

2. LBP

PT helps early LBP

Spine (Phila Pa 1976). 2019 Nov 15. doi: 10.1097/BRS.0000000000003318

Importance of Early Improvement In The Treatment of Low Back Pain With Physical Therapy.

Walston Z¹, McLester C².

STUDY DESIGN:

A retrospective observational study **OBJECTIVE.:** Assess the time course of functional outcome improvements during a physical therapy (PT) episode of care for patients with low back pain (LBP). In addition, assess the impact of patient variables, such as symptom duration, on the time course of functional outcome improvements.

SUMMARY OF BACKGROUND DATA:

Early improvement in patient reported symptoms and functional limitations may play an important role in the eventual success of an intervention. Early improvements in pain are associated with greater improvement in disability and depression in patients with LBP.

METHODS:

A total 11,945 patients were included. Intake Function Status (FS), FS change at discharge, predicted FS change at discharge, FS change at first progress report (FS1), duration of symptoms prior to treatment, and duration of physical therapy episode of care were assessed. Pearson Correlation analysis was used to assess correlation between collected variables and FS change.

RESULTS:

The mean FS change was 16.995 units, mean FS1 was 12.024 units, total duration was 63.591 days, and duration at FS1 was 28.969 days, indicating 70.72% of FS change occurred in the first 45.45% of the episode of care. Similar results occurred in all symptom duration categories, ranging from '0-7 days' to 'greater than 6 months' duration. Correlation analysis demonstrated FS1 had the greatest correlation to FS. A strong correlation ($r > 0.7$) was demonstrated in all symptom duration categories ranging from 0.741 to 0.805.

CONCLUSIONS:

The results of this study yield further support for the importance of rapid functional improvements during a PT episode of care. Additionally, patients demonstrated roughly two-thirds of their improvement in the first 40% of visits regardless of their symptom duration. This study may help clinicians identify a need to modify a plan of care if insufficient early improvement is observed.

LEVEL OF EVIDENCE: 3.

Recovery from LBP factors

Individual recovery expectations and prognosis of outcomes in non-specific low back pain: prognostic factor review<https://doi.org/10.1002/14651858.CD011284.pub2>

- **Jill A Hayden Maria N Wilson Richard D Riley Ross Iles Tamar Pincus Rachel Ogilvie**

Background Low back pain is costly and disabling. Prognostic factor evidence can help healthcare providers and patients understand likely prognosis, inform the development of prediction models to identify subgroups, and may inform new treatment strategies. Recent studies have suggested that people who have poor expectations for recovery experience more back pain disability, but study results have differed.

Objectives To synthesise evidence on the association between recovery expectations and disability outcomes in adults with low back pain, and explore sources of heterogeneity.

Selection criteria We included low back pain prognosis studies from any setting assessing general, self-efficacy, and treatment expectations (measured dichotomously and continuously on a 0 - 10 scale), and their association with work participation, clinically important recovery, functional limitations, or pain intensity outcomes at short (3 months), medium (6 months), long (12 months), and very long (> 16 months) follow-up.

Data collection and analysis We extracted study characteristics and all reported estimates of unadjusted and adjusted associations between expectations and related outcomes. Two review authors independently assessed risks of bias using the Quality in Prognosis Studies (QUIPS) tool. We conducted narrative syntheses and meta-analyses when appropriate unadjusted or adjusted estimates were available. Two review authors independently graded and reported the overall quality of evidence.

Main results We screened 4635 unique citations to include 60 studies (30,530 participants). Thirty-five studies were conducted in Europe, 21 in North America, and four in Australia. Study populations were mostly chronic (37%), from healthcare (62%) or occupational settings (26%). General expectation was the most common type of recovery expectation measured (70%); 16 studies measured more than one type of expectation. Usable data for syntheses were available for 52 studies (87% of studies; 28,885 participants). We found moderate-quality evidence that positive recovery expectations are strongly associated with better work participation (narrative synthesis: 21 studies; meta-analysis: 12 studies, 4777 participants: odds ratio (OR) 2.43, 95% confidence interval (CI) 1.64 to 3.62), and low-quality evidence for clinically important recovery outcomes (narrative synthesis: 12 studies; meta-analysis: 5 studies, 1820 participants: OR 1.89, 95% CI 1.49 to 2.41), both at follow-up times closest to 12 months, using adjusted data. The association of recovery expectations with other outcomes of interest, including functional limitations (narrative synthesis: 10 studies; meta-analysis: 3 studies, 1435 participants: OR 1.40, 95% CI 0.85 to 2.31) and pain intensity (narrative synthesis: 9 studies; meta-analysis: 3 studies, 1555 participants: OR 1.15, 95% CI 1.08 to 1.23) outcomes at follow-up times closest to 12 months using adjusted data, is less certain, achieving very low- and low-quality evidence, respectively. No studies reported statistically significant or clinically important negative associations between recovery expectations and any low back pain outcome.

Authors' conclusions We found that individual recovery expectations are probably strongly associated with future work participation (moderate-quality evidence) and may be associated with clinically important recovery outcomes (low-quality evidence). The association of recovery expectations with other outcomes of interest is less certain. Our findings suggest that recovery expectations should be considered in future studies, to improve prognosis and management of low back pain.

7. PELVIC ORGANS/WOMAN'S HEALTH

Open vs laparoscopic

No Differences in the Prevalence and Intensity of Chronic Postsurgical Pain Between Laparoscopic Hysterectomy and Abdominal Hysterectomy: A Prospective Study

Authors Jin J, Min S, Peng L, Du X, Zhang D, Ren L

DOI <https://doi.org/10.2147/JPR.S225230>

Objective: To compare the prevalence and characteristics of chronic postsurgical pain (CPSP) between laparoscopic hysterectomy (LH) and abdominal hysterectomy (AH) groups 3, 6, and 12 months after surgery, and to assess the impact of pain on the activities of daily living (ADL) of patients.

Methods: The demographic characteristics, intraoperative clinical factors, and postoperative pain score were collected prospectively in patients scheduled for elective LH or AH for benign disease at our institution from July 2014 to June 2015. Patients were interviewed by telephone and followed up for pain assessment 3, 6, and 12 months after surgery. The prevalence, intensity, and specific locations of pain, as well as analgesic administration and impact on the ADL, were included in the questionnaire.

Results: The results from 406 patients (225 patients in the LH group and 181 patients in the AH group) were obtained. Three months after surgery, the prevalence of CPSP was 20.9% in the LH group and 20.4% in the AH group. At 6 months, the prevalence of pain declined to 11.6% in the LH group and 9.4% in the AH group. At 12 months after surgery, only 13 (5.8%) patients in the LH group and 11 (6.1%) patients in the AH group complained about persistent pain. The prevalence of CPSP, as well as the average numerical rating scale pain scores at rest and during movement, during 12 months after surgery were not significantly different between the groups. CPSP after hysterectomy exhibited a negative impact on the ADL.

Conclusion: The prevalence and intensity of CPSP were not significantly different between patients undergoing LH or AH within 12 months after surgery. A tendency towards a reduction in chronic pain over time was documented. Chronic post-hysterectomy pain exhibited a negative impact on the ADL.

10 A. CERVICAL SPINE**Virtual reality ex did not help**

Clin J Pain. 2020 Feb;36(2):101-109. doi: 10.1097/AJP.0000000000000780.

Illusion-enhanced Virtual Reality Exercise for Neck Pain: A Replicated Single Case Series.

Harvie DS^{1,2,3}, Smith RT³, Moseley GL^{4,5}, Meulders A^{6,7}, Michiels B⁸, Sterling M⁹.

OBJECTIVES:

Body illusions have shown promise in treating some chronic pain conditions. We hypothesized that neck exercises performed in virtual reality (VR) with visual feedback of rotation amplified would reduce persistent neck pain.

METHODS:

In a multiple-baseline replicated single case series, 8 blinded individuals with persistent neck pain completed a 4-phase intervention (initial n=12, 4 dropouts): (1) "baseline"; (2) "VR" during which participants performed rotation exercises in VR with no manipulation of visual feedback; (3) "VR enhanced" during which identical exercises were performed but visual feedback overstated the range of motion being performed; (4) "follow-up." Primary outcomes were twice-daily measures of pain-free range of motion and pain intensity. During the baseline and follow-up phases, measures were taken but no intervention took place.

RESULTS:

No differences in primary outcomes were found between VR and baseline, VR enhanced and VR, or VR enhanced and follow-up.

DISCUSSION:

Our hypothesis, that neck exercises performed in VR with visual feedback of rotation amplified, would reduce persistent neck pain was not supported. Possible explanations and future directions are discussed.

