: X 3	Distance from wall: Any distance Duration: 25 min Frequency: X 3	Start a 6-10 racket game with a partner, just passing the ball	Etc...

Amplifying force
Amplifying endurance

Lederman E 2013 Therapeutic stretching: towards a functional approach, Elsevier

- ### Summary
- Identify and work towards the patient's functional goals
 - Construct the management from the patient's own movement repertoire
 - Identify the recovery process/s associated with the patient's condition
 - Match the exercise to support the recovery process

Find out more:
www.cpdo.net
 Workshops
 Group supervision
cpd@cpdo.net

The Medicalisation of Posture

Thursday 24 Feb, 19:00-20:30

What is posture and does it exist?
 Is there a good or bad posture?
 Is there a relationship between posture and musculoskeletal conditions?
 Is there any value in postural assessment?
 Is postural correction possible and does it have a therapeutic value?

