

**The association between pain beliefs and pain intensity and/or disability in people with shoulder pain: a systematic review. Martinez-Calderon J et al. Musculoskelet Sci Pract. 2018 Oct;37:29-57.**

Review Submitted: Casey B Moler

**Objective:** To investigate the association between pain beliefs and pain intensity and/or disability and its predictive and prognostic value in individuals with shoulder pain.

**Methods:** An electronic search using PubMed, EBSCOhost, AMED, CINAHL, EMBASE and PubPysch and grey literature found observational cross-sectional and longitudinal studies from inception to July 2017. The studies selected observational studies with people who had shoulder pain with no systemic disease that reported on pain beliefs and showed the predictive value of pain beliefs on intensity and/or disability.

**Results:** 33 studies were included in the quantitative synthesis, resulting in a total sample of over 10,000 participants with shoulder pain. The pain beliefs assessed were: pain catastrophizing, fear avoidance, kinesiophobia, expectations of recovery, optimism, self-efficacy, fear of pain, internal and external locus of control, preoperative concerns, and beliefs about preferences of treatments. Higher levels of pain intensity and disability were shown to be associated with patients with increased behaviors of pain catastrophizing and kinesiophobia. In addition, these cross-sectional analysis also found that patients who demonstrated better expectations of recovery and self-efficacy were shown to be correlated with decreased levels of pain intensity and disability.

Pain beliefs	Pain intensity						
	Shoulder impingement syndrome	Subacromial shoulder pain	Shoulder instability	Rotator cuff disease	Glenohumeral osteoarthritis	Unspecific Shoulder pain	Multiples shoulder pain conditions
Kinesiophobia	✗ (Clausen et al., 2017)					✗ (George et al., 2008a; b) ✓ (Lentz et al., 2009)	
Fear of pain				✗ (George and Hirsh, 2009)		✗ (George et al., 2008a; b)	
Fear-avoidance beliefs		✗ (Kromer et al., 2014)					
Pain catastrophizing		✓ (Kromer et al., 2014)		✓ (George and Hirsh, 2009) ✗ (Kindler et al., 2011)		✓ (George et al., 2008a; b)	✓ (Menendez et al., 2015)
Expectations of recovery			✗ (Plath et al., 2017)		✓ (Henn et al., 2011)	✓ (Warth et al., 2013)	
Self-efficacy							✓ (Menendez et al., 2015)

Note: ✓: results are statistically significant. ✗: results are not statistically significant.

Pain beliefs	Disability					
	Shoulder impingement syndrome	Rotator cuff disease	Glenohumeral osteoarthritis	Unspecific Shoulder pain	Shoulder pain	Multiples shoulder pain conditions
Kinesiophobia	✗ (Clausen et al., 2017)				✓ (Lentz et al., 2009)	
Pain catastrophizing						✓ (Menendez et al., 2015)
Expectations of recovery		✓ (Razmjou et al., 2009) ✓ (Tashjian et al., 2004)	✓ (Henn et al., 2011)	✓ (Warth et al., 2013)		
Self-efficacy						✓ (Menendez et al., 2015)

Note: ✓: results are statistically significant. ✗: results are not statistically significant.

**Conclusion:** There is some evidence suggesting that pain beliefs can predict the course of pain intensity and disability in individuals with shoulder pain. **Pain catastrophizing and kinesiophobia** (outlined in red in the Figure 1.) were found to be significantly associated with higher levels of pain intensity and disability. While those outlined in green, **expectations of recovery and self-efficacy**, were associated with lower levels of pain and disability. The overall body of evidence of all studies used were found to be quite low after using the GRADE approach. Therefore further research is warranted before firm conclusions can be made.

**Commentary:** Despite the low quality studies included in this review, the results should make practicing clinicians consider and acknowledge the potential for patient's pain beliefs regarding their shoulder pain to be associated with their pain levels and overall disability. Screening for patient's pain beliefs and addressing these modifiable biopsychosocial factors could help achieve more successful results with our treatment of this patients with shoulder pain. Therefore, we should consider properly interviewing and screening our patients with shoulder pain on their pain beliefs. This review also brings to light our ability to educate our patients on expectations for their recovery as it has been shown to be associated with improved patient outcomes. We can also take away from this review how the potential for self-efficacy can positively or negatively impact our patient's prognosis and outcomes. These pain beliefs should be addressed with each individual patient as they are all modifiable and may improve our patient outcomes with shoulder pain.

