



Abstracts November 2023

Awareness and use of five imaging decision rules for musculoskeletal injuries: a systematic review

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Abstract

Background: Several validated decision rules are available for clinicians to guide the appropriate use of imaging for patients with musculoskeletal injuries, including the Canadian CT Head Rule, Canadian C-Spine Rule, National Emergency X-Radiography Utilization Study (NEXUS) guideline, Ottawa Ankle Rules and Ottawa Knee Rules. However, it is unclear to what extent clinicians are aware of the rules and are using these five rules in practice.

Objective: To determine the proportion of clinicians that are aware of five imaging decision rules and the proportion that use them in practice.

Design: Systematic review.

Methods: This was a systematic review conducted in accordance with the 'Preferred reporting items for systematic reviews and meta-analyses' (PRISMA) statement. We performed searches in MEDLINE (via Ovid), CINAHL (via EBSCO), EMBASE (via Ovid), Cochrane Central Register of Controlled Trials (CENTRAL), Web of Science and Scopus databases to identify observational and experimental studies with data on the following outcomes among clinicians related to five validated imaging decision rules: awareness, use, attitudes, knowledge, and barriers and facilitators to implementation. Where possible, we pooled data using medians to summarise these outcomes.

Results: We included 39 studies. Studies were conducted in 15 countries (e.g. the USA, Canada, the UK, Australasia, New Zealand) and included various clinician types (e.g. emergency physicians, emergency nurses and nurse practitioners). Among the five decision rules, clinicians' awareness was highest for the Canadian C-Spine Rule (84%, n = 3 studies) and lowest for the Ottawa Knee Rules (18%, n = 2). Clinicians' use was highest for NEXUS (median percentage ranging from 7 to 77%, n = 4) followed by Canadian C-Spine Rule (56-71%, n = 7 studies) and lowest for the Ottawa Knee Rules which ranged from 18 to 58% (n = 4).

Conclusion: Our results suggest that awareness of the five imaging decision rules is low. Changing clinicians' attitudes and knowledge towards these decision rules and addressing barriers to their implementation could increase use.

The biopsychosocial model is lost in translation: from misrepresentation to an inactive modernization.

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Physiotherapy Theory and Practice May 28, 2022

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Abstract:

Introduction: There are increasing recommendations to use the biopsychosocial model (BPSM) as a guide for musculoskeletal research and practice. However, there is a wide range of interpretations and applications of the model, many of which deviate from George Engel's original BPSM. These deviations have led to confusion and suboptimal patient care. Objectives: 1) To review Engel's original work; 2) outline prominent BPSM interpretations and misapplications in research and practice; and 3) present an "enactive" modernization of the BPSM.

Methods: Critical narrative review in the context of musculoskeletal pain.

Results: The BPSM has been bio medicalized, fragmented, and used in reductionist ways. Two useful versions of the BPSM have been running mostly in parallel, rarely converging. The first version is a "humanistic" interpretation based on person- and relationship-centeredness. The second version is a "causation" interpretation focused on multifactorial contributors to illness and health. Recently, authors have argued that a modern enactive approach to the BPSM can accommodate both interpretations.

Conclusion: The BPSM is often conceptualized in narrow ways and only partially implemented in clinical care. We outline how an "enactive-BPS approach" to musculoskeletal care aligns with Engel's vision yet addresses theoretical limitations and may mitigate misapplications.

The smallest worthwhile change on function from a self-management intervention for non-persistent low back pain

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Abstract:

Purpose: To determine: (1) the smallest change in function patients would need to see following a self-management intervention for low back pain (LBP) to consider it worthwhile; (2) the association between patient-related factors and the magnitude of the smallest worthwhile change.

Methods: A cross-sectional analysis of 212 participants of the TEXT4myBACK randomized trial was conducted. At baseline, participants nominated the smallest change in function (0–30 scale) following a self-management program they would need to reach to consider it worthwhile. A multivariate regression model estimated the effects of demographic, comorbidities, lifestyle and LBP-related factors on the smallest worthwhile change estimates.

Results: On average, people with LBP need to experience an improvement of at least 9.4 points (SD: 5.7) in function to consider a self-management intervention worthwhile. Only baseline function severity was significantly associated with the smallest worthwhile estimate (-0.60 ; 95%CI $-0.76, -0.44$).

Conclusion: On average, an improvement of 9.4 points (or 31%) in function is considered by people with LBP as the smallest change that makes self-management worthwhile. Those with lower levels of function needed to experience greater improvements.

Identifying characteristics of resistance-based therapeutic exercise interventions for Achilles tendinopathy: A scoping review

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Physical Therapy in Sport July 01, 2023

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Abstract:

Objective: This scoping review describes resistance-based therapeutic exercise intervention characteristics for Achilles tendinopathy (AT) treatment (e.g., therapeutic dose, underlying mechanisms targeted by exercise) and assesses participant reporting characteristics.

Methods: Seven electronic databases were searched; studies delivering a resistance exercise-focused treatment for individuals with AT were included. The Template for Intervention Description and Replication (TIDieR) and the ICON 2019 'Recommended standards for reporting participant characteristics in tendinopathy research' checklists framed data extraction, and study quality was assessed using the Mixed Methods Appraisal Tool 2018 version.

Results: 68 publications (describing 59 studies and 72 exercise programs) were included. Results demonstrate that therapeutic exercise interventions for AT are well reported according to the TIDieR checklist, and participant characteristics are well reported according to the ICON checklist. Various underlying therapeutic mechanisms were proposed, with the most common being increasing tendon strength, increasing calf muscle strength, and enhancing collagen synthesis.

Conclusions: While evidence suggests that resistance-based therapeutic exercise interventions are effective in treating AT, more reporting on program fidelity, adherence, and compliance is needed. By summarizing currently published AT exercise programs and reporting key intervention characteristics in a single location, this review can assist clinicians in developing individualized resistance training programs for people with AT.

Are we Jumping to the Wrong Conclusions? Longer Jumps and More Hops in Female Football Players Who Went on to

Sustain a Primary or Secondary ACL Injury Compared to Those Who Did Not

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Sports Medicine November 10, 2023

<https://doi.org/10.1186/s40798-023-00656-7>

Abstract:

Background: Different functional performance tests are used to assess patients in the clinic and before return to sport (RTS), where the rehabilitation goal is to reach good strength and jumping ability. A limb symmetry index of $\geq 90\%$ is a common target in rehabilitation before RTS. The aim of this short communication is to use data from our 2-year prospective cohort study on female football players, either with or without an anterior cruciate ligament (ACL) reconstruction, to discuss whether hop performance in 3 commonly used hop tests can inform safe football participation, that is, with a low risk for ACL injury or reinjury.

Method: At baseline, 117 active female football players (mean age-standard deviation, 20 ± 2 years) were included 19 ± 9 months after ACL reconstruction as well as 119 matched female knee-healthy players (age 19 ± 3 years). All players performed a single hop for distance test, 5-jump test and side hop test at baseline and were then prospectively followed for 2 years. Twenty-eight (24%) players sustained a second ACL injury and 8 (7%) sustained a primary ACL injury.

Results: Longer jumps in the 5-jump test (922 cm vs. 865 cm, Cohen's $d = -0.60$) and more hops in the side hop test for both limbs (41–42 hops vs. 33–36 hops, $d = -0.43$ to -0.60) were seen in players who sustained a second ACL injury compared with those who did not. Longer jumps in the single hop for distance test (both limbs) (139–140 cm vs. 124–125 cm, $d = -0.38$ to -0.44), in the 5-jump test (975 cm vs. 903 cm, $d = -0.42$) and more hops in the side hop test (both limbs) (48–49 hops vs. 37–38 hops, $d = -0.38$ to -0.47) were seen in players who sustained a primary ACL injury compared with those who did not.