Neck pain and muscle weakness

J Manipulative Physiol Ther. 2019 Oct;42(8):608-622. doi: 10.1016/j.jmpt.2018.12.008. Epub 2019 Nov 23.

Individuals With Chronic Neck Pain Have Lower Neck Strength Than Healthy Controls: A Systematic Review With Meta-Analysis.

Miranda IF¹, Wagner Neto ES², Dhein W³, Brodt GA⁴, Loss JF².

OBJECTIVE:

The aim is to verify whether there is difference in neck strength between healthy individuals and individuals with chronic neck pain.

METHODS:

The PubMed, Embase, and Scopus databases were searched. Two independent reviewers selected relevant full articles comparing neck strength between healthy individuals and individuals with chronic neck pain. Two independent reviewers extracted the data from the full articles selected. A meta-analysis was used to assess standardized mean differences in neck strength based on a random-effects model (Prospero number CRD42017081502).

RESULTS:

The search returned 3554 results; 15 articles were included. The chronic neck pain group showed lower neck strength compared with healthy individuals. The standardized mean difference was -0.90 (95% confidence interval [CI] = -1.13 to -0.67) for flexion, -0.79 (95% CI = -0.99 to -0.60) for extension, -0.74 (95% CI = -1.03 to -0.45) for right lateral flexion, and -0.75 (95% CI = -1.04 to -0.46) for left lateral flexion.

CONCLUSION:

Based on this meta-analysis with a 3a level of evidence, individuals with chronic neck pain have lower neck strength for flexion, extension, and the lateral flexion of the neck than healthy controls.

13 C. AIRWAYS/SWALLOWING/SPEECH**TA function with breathing****Influence of phase of respiratory cycle on ultrasound imaging of deep abdominal muscle thickness**

Charlotte Amerijckx^a, Nina Goossens^a, Madelon Pijnenburg^b, Frank Musarra^c, Daniel M. van Leeuwen^{b,d}, Marc Schmitz^e, Lotte Janssens^a

DOI: <https://doi.org/10.1016/j.msksp.2019.102105>

Highlights

- Transversus abdominis and internal oblique act in both trunk control and breathing.
- Thickness was measured by ultrasound during 3 phases of the respiratory cycle.
- Thickness of these muscles increases when lung volume decreases.
- Reliability of an average of 3 measures is excellent during the respiratory cycle.
- These results provide valuable opportunities in a physiotherapeutic setting.

Abstract**Background**

It is difficult to evaluate the transversus abdominis (TrA) and internal oblique (IO) due to their dual role in both trunk control and breathing.

Objectives

To investigate whether TrA and IO thickness as measured by ultrasound differs across the respiratory cycle in upright standing.

Design

Observational study.

Methods

Thickness of TrA and IO was measured with ultrasound in 67 subjects in upright standing. Measures were performed 3 times and by 2 assessors, at the end of relaxed expiration, at the end of a full inspiration, and at the end of full expiration. Differences were assessed by ANOVA. Intra- and inter-rater reliability (of a single measure and the average of 3 measures) were assessed by intra-class correlation (ICC).

Results

Thickness of the TrA and IO was higher at full expiration than at the end of relaxed expiration ($p < 0.001$), and in turn compared to at full inspiration ($p < 0.001$). Intra-rater reliability was excellent at all respiratory phases (ICC 0.76–0.87). Whereas inter-rater reliability for a single measure was only fair to good for TrA (ICC 0.52–0.71) and good to excellent for IO (ICC 0.61–0.78), the inter-rater reliability of the average was excellent at all respiratory phases (ICC 0.75–0.90).

Conclusions

Thickness of TrA and IO increases when lung volume decreases. The intra- and inter-rater reliability of an average measure were excellent at the end of relaxed expiration, full inspiration and full expiration. This provides new opportunities to evaluate the deep abdominal muscles, and their role in respiration, in a physiotherapeutic setting.

13 D. SLEEP**Sleep and psychometrics**

J Sleep Res. 2020 Jan 6:e12969. doi: 10.1111/jsr.12969.

Poor sleep quality associates with self-reported psychiatric and cardiometabolic symptoms independently of sleep timing patterns in a large sample of rural and urban workers.

Carvalho FG^{1,2}, Cunha AMD¹, Tonon AC^{1,2}, Pereira FDS³, Matte U⁴, Callegari-Jacques SM⁵, Hidalgo MP^{1,2}.

Poor sleep associates with mental and cardiometabolic pathological outcomes. The participation of sleep timing features in the pathways by which this relationship occurs is not clear.

This study aims to evaluate the interrelationship between sleep quality and self-reported psychiatric/cardiometabolic symptoms, considering mediation and moderation effects of sleep timing patterns, and urban versus rural work environment, respectively; and to verify the association between sleep quality and polymorphisms of AANAT, RORA and TIMELESS genes. An epidemiological survey was performed in a rural area in southern Brazil. Eight-hundred and twenty-nine subjects were evaluated for sleep quality using the Pittsburgh Sleep Quality Index, and sleep timing patterns using the Munich Chronotype Questionnaire. Work characteristics and psychiatric/cardiometabolic symptoms were assessed using a structured self-report questionnaire. Three polymorphisms of AANAT, RORA and TIMELESS (rs3760138, rs782931 and rs774045, respectively) were genotyped in blood samples. We found statistically significant associations of poor sleep quality with self-reported psychiatric symptoms ($B = 0.382$; 95% CI 0.289-0.476; adjusted p -value $<.001$), and with self-reported cardiometabolic symptoms ($B = 0.079$; 95% CI 0.013-0.151; adjusted p -value = .048). The genetic analysis showed that RORA GA/AA genotype was associated to poor sleep quality ($B = 0.146$, 95% CI 0.054-0.239; adjusted p -value = .004). No moderated mediation effects were observed in the conditional analysis. TIMELESS polymorphism was not included in the analysis due to the low frequency of risk genotypes.

These results yield new insights regarding the interrelationship between sleep characteristics and psychiatric/cardiometabolic self-reported symptoms, taking into account genes related to the biological clocks and melatonin pathways.

OSA and triglycerides

J Sleep Res. 2020 Jan 6:e12979. doi: 10.1111/jsr.12979

Obstructive sleep apnea and hypertriglyceridaemia share common genetic background: Results of a twin study.

Meszaros M¹, Tarnoki AD², Tarnoki DL², Kovacs DT², Forgo B², Lee J³, Sung J³, Vestbo J^{4,5}, Müller V¹, Kunos L¹, Bikov A^{1,4,5}.

Obstructive sleep apnea is associated with an increased risk of hypertension, diabetes and dyslipidaemia. Both obstructive sleep apnea and its comorbidities are at least partly heritable, suggesting a common genetic background.

Our aim was to analyse the heritability of the relationship between obstructive sleep apnea and its comorbidities using a twin study. Forty-seven monozygotic and 22 dizygotic adult twin pairs recruited from the Hungarian Twin Registry (mean age 51 ± 15 years) attended an overnight diagnostic sleep study. A medical history was taken, blood pressure was measured, and blood samples were taken for fasting glucose, total cholesterol, triglyceride, high-density lipoprotein cholesterol, low-density lipoprotein cholesterol and lipoprotein (a). To evaluate the heritability of obstructive sleep apnea and its comorbidities bivariate analysis was performed with an adjustment for age, gender, body mass index (BMI) and smoking after false discovery rate correction and following exclusion of patients on lipid-lowering and antidiabetic medications. There was a significant correlation between indices of obstructive sleep apnea severity, such as the apnea-hypopnea index, oxygen desaturation index and percentage of sleep time spent with oxygen saturation below 90%, as well as blood pressure, serum triglyceride, lipoprotein (a) and glucose levels (all $p < .05$). The bivariate analysis revealed a common genetic background for the correlations between serum triglyceride and the oxygen desaturation index ($r = .63$, $p = .03$), as well as percentage of sleep time spent with oxygen saturation below 90% ($r = .58$, $p = .03$). None of the other correlations were significantly genetically or environmentally determined. T

his twin study demonstrates that the co-occurrence of obstructive sleep apnea with hypertriglyceridaemia has a genetic influence and heritable factors play an important role in the pathogenesis of dyslipidaemia in obstructive sleep apnea.

Daytime sleepiness

J Sleep Res. 2019 Dec;28(6):e12852. doi: 10.1111/jsr.12852. Epub 2019 Apr 10.

Definition of excessive daytime sleepiness in the general population: Feeling sleepy relates better to sleep-related symptoms and quality of life than the Epworth Sleepiness Scale score. Results from an epidemiological study.