---

**Intramuscular tendon injury is not associated with an increased hamstring reinjury rate within 12 months after return to play. Anne D van der Made, Emad Almusa, et al. *Br J Sports Med* 2018; 52:1261-1266.**

**Review Submitted by:** Erik Kreil, PT, DPT, CSCS

**Objective:** To determine the association of intramuscular tendon injury with higher reinjury rates in the context of patients with acute hamstring injury.

**Methods:** A prospective study was conducted observing 165 athletes who represented pooled data from 2 double-blinded RCTs studying effect of platelet-rich plasma treatment for acute hamstring injuries. Original MRIs taken within 5 days of the initial event were used to confirm and score intramuscular tendon injuries using the modified Peetrons classification by a musculoskeletal radiologist specific to this study. Participants from the RCTs underwent either a criterion-based three or six-phase rehabilitation program using clinical evaluation to guide return to play clearance. All participants were instructed to contact the principal investigator upon suspected reinjury. Cumulative incidence curves were constructed using 1 minus survival function following SPSS for statistical analysis. A Cox proportional hazards model was used to determine an association between intramuscular tendon injury and reinjury rate.

**Results:** 64 of the participants were found to have sustained an intramuscular tendon disruption hamstring following the acute injury. No significant association was found between presence of intramuscular tendon disruption and rate of reinjury following analysis with 95% confidence. Post-hoc

analysis was conducted at 2 and 3 months after return to play, revealing no significant association between intramuscular tendon injury and reinjury rates.

**Commentary:** This is the largest study of acute hamstring injuries with intramuscular tendon involvement to date. Providing accurate prognosis is important, and return to play clinical decision making can be difficult given the high incidence of reinjury rates following an initial hamstring injury. Prior research suggests that patients playing individual sports with this injury have a higher risk of reinjury, however the current study provides deeper understanding with indication of the alternative when criterion-based rehabilitation programs are involved. This suggests to clinicians that a more conservative approach is not always indicated, as risk of reinjury may not be as significant as previously thought. With this knowledge, we can make more accurate decision making in the final phases of sports-specific rehabilitation and improve overall patient prognosis.

---

**Dry needling versus trigger point compression of the upper trapezius: a randomized clinical trial with two-week and three-month follow-up. Maryam Ziaefar, Amir Massoud Arab, Zahra Mosallanezhad & Mohammad Reza Nourbakhsh. *Journal of Manual & Manipulative Therapy* 2018; DOI: 10.1080/10669817.2018.1530421**

**Review Submitted By:** Jeff Peckins

**Objective:** To determine the effectiveness of dry needling (DN) compared to trigger point compression (TPC) in decreasing pain and improving function in patients with myofascial trigger points (MTrP) in the upper trapezius muscle.

**Methods:** Thirty-three individuals with myofascial trigger points were randomly assigned to either the dry needling or the trigger point compression groups. Subjects received their assigned intervention for three sessions, every other day, for one week. Outcomes assessed were pain intensity via VAS as well as disability via the Neck Pain Questionnaire (NPQ) and Disability of the arm, hand, and shoulder (DASH) questionnaire. Outcomes for pain and disability were assessed before treatment, immediately after treatment (one week), two weeks, and three months.

**Results:** There were significant changes in VAS, NPQ, and DASH with both the DN and TPC groups at all time frames when compared to before treatment ( $p < 0.05$ ). The only statistically significant difference between the DN and TPC groups was a change in pain intensity immediately after the three treatment sessions in favor of the DN group ( $p = .02$ ). The effect size of the DN group was greater than the TPC group at all time points after treatment.

**Conclusion:** Both the DN and TPC groups showed significant changes in pain intensity and neck and upper extremity disability when compared to before treatment scores. The only statistically significant difference between the groups was in pain intensity at one week in favor of the DN group.

