RECONCILING BIOMECHANICS WITH PAIN SCIENCE

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Brief Course Description
Significant research in the pain neurosciences and biomechanics field often appears to undermine the reasoning and justifications for many of the traditional therapeutic approaches and techniques of the many rehabilitation professions. By addressing both the weaknesses and strengths of the biomechanical approach we can see that treatment can be much simpler, congruent with the cognitive, neuroscience approach and best evidenced based practice.

This course provides a framework to utilize an alternative biomechanical approach that blends neuroscience pain education. This course teaches the therapist how to teach patients about pain science in a treatment framework that still utilizes specific/corrective exercise and manual therapy. Therapists are taught a model of treatment that **simplifies** the assessment process and the treatment.

LEARNING STYLE

This course is a mix of a discussion based lecture, case studies and practical components. The practical components are used with the case studies to "feel" the interventions. However, there no "specific" techniques. Rather, the point is to show that the framework helps the therapist use their own techniques but in a different way. Further, we can then share "techniques" from all participants in the class. Exercises are demonstrated and time is given to practice these exercises. When exploring how Key Messages relate to pain and changing behaviour the practical component helps the therapist use their own experiences and "stories" to fit with the Key Messages of pain and behaviour change.

 OBJECTIVES

- Provide assessment techniques to aid in diagnosis and management common musculoskeletal complaints
- Demonstrate how biomechanical treatments and explanations can address the multidimensional nature of pain
- Demonstrate how cognitive restructuring and goal setting of meaningful activities can be used alongside mechanical treatments to address the multidimensional nature of pain
- Provide and teach exercise prescription that is informed by biomechanics and therapeutic neuroscience
- Explain the "pain science" behind common clinical problems and learn methods of applying therapeutic neuroscience education
- Identify and use their current movement based skills within a graded exposure and graded activity paradigm

LECTURES

Module 1: Course Introduction and Clinical Decision Making (1 hour and 35 minutes)
- A review of the multidimensional nature of pain will occur
- Clinical questions and themes are posed to help find common threads for rehabilitation

Module 2: Treatment Fundamentals Lecture (60 minutes)
- An alternative to the kinesiopathological model of treatment is produced
- A case for simplicity is made
- Clinical reasoning for safety, potential red flags and contraindications to a biopsychosocial approach
- A simplified framework to incorporate both biomechanical treatments with psychosocial treatments is outlined

Module 3: Reframing the Kinesiopathological Model (50 minutes)
- an exploration of the utility and limitations of the biomechanical model in pain and injury management
- introduction to how the current biomedical model can be simplified and modified to be consistent with the best evidence of both pain science and biomechanical science
- Exploration of the role of posture on pain

Module 4: Targets of Exercise Prescription (1 hour and 10 minutes)
- A biopsychosocial approach to exercise and movement prescription is introduced
- Case studies are used to explore common and potential mechanisms of therapy
- An in-depth review of exercise prescription and potential targets of knee osteoarthritis is explored

Module 5: Exercise Prescription Dosage and Variables (1 hour and 5 minutes)
- A review of the details of exercise prescription
- Repetitions, sets, volume, intensity goals for common targets of exercise
- Topics will include strength, hypertrophy, power, analgesia, habituation, range of motion

Module 6: The comprehensive capacity model and the targets of exercise prescription. (2 hours)
- A simplified approach to exercise prescription is shown
- The importance of comprehensive capacity and movement options is highlighted and illustrated when it is necessary
- an evidence based approach to understanding pain and rehabilitating common conditions

- an approach to understand the assessment of sensitivity in exercise prescription
- demonstrations of the exercise interventions
- case study autopsies are performed illustration common themes behind various treatment approaches and how a simplified intervention can be effective
- A review of common themes in tendinopathy and how that research can guide much clinical practice

Module 7: Symptom Modification Model of Injury/Pain Management (2 hours and 30 minutes)
- the comprehensive capacity and graded exposure approach to injury and pain treatment will be detailed
- students will learn a framework and simplified clinical reasoning tool to help guide therapy
- Symptom modification as clinical reasoning to guide interventions as demonstrated through case studies
- Special topics include Graded Exposure, working with painful exercises, movement modifications and graded activity.
- active and passive approaches to the symptom modification interventions and how these manual therapy approaches are supported by exercise interventions will be taught.

Module 8: Special topics in reconciling biomechanics (1 hour and 10 minutes)
- Re-evaluating the role of spine stability in low back pain
- Questioning the role of knee valgus in knee cap related pain

Module 9: When biomechanics matters (45 minutes)
- Re-evaluating the role of spine flexion as an independent risk factor for low back pain
- A framework for when movement quality and biomechanics are important for pain and injury via the research behind ACL injury and rehabilitation is proposed
- The importance of habit interruption as a rationale for changing movement quality

Module 10: Key Messages of Recovery and Pain Science (1 hour and 45 minutes)
- Pain science primer
- Identifying potential false beliefs that might influence pain and disability
- How to deliver Key Messages that are chosen by false beliefs
- Interviewing techniques are illustrated to help change opinions and ultimately change behaviour
- case studies are presented by the class and solved with facilitation from the instructor and the group
- a reconceptualization of common clinical tests is demonstrated to show that much of our current testing can be modified to still be useful
- Specific examples demonstrating how to begin meaningful treatment "when everything hurts" and all manual therapy and exercise therapy has failed

Recommended Reading

Moseley GL, Butler DS. Fifteen Years of Explaining Pain: The Past, Present,and Future. J Pain. 2015 Sep;16(9):807-13. doi: 10.1016/j.jpain.2015.05.005. Epub 2015 Jun 5. Review. PubMed PMID: 26051220.

Nijs J, Lluch Girbés E, Lundberg M, Malfliet A, Sterling M. Exercise therapy for chronic musculoskeletal pain: Innovation by altering pain memories. Man Ther.2015 Feb;20(1):216-20. doi: 10.1016/j.math.2014.07.004. Epub 2014 Jul 18.

Ng L, Campbell A, Burnett A, Smith A, O'Sullivan P. Spinal Kinematics of Adolescent Male Rowers With Back Pain in Comparison to Matched Controls During Ergometer Rowing. J Appl Biomech. 2015 Aug 6. [Epub ahead of print] PubMed PMID: 26252195.

O'Keeffe M, Purtill H, Kennedy N, O'Sullivan P, Dankaerts W, Tighe A, Allworthy L, Dolan L, Bargary N, O'Sullivan K. Individualised cognitive functional therapy compared with a combined exercise and pain education class for patients with non-specific chronic low back pain: study protocol for a multicentre randomised controlled trial. BMJ Open. 2015 Jun 1;5(6):e007156. doi: 10.1136/bmjopen-2014-007156. PubMed PMID: 26033941; PubMed Central PMCID:PMC4458611.

Sanchis M, Lluch E, Nijs J, Struyf F, Kangasperko M. The role of central sensitization in shoulder pain: A systematic literature review. Semin Arthritis Rheum. 2015 Jun;44(6):710-6. doi: 10.1016/j.semarthrit.2014.11.002. Epub 2014 Nov 13. Review. PubMed PMID: 25523242.

Struyf F, Lluch E, Falla D, Meeus M, Noten S, Nijs J. Influence of shoulder pain on muscle function: implications for the assessment and therapy of shoulder disorders. Eur J Appl Physiol. 2015 Feb;115(2):225-34. doi: 10.1007/s00421-014-3059-7. Epub 2014 Nov 28. PubMed PMID: 25431129.