Thorarinsdottir EH^{1,2}, Bjornsdottir E^{2,3,4}, Benediktsdottir B^{2,3}, Janson C⁵, Gislason T^{2,3}, Aspelund T^{2,6}, Kuna ST^{7,8}, Packer AI⁷, Arnardottir ES^{4,9}.

Many different subjective tools are being used to measure excessive daytime sleepiness (EDS) but the most widely used is the Epworth Sleepiness Scale (ESS). However, it is unclear if using the ESS is adequate on its own when assessing EDS.

The aim of this study was to estimate the characteristics and prevalence of EDS using the ESS and the Basic Nordic Sleep Questionnaire (BNSQ) in general population samples. Participants aged 40 years and older answered questions about sleepiness, health, sleep-related symptoms and quality of life.

Two groups were defined as suffering from EDS: those who scored >10 on the ESS (with increased risk of dozing off) and those reporting feeling sleepy during the day ≥ 3 times per week on the BNSQ. In total, 1,338 subjects (53% male, 74.1% response rate) participated, 13.1% reported an increased risk of dozing off, 23.2% reported feeling sleepy and 6.4% reported both.

The prevalence of restless leg syndrome, nocturnal gastroesophageal reflux, difficulties initiating and maintaining sleep and nocturnal sweating was higher among subjects reporting feeling sleepy compared to non-sleepy subjects. Also, subjects reporting feeling sleepy had poorer quality of life and reported more often feeling unrested during the day than non-sleepy subjects. However, subjects reporting increased risk of dozing off (ESS > 10) without feeling sleepy had a similar symptom profile as the non-sleepy subjects.

Therefore, reporting only risk of dozing off without feeling sleepy may not reflect problematic sleepiness and more instruments in addition to ESS are needed when evaluating daytime sleepiness.

Longer sleep more cognitive decline

J Sleep Res. 2019 Dec;28(6):e12864. doi: 10.1111/jsr.12864. Epub 2019 Apr 21.

Associations between sleep duration and cognitive impairment in mild cognitive impairment.

Basta M¹, Simos P^{1,2}, Vgontzas A¹, Koutentaki E¹, Tziraki S¹, Zaganas I³, Panagiotakis S⁴, Kapetanaki S³, Fountoulakis N⁴, Lionis C⁵.

The prevalence of mild cognitive impairment (MCI) increases among elderly people and is associated with a high risk of dementia. Identifying factors that may contribute to the progress of MCI to dementia is critical.

The objective of this study was to examine the association of objective sleep with cognitive performance in MCI patients. A subsample of 271 participants with a diagnosis of probable Alzheimer's disease (AD; N = 50) or mild cognitive impairment (MCI; N = 121) and 100 persons who were not cognitively impaired (NI) were recruited from a large population-based cohort in the island of Crete, Greece (3140 older adults aged >60 years). All participants underwent extensive neuropsychiatric/neuropsychological evaluation and a 3-day 24-hr actigraphy. Objective sleep variables and their association with neuropsychological performance were examined across the three groups, controlling for demographics, body mass index, depression, sleep apnea symptoms and psychotropic medications.

Patients with AD had significantly longer 24-hr total sleep time (TST) compared to the MCI and NI groups. Long 24-hr TST was associated with reduced performance on tasks that placed significant demands on attention and processing speed in the MCI group and the AD group. Elderly patients with MCI have similar objective sleep duration to normal controls, whereas AD patients sleep longer. Long sleep duration in patients with multidomain subtypes of MCI is associated with critical non-memory cognitive domains.

It appears that within the MCI group those that sleep longer have more severe cognitive impairment.

20 A. ROTATOR CUFF**Shoulder position**

Meta-analysis

The Critical Shoulder Angle Shows a Reciprocal Change in Magnitude When Evaluating Symptomatic Full-Thickness Rotator Cuff Tears Versus Primary Glenohumeral Osteoarthritis as Compared With Control Subjects: A Systematic Review and Meta-AnalysisGeoffrey C.S.SmithM.B.Ch.B., F.R.A.C.S., F.A.Ortho.A.^{ab}VictorLiuBSc (Med.)^bPatrick H.LamM.D., Ph.D.^c

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Purpose

To determine whether a high critical shoulder angle (CSA) is associated with symptomatic full-thickness rotator cuff (RC) tears and/or whether a low CSA is associated with primary glenohumeral osteoarthritis (GHOA).

Methods

A systematic review was performed following the Preferred Reporting Items for Systematic Reviews and Meta-Analyses guidelines. All observational studies that examined an association between CSA and full-thickness RC tears and/or primary GHOA were included. A primary meta-analysis was performed including all studies that met the inclusion criteria regardless of radiographic quality. A secondary meta-analysis was performed to explore the hypothesis that radiographic quality was a source of heterogeneity, which excluded those studies in which radiographic quality was not strictly defined and controlled.

Results

For the primary meta-analysis, 11 studies met the inclusion criteria for RC tears and 5 for primary GHOA. The CSA was greater in the RC tear group than the control group (mean difference 4.03°, 95% confidence interval 2.95°-5.11, 95% prediction interval 0.0487°-8.01°; $P < .001$). The CSA was lower in the GHOA group than the control group (mean difference -3.98°, 95% confidence interval -5.66° to -2.31°, 95% prediction interval -10.2° to -2.19°; $P < .001$). A high level of heterogeneity was observed in the RC tear analysis ($I^2 = 88.4$), which decreased after the exclusion of 5 studies based on radiographic quality ($I^2 = 75.3$). A high level of heterogeneity also was observed in the primary GHOA analysis ($I^2 = 87.3$), which decreased after the exclusion of 2 studies based on the radiographic quality ($I^2 = 48.2$).

Conclusions

There is a reciprocal change in magnitude of the CSA when evaluating symptomatic full-thickness RC tears versus primary GHOA as compared with control subjects. Radiographic quality is a source of heterogeneity in studies that investigate a link between CSA and RC tears and primary GHOA.

30 A. HIP IMPINGEMENT**Distances**

Arthroscopy. 2020 Jan;36(1):150-155. doi: 10.1016/j.arthro.2019.08.013.

Normal Ischiofemoral Distance and Its Associated Factors: Computed Tomography-Based Study.

Won H¹, Lee YK¹, Lee BS², Park JW¹, Won S¹, Koo KH³.

PURPOSE:

The purposes of this study are (1) to measure the ischiofemoral distance (IFD) in nondiseased hips and (2) to reveal patient demographic and anatomical factors associated with IFD.

METHODS:

In this retrospective study, we identified patients who had unilateral osteonecrosis of the femoral head on computed tomography (CT) scan from November 2005 to July 2018 and assessed the unaffected contralateral hips of the patients. Among the contralateral hips, we excluded hips with hip pain, incomplete or poor-quality CT image, incomplete medical record, degenerative arthritis of the hip, or previous hip surgery. IFD was measured on the axial CT image, and correlated demographic factors (age, sex, height, weight, and body mass index) and anatomical parameters (neck-shaft angle of the femur and femoral anteversion) with IFD were evaluated.

RESULTS:

Five hundred seventeen patients (517 hips) were evaluated. There were 302 men and 215 women, and their mean age was 51.7 years (range 15-83 years). The mean IFD was 33.2 (\pm 9.2) mm in men and 24.3 (\pm 8.9) mm in women ($P < .001$). Interobserver and intraobserver reliability (intraclass correlation coefficients) were 0.99 (95% confidence interval 0.98-1.0) and 0.98 (95% confidence interval 0.97-0.99), respectively. The mean neck-shaft angle was $129.31^\circ \pm 5.04^\circ$ in males and $129.93^\circ \pm 6.29^\circ$ in females. The mean femoral anteversion was $9.72^\circ \pm 7.95^\circ$ in males and $12.61^\circ \pm 8.91^\circ$ in females. IFD was positively correlated with height (correlation coefficient [r] = 0.464, $P < .001$) and weight (0.286, $P < .001$), whereas it was negatively correlated with age (-0.198, $P < .001$), neck-shaft angle (-0.123, $P = .005$), and femoral anteversion (-0.346, $P < .001$). There was no correlation between body mass index and IFD ($P = .522$). In multivariate regression analysis, IFD was positively associated with height ($\beta = .632$), and negatively associated with neck-shaft angle of the femur and femoral anteversion ($\beta = -0.155$ and -0.328 , respectively).

CONCLUSIONS:

In asymptomatic hips, the mean IFD was 33.2 ± 9.2 mm in males and 24.3 ± 8.9 mm in females. The IFD was positively correlated with height and negatively with neck-shaft angle of the femur and femoral anteversion.