**Commentary:** There were not large statistically significant differences between the DN and TPC groups except for in pain intensity at one week in favor of the DN groups. Both groups improved when compared to their pre-treatment scores, however DN overall had larger improvements at all time periods in all outcomes measures besides neck disability after two-weeks. It is likely that if a physical

therapist is certified in DN, it may be advantageous to use DN in the treatment of MTrP as opposed to TPC, especially if the primary goal is short-term pain relief.

An important feature of this study is that it investigates the effectiveness of DN and TPC not only before and after treatment, but also two weeks and three months after treatment. This gives evidence to the effectiveness of both interventions for long-term pain relief and decreased disability. It would be interesting to determine how these results would compare to a placebo or no treatment. Another finding of the study was that the highest amount of pain intensity relief and improved perceived disability was found immediately after treatment. Outcomes typically worsened as time progressed from one week to two weeks, and then again to three months. It is possible that continued treatment could provide continued pain relief and improved disability.

---

**Patterson et al., Worsening Knee Osteoarthritis Features on Magnetic Resonance Imaging 1 to 5 Years After Anterior Cruciate Ligament Reconstruction. *American Journal of Sports Medicine*. 2018. Vol. 46, No. 12. Pages: 2873-2883.**

**Review Submitted by:** Cameron Holshouser, PT, DPT

**Objective:** The objectives of this study were to (1) describe longitudinal changes to early OA features on MRI from 1 to 5 years post-ACLR and (2) determine the association between patient characteristics (age, sex, BMI, time from injury to surgery, meniscus/cartilage defects at time of ACLR, anteroposterior knee laxity) and MRI findings.

**Methods:** Participants underwent a 3.0-T MRI at 1 and 5 years after primary hamstring autograft ACLR. Early tibiofemoral and patellofemoral OA features were assessed with the MRI Osteoarthritis Knee Score (MOAKS) by a single radiologist. The primary outcomes were worsening cartilage defects, bone marrow lesions (BML), osteophytes, and meniscal lesions. Worsening features were defined as any increase in the MOAKS either by an increase in OA feature progression or a new feature that was not present at baseline. This was performed in patellofemoral, medial tibiofemoral and lateral tibiofemoral compartments. Logistic regression was generalized estimating equations evaluated participant characteristics associated with worsening features. Participants met inclusion criteria including ACLR technique and postoperative rehab which was described in the author's previous publication. Brief inclusion criteria included a primary single-bundle hamstring autograft ACLR by 1 of 2 orthopedic surgeons in Melbourne, Australia. Brief exclusion criteria: knee injury/surgery prior to ACL injury, > 5 years between ACL injury and ACLR, secondary injury to ACLR between surgery and 1-year assessment.

**Results:** 78 (48 males) of the 111 participants completed the follow up study. Worsening of cartilage defects in any compartment occurred in 51% of participants, most common in the patellofemoral (44%) joint while medial (10%) and lateral (13%) tibiofemoral compartments also showed changes. Worsening bone marrow lesions were present in 18% at the patellofemoral joint, 6% medial and 13% lateral tibiofemoral. Osteophyte ( $\geq$  grade 2) formation were present in 9% of participants in the patellofemoral joint, 10% in medial tibiofemoral, and 8% in lateral tibiofemoral. Deteriorating meniscal changes were present in 22% of participants. Worsening of at least 1 MRI detected OA feature in any compartment was present in 68% of participants. Radiographic OA in any compartment was evident in 6% of participants at 1 year and 21% at 5 years. Risk factors: baseline BMI > 25 kg/m<sup>2</sup> displayed 2-5 times

greater odds of worsening for all OA features besides BML; participants >26 years old at time of surgery had 4 times greater odds of worsening patellofemoral cartilage defects, anteroposterior knee laxity (>3mm difference) was related to 4 times greater odds of worsening meniscal lesions.

**Conclusions:** This study found high rates of OA-related degenerative changes on MRI in young adults between 1 and 5 years post-ACLR, with two-thirds demonstrating some joint degeneration compared to baseline. Patellofemoral cartilage appears to be the highest risk for early bone degenerative changes, especially those who were older and had higher BMI. Older patients with higher BMI should be educated on the high risk of early degenerative changes post ACLR.