Conclusions: The average hop performance, i.e., longer jumps or more hops, was greater in players who went on to sustain a primary or secondary ACL injury compared to those who did not over a two-year follow-up period. Even though hop tests are not used in isolation to evaluate readiness to RTS, their interpretation needs consideration in the decision-making process of returning to pivoting sports.

Effects of blood-flow restricted exercise versus conventional resistance training in musculoskeletal disorders—a systematic review and meta-analysis

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BMC Sports Science, Medicine and Rehabilitation October 25, 2023

Abstract:

Objective: To compare the effect of low-load blood flow restricted resistance training (BFR-RT) versus high-load resistance training (HL-RT) on muscle strength, muscle mass, physical function, patient-reported outcomes, and adherence to training in clinical musculoskeletal populations.

Data sources: Web of Science, Cochrane Central, Medline, Embase, SportDiscus was searched on the 30th of May 2022.

Review methods: This study was conducted as a systematic review and meta-analysis. Randomized Controlled Trials (RCTs) were included if they (i) included patients, (ii) comprised of a BFR-RT intervention protocol and a group who performed HL-RT ($\geq 70\%1RM$) for at least eight exercise sessions, and (iii) involved at least 1 exercise that targeted the lower limbs. The Cochrane Risk of Bias tool was used to evaluate the risk of bias. The meta-analyses were performed using a random effects model with an adjustment to the confidence interval.

Results: Seven RCTs comprising 303 participants (BFR-RT: $n = 151$; HL-RT: $n = 152$) were identified. HL-RT and BFR-RT showed similar gains in dynamic (1-10RM) knee extensor strength and leg press strength, quadriceps cross sectional area, sit-to-stand performance, and patient reported pain and function. There was a moderate effect favoring BFR-RT for increasing maximal isometric knee extensor strength. The grading of certainty in evidence was low-to-very low for all outcome variables.

Conclusion: This systematic review and meta-analysis extend our current knowledge about BFR-RT and HL-RT as equally effective exercise methods for inducing gains in maximal muscle strength in healthy populations, by now also comprising patients suffering from various clinical musculoskeletal conditions. The certainty in the estimates was low-to-very low, prompting the inclusion of future higher-quality trials.

Risk assessment of vascular complications following manual therapy and exercise for the cervical region: diagnostic accuracy of the International Federation of Orthopedic Manipulative Physical Therapists framework (The Go4Safe project)

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Maarten Uyttenboogaart, Joost C. Bot, Rene Castien, Jan J.M Pool, Barbara Cagnie, Gwendolyn G.M Scholten-Peeters
Journal of Physiotherapy October 04, 2023
<https://doi.org/10.1016/j.jphys.2023.08.008>

Abstract:

Question: What is the diagnostic accuracy of the International Federation of Orthopedic Manipulative Physical Therapists (IFOMPT) framework to assess the risk of vascular complications in patients seeking physiotherapy care for neck pain and/or headache?

Design: Cross-sectional diagnostic accuracy study.

Participants: One hundred and fifty patients seeking physiotherapy for neck pain and/or headache in primary care.

Methods: Nineteen physiotherapists performed the index test according to the IFOMPT framework. Patients were classified as having a high, intermediate or low risk of vascular complications, following manual therapy and/or exercise, derived from the estimated risk of the presence of vascular pathology. The reference test was a consensus medical decision reached by a vascular neurologist and an interventional neurologist, with input from a neuroradiologist. The neurologists had access to clinical data and magnetic resonance imaging of the cervical spine, including an angiogram of the cervical arteries.

Outcome measures: Diagnostic accuracy measures were calculated for 'no contraindication' (i.e., the low-risk category) and 'contraindication' (i.e., the high-risk and intermediate-risk categories) for manual therapy and/or exercise. Sensitivity, specificity, predictive values, likelihood ratios and the area under the curve were calculated.

Results: Manual therapy and/or exercise were contraindicated in 54.7% of the patients. The sensitivity of the IFOMPT framework was low (0.50, 95% CI 0.39 to 0.61) and its specificity was moderate (0.63, 95% CI 0.51 to 0.75). The positive and negative likelihood ratios were weak at 1.36 (95% CI 0.93 to 1.99) and 0.79 (95% CI 0.60 to 1.05), respectively. The area under the curve was poor (0.57, 95% CI 0.49 to 0.65).

Conclusion: The IFOMPT framework has poor diagnostic accuracy when compared with a reference standard consisting of a consensus medical decision.

What matters to people with chronic musculoskeletal pain consulting general practice? Comparing research priorities across different sectors

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Scandinavian Journal of Pain September 12, 2023
<https://doi.org/10.1515/sjpain-2023-0046>

Abstract:

Objectives: Chronic musculoskeletal pain (CMP) is a common condition, often consulted in general practice. Our previous study identified research priorities among people with CMP using a broad recruitment strategy. It is unclear whether these research priorities reflect specific settings, including the population in general practice. Potential dissimilarities may have important implications for future research. Therefore, the study aims to explore potential differences between the previously established research priorities compared to priorities of people with CMP consulting general practice.

Methods: Eighty-eight people living with CMP (51 females/ 37 males) from four regions of Denmark were recruited when they consulted their general practitioner. Participants were presented to an online survey and asked to prioritize predefined research themes (n=14) and research questions (n=38). The prioritization was summarized into a Top-10 research priorities and compared the Top-10 from our previous study.

Results: Treatment (n=57), diagnosis (n=46), cross-sectoral management (n=39) and influence on daily life (n=39) were the most selected research themes. The most prioritized research questions regarded the effectiveness of treatments and cross-sectoral management, improving diagnostic approaches and how pain affects the individuals' mental state. Four out of ten research questions aligned with our previous Top-10.

Conclusions: Our study identified several differences in research priorities between people living with CMP from the general population and from general practice. These findings highlight the needs for investigating how different settings influence research prioritization. This adds important knowledge for researchers and policymakers focusing on future research within the management of CMP.

Systematic Review to Inform a World Health Organization (WHO) Clinical Practice Guideline: Benefits and Harms of Structured Exercise Programs for Chronic Primary Low Back Pain in Adults

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<https://doi.org/10.1007/s10926-023-10124-4>

Abstract:

Purpose: Evaluate benefits and harms of structured exercise programs for chronic primary low back pain (CPLBP) in adults to inform a World Health Organization (WHO) standard clinical guideline.

Methods: We searched for randomized controlled trials (RCTs) in electronic databases (inception to 17 May 2022). Eligible RCTs targeted structured exercise programs compared to placebo/sham, usual care, or no intervention (including comparison interventions where the attributable effect of exercise could be isolated). We extracted outcomes, appraised risk of bias, conducted meta-analyses where appropriate, and assessed certainty of evidence using GRADE.

Results: We screened 2503 records (after initial screening through Cochrane RCT Classifier and Cochrane Crowd) and 398 full text RCTs. Thirteen RCTs rated with overall low or unclear risk of bias were synthesized. Assessing individual exercise types (predominantly very low certainty evidence), pain reduction was associated with aerobic exercise and Pilates vs. no intervention, and motor control exercise vs. sham. Improved function was associated with mixed exercise vs. usual care, and Pilates vs. no intervention. Temporary increased minor pain was associated with mixed exercise vs. no intervention, and yoga vs. usual care. Little to no difference was found for other comparisons and outcomes. When pooling exercise types, exercise vs. no intervention probably reduces pain in adults (8 RCTs, SMD=− 0.33, 95% CI − 0.58 to − 0.08) and functional limitations in adults and older adults (8 RCTs, SMD=− 0.31, 95% CI − 0.57 to − 0.05) (moderate certainty evidence).