32 A. KNEE/ACL**Quadriceps after ACL hamstrings****Quadriceps muscle compensatory activations are delayed following anterior cruciate ligament reconstruction using hamstring tendon graft**

Luciana Labanca^a Luca Laudani^{ab} Pier Paolo Mariani^{ac} Andrea Macaluso^{ac}

<https://doi.org/10.1016/j.knee.2019.09.011> Get rights and content

Abstract**Background**

Compensatory and anticipatory quadriceps activation (CQA and AQA) in response to postural perturbations are essential for functional stability of the knee. This study aimed at investigating CQA and AQA before and after anterior cruciate ligament reconstruction (ACLR) using hamstrings graft.

Methods

Twelve participants with ACLR and 12 healthy controls were exposed to 10 either unpredictable or predictable perturbations of the knee before ACLR (T1), two months (T2) and six months (T3) after surgery. Latencies of CQA and AQA in vastus lateralis (VL), rectus femoris (RF) and vastus medialis (VM) were measured.

Results

Latency of CQA was delayed in ACLR compared to controls at T1 for VL (105 ± 25 vs. 57 ± 9 ms; $P < .001$), RF (102 ± 23 vs. 56 ± 9 ms; $P < .001$) and VM (107 ± 24 vs. 66 ± 16 ms; $P < .001$), at T2 for VL (68 ± 14 vs. 55 ± 10 ms; $P < .01$) and at T3 for VL (105 ± 22 vs. 58 ± 7 ms; $P < .001$), RF (102 ± 22 vs. 58 ± 12 ms; $P < .001$) and VM (106 ± 20 vs. 63 ± 8 ms; $P < .001$). AQA occurred earlier in ACLR than in controls at T1 for VL (-82 ± 64 vs. -14 ± 11 ms; $P < .05$) and VM (-105 ± 68 vs. -9 ± 12 ms; $P < .05$).

Conclusion

CQA are delayed following ACLR with hamstring graft and should be addressed by post-surgical rehabilitation.

34. PATELLA

Hip contribution to PFP

Eur Radiol. 2020 Jan 3. doi: 10.1007/s00330-019-06592-z

Sharp margin of antero-inferior lateral femoral condyle as a risk factor for patellar tendon-lateral femoral condyle friction syndrome.

Li J¹, Sheng B¹, Liu X¹, Yu F¹, Lv F¹, Lv F¹, Yang H².

OBJECTIVE:

To determine the correlation between patellar tendon-lateral femoral condyle friction syndrome (PLFFS) and the morphological characteristics of the antero-inferior part of the lateral femoral condyle (ALFC) to explore the potential pathogenesis.

METHODS:

A total of 170 knees of 140 patients with PLFFS (PLFFS group) were retrospectively analyzed using magnetic resonance imaging (MRI) data for a 4-year period from our database. The Insall-Salvati ratio, shape of the ALFC (SALFC, defined as two subtypes: sharp versus blunt), lateral femoral condyle angle (LFCA), lateral trochlear length (LTL), and lateral trochlear height (LTH) were measured on MRI. Two groups were enrolled as controls: pure patella alta group (n = 192) and normal group (n = 172). All the parameters of the PLFFS group were compared with those of the two control groups.

RESULTS:

The LFCA was significantly lower ($p < 0.001$) in the PLFFS group than in the pure patella alta group. The SALFC was significantly different ($p < 0.001$) in these two groups, whereas the Insall-Salvati ratio, LTH, and LTL showed no significant difference. The LFCA, LTH, SALFC, and the Insall-Salvati ratio in the PLFFS group were also significantly different ($p < 0.001$) with the normal group. Receiver operating characteristic (ROC) analysis showed the efficacy of the Insall-Salvati ratio and SALFC was better than that of the other parameters.

CONCLUSIONS:

The morphological characteristics of ALFC are correlated with PLFFS. The sharp shape of ALFC may be an important causative co-factor along with patella alta in the pathogenesis of PLFFS.

KEY POINTS:

- A sharp margin of the antero-inferior lateral femoral condyle is an important risk factor for the development of PLFFS in patients with patella alta.
- Antero-inferior femoral condyle shape can easily be assessed with high intra- and inter-reader reliability PLFFS.
- PLFFS is more common in young adults.

Predictors of outcomes

Am J Sports Med. 2019 Dec 10:363546519889623. doi: 10.1177/0363546519889623.

Predictors of Pain, Function, and Change in Patellofemoral Pain.

Hott A¹, Brox JI^{2,3}, Pripp AH⁴, Juel NG³, Liavaag S⁵.

BACKGROUND:

Identification of factors predictive of outcome and change is important to improve treatment for patellofemoral pain (PFP). Few studies have examined the predictive value of psychological factors in PFP, although they have been reported to be important predictors in other musculoskeletal pain conditions.

PURPOSE:

To evaluate predictors of pain, function, and change 1 year after an exercise-based intervention in PFP.

STUDY DESIGN:

Cohort study; Level of evidence, 3.

METHODS:

In sum, 112 patients were recruited to a randomized controlled trial; 98 attended 1-year follow-up. There were no between-group differences in the trial; thus, the material was analyzed as 1 cohort. Nine baseline factors—sex, bilateral pain, worst pain, pain duration, Anterior Knee Pain Scale (AKPS), kinesiophobia, anxiety and depression, self-efficacy, and number of pain sites throughout the body—were investigated for their predictive ability on outcome at 1 year (AKPS, worst pain) and for change at 1 year (global change score, change in AKPS, and change in worst pain). Multivariable linear regression models with stepwise backward removal method were used to find predictors of poor outcome.

RESULTS:

Number of pain sites at baseline was a significant predictor of worse outcome for AKPS ($B = -2.7$; 95% CI, -4.0 to -1.3; $P < .01$), worst pain ($B = 0.5$; 95% CI, 0.2-0.8; $P < .01$), global change ($B = -0.8$; 95% CI, -1.2 to -0.5; $P < .01$), change in AKPS ($B = -2.7$; 95% CI, -4.0 to -1.3; $P < .01$), and change in worst pain ($B = 0.5$, 95% CI, 0.2-0.8; $P < .01$) at 1 year. Baseline scores for AKPS and worst pain predicted respective 1-year levels and change scores ($P < .01$). Lower self-efficacy and male sex predicted less global change ($P < .01$). Longer pain duration predicted final score and change score for worst pain ($P < .01$). The predictive models had reasonable fit with adjusted R^2 from 0.22 to 0.35.

CONCLUSION:

Higher number of pain sites throughout the body was a consistent predictor of poor outcome and less change at 1 year. Baseline levels for AKPS and worst pain predicted respective final scores and change scores

35. KNEE/TOTAL**Degree of Varus influences outcomes**

BMC Musculoskelet Disord. 2020 Jan 6;21(1):9. doi: 10.1186/s12891-019-3029-7.

Predicting clinical outcomes after total knee arthroplasty from preoperative radiographic factors of the knee osteoarthritis.

Toguchi K^{1,2}, Nakajima A³, Akatsu Y¹, Sonobe M¹, Yamada M¹, Takahashi H¹, Saito J¹, Aoki Y⁴, Suguro T⁵, Nakagawa K¹.

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BACKGROUND:

Total knee arthroplasty (TKA) is the major surgical treatment for end-stage osteoarthritis (OA). Despite its effectiveness, there are about 20% of patients who are dissatisfied with the outcome. Predicting the surgical outcome preoperatively could be beneficial in order to guide clinical decisions.

METHODS:

One-hundred and ten knees of 110 consecutive patients who underwent TKAs for varus knees resulting from OA were included in this study. Preoperative varus deformities were evaluated by femorotibial angle (FTA), medial proximal tibial angle (MPTA) and lateral distal femoral angle (LDFA), and classified as a severe varus (SV) or a mild varus (MV) group. The osteophyte score (OS), which we developed originally, was also calculated based on the size of the osteophytes and classified as groups with more or less osteophytes. We compared preoperative and 1-year postoperative range of motion, the Knee Society Score, and Japanese Knee injury Osteoarthritis Outcome Score (KOOS) between SV and MV groups (varus defined by FTA, MPTA, or LDFA), in each group with more or less osteophytes.

RESULTS:

When varus deformities were defined by FTA, regardless of OS, postoperative KOOS subscales and/or the improvement rates were significantly higher in the SV group than in the MV group. When varus defined by MPTA, regardless of OS, there were no significant differences in postoperative KOOS subscales between groups. However, when varus defined by LDFA, scores for pain, activities of daily living (ADL), and quality of life (QOL) on postoperative KOOS and/or the improvement rates were significantly higher in the SV group than in the MV group only in patients with less osteophytes. No significant differences were found between groups in patients with more osteophytes.