**Commentary:** How quickly these degenerative OA changes are occurring and the fact that they are occurring in such a young population is very concerning. OA changes were occurring in over two-thirds of this ACLR population. The authors state that the rate of cartilage degeneration in healthy older adults occurs at a rate of 2% per annum versus in this study had a degeneration rate of 13% per annum. This shows how rapid post-traumatic OA changes can occur. It was also interesting that the degenerative changes occurred mostly in the patellofemoral joint, especially because all of these patient's underwent a hamstring autograft procedure and not the more common patellar tendon graft. The authors hypothesize that the patellofemoral compartment may be more at risk due to an altered chemical environment after ACLR, pre-existing faulty movement patterns increasing stress on the patellofemoral complex, and/or quadriceps muscle dysfunction. With this knowledge, as physical therapists we need to educate patients who are at risk (individuals over 26 years old with a BMI over 25) on their risk of post-traumatic OA changes. We may need to consider the way we load that tissue either by progressing weight bearing differently, changing movement patterns, manual therapy, strength training, activity restrictions, etc. so that we can decrease the risk of patellofemoral OA so that these patients are not getting knee replacements at 35 years old. The authors state the limitations of this study include: high dropout rate, unblinded MRI, the limited number of patients with OA features influenced statistical stability of regression models, and they included patients with reinjuries and combined injuries to represent a typical ACLR cohort, so some OA changes may have been pre-existing.

---

**Kinematic Differences During Single-Leg Step-Down Between Individuals With Femoroacetabular Impingement Syndrome and Individuals Without Hip Pain. Lewis, C. L., Loverro, K. L., & Khuu, A. J Orthop Sports Phys Ther. 2018 April. 48(4): 270-279. Doi: 10.2519/jospt.2018.7794**

**Objective:** To determine if there are differences in pelvic and LE movement patterns during a single leg step down in those with FAIS as compared to controls. They also sought to analyze the differences in these movement patterns when comparing males and females.

**Methods:** FAIS subjects with hip pain >2 weeks needed to be diagnosed via imaging and clinical exam, including (+) FADDIR, FABER, or SLR. All subjects (control and FAIS) performed a single leg step down off of a 16cm step. The subject lowered and raised the non-stance leg by bending on the stance leg until the heel lightly tapped the floor at a cadence of ~60 beats per minute. Hip and knee joint angles, as well as pelvic, thigh, and shank segment angles, in the sagittal and frontal planes were extracted at 60° of knee flexion during the descent phase for each trial. These values were then averaged for each participant to produce the dependent variables of the study.

**Results:** There were 20 subjects with FAIS and 40 subjects without hip pain. During the step down task, subjects with FAIS had greater hip flexion angle (4.9°) and anterior pelvic tilt (4.1°) when comparing with those without hip pain. When comparing males and females in the FAIS group; females had more hip flexion (6.1°), more hip adduction (4.8°), more anterior pelvic tilt (5.8°), more contralateral pelvic drop (1.4°), and more thigh adduction (2.7°). Again, all of these comparisons were analyzed at 60° of knee flexion. All above values were considered to be statistically significant ( $p < 0.05$ ).

**Conclusions:** During a single leg step down, subjects with FAIS had altered hip and pelvic kinematics (increased hip flexion and anterior pelvic tilt) as compared to those without hip pain. In those with diagnosed FAIS, females were also shown to have altered kinematics (increased hip flexion, hip adduction, anterior pelvic tilt, C/L pelvic drop, and thigh adduction) as compared to males.

**Commentary:** In those with FAIS, common thought would be that they would avoid positions that would lead to symptom reproduction via compression/impingement. This study found that subjects with FAIS actually had greater hip flexion angle during a single leg step down. This can be attributed to an increase in anterior pelvic tilt during the movement, which corresponds with other studies that analyzed pelvic angles during other tasks (i.e. bilateral squat, stair climbing, active hip flexion in standing). The chicken or the egg debate arises from the findings of this study. Did the pain the subjects with FAIS experience cause the altered biomechanics? Or was the altered biomechanics the cause of the FAIS development? As the authors state, it is not possible to determine this from this study's results, but it can be theorized that this compensation was once painless/optimal and is now painful (pain theory). Either way, it gives us something that we can work on from a physical therapy standpoint that can limit the patient's symptoms, whether it be a mobility (capsular/soft tissue) restriction or impaired neuromuscular motor control.