Conclusions: With moderate certainty, structured exercise programs probably reduce pain and functional limitations in adults and older people with CPLBP.

The value of Clinical signs in the diagnosis of Degenerative Cervical Myelopathy - A Systematic review and Meta-analysis

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Global Spine Journal October 30, 2023

<https://doi.org/10.1177/21925682231209869>

Abstract:

Study Design: Delayed diagnosis of degenerative cervical myelopathy (DCM) is likely due to a combination of its subtle symptoms, incomplete neurological

assessments by clinicians and a lack of public and professional awareness. Diagnostic criteria for DCM will likely facilitate earlier referral for definitive management.

Objectives: This systematic review aims to determine (i) the diagnostic accuracy of various clinical signs and (ii) the association between clinical signs and disease severity in DCM?

Methods: A search was performed to identify studies on adult patients that evaluated the diagnostic accuracy of a clinical sign used for diagnosing DCM. Studies were also included if they assessed the association between the presence of a clinical sign and disease severity. The QUADAS-2 tool was used to evaluate the risk of bias of individual studies.

Results: This review identified eleven studies that used a control group to evaluate the diagnostic accuracy of various signs. An additional 61 articles reported on the frequency of clinical signs in a cohort of DCM patients. The most sensitive clinical tests for diagnosing DCM were the Tromner and hyperreflexia, whereas the most specific tests were the Babinski, Tromner, clonus and inverted supinator sign. Five studies evaluated the association between the presence of various clinical signs and disease severity. There was no definite association between Hoffmann sign, Babinski sign or hyperreflexia and disease severity.

Conclusion: The presence of clinical signs suggesting spinal cord compression should encourage health care professionals to pursue further investigation, such as neuroimaging to either confirm or refute a diagnosis of DCM.

Terminating Corticosteroid Injection in Tendinopathy? Hasta la Vista, Baby

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The Journal of Orthopedic and Sports Physical Therapy July 28, 2023

<https://www.jospt.org/doi/10.2519/jospt.2023.11875>

Abstract:

Synopsis: Two recent randomized-controlled trials showed promising results of local corticosteroid injections combined with exercise therapy for Achilles tendinopathy and plantar fasciopathy. Should clinicians go back to using corticosteroid injections to treat tendinopathy? Are corticosteroids back (baby)? In this viewpoint we critically appraise the new evidence and humbly share our clinical reasoning when advising athletes about corticosteroid injections in practice. Our goal is to help clinicians

decide what to do and what to recommend to patients. We prioritize the risk for higher recurrence rates and tendon rupture when weighing the reasonable treatment options for tendinopathy and recommend against using corticosteroid injections. The best systematic review evidence shows that local corticosteroid injections are not effective for tendinopathies after the first few weeks, and produce worse long-term outcomes compared to other treatments. For now, we consider corticosteroid injections remain terminated.

The effectiveness of the Wim Hof method on cardiac autonomic function, blood pressure, arterial compliance, and different psychological parameters

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Scientific Reports October 16, 2023

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Abstract:

The Wim Hof method (WHM) is a multi-disciplinary approach to physical and mental well-being combining cold exposure, breathing exercises, and meditation. This study evaluated the effects of a 15 days WHM intervention on cardiovascular parameters at rest and during a cold pressor test (CPT), as well as on various psychological parameters. Forty-two participants were randomized into an intervention (IG) and a control group. Throughout the 15 days intervention, the IG performed the WHM daily. Before and after the intervention, systolic (SBP) and diastolic blood pressure (DBP), pulse wave velocity (PWV), heart rate (HR), root mean sum of squared distance (RMSSD), and standard deviation of RR-intervals (SDNN) were assessed at rest and during a CPT. Furthermore, perceived stress (PSS), positive affect (PANAS+), negative affect (PANAS-), and subjective vitality (trait (SVSt) and state (SVSs)) was determined. No significant time \times group interactions could be detected in HR ($p = 0.709$); RMSSD ($p = 0.820$), SDNN ($p = 0.186$), SBP ($p = 0.839$), DBP ($p = 0.318$), PWV ($p = 0.983$), PANAS+ ($p = 0.427$), PANAS- ($p = 0.614$), SVSt ($p = 0.760$), SVSs ($p = 0.366$), and PSS ($p = 0.364$). No significant time \times group effects could be detected during the CPT (Δ HR: $p = 0.596$; Δ SBP: $p = 0.366$; Δ DBP: $p = 0.999$; Δ PWV: $p = 0.635$; perceived pain: $p = 0.231$). Performing the WHM daily did not exert positive effects on cardiovascular and psychological parameters.

The effectiveness of neuromobilization exercises in carpal tunnel syndrome: Systematic review and meta-analysis

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Physiotherapy Theory and Practice April 28, 2022

<https://doi.org/10.1080/09593985.2022.2068097>

Abstract:

Purpose: To examine the effectiveness of Neuromobilization Exercises (NE) on pain, grip and pinch strength, two-point discrimination, motor and sensory distal latency, symptom severity, and functional status using the Boston Carpal Tunnel Questionnaire (BCTQ) in Carpal Tunnel Syndrome (CTS).

Methods: Major electronic databases were searched from inception up to September 2021 for randomized trials comparing the effects of NE with or without other interventions against no treatment, surgery, or other interventions in patients with CTS. Standardized Mean Differences (SMD) and 95% confidence interval (CI) were calculated using a random-effects inverse variance model according to the outcome of interest and comparison group. Methodological quality was assessed with PEDro and quality of evidence with the GRADE approach.

Results: Twenty-five articles were included and sixteen of them demonstrated high methodological quality. NE was superior to no treatment on pain (very low-quality evidence; SMD = -2.36, 95% CI -4.31 to -0.41). NE was superior to no treatment on the functional scale of the BCTQ (low-quality evidence; SMD = -1.27 95% CI -1.60 to -0.94). Most importantly, NE did not demonstrate evidence of clinical effectiveness.

Conclusion: Low to very low-quality evidence suggests that there are no clinical benefits of NE in patients with mild to moderate CTS.

Early Exercise is Associated with Faster Concussion Recovery Among Collegiate Athletes: Findings from the NCAA-DoD CARE Consortium

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Sports Medicine May 20, 2023

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Abstracts:

Background: Growing evidence indicates early exercise may improve symptoms and reduce clinical recovery time after concussion, but research examining collegiate student-athletes is scarce.

Objective: The aim of this study was to compare symptom recovery time, clinical recovery time, and persisting post-concussion symptom (i.e., symptoms \geq 28 days)

prevalence by the timing of light exercise initiation before the graded return to play (RTP) protocol among concussed participants.

Methods: Collegiate student-athletes ($n = 1228$; age 18.4 ± 0.9 years; 56.5% male, 76.3% division I; 33.7% ≥ 1 prior concussion) across 30 institutions enrolled in the CARE Consortium completed post-concussion assessments and were monitored over time. Symptom recovery (days from injury to symptom resolution) and clinical recovery (days from injury to return to play protocol completion) was determined by the student-athletes' clinicians. Student-athletes were categorized by timing of light exercise initiation. Early (< 2 days post-concussion; $n = 161$), typical (3–7 days post-concussion; $n = 281$), and late exercise (≥ 8 days post-concussion; $n = 169$) groups were compared with the no-exercise group ($n = 617$; i.e., did not exercise prior to beginning the RTP protocol) for all analyses. Multivariable Cox regression models with hazard ratios (HR) and survival curves and a multivariable binomial regression model with prevalence ratios (PR) compared recovery outcomes between exercise groups while accounting for covariates.