CONCLUSIONS:

We classified OA types by radiographic measurements of femur and tibia in combination with OS. Postoperative patient-reported outcomes were better in patients with SV knees but were poor in patients with knees with MV deformity and less osteophytes.

41 A. ACHILLES TENDON AND CALF

Pain in chronic pain

Int J Sports Phys Ther. 2019 Dec; 14(6): 945–956. PMID: 31803527

PAIN SENSITIVITY IN CHRONIC ACHILLES TENDINOPATHY

Brian J. Eckenrode, PT, DPT, OCS,^{1,2} David M. Kietrys, PT, PhD, OCS, FCPP,² and Scott K. Stackhouse, PT, PhD³

Background Achilles tendinopathy is a common overuse injury sustained by athletes (including runners) that often becomes chronic. There is evidence that chronic musculoskeletal pain conditions exhibit signs of nervous system sensitization.

Hypothesis/Purpose The objective of this study was to compare pain sensitivity (pressure pain threshold [PPT], heat pain threshold [HPT], and heat temporal summation [HTS]) between active healthy adults with and without chronic Achilles tendinopathy in order to determine if signs of peripheral and/or central sensitization exist in chronic Achilles tendinopathy.

Study Design Cohort study

Methods Seventeen participants with chronic (≥ 3 months) Achilles tendinopathy (39.0 years \pm 10.81) and 24 healthy controls (31.83 years \pm 8.92) were included. All participants completed the Pain Catastrophizing Scale (PCS). Participants in the Achilles group also completed the Lower Extremity Functional Scale (LEFS) and the Victorian Institute of Sport Assessment-Achilles (VISA-A). Pain processing was quantified using PPT, HPT and HTS tests.

Results

There were no significant differences in PCS scores between groups. In the Achilles tendinopathy group, the mean VISA-A score was 58.5 ± 18.4 ; the mean LEFS was 63.7 ± 8.0 . Primary hyperalgesia (decreased pain threshold at injury site) was detected in the Achilles tendinopathy group, as evidenced by lower PPT ($p < 0.0001$) and lower HPT ($p = 0.028$). Mechanical secondary hyperalgesia, a sign of central sensitization, was found in the Achilles tendinopathy group at the tibialis anterior ($p = 0.042$) and non-involved Achilles ($p = 0.025$), but not at the thenar eminence ($p = 0.276$). The degree of HTS was not different between groups ($p = 0.981$).

Conclusion

Active participants with chronic Achilles tendinopathy showed signs of both peripheral and central sensitization; however, widespread hyperalgesia into the upper extremities and elevated temporal summation were not observed. Evidence of differences in pain sensitivity lend support to the theory for a multifactorial model of tendinopathy, which consists of an impaired motor system, local tendon pathology, and changes in the pain/nociceptive system. Physical therapy management of chronic Achilles tendinopathy may need to address potential changes in the nervous system. Interventions used to treat chronic tendinopathies should be investigated for their potential to resolve peripheral and central sensitization.

Eccentric questioned

Musculoskeletal Care. 2019 Dec;17(4):283-299. doi: 10.1002/msc.1428. Epub 2019 Nov 25.

The efficacy of loading programmes for improving patient-reported outcomes in chronic midportion Achilles tendinopathy: A systematic review.

Head J¹, Mallows A¹, Debenham J², Travers MJ^{3,4}, Allen L¹.

OBJECTIVE:

Achilles tendinopathy is a common type of overuse condition, with isolated eccentric loading (ECL) programmes being the principal conservative treatment of choice. However, alternative protocols, involving different contraction types, have more recently been investigated. The purpose of the present review was to examine the evidence from studies comparing two or more different types of loading programmes in relation to patient-reported outcomes for people with Achilles tendinopathy.

METHODS:

A systematic review was undertaken, and the risk of bias of included papers were assessed using the Cochrane Risk of Bias tool. An electronic search of CINAHL, MEDLINE, Embase and SPORTDiscus was undertaken from their inception to May 2018. The eligibility criteria for selecting studies were randomized controlled or clinical controlled trials investigating two or more different loading programmes for chronic (>3 months) Achilles tendinopathy.

RESULTS:

Seven articles were included in the review. Low-quality evidence exists that a do-as-tolerated modification of the Alfredson programme is more effective than the standardized programme at improving function in the short term. Very-low-quality evidence suggests that ECL is superior at reducing pain levels than concentric in isolation, but no more effective at improving pain or disability than concentric-eccentric programmes.

CONCLUSIONS:

There is conflicting evidence regarding the superiority of ECL over other contraction types, challenging the current approach to managing Achilles tendinopathy. There is also evidence that do-as-tolerated repetition volumes are more effective at improving function in the short term compared with those recommended by the standardized Alfredson protocol.

45 A. MANUAL THERAPY LUMBAR & GENERAL**Manipulation brain changes**

Ir J Med Sci. 2019 Nov 26. doi: 10.1007/s11845-019-02140-2.

The effect of spinal manipulation on brain neurometabolites in chronic nonspecific low back pain patients: a randomized clinical trial.

Didehdar D¹, Kamali F^{2,3}, Yoosefinejad AK^{1,4}, Lotfi M⁵.

BACKGROUND:

In patients with chronic nonspecific low back pain (NCLBP), brain function changes due to the neuroplastic changes in different regions.

AIM:

The current study aimed to evaluate the brain metabolite changes after spinal manipulation, using proton magnetic resonance spectroscopy (¹H-MRS).

METHODS:

In the current study, 25 patients with NCLBP aged 20-50 years were enrolled. Patients were randomly assigned to lumbopelvic manipulation or sham. Patients were evaluated before and 5 weeks after treatment by the Numerical Rating Scale (NRS), the Oswestry Disability Index (ODI), and ¹H-MRS.

RESULTS:

After treatment, severity of pain and functional disability were significantly reduced in the treatment group vs. sham group ($p < 0.05$). After treatment, N-acetyl aspartate (NAA) in thalamus, insula, dorsolateral prefrontal cortex (DLPFC) regions, as well as choline (Cho) in the thalamus, insula, and somatosensory cortex (SSC) regions, had increased significantly in the treatment group compared with the sham group ($p < 0.05$). A significant increase was further observed in NAA in thalamus, anterior cingulate cortex (ACC), and SCC regions along with Cho metabolite in thalamus and SCC regions after treatment in the treatment group compared with the baseline measures ($p < 0.05$). Also, a significant increase was observed in Glx (glutamate and glutamine) levels of thalamus ($p = 0.03$). There was no significant difference in terms of brain metabolites at baseline and after treatment in the sham group.

CONCLUSION:

In the patient with low back pain, spinal manipulation affects the central nervous system and changes the brain metabolites. Consequently, pain and functional disability are reduced.

45 B. MANUAL THERAPY CERVICAL**McKenzie for neck pain**

Musculoskeletal Care. 2019 Dec 4. doi: 10.1002/msc.1440.

Cognitive behavioural interventions, and function and pain outcomes among patients with chronic neck pain managed with the McKenzie approach.

Edmond SL¹, Werneke MW², Young M³, Grigsby D⁴, McClenahan B⁵, Harris G⁶, McGill T⁷.

OBJECTIVES:

Graded activity and graded exposure in vivo are recommended cognitive behavioural approaches to improve function and pain outcomes for patients receiving physiotherapy for chronic nonspecific neck pain. The McKenzie method is a common treatment approach for patients with neck pain. The study objectives were to examine associations between interventions with graded activity and/or graded exposure, as determined by the treating physiotherapist, and function and pain outcomes for patients with chronic nonspecific neck pain managed by clinicians with credentials in the McKenzie approach.

METHOD:

A cohort study was carried out, in which subjects (n = 366) with chronic nonspecific neck pain completed intake surveys (i.e., the Neck Functional Status Computerized Adaptive Test and the Numeric Pain Rating Scale), and questions related to their demographic, lifestyle and health status. Treatment with graded activity/graded exposure during the episode of care was recorded. Function and pain measures were repeated at discharge. Multivariable models examining associations between patients receiving versus not receiving graded activity/graded exposure, and pain and function outcomes were constructed, controlling for potential confounding effects.

RESULTS:

Despite statistical significance, there were no clinically relevant differences between treatment versus no treatment with graded activity/graded exposure, and function or pain outcomes.

CONCLUSION:

There is insufficient evidence to suggest that patients being managed with McKenzie methods will attain clinically relevant improvements in function or pain outcomes when augmenting treatment with graded activity and/or graded exposure when the choice to intervene with these cognitive behavioural approaches is determined by the treating physiotherapist.

45 C. MANUAL THERAPY THORACIC**T spine manip minimal effect on LBP**

J Orthop Sports Phys Ther. 2019 Dec 6:1-43. doi: 10.2519/jospt.2020.8928.