---

**Citation:**

Physiologic preoperative knee hyperextension is a predictor of failure in an anterior cruciate ligament revision cohort. The MARS group et al. *Am J Sports Med.* 2018 Oct;46(12):2836-284. doi: 10.1177/0363546518777732.

**Review Submitted by:** Matt Fung

**Objective:** The purpose of this study was to determine the prevalence of preoperative physiologic knee hyperextension (HE) in a large revision anterior cruciate ligament reconstruction (ACLR) population and to determine its effects on 2-year outcome. The study hypothesis was that preoperative physiologic knee HE  $\geq 5^\circ$  is an independent risk factor for anterior cruciate ligament (ACL) graft rupture 2 years after revision.

**Methods:** Patients undergoing revision ACLR from 2006 to 2011 were identified and prospectively enrolled into this cohort study. Exclusion criteria consisted of patients undergoing double bundle reconstructions due to their potential to limit terminal knee extension. Thus, the study included only those patients who received single bundle ACL graft. Passive knee extension were measured on both knees under anesthesia by the participating surgeon. Patients were followed up at 2 years and asked to complete an identical set of outcome instruments (International Knee Documentation Committee, Knee injury and Osteoarthritis Outcome Score, WOMAC, and Marx Activity Rating Scale) as well as provide

information regarding revision ACL graft failure. A regression model with graft failure as the dependent variable included age, sex, graft type at the time of the revision ACL surgery, and physiologic pre-operative passive HE  $\geq 5^\circ$  (yes/no) to assess these as potential risk factors for clinical outcomes 2 years after revision ACLR. A logistic regression model was used to analyze 4-independent variables – age, sex, graft type (autograft vs allograft), and symmetric knee HE  $\geq 5^\circ$  vs  $< 5^\circ$  - to assess these potential risk factors on outcomes 2-years after revision.

**Results:** The cohort study included 1145 patients, for whom 2-year follow-up attained 91%. The median age was 26 years, and 42% were female. There were 50% autografts, 48% allografts, and 2% had combined autograft and allograft. Passive knee HE  $\geq 5^\circ$  was present in 374 (33%) of the revision cohort, with 52% of being female. There were 34 known graft ruptures in the entire cohort, of which 12 were in the HE  $\geq 5^\circ$  group (3.2% failure) and 22 in the non HE  $\geq 5^\circ$  group (2.9% failure). Median age of patients who suffered graft failure were 19 years old. Three variables in the regression model were significant independent predictors of graft failure: younger age ( $< 26$ y/o) odds ratio (OR)= 3.6; use of allograft, OR=3.3; and HE  $\geq 5^\circ$ , OR= 2.12. Sex was not identified as a predictor of graft failure in this study, OR=1.5.

**Conclusions:** This study found that preoperative physiologic passive knee HE  $\geq 5^\circ$  is present in one-third of patients who undergo revision ACLR. Passive knee HE  $\geq 5^\circ$  was found to be an independent significant predictor of graft failure after revision ACLR, with a 2.12 OR of subsequent graft rupture. Younger age and use of allograft tissues for ACLR were also found to be significant independent predictors of graft failure with an OR of  $> 3$ .

**Commentary:** It is important to recognize the identified potential preoperative risk factors associated with post-operative graft failure within a 2-year period. As physical therapists we do not always get the opportunity to work with these patients preoperatively but we can assess their uninjured limb to determine their baseline laxity and normal ROM. We need to consider other patient specific risk factors and goals in addition to the objective preoperative passive knee HE  $\geq 5^\circ$  that could additionally increase the risk for graft failure. The combination of these risk factors will help to determine my progression of their ACLR rehabilitation. I will continue to treat each individual patient based on their presentation attempting to regain passive ROM to their normal while considering surgeon recommendations. Limitations of this study include patient reports graft failure non confirmed by MRI, physical examination, or objective laxity measurements.