Results: Compared to the no-exercise group, the early exercise group was 92% more probable to experience symptom recovery (HR 1.92; 95% CI 1.57–2.36), 88% more probable to reach clinical recovery (HR 1.88; 95% CI 1.55–2.28) and took a median of 2.4 and 3.2 days less to recover, respectively. The late exercise group relative to the no-exercise group was 57% less probable to reach symptom recovery (HR 0.43; 95% CI 0.35–0.53), 46% less probable to achieve clinical recovery (HR 0.54; 95% CI 0.45–0.66) and took 5.3 days and 5.7 days more to recover, respectively. The typical exercise group did not differ in hazard for symptom or clinical recovery ($p \geq 0.329$) compared with the no-exercise group. The prevalence of persisting post-concussion symptoms in the combined sample was 6.6%. Early exercise had 4% lower prevalence (PR 0.96, 95% CI 0.94–0.99) and typical exercise had 3% lower prevalence (PR 0.97, 95% CI 0.94–0.99) of persisting post-concussion symptoms, while the late exercise group had an elevated prevalence (PR 1.11, 95% CI 1.04–1.18) compared with the no-exercise group.

Conclusion: Exercise < 2 days post-concussion was associated with more probable and faster symptom and clinical recovery, and lower persisting post-concussion symptom prevalence. When considering our findings and existing literature, qualified clinicians may implement early exercise into their clinical practice to provide therapeutic treatment and improve student-athlete recovery.

Exercise therapy for tendinopathy: a mixed-methods evidence synthesis exploring feasibility, acceptability and effectiveness

Kay Cooper, Lyndsay Alexander, David Brandie, Victoria Tzortziou Brown, Leon Greig, Isabelle Harrison, Colin MacLean, Laura Mitchell, Dylan Morrissey, Rachel Ann Moss, Eva Parkinson, Anastasia Vladimirovna Pavlova, Joanna Shim, and Paul Alan Swinton

Health Technology Assessment October 2023

<https://doi.org/10.3310/TFWS2748>

Abstract:

Background: Tendinopathy is a common, painful and functionally limiting condition, primarily managed conservatively using exercise therapy.

Review questions: (i) What exercise interventions have been reported in the literature for which tendinopathies? (ii) What outcomes have been reported in studies

investigating exercise interventions for tendinopathy? (iii) Which exercise interventions are most effective across all tendinopathies? (iv) Does type/location of tendinopathy or other specific covariates affect which are the most effective exercise therapies? (v) How feasible and acceptable are exercise interventions for tendinopathies?

Methods: A scoping review mapped exercise interventions for tendinopathies and outcomes reported to date (questions i and ii). Thereafter, two contingent systematic review workstreams were conducted. The first investigated a large number of studies and was split into three efficacy reviews that quantified and compared efficacy across different interventions (question iii), and investigated the influence of a range of potential moderators (question iv). The second was a convergent segregated mixed-method review (question v). Searches for studies published from 1998 were conducted in library databases (n = 9), trial registries (n = 6), grey literature databases (n = 5) and Google Scholar. Scoping review searches were completed on 28 April 2020 with efficacy and mixed-method search updates conducted on 19 January 2021 and 29 March 2021.

Results: Scoping review – 555 included studies identified a range of exercise interventions and outcomes across a range of tendinopathies, most commonly Achilles, patellar, lateral elbow and rotator cuff-related shoulder pain. Strengthening exercise was most common, with flexibility exercise used primarily in the upper limb. Disability was the most common outcome measured in Achilles, patellar and rotator cuff-related shoulder pain; physical function capacity was most common in lateral elbow tendinopathy.

Efficacy reviews: 204 studies provided evidence that exercise therapy is safe and beneficial, and that patients are generally satisfied with treatment outcome and perceive the improvement to be substantial. In the context of generally low and very low-quality evidence, results identified that: (1) the shoulder may benefit more from flexibility (effect size Resistance: Flexibility = 0.18 [95% CrI 0.07 to 0.29]) and proprioception (effect size Resistance: Proprioception = 0.16 [95% CrI -1.8 to 0.32]); (2) when performing strengthening exercise it may be most beneficial to combine concentric and eccentric modes (effect size Eccentric Only: Concentric Eccentric = 0.48 [95% CrI -0.13 to 1.1]; and (3) exercise may be most beneficial when combined with another conservative modality (e.g. injection or electro-therapy increasing effect size by ≈ 0.1 to 0.3).

Mixed-method review: 94 studies (11 qualitative) provided evidence that exercise interventions for tendinopathy can largely be considered feasible and acceptable, and that several important factors should be considered when prescribing exercise for tendinopathy, including an awareness of potential barriers to and facilitators of engaging with exercise, patients' and providers' prior experience and beliefs, and the importance of patient education, self-management and the patient-healthcare professional relationship.

Limitations: Despite a large body of literature on exercise for tendinopathy, there are methodological and reporting limitations that influenced the recommendations that could be made.

Conclusion: The findings provide some support for the use of exercise combined with another conservative modality; flexibility and proprioception exercise for the shoulder; and a combination of eccentric and concentric strengthening exercise across tendinopathies. However, the findings must be interpreted within the context of the quality of the available evidence.

Future work: There is an urgent need for high-quality efficacy, effectiveness, cost-effectiveness and qualitative research that is adequately reported, using common terminology, definitions and outcomes.

Qualitative Examination of the Experience of Perceived Injustice Following Disabling Occupational Injury

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Journal of Occupational Rehabilitation October 26, 2023

<https://doi.org/10.1007/s10926-023-10154-y>

Abstract:

Purpose: The primary objective of this study was to explore individuals' perspectives on the factors, situations or events that contributed to their perceptions of injustice following occupational injury.

Materials and Methods: The study sample consisted of 30 participants (18 women, 12 men) who had submitted a time-loss claim for a work-related musculoskeletal injury. Participants with elevated scores on a measure of perceived injustice were interviewed about the factors that contributed to their sense of injustice. A thematic analysis was conducted to identify the broad classes of situations or events that participants experienced as unjust in the weeks following occupational injury.

Results: Three dominant themes emerged from the interviews: (1) Invalidation, (2) Undeserved suffering and (3) Blame. Inductively derived subthemes reflected specific dimensions of post-injury experiences that contributed to participants' sense of injustice.

Conclusions: Given that suffering and invalidating communication are potentially modifiable factors, there are grounds for optimism that intervention approaches can be developed to prevent or reduce perceptions of injustice in the aftermath of debilitating injury. The development of intervention approaches that are effective in preventing or reducing perceptions of injustice holds promise of contributing to more positive recovery outcomes in individuals who have sustained debilitating work injuries.

First Provider Seen for an Acute Episode of Low Back Pain Influences Subsequent Health Care Utilization

Christopher G. Bise, PT, DPT, PhD, Michael Schneider, DC, PhD, Janet Freburger, PT, PhD, G. Kelley Fitzgerald, PT, PhD, Galen Switzer, PhD, Garry Smyda, BS, Pamela Peele, PhD, Anthony Delitto, PT, PhD

Physical Therapy & Rehabilitation Journal June 28, 2023

<https://doi.org/10.1093/ptj/pzad067>

Abstract:

Objective: Costs associated with low back pain (LBP) continue to rise. Despite numerous clinical practice guidelines, the evaluation and treatments for LBP are variable and largely depend on the individual provider. As yet, little attention has been given to the first choice of provider. Early research indicates that the choice of first provider and the timing of interventions for LBP appear to influence utilization. We sought to examine the association between the first provider seen and health care utilization.