Short-term Effects of Thoracic Spine Thrust Manipulation, Exercise, and Education in Individuals With Low Back Pain: A Randomized Controlled Trial.

Fisher LR^{1,2}, Alvar BA³, Maher SF⁴, Cleland JA⁵.

STUDY DESIGN:

Randomized controlled trial.

OBJECTIVE:

To determine the short-term effectiveness of thoracic manipulation (MAN) when compared to sham manipulation (SHAM) for individuals with LBP.

BACKGROUND:

Low back pain is one of the most prevalent and disabling musculoskeletal conditions. The management of LBP has been studied extensively, yet the most effective treatment strategies remain to be elucidated.

METHODS:

Patients with LBP were stratified based on symptom duration and randomly assigned to MAN or SHAM treatment groups. Groups received three visits which included core stabilization exercises and patient education. Factorial repeated measures ANOVA and multiple regression was performed for pain, disability, and fear-avoidance. Mann Whitney-U test was used to analyze patient perceived improvement with the Global Rating of Change scale (GROC) at follow up.

RESULTS:

Ninety participants completed the study (mean age 38 ± 11.5 years; 70% female, 72% chronic LBP). The overall group-by-time interaction for the ANOVA was not significant for MODQ, NPRS, FABQ. GROC was not significantly different between the groups.

CONCLUSION:

Three sessions of thoracic manipulation, education, and exercise did not result in improved outcomes when compared to a sham manipulation, education, and exercise in individuals with chronic LBP. Future studies are needed to identify the most effective management strategies for the treatment of low back pain. Registered at clinicaltrials.gov (NCT02853357).

45 D. MANUAL THERAPY EXTREMITIES**MWM helps ankle postural control**

J Sport Rehabil. 2019 Nov 19:1-9. doi: 10.1123/jsr.2019-0198.

Immediate Effects of Ankle Joint Mobilization With Movement on Postural Control, Range of Motion, and Muscle Strength in Healthy Individuals: A Randomized, Sham-Controlled Trial.

Tomruk M, Soysal Tomruk M, Alkan E, Gelecek N.

Abstract

CONTEXT:

Ankle proprioception is one of the crucial components contributing to postural control. Although the effects of Mulligan's mobilization with movement (MWM) on postural control, ankle dorsiflexion range of motion (DFROM), and muscle strength in people with ankle disorders have previously been investigated, it is still unclear whether ankle MWM had ability to change postural control, DFROM, and muscle strength.

OBJECTIVES:

To reveal pure effects of MWM on postural control, ankle DFROM, and muscle strength in healthy individuals.

DESIGN:

A prospective, randomized, double-blinded, sham-controlled study.

SETTING:

Musculoskeletal laboratory, Dokuz Eylul University, Turkey.

PARTICIPANTS:

Forty students in good health recruited from a local university.

INTERVENTIONS:

Mulligan's MWM or sham application over ankle joint.

MAIN OUTCOME MEASURES:

The primary outcome was postural control and measured using limits of stability (LOS) test. The secondary outcomes were tibialis anterior muscle strength and ankle DFROM, which were measured using handheld dynamometer and weight-bearing lunge test, respectively. All outcomes were assessed before and immediately after intervention.

RESULTS:

Left and right ankle DFROM and LOS overall score showed a statistically significant improvement compared with first measurement in both groups ($P < .05$). However, LOS time was significantly improved only in the MWM group ($P < .05$). Statistical analyses of between-group mean differences showed that Mulligan's MWM provided significant improvement in the LOS in forward-right direction compared with sham application ($P = .03$).

CONCLUSIONS:

The results of this study suggest that the application of Mulligan's MWM on ankle joint might be beneficial to improve postural control in forward right direction in individuals with healthy ankles. On the other hand, both MWM and sham application were able to increase overall postural control and DFROM, and MWM had no superiority over sham application for increasing these 2 variables.

50 A. MOTOR CONTROL**LBP – McKenzie vs. motor control**

Physiotherapy. 2019 Dec;105(4):442-445. doi: 10.1016/j.physio.2018.12.004. Epub 2018 Dec 21.

A randomized clinical trial comparing the McKenzie method and motor control exercises in people with chronic low back pain and a directional preference: 1-year follow-up.

Halliday MH¹, Pappas E², Hancock MJ³, Clare HA⁴, Pinto RZ⁵, Robertson G⁶, Ferreira PH².

OBJECTIVE:

The primary objective of this study was to compare the long-term (1-year follow-up) effects of the McKenzie method and motor control exercises on trunk muscle thickness in people with chronic low back pain (LBP) and a directional preference.

DESIGN:

Randomized controlled trial.

SETTING:

A secondary public health facility in Sydney, Australia.

PARTICIPANTS:

Seventy adults with greater than 3-month history of LBP and a directional preference.

INTERVENTIONS:

Participants were randomized to receive 12 treatments of either the McKenzie method or motor control exercises over 8-weeks.

OUTCOME MEASURES:

Muscle thickness of the transversus abdominis, obliquus internus, and obliquus externus measured from ultrasound images. Secondary outcomes included function, perceived recovery, and pain. Outcomes were collected at baseline, post intervention at 8-weeks, and at 1-year follow-up by blinded assessors. The current paper focuses on the 1-year follow-up.

RESULTS:

Fifty-eight participants completed data collection for the primary outcome at 1-year. There were no significant between group differences for changes in trunk muscle thickness for any of the three investigated muscles: transversus abdominis [3%, 95% confidence interval (CI): -5%, 11%], obliquus internus [-4%, 95% CI: -9%, 2%] and obliquus externus [3%, 95% CI: -4%, 11%]. Similarly, there were no significant differences between groups for the secondary outcomes of function, perceived recovery and pain.

CONCLUSION:

Trunk muscle thickness, function, perceive recovery and pain are similar between patients receiving McKenzie method or motor control exercises at a 1-year follow-up in a population of people with chronic LBP and a directional preference. Clinical Trials Registration number CTRN12611000971932.

52. EXERCISE

Exercise helps LBP

Br J Sports Med. 2019 Nov 28. pii: bjsports-2019-101205. doi: 10.1136/bjsports-2019-101205.

Exercise treatment effect modifiers in persistent low back pain: an individual participant data meta-analysis of 3514 participants from 27 randomised controlled trials.

Hayden JA¹, Wilson MN², Stewart S², Cartwright JL², Smith AO², Riley RD³, van Tulder M⁴, Bendix T⁵, Cecchi F⁶, Costa LOP⁷, Dufour N⁸, Ferreira ML⁹, Foster NE¹⁰, Gudavalli MR¹¹, Hartvigsen J¹², Helmhout P¹³, Kool J¹⁴, Koumantakis GA¹⁵, Kovacs FM¹⁶, Kuukkanen T¹⁷, Long A¹⁸, Macedo LG¹⁹, Machado LAC²⁰, Maher CG²¹, Mehling W²², Morone G²³, Peterson T²⁴, Rasmussen-Barr E²⁵, Ryan CG²⁶, Sjögren T²⁷, Smeets R²⁸, Staal JB²⁹, Unsgaard-Tøndel M³⁰, Wajswelner H³¹, Yeung EW³²; Chronic Low Back Pain IPD Meta-Analysis Group.

BACKGROUND:

Low back pain is one of the leading causes of disability worldwide. Exercise therapy is widely recommended to treat persistent non-specific low back pain. While evidence suggests exercise is, on average, moderately effective, there remains uncertainty about which individuals might benefit the most from exercise.

METHODS:

In parallel with a Cochrane review update, we requested individual participant data (IPD) from high-quality randomised clinical trials of adults with our two primary outcomes of interest, pain and functional limitations, and calculated global recovery. We compiled a master data set including baseline participant characteristics, exercise and comparison characteristics, and outcomes at short-term, moderate-term and long-term follow-up. We conducted descriptive analyses and one-stage IPD meta-analysis using multilevel mixed-effects regression of the overall treatment effect and prespecified potential treatment effect modifiers.

RESULTS:

We received IPD for 27 trials (3514 participants). For studies included in this analysis, compared with no treatment/usual care, exercise therapy on average reduced pain (mean effect/100 (95% CI) -10.7 (-14.1 to -7.4)), a result compatible with a clinically important 20% smallest worthwhile effect. Exercise therapy reduced functional limitations with a clinically important 23% improvement (mean effect/100 (95% CI) -10.2 (-13.2 to -7.3)) at short-term follow-up. Not having heavy physical demands at work and medication use for low back pain were potential treatment effect modifiers-these were associated with superior exercise outcomes relative to non-exercise comparisons. Lower body mass index was also associated with better outcomes in exercise compared with no treatment/usual care. This study was limited by inconsistent availability and measurement of participant characteristics.

