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**Paul Chesterton, William Evans, Nick Livadas & Shaun J. McLaren (2019) Time-course changes associated with PA lumbar mobilizations on lumbar and hamstring range of motion: a randomized controlled crossover trial, *Journal of Manual & Manipulative Therapy*, 27:2, 73-82, DOI [10.1080/10669817.2018.1542558](https://doi.org/10.1080/10669817.2018.1542558)**

**Review Submitted By:** Erik Kreil

**Objective:** Compare pre- and post-treatment measures of active knee extension and lumbar flexion ROM in response to L4/L5 UPA joint mobilizations.

**Methods:** In this controlled crossover trial, 24 asymptomatic males were divided into either an intervention group, where they received L4/5 UPA mobilizations, and a control group. Active knee extension and active lumbar flexion measures were performed at baseline and intervals of 5 minutes from 5-60minutes after intervention.

**Results:** The intervention group demonstrated changes in mean active knee extension from 37.2 degrees from full extension to 9.8 degrees +/- 1.9 closer to full extension, where active lumbar flexion improved mean baseline of 14.37cm by 1.34cm with a 90% confidence interval. Observed gains diminished considerably at 20 minutes post-treatment to just 5.3 degrees, worse at 60 minutes post-treatment to just 2.1 degrees. Active lumbar flexion gains reduced at 15 minutes post-treatment to just 0.76cm, worse at 60 minutes to just 0.26cm.

**Conclusion:** Effect of UPA mobilizations had a moderate effect on active knee extension and lumbar flexion within 15-20 minutes post-treatment, however the magnitudes of its effect on both measures became small or trivial after this time period, sequentially worse as measures were taken closer to 60 minutes post-treatment.

**Commentary:** Physical therapy practice models vary considerably, some of which push clinicians to order their treatments in a specific sequence (i.e, exercise before manual therapy). The results of this study express the important of considering the time-course changes for observed benefit after a prescribed treatment. Manual therapy techniques, such as unilateral posterior-anterior mobilizations, may benefit your patient; however, if the observed benefit has an exponential reduction in magnitude, the treatment would be more beneficial to be used prior to exercise and not standalone.

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**Franke TPC, Backx FJG, & Huisstede BMA. Running themselves into the ground? Incidence, prevalence, and impact of injury and illness in runners preparing for a half or full marathon. *J Orthop Sports Phys Ther*. 2019;49(7):518-528**

**Review Submitted By:** Matt Fung PT, DPT

**Objective:** The primary aim of the study was to describe the incidence, prevalence, and impact of running-related injuries (RRI) and illness symptoms in half marathon and marathon runners during a 16-week preparatory period before the Utrecht Marathon, for both the half and full marathon events.

**Methods:** Prospective cohort study used the Oslo Sports Trauma Research center (OSTRC) questionnaire to register RRI's and illness symptoms every 2 weeks during the 16-week study period. When an injury

or illness occurred, questions were added regarding its nature. Incidence proportion (number of new cases divided by the number of runners at risk) was calculated along with the period prevalence (number of existing and new cases within a 2-week period, divided by the total number of runners at risk during that period.)

**Results:** Of the 161 runners included in the study, 9 out of 10 reported a RRI or illness symptom at some time during the study period. In any 2-week period, 5.6%-14.8% of the runners reported a new RRI, and 6.3% to 13.8% of the runners reported a new illness symptom. The prevalence of RRIs ranged from 29.2% to 43.5%, and the prevalence of illness symptoms ranged from 28.3% to 71.2%. The most prevalent RRIs were in the lower leg (5.4-12.3%) and knee (2.7-9.3%). The most prevalent illness symptoms were rhinorrhea/sneezing (3.9-12.7%) and coughing (3.9-11.9%). The incidence and prevalence of illness symptoms peaked at the same time as the influenza-like illness epidemic of the winter of 2015-2016.

**Conclusion:** Nine out of every 10 runners reported an RRI or illness symptom during the 16-week period in the lead-up to a half marathon or full marathon. One in every three runners reported an RRI, and half reported illness symptoms. In any 2-week period, up to 1 in 7 runners reported a new RRI. The most prevalent RRIs affected the lower leg and knee. Ankle and substantial groin RRIs had the greatest impact. The most prevalent illness symptoms were rhinorrhea/sneezing and coughing. Fever, substantial shortness of breath, substantial sore throat, and substantial coughing were the symptoms that had the greatest impact.

**Commentary:** Interesting article performed here with plenty of relevance to our field as we see many novice and experienced runners presenting to the clinic with training related injuries. This study had its limitations in regards to a small population size preparing for a half and full marathon in Utrecht Netherlands using a self-report as their main means for data collection. The findings however were fairly substantial reporting 9 out of every 10 runners reporting RRIs in the 16-week lead up period to the marathon. Of the included participants a little less than half the population included in this study had no prior half or full marathon experience. I would be curious to see what type of running regimens or mileage these individuals were running per week and day and if they were receiving any advice on how to ramp up prior to the event.

With all this being said I feel that our role is to educate these individuals on creating a progressive training schedules with cues to not train through pain, as that would most likely only lead to overuse injuries and prolong their effects.

TABLE 5

## TYPE OF RRIs DURING THE 16-WEEK PREPARATORY PERIOD BEFORE THE UTRECHT MARATHON\*

Type of RRI	All RRIs	