Methods: Using 2015–2018 data from a large insurer, this retrospective analysis focused on patients (29,806) seeking care for a new episode of LBP. The study identified the first provider chosen and examined the following year of medical utilization. Cox proportional hazards models were calculated using inverse probability weighting on propensity scores to evaluate the time to event and the relationship to the first choice of provider.

Results: The primary outcome was the timing and use of health care resources. Total health care use was lowest in those who first sought care with chiropractic care or physical therapy. Highest health care use was seen in those patients who chose the emergency department.

Conclusion: Overall, there appears to be an association between the first choice of provider and future health care use. Chiropractic care and physical therapy provide nonpharmacologic and nonsurgical, guideline-based interventions. The use of physical therapists and chiropractors as entry points into the health system appears related to a decrease in immediate and long-term use of health resources. This study expands the existing body of literature and provides a compelling case for the influence of the first provider on an acute episode of LBP.

Impact: The first provider seen for an acute episode of LBP influences immediate treatment decisions, the trajectory of a specific patient episode, and future health care choices in the management of LBP.

External weight mass and carrying position influence peak patellar tendon force and patellofemoral joint contact force independently during forward lunge.

Michiel Hagen, Sam Van Rossom, Danilo S. Catelli, Sabine Verschueren, Jos Vanrenterghem

Clinical Biomechanics October 15, 2023

<https://doi.org/10.1016/j.clinbiomech.2023.106127>

Abstract:

Background: The forward lunge is a common exercise in the rehabilitation of patellar tendinopathy and patellofemoral pain syndrome. External weights are frequently used to increase the peak patellar tendon force and patellofemoral joint contact force during this exercise. The weight's position might influence this relationship. The objective of this study was to investigate the combined effect of an external weight's mass and carrying position on the peak patellar tendon force and patellofemoral joint contact force during a forward lunge.

Methods: Ten healthy individuals performed forward lunges holding external weights between 0.1- and 0.3-times body mass either in one hand at the ipsilateral or contralateral side of the leading leg, or in two hands at the side or in front of the trunk. Three-dimensional kinematic data and ground reaction forces were collected, and peak patellar tendon force and patellofemoral joint contact force were calculated using musculoskeletal modelling. Two-way repeated measures ANOVAs determined the main effects for the external weight's mass and position as well as their interaction effect.

Findings: Increasing the mass of the external weights increased both the peak patellar tendon force and patellofemoral joint contact force linearly and at the same rate in all positions. Both peak forces were larger in the one-hand ipsilateral and two-hand side positions.

Interpretation: An external weight's mass and position both influence the peak patellar tendon force and patellofemoral joint contact force during a forward lunge. The rate of increase in peak forces with increasing mass was similar for all weight-carrying positions.

Does the psychological profile of a patient with frozen shoulder predict future outcome? A systematic review

Fabrizio Brindisino, Silvia Minnucci, Giorgio Sergi, Mariangela Lorusso, Filip Struyf, Tiziano Innocenti

Wiley Online Library October 22, 2023

<https://doi.org/10.1002/pri.2056>

Abstract:

Background and Purpose: Frozen shoulder (FS) is defined as a condition characterized by functional restriction and daily and nightly pain. As in other shoulder pathologies, the manifestation of psychological factors is recognized in FS; however, from a psychological point of view, only few studies have reported its prognostic value. The aim of this systematic review is to investigate, in patients with FS, the prognostic value of psychological factors on pain, function, disability, health-related quality of life, return to work and time to recovery.

Materials and Methods: This systematic review was reported following the Preferred Reporting Items for Systematic reviews and Meta-Analysis—PRISMA 2020 guideline. The authors followed the Cochrane Handbook for Systematic review of Intervention as methodological guidance. The Quality in Prognostic Studies—QUIPS tool was used to assess the risk of bias.

Results: Pain-related fear and depression could be prognostic regarding patient-reported outcome measures assessing shoulder function, disability, and pain; instead, pain catastrophizing could have a prognostic value assessed by the disability of the arm shoulder and hand -DASH scale. Anxiety would appear to impact on disability and pain.

Discussion and Conclusions: As widely reported in numerous musculoskeletal conditions, also in FS psychological factors influence the physical dimension such as pain, disability and function. Therefore, clinicians should be encouraged to identify these factors through a comprehensive assessment of the bio-psychological profile of each individual with FS. Perhaps, patients with FS that show such psychological

prognostic factors could benefit from a comprehensive and shared approach with other dedicated professionals.

How do we explain painful non-traumatic knee conditions to adolescents? A multiple-method study to develop credible explanations.

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European Journal of Pain November 07, 2023

<https://doi.org/10.1002/ejp.2210>

Abstract:

Background: Perceived diagnostic uncertainty can leave adolescents confused about their condition and impede their ability to understand “what's wrong with me”. Our aim is to develop credible explanations about the condition for adolescents suffering from non-traumatic knee pain.

Methods: This multiple-method study integrated findings from two systematic literature searches of qualitative and quantitative studies, an Argumentative Delphi with international experts (n = 16) and think-aloud interviews with adolescents (n = 16). Experts provided feedback with arguments on how to communicate credible explanations to meet adolescents' needs; we analyzed feedback using thematic analysis. The explanations were tailored based on the adolescent end-users' input.

Results: We screened 3239 titles/abstracts and included 16 papers exploring diagnostic uncertainty from adolescents' and parents' perspectives. Five themes were generated: (1) understanding causes and contributors to the pain experience, (2) feeling stigmatized for having an invisible condition, (3) having a name for pain, (4) controllability of pain, and (5) worried about something being missed. The Argumentative Delphi identified the following themes: (1) multidimensional perspective, (2) tailored to adolescents, (3) validation and reassurance, and (4) careful wording. Merging findings from the systematic search and the Delphi developed three essential domains to address in credible explanations: “What is non-traumatic knee pain and what does it mean?”, “What is causing my knee pain?” and “How do I manage my knee pain?”

Conclusions: Six credible explanations for the six most common diagnoses of non-traumatic knee pain were developed. We identified three domains to consider when tailoring credible explanations to adolescents experiencing non-traumatic knee pain.

Significance: This study provides credible explanations for the six most common diagnoses of non-traumatic knee pain. Additionally, we identified three key domains that may need to be addressed to reduce diagnostic uncertainty in adolescents suffering from pain complaints. Based on our findings, we believe that clinicians will benefit from exploring adolescents' own perceptions of why they experience pain and perceived management strategies, as this information might capture important clinical information when managing these young individuals.

Clinical Study The impact of aggregate positive lifestyle behaviors on low back pain resilience and care seeking.

Katharine E. Roberts, MResa, Paula R. Beckenkamp, PhD, Manuela L. Ferreira, PhDc, Emma K. Ho, PhD, Ana P. Carvalho-e-Silva, PhD, Lucas Calais-Ferreira, PhD, Paulo H. Ferreira, PhD

The Spine Journal June 17, 2023

<https://doi.org/10.1016/j.spinee.2023.06.388>

Abstract:

Background Context: Low back pain (LBP) is a global issue, and the high associated costs are mainly attributed to a small proportion of people with LBP who seek care. Importantly, the impact of aggregate positive lifestyle behaviors on LBP resilience and care seeking is not known.

Purpose: This study aimed to evaluate the relationship between positive lifestyle behaviors and LBP resilience.

Study Design: This study was a prospective longitudinal cohort study.

Patient Sample: Data was collected as part of the Australian Twin BACK Study (AUTBACK). Participants who reported a lifetime previous history of LBP at baseline were included in this analysis (n = 340).