CONCLUSIONS:

This study provides potentially useful information to help treat patients and design future studies of exercise interventions that are better matched to specific subgroups. PROTOCOL

PUBLICATION: <https://doi.org/10.1186/2046-4053-1-64>.

58. RUNNING**Changing strike pattern not supported by research**

Sports Med. 2019 Dec 10. doi: 10.1007/s40279-019-01238-y.

What are the Benefits and Risks Associated with Changing Foot Strike Pattern During Running? A Systematic Review and Meta-analysis of Injury, Running Economy, and Biomechanics.

Anderson LM^{1,2}, Bonanno DR^{2,3}, Hart HF^{2,4}, Barton CJ^{5,6}.

BACKGROUND:

Running participation continues to increase. The ideal strike pattern during running is a controversial topic. Many coaches and therapists promote non-rearfoot strike (NRFS) running with a belief that it can treat and prevent injury, and improve running economy.

OBJECTIVE:

The aims of this review were to synthesise the evidence comparing NRFS with rearfoot strike (RFS) running patterns in relation to injury and running economy (primary aim), and biomechanics (secondary aim).

DESIGN:

Systematic review and meta-analysis. Consideration was given to within participant, between participant, retrospective, and prospective study designs.

DATA SOURCES:

MEDLINE, EMBASE, CINAHL, and SPORTDiscus.

RESULTS:

Fifty-three studies were included. Limited evidence indicated that NRFS running is retrospectively associated with lower reported rates of mild (standard mean difference (SMD), 95% CI 3.25, 2.37-4.12), moderate (3.65, 2.71-4.59) and severe (0.93, 0.32-1.55) repetitive stress injury. Studies prospectively comparing injury risk between strike patterns are lacking. Limited evidence indicated that running economy did not differ between habitual RFS and habitual NRFS runners at slow (10.8-11.0 km/h), moderate (12.6-13.5 km/h), and fast (14.0-15.0 km/h) speeds, and was reduced in the immediate term when an NRFS-running pattern was imposed on habitual RFS runners at slow (10.8 km/h; SMD = - 1.67, - 2.82 to - 0.52) and moderate (12.6 km/h; - 1.26, - 2.42 to - 0.10) speeds. Key biomechanical findings, consistently including both comparison between habitual strike patterns and following immediate transition from RFS to NRFS running, indicated that NRFS running was associated with lower average and peak vertical loading rate (limited-moderate evidence; SMDs = 0.72-2.15); lower knee flexion range of motion (moderate-strong evidence; SMDs = 0.76-0.88); reduced patellofemoral joint stress (limited evidence; SMDs = 0.63-0.68); and greater peak internal ankle plantar flexor moment (limited evidence; SMDs = 0.73-1.33).

CONCLUSION:

The relationship between strike pattern and injury risk could not be determined, as current evidence is limited to retrospective findings. Considering the lack of evidence to support any improvements in running economy, combined with the associated shift in loading profile (i.e., greater ankle and plantarflexor loading) found in this review, changing strike pattern cannot be recommended for an uninjured RFS runner.

59. PAIN**Open label placebo**

Clin J Pain. 2020 Feb;36(2):68-79. doi: 10.1097/AJP.0000000000000781.

Deceptive and Nondeceptive Placebos to Reduce Pain: An Experimental Study in Healthy Individuals.

Kube T^{1,2}, Rief W¹, Vivell MB¹, Schäfer NL¹, Vermillion T¹, Körfer K¹, Glombiewski JA^{1,2}.

OBJECTIVES:

Recent research has shown that placebos can be effective even if they are openly prescribed to participants. Yet, it is unclear how such "open-label placebos" (OLPs) compare to deceptive placebo (DP) and what the mechanisms of actions are. In this study, we therefore compared 2 versions of OLP to DP and no treatment (NT).

MATERIALS AND METHODS:

Using a standard heat pain paradigm, 117 healthy volunteers underwent a baseline and a posttreatment pain assessment. With the exception of NT, all groups received an inert placebo cream after the first assessment. OLP was administered by either evoking positive expectancies or by raising hope for placebo analgesia, thus distinguishing for the first time conceptually between expectancy and hope in experimental pain research. The primary outcome was pre-post change in pain tolerance.

RESULTS:

Increase in pain tolerance was larger in the 3 treatment groups compared with NT, whereas the treatment groups did not differ from each other. Further results showed that participants receiving DP reported a large reduction of subjective pain intensity and unpleasantness, whereas no such reduction was found for the 2 OLP groups. The 2 OLP versions did not differ in terms of their analgesic effects.

DISCUSSION:

The study provided evidence for traditional placebo analgesia on the basis of deception. For OLP, we found that OLP indeed increased pain tolerance; however, participants receiving OLP were reluctant to report any subjective analgesic effects. Combined with previous studies, the present findings suggest that the effects of OLP are weaker in healthy volunteers than in clinical samples.

LBP pain factors

Clin J Pain. 2020 Feb;36(2):124-134. doi: 10.1097/AJP.0000000000000775.

Relationships Between Psychological, Social, Physical Activity, and Sleep Measures and Somatosensory Function in Individuals With Spinal Pain: A Systematic Review and Meta-analysis.

Othman R¹, Dassanayake S¹, Jayakaran P¹, Tumilty S¹, Swain N², Mani R¹.

OBJECTIVE:

Somatosensory abnormalities are linked to clinical pain outcomes in individuals with spinal pain. However, a range of factors might confound the relationship between altered somatosensory function and clinical pain outcomes. This systematic review aimed to evaluate the literature to assess the level of evidence of associations between psychological, social, physical activity, and sleep measures and somatosensory function (assessed via sensory psychophysical testing) among individuals with spinal pain.

METHODS:

A comprehensive literature search was performed in 6 electronic databases from their inception to June 2018. Two reviewers independently assessed the methodological quality using a modified Quality in Prognostic Studies (QUIPS) tool and supplemented with recommendations from the Critical Appraisal and Data Extraction for the Systematic Review of Prediction Modelling Studies (CHARMS) checklist and the Quality Assessment of Diagnostic Accuracy Studies (QUADAS-2) tool. The level of evidence was assessed using the Grading of Recommendations, Assessment, Development, and Evaluations (GRADE) system. Data were pooled to evaluate the strength of the relationships of interest.

RESULTS:

Among the 17 factors identified in the included studies, pain catastrophizing, depression, and pain-related fear have significant negative (small to fair) associations with pain thresholds. A "very low" to "moderate" quality of evidence was found for all the investigated factors. Subgroup analysis showed a smaller effect size for pain catastrophizing/fear of movement and pain thresholds in individuals with low back pain.

CONCLUSIONS:

Psychological factors are associated negatively with pain thresholds and they need to be adjusted when establishing predictive relationships between somatosensory function and pain outcomes in individuals with spinal pain.

Caregiver catastrophizing

Clin J Pain. 2020 Feb;36(2):61-67. doi: 10.1097/AJP.0000000000000773.

Interpersonal Dyadic Influences of Pain Catastrophizing Between Caregivers and Children With Chronic Pain.

Parker DM¹, Birnie KA², Yoon IA¹, Bhandari RP¹.

OBJECTIVES:

Pain catastrophizing is an important predictor of pain-related outcomes. Caregiver and child levels of catastrophizing about child chronic pain are associated cross-sectionally, yet predictive associations testing interpersonal influences within caregiver-child dyads are lacking. The present study tested caregiver and child influences on partner catastrophizing about child pain over a period of 1 month following initiation of interdisciplinary pain treatment and examined whether the change in pain catastrophizing was associated with child pain interference.

MATERIALS AND METHODS:

A total of 113 caregiver-child dyads (Mage=14.41) completed measures at the time of initiating care at a pediatric tertiary outpatient pain management clinic (baseline) and ~1 month later. Caregivers and children independently reported on catastrophizing about child pain and child pain interference at baseline and 1-month follow-up.

RESULTS:

Caregiver and child pain catastrophizing decreased over 1 month following initial interdisciplinary pain evaluation, with average scores remaining in the moderate to high range. Change in caregiver, but not child, catastrophizing about child pain was predicted by partner baseline pain catastrophizing. Decreases in catastrophizing about child pain were associated with within-person improvement in ratings of child pain interference.

DISCUSSION:

In the short period following initial pain evaluation, caregivers and children evidenced reductions in pain catastrophizing, which were associated with increased child function. Findings highlight the important role of child cognitive-affective responses to pain in influencing caregiver catastrophizing about child pain. Understanding the individual contributions children and caregivers make to interpersonal pain processes will inform future family-level clinical interventions.