Outcome Measures: The outcomes of interest were the number of weeks without activity limiting LBP and total number of days of healthcare usage, health practitioner care, self-management care, and medication intake.

Methods: A lifestyle behavior score was built using variables of body mass index (BMI), physical activity, smoking status, and sleep quality. Negative binomial regression analyses were used to assess the relationship between the positive lifestyle behavior score and the count outcomes of number of weeks without activity limiting LBP and number of days participants used care.

Results: After adjusting for covariates, no association was found between participants' positive lifestyle behavior score and their number of weeks without activity limiting LBP (IRR: 1.02, 95% CI 1.00–1.05). There was a statistically significant relationship between higher positive lifestyle behavior scores and fewer number of days of participants' total healthcare usage (IRR:0.69, 95% CI 0.56–0.84), healthcare practitioner visits (IRR:0.62, 95% CI 0.45–0.84), use of self-management strategies (IRR:0.74, 95% CI 0.60–0.91), and use of pain medication (IRR:0.55, 95% CI 0.44–0.68).

Conclusion: People who adopt optimal lifestyle behaviors, such as engaging in adequate physical activity, achieving optimal quality sleep, maintaining an ideal BMI, and not smoking, may not experience less time suffering from activity limiting LBP, but are less likely to use healthcare and pain medication for their LBP.

What do people believe to be the cause of low back pain? A scoping review

Søren Grøna, Kasper Bulow, Tobias Daniel Jonsson, Jakob Degn, Alice Kongsted, Brazilian Journal of Physical Therapy October 25, 2023

<https://doi.org/10.1016/j.bjpt.2023.100562>

Abstract:

Objective: To explore how causal beliefs regarding non-specific low back pain (LBP) have been quantitatively investigated.

Methods: A scoping review based on the guidelines by the JBI (former Joanna Briggs Institute) was conducted. We searched Medline, Embase, PsycINFO, and CINAHL for relevant studies and included peer-reviewed original articles that measured causal beliefs about non-specific LBP among adults and reported results separate from other belief domains.

Results: A total of 81 studies were included, of which 62 (77 %) had cross sectional designs, 11 (14 %) were cohort studies, 3 (4 %) randomized controlled trials, 4 (5 %) non-randomized controlled trials, and 1 (1 %) case control. Only 15 studies explicitly mentioned cause, triggers, or etiology in the study aim. We identified the use of 6 questionnaires from which a measure of causal beliefs could be obtained. The most frequently used questionnaire was the Illness Perception Questionnaire which was used in 8 of the included studies. The studies covered 308 unique causal belief items which we categorized into 15 categories, the most frequently investigated being causal beliefs related to “structural injury or impairment”, which was investigated in 45 (56 %) of the studies. The second and third most prevalent categories were related to “lifting and bending” (26 studies [32 %]) and “mental or psychological” (24 studies [30 %]).

Conclusion: There is a large variation in how causal beliefs are measured and a lack of studies designed to investigate causal beliefs, and of studies determining a longitudinal association between such beliefs and patient outcomes. This scoping review identified an evidence gap and can inspire future research in this field.

The mechanical loading of the spine in physical activities

Robin Schäfer, Katharina Trompeter, Daniela Fett, Kai Heinrich, Johannes Funken, Stefan Willwacher, Gert-Peter Brüggemann, Petra Platen

European Spine Journal May 11, 2023

<https://doi.org/10.1007/s00586-023-07733-1>

Abstract:

Purpose: To summarize the mechanical loading of the spine in different activities of daily living and sports.

Methods: Since the direct measurement is not feasible in sports activities, a mathematical model was applied to quantify spinal loading of more than 600 physical tasks in more than 200 athletes from several sports disciplines. The outcome is compression and torque (normalized to body weight/mass) at L4/L5.

Results: The data demonstrate high compressive forces on the lumbar spine in sport-related activities, which are much higher than forces reported in normal daily activities and work tasks. Especially ballistic jumping and landing skills yield high

estimated compression at L4/L5 of more than ten times body weight. Jumping, landing, heavy lifting and weight training in sports demonstrate compression forces significantly higher than guideline recommendations for working tasks.

Conclusion: These results may help to identify acute and long-term risks of low back pain and, thus, may guide the development of preventive interventions for low back pain or injury in athletes.

Lumbosacral radicular pain

Peene Laurens MD, FIPP; Steven P. Cohen MD, FIPPM, Jan Willem Kallewaard MD, PhD, FIPP, Andre Wolff MD, PhD, Frank Huygen MD, PhD, FIPP. Antal van de Gaag MD, Monique Steegers MD, PhD, FIPP, et.al.

Wiley Online Library November 20, 2023

<https://doi.org/10.1111/papr.13317>

Abstracts:

Introduction: Patients suffering lumbosacral radicular pain report radiating pain in one or more lumbar or sacral dermatomes. In the general population, low back pain with leg pain extending below the knee has an annual prevalence that varies from 9.9% to 25%.

Methods: The literature on the diagnosis and treatment of lumbosacral radicular pain was reviewed and summarized.

Results: Although a patient's history, the pain distribution pattern, and clinical examination may yield a presumptive diagnosis of lumbosacral radicular pain, additional clinical tests may be required. Medical imaging studies can demonstrate or exclude specific underlying pathologies and identify nerve root irritation, while selective diagnostic nerve root blocks can be used to confirm the affected level(s). In subacute lumbosacral radicular pain, transforaminal corticosteroid administration provides short-term pain relief and improves mobility. In chronic lumbosacral radicular pain, pulsed radiofrequency (PRF) treatment adjacent to the spinal ganglion (DRG) can provide pain relief for a longer period in well-selected patients. In cases of refractory pain, epidural adhesiolysis and spinal cord stimulation can be considered in experienced centers.

Conclusions: The diagnosis of lumbosacral radicular pain is based on a combination of history, clinical examination, and additional investigations. Epidural steroids can be considered for subacute lumbosacral radicular pain. In chronic lumbosacral radicular pain, PRF adjacent to the DRG is recommended. SCS and epidural adhesiolysis can be considered for cases of refractory pain in specialized centers.

Two-year MRI-defined structural damage and patient-reported outcomes following surgery or exercise for meniscal tears in young adults.

Stine Haugaard Clausen, Søren T Skou, Mikael Ploug Boesen, Dimitar Ivanov Radev, Engin Yeter Kurt, Camma Damsted, Per Hölmich, et.al

British Journal of Sports Medicine October 5, 2023

<http://dx.doi.org/10.1136/bjsports-2023-107352>

Abstracts:

Objective: To investigate potential differences in structural knee joint damage assessed by MRI and patient-reported outcomes (PROMs) at 2-year follow-up between young adults randomized to early surgery or exercise and education with optional delayed surgery for a meniscal tear.

Methods: A secondary analysis of a multicenter randomized controlled trial including 121 patients (18–40 years) with an MRI-verified meniscal tear. For this study, only patients with 2-year follow-up were included. The main outcomes were the difference in worsening of structural knee damage, assessed by MRI using the Anterior Cruciate Ligament Osteoarthritis Score, and the difference in change in the mean score of four Knee Injury and Osteoarthritis Outcome Score (KOOS4) subscales covering pain, symptoms, function in sport and recreation, and quality of life, from baseline to 2 years.

Results: In total, 82/121 (68%) patients completed the 2-year follow-up (39 from the surgical group and 43 from the exercise group). MRI-defined cartilage damage had developed or progressed in seven (9.1%) patients and osteophytes developed in two (2.6%) patients. The worsening of structural damage from baseline to 2-year follow-up was similar between groups. The mean (95%CI) adjusted differences in change in KOOS4 between intervention groups from baseline to 2 years was -1.4 ($-9.1, 6.2$) points. The mean improvement in KOOS4 was 16.4 ($10.4, 22.4$) in the surgical group and 21.5 ($15.0, 28.0$) in the exercise group. No between group differences in improvement were found in the KOOS subscales.

Conclusions: The 2-year worsening of MRI-defined structural damage was limited and similar in young adult patients with a meniscal tear treated with surgery or exercise with optional delayed surgery. Both groups had similar clinically relevant improvements in KOOS4, suggesting the choice of treatment strategy does not impact 2-year structural knee damage or PROMs.

Concerns on the Science and Practice of a Movement System

Christopher T Joyce, PT, DPT, PhD, Jason M Beneciuk, PT, DPT, PhD, MPH, Steven Z George, PT, PhD, FAPTA

Physical Therapy & Rehabilitation Journal September 08, 2023

<https://doi.org/10.1093/ptj/pzad087>

Abstract:

Introduction: Theoretically, the movement system is the integration of body systems that generates and maintains all movements contributing to individual function. Movement diagnoses are diagnostic labels ascribed to movements that are hypothesized to be aberrant. In the context of the International Classification of Functioning, Disability and Health framework, a movement diagnosis may be most appropriately positioned as a “body systems impairment.” Recently, movement diagnoses have been put forth as fundamental to the movement system that is being advocated as a model for physical therapy management. However, we caution against expeditious advancement of practice approaches that have yet to be empirically substantiated. In this Point of View, we look at the science behind a

movement system diagnosis. We highlight scientific challenges facing the adoption of the proposed movement system as a cornerstone of clinical practice as it relates to the International Classification of Functioning, Disability and Health model.

Injury mechanisms and situational patterns of severe lower limb muscle injuries in male professional football (soccer) players: a systematic video analysis study on 103 cases

Francesco Della Villa, Bruno Massa, Antonio Bortolami, Gianni Nanni, Jesus Olmo, Matthew Buckthorpe

British Journal of Sports Medicine October 12, 2023

<http://dx.doi.org/10.1136/bjsports-2023-106850>

Abstract:

Objective: The objective of this study is to describe the mechanism of injury and situational patterns (based on ball possession and playing action leading to injury) of severe (lay-off time >28 days) lower limb muscle injuries in professional male football (soccer) players during match play.

Methods: Players experiencing a severe muscle injury of the lower limb during Italian first (Serie A) division male football matches over three consecutive seasons (2018–2021) were identified. Video footage was obtained and three raters independently categorized injury mechanism and situational patterns using a standardized checklist. Injury epidemiology (month), timing of injuries within the match and location of injuries on the pitch were also examined.

Results: We identified 121 lower limb severe muscle injuries. Videos of sufficient quality were available for 103 (85%) cases, including 61 (60%) hamstring, 17 (16%) calf, 16 (15%) adductor and 9 (9%) quadricep muscle injuries. Nearly two-thirds of injuries involved the dominant/kicking leg (n=65, 63%). Eighty-five (83%) injuries were non-contact and 18 (17%) indirect contact. Four main situational patterns were identified and accounted for 88% of injuries: (1) running/acceleration (n=35, 34%); (2) closed kinetic chain stretching (n=21, 20%); (3) open kinetic chain stretching (n=19, 18%) and (4) kicking (n=16, 16%), with differences between muscle groups. 71% of injuries occurred in the first half of the match ($p<0.01$), with a gradual increase through the first half.

Conclusion: Most severe muscle injuries during football matches were non-contact and occurred in the first half during running/acceleration, open and closed kinetic chain stretching, or kicking.

We Are All in This Together Whole of Community Pain Science Education Campaigns to Promote Better Management of Persistent Pain

Cormac G. Ryan, Emma L. Karran, Sarah B. Wallwork, Francis Fatoye, Deepak Ravindran, G. Lorimer Moseley

The Journal of Pain October 31, 2023

<https://doi.org/10.1016/j.jpain.2023.10.024>

Abstract:

Persistent pain is a major public health issue estimated to affect a quarter of the world's population. Public understanding of persistent pain is based on outdated biomedical models, laden with misconceptions that are contrary to best evidence. This understanding is a barrier to effective pain management. Thus, there have been calls for public health-based interventions to address these misconceptions. Previous pain-focused public education campaigns have targeted pain beliefs and behaviours that are thought to promote recovery, such as staying active. However, prevailing pain-related misconceptions render many of these approaches counter-intuitive, at best. Pain Science Education improves understanding of 'how pain works' and has been demonstrated to improve pain and disability outcomes. Extending Pain Science Education beyond the clinic to the wider community seems warranted. Learning from previous back pain-focused and other public health educational campaigns could optimize the potential benefit of such a Pain Science Education campaign. Pain Science Education-grounded campaigns have been delivered in Australia and the UK and show promise, but robust evaluations are needed before any firm conclusions on their population impact can be made. Several challenges exist going forward. Not least is the need to ensure all stakeholders are involved in the development and implementation of Pain Science Education public messaging campaigns. Furthermore, it is crucial that campaigns are undertaken through a health equity lens, incorporating underrepresented communities to ensure that any intervention does not widen existing health inequalities associated with persistent pain.

Are Muscles in Musculoskeletal Pain Syndromes Objectively Stiffer Than Normal? – An Evidence Map

Andreas Haueise, Guillaume Le Sant, Angelika Eisele-Metzger, Angela V. Dieterich

Are Muscles In Musculoskeletal Pain Syndromes Objectively Stiffer Than Normal? – An Evidence Map

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1 Background

Patients with musculoskeletal pain often report 'stiff' muscles. But are muscles in musculoskeletal pain syndromes objectively stiffer than those in asymptomatic individuals? Muscle stiffness can be objectively measured using ultrasound shear wave elastography (SWE). Publications on SWE-based comparisons of muscle stiffness between individuals with and without musculoskeletal pain are increasing rapidly.

2 Aims

Our aim was (1) to review and map the evidence regarding objectively measured muscle stiffness in musculoskeletal pain conditions; and (2) to survey and critically appraise current methods of applying SWE to measure muscle stiffness.

3 Methods

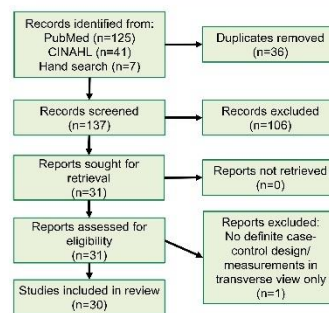


Fig. 1: PRISMA flow chart

Inclusion criteria: Studies assessing muscle stiffness using SWE in symptomatic and asymptomatic individuals, regardless of design.

Studies were **critically appraised** with the AXIS tool, supplemented by items related to SWE methods

4 Results

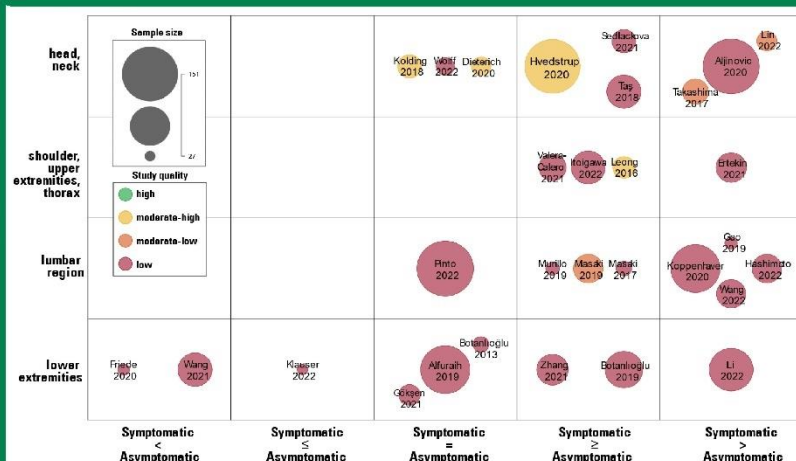


Fig. 2: Evidence map of the included studies sorted by the examined body region and by five result categories. The signs <, =, > refer to the stiffness of the measured muscles in the symptomatic/ asymptomatic group. The size of the bubbles indicates the sample size; the colour indicates the study quality.