Childhood experiences and pain

Pain. 2020 Jan;161(1):156-165. doi: 10.1097/j.pain.0000000000001706.

Heightened risk of pain in young adult women with a history of childhood maltreatment: a prospective longitudinal study.

Beal SJ^{1,2}, Kashikar-Zuck S^{1,2}, King C^{1,2}, Black W³, Barnes J², Noll JG^{1,2,4}.

A child maltreatment history is reported more frequently among adults with chronic pain compared with the general population; unfortunately, studies have primarily relied upon retrospective maltreatment reports by adults with chronic pain. This prospective study assessed pain symptoms in a cohort of young adult women with a documented history of child maltreatment, compared with a matched cohort of women who did not experience childhood maltreatment. Young women (N = 477) were recruited between ages 14 to 17 years and followed annually to age 19. Of these women, 57% experienced maltreatment (ie, physical, sexual, or emotional abuse, neglect; n = 273) substantiated by child welfare record. Maltreated women were demographically matched to nonmaltreated women, also confirmed by child welfare record. In adolescence, post-traumatic stress was assessed. Women were contacted as young adults (Mage = 24.76; n = 383) and surveyed about their pain experiences, including the presence of pain in the past week, pain severity (0-10), and number of body areas with pain. Mediation path analyses examining the impact of maltreatment and adolescent post-traumatic stress on young adult pain were estimated through structural equation modeling. As adults, women who had experienced child maltreatment reported higher pain intensity, a greater number of pain locations, and were more likely to experience pain in the previous week than nonmaltreated women.

Adolescent post-traumatic stress partially explained the effects of maltreatment on pain. Young adult women who experienced child maltreatment are at higher risk of pain, particularly when they also experienced post-traumatic stress as adolescents.

Laughter effect on pain

Effects of mirthful laughter on pain tolerance: A randomized controlled investigation

Stephanie S. Lapierre

,

Brett D. Baker

,

Hirofumi Tanaka

DOI: <https://doi.org/10.1016/j.jbmt.2019.04.005>

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Introduction

Chronic pain is a debilitating condition that affects many people. Currently, there is no single treatment known to cure or assure relief from chronic pain. Accordingly, the management of patients' discomfort is an integral part of treating chronic pain. Such treatment, however, is not effective for many patients. We investigated whether mirthful laughter provided by comic relief can influence pain tolerance and muscle soreness in young healthy participants.

Methods

Forty participants underwent a randomized controlled cross-over designed experiment. Each participant was exposed to a comedy video eliciting mirthful laughter and an uninteresting documentary. Delayed onset muscle soreness was induced in one leg at a time by eccentric exercise. Pain tolerance was tested using blunt force application and assessed subjectively using a visual analog scale.

Results

Watching the comedy video elicited a significantly greater irregular breathing pattern compared with watching the documentary video ($p < 0.001$). After watching the comedy, the participants' positive affect was increased ($\Delta 2 \pm 1$) while it was largely decreased ($\Delta -11 \pm 2$) after watching the documentary video ($p < 0.001$). Pain tolerance was decreased by 17 ± 5 N after viewing the documentary video ($p < 0.001$), but did not change significantly after watching the comedy.

Conclusions

Thirty minutes of watching a comedy eliciting laughter favorably influenced pain tolerance in healthy humans.

Early life experiences impact pain processing

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The association of early life stressors with pain sensitivity and pain experience at 22 years.

Waller R¹, Smith AJ¹, O'Sullivan PB¹, Slater H¹, Sterling M², Straker LM¹.

Early life stress (ELS) can significantly influence biological pathways associated with nociception, increasing vulnerability to future heightened pain sensitivity and subsequent risk of pain events.

However, very little human research has investigated the association of ELS, measured across multiple domains, with future pain sensitivity. Data from Gen1 and Gen2 of the Raine Study were used to assess the association between a wide range of early life stressors, including antenatally, and pressure and cold pain sensitivity at young adulthood.

Participants were classified into 2 groups according to their cold pain sensitivity. In addition, the interaction between ELS, pain sensitivity, and pain experience (based on Örebro Musculoskeletal Pain Questionnaire) at age 22 years was examined. Analysis was performed using both a complete case and multiple imputation approach, adjusting for contemporaneous 22-year correlates, with comparable results in each model.

More problematic behaviour at age 2 years was associated with less pressure pain sensitivity at 22 years (13.7 kPa, 95% CI: 1.0-27.0, $P = 0.037$), with no interaction between problematic behaviour and pain experience at 22 years. For those reporting a moderate/high pain experience at 22 years, poor family functioning increased the odds ratio for high cold pain sensitivity (3.0, 95% CI: 1.6-5.6), but for those reporting no/low pain experience, it did not (OR:1.2, 95% CI: 0.8-1.8).

This study provides the most comprehensive investigation of the relationship between ELS and pressure and cold pain sensitivity in young adults supporting early life as a critical period of development influencing future nociceptive processing.

62 A. NUTRITION/VITAMINS**Intermittent fasting**

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Impact of intermittent fasting on health and disease processes

Mark P. Mattson,^{a,b,*} Valter D. Longo,^c and Michelle Harvie^d

Humans in modern societies typically consume food at least three times daily, while laboratory animals are fed ad libitum.

Overconsumption of food with such eating patterns often leads to metabolic morbidities (insulin resistance, excessive accumulation of visceral fat, etc.), particularly when associated with a sedentary lifestyle. Because animals, including humans, evolved in environments where food was relatively scarce, they developed numerous adaptations that enabled them to function at a high level, both physically and cognitively, when in a food-deprived/fasted state. Intermittent fasting (IF) encompasses eating patterns in which individuals go extended time periods (e.g., 16-48h) with little or no energy intake, with intervening periods of normal food intake, on a recurring basis. We use the term periodic fasting (PF) to refer to IF with periods of fasting or fasting mimicking diets lasting from 2 to as many as 21 or more days. In laboratory rats and mice IF and PF have profound beneficial effects on many different indices of health and, importantly, can counteract disease processes and improve functional outcome in experimental models of a wide range of age-related disorders including diabetes, cardiovascular disease, cancers and neurological disorders such as Alzheimer's disease Parkinson's disease and stroke. Studies of IF (e.g., 60% energy restriction on 2days per week or every other day), PF (e.g., a 5day diet providing 750-1100kcal) and time-restricted feeding (TRF; limiting the daily period of food intake to 8h or less) in normal and overweight human subjects have demonstrated efficacy for weight loss and improvements in multiple health indicators including insulin resistance and reductions in risk factors for cardiovascular disease.

The cellular and molecular mechanisms by which IF improves health and counteracts disease processes involve activation of adaptive cellular stress response signaling pathways that enhance mitochondrial health, DNA repair and autophagy. PF also promotes stem cell-based regeneration as well as long-lasting metabolic effects. Randomized controlled clinical trials of IF versus PF and isoenergetic continuous energy restriction in human subjects will be required to establish the efficacy of IF in improving general health, and preventing and managing major diseases of aging.

62 B. CRYOTHERAPY**Total knee icing****A Pleasant Sensation Evoked by Knee or Hand Icing Influences the Effect on Pain Intensity in Patients After Total knee Arthroplasty: A Prospective, Randomized, Cross-Over Study****Authors** Nishigami T, Nakao S, Kondo H, Oda S, Mibu A**DOI** <https://doi.org/10.2147/JPR.S203493>

Purpose: Cold therapy on the operated area after surgery is often used as an analgesic and to reduce pain, swelling, and increase range of motion. However, evidence to support the results of cold therapy is still scarce and the mechanism underlying its effectiveness remains unclear. The present study aimed to investigate whether a pleasant sensation evoked by icing the treated knee or a site distant from the treated site (the hand) influenced the acute effect on pain intensity in patients who have undergone total knee arthroplasty (TKA).

Patients and methods: A total of 37 patients with knee OA who underwent TKA were enrolled in this study. This prospective, randomized, cross-over study was performed for 2 days consecutively between days 8 and 15 postoperatively. Cold pack was placed on the anterior surface of the treated knee and palm for 10 mins, respectively. The main primary outcomes were the intensity of knee pain during maximal passive knee flexion.

Results: The two-way ANOVA showed significance only in the main effect of a pleasant sensation ($F = 11.3$, $p = 0.001$), but not in the icing site ($F = 0.005$, $p = 0.94$) and interaction ($F = 0.65$, $p = 0.42$).

Conclusion: This study shows that a pleasant sensation evoked by knee or hand icing influenced the effect on pain intensity during maximal knee flexion in patients after TKA. Even if knee icing has no effect on pain and evokes no pleasant sensation, it may be worthwhile to conduct hand icing to reduce pain.