- Of 137 articles identified, 30 articles were included (Fig. 1).
- High-quality evidence was missing (Fig. 2).
- Results comprise studies reporting lower stiffness in symptomatic participants, no differences between groups, and higher stiffness in symptomatic individuals (Fig. 2).
- Studies of moderate-high quality suggest in part equal and in part higher stiffness of involved muscles in symptomatic individuals (Fig. 2).
- The methods and reporting of the use of SWE were inconsistent and often incomplete.

5 Conclusions

Evidence regarding the objective stiffness of muscles involved in musculoskeletal pain conditions is conflicting. The results of the four studies of moderate-high quality suggest that only few muscles stiffen with musculoskeletal pain. Methodological differences between studies and small sample sizes may explain many of the inconsistencies between findings. Methodological standards for SWE measurements on muscles are urgently required.



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| This work was funded by the Baden-Württemberg Ministry of Science, Research and Arts (Germany) |

Running footwear matters: decoding the influence of running shoe characteristics on physiology, biomechanics and running performance (PhD Academy Award)

Víctor Rodrigo Carranza

Abstract:

What did I do?

The objectives of my PhD were to: (1) evaluate and analyze the performance improvement caused by advanced footwear technology (AFT) in road racing performance and (2) analyze the effect and describe the mechanisms that the main AFT characteristics produce on running performance.

Why did I do it?

Recently, a new running shoe concept has been launched, which has revolutionized footwear design, named AFT. This type of running footwear is defined by the combination of: (1) reduced shoe mass, (2) greater rocker geometry, (3) a curved carbon fibre plate or other element embedded in the midsole in order to increase longitudinal bending stiffness (LBS), (4) more compliant and resilient midsole foams (i.e., polyether block amide (PEBA)) to provide cushioning and responsiveness and (5) increased midsole thickness (figure 1A). Although this shoe demonstrated improvements in running economy, it is not known what impact it has had on road running performance, the events for which it was designed. In addition, the impact of each of its characteristics has not been evaluated in order to understand by which mechanisms AFT improves running performance. My PhD sought to answer these questions.

How did I do it?

I performed two types of experimental designs to address the objectives. With respect to the first objective, I performed four longitudinal, observational and retrospective studies. Data were collected from the top 100 male performances in 10k, half marathon and marathon from the World Athletics public database (<https://worldathletics.org>) in the years before the launch of AFT (2015–2016) and post-launch (2017–2019) to evaluate the impact (time performance improvement) that AFT had in the main long-distance events. Additionally, an individual analysis was carried out to find the number of non-responders when using AFT. The shoes used by the athletes were identified in 93.1% of the cases by means of publicly available photographs. To evaluate the second objective, I performed four cross-sectional, randomized controlled experimental designs and a systematic review with meta-analysis. These studies evaluated different experimental shoe conditions (created specifically for the studies) while assessing different AFT characteristics on running economy, biomechanics and running performance: increase of shoe mass, increase of LBS (control, stiff and stiffest) and midsole materials (ethylene-vinyl acetate (EVA) vs PEBA) of AFT.

What did I find?

Objective 1 For all the distances analyzed, the mean performance was better when runners used AFT compared with when they ran without AFT ($p < 0.05$).

I observed mean improvements with AFT's in 10k (14s, 0.83%), half-marathon (18s, 0.50%) and marathon (74s, 0.97%) distances. In addition, I observed a critical speed improvement of 3.31% in an experimental group of runners who during the period evaluated used and did not use AFT, compared with the control group who did not use AFT. However, analyzing a small group ($n=12$) of runners who for the same year did not use and then used this type of footwear, ~25% of runners did not improve their performance when using AFT.

Teaching patients about pain: the emergence of Pain Science Education, its learning frameworks and delivery strategies

G Lorimer Moseley, Hayley B Leake, Anneke J Beetsma, James A Watson, David S Butler, Annika van der Mee, Jennifer N. Stinson, Daniel Harvie, Tonya M. Palermo, Mira Meeus, Cormac G Ryan

The Journal of Pain November 19, 2023

<https://doi.org/10.1016/j.jpain.2023.11.008>

Abstract:

Since it emerged in the early 2000's, intensive education about 'how pain works', widely known as pain neuroscience education or explaining pain, has evolved into a new educational approach, with new content and new strategies. The substantial differences to the original have led the PETAL collaboration to call the current iteration 'Pain Science Education'. This review presents a brief historical context for PSE, the clinical trial, consumer perspective and real-world clinical data that have pushed the field to update both content and method. We describe the key role of educational psychology in driving this change, the central role of constructivism and the constructivist learning frameworks around which PSE is now planned and delivered. We integrate terminology and concepts from the learning frameworks currently being used across the PETAL collaboration in both research and practice – the Interactive, Constructive, Active, Passive (ICAP) framework, transformative learning theory, dynamic model of conceptual change. We then discuss strategies that are being used to enhance learning within clinical encounters, which focus on the skill, will and thrill of learning. Finally, we provide practical examples of these strategies so as to assist the reader to drive their own patient pain education offerings towards more effective learning.

Perspective: Rapid progress in several fields and research groups has led to the emergence 'Pain Science Education'. This PETAL review describes challenges that have spurred the field forward, the learning frameworks and educational strategies that are addressing those challenges, and some easy wins to implement and mistakes to avoid.

Ready To Play: health problems in women's football—a two-season prospective cohort study in the Norwegian premier league.

Roar Amundsen, Solveig Thorarinsdottir, Benjamin Clarsen, Thor Einar Andersen, Merete Møller, Roald Bahr

British Journal of Sports Medicine October 20, 2023

Abstract:

Objectives: To describe the prevalence, incidence and burden of all health problems in the Norwegian women's premier league.

Methods: During the 2020 and 2021 seasons, players in the Norwegian women's premier league reported all health problems (sudden-onset injuries, gradual-onset injuries and illnesses) weekly, using the Oslo Sports Trauma Research Centre Questionnaire on Health Problems. Team medical staff diagnosed reported problems using the Sport Medicine Diagnostic Coding System. We calculated average weekly prevalence, incidence and burden of all health problems reported.

Results: We included 294 players (age: 22±4 years) from 11 teams. Response rate to the weekly questionnaire was 79%. On average, 32% (95% CI: 31% to 33%) of the players reported at least one health problem at any time and 22% (95% CI: 21% to 23%) reported a substantial health problem negatively affecting their training volume or performance. The overall incidence was 10.7 health problems per 1000 hours of football exposure. Sudden-onset injuries were most severe (68% of the total time loss), followed by gradual-onset injuries (25%) and illnesses (8%). Thigh was the most common injury location (26%), while knee injuries were most severe, causing 42% of the total injury time loss. Anterior cruciate ligament (ACL) injuries alone caused 30% of the total injury time loss.

Conclusion: One in five players had a health problem negatively affecting their training volume or performance at any time. Sudden-onset injuries represented the most burdensome health problem. Thigh injuries were most frequent, while knee injuries, ACL injuries especially, were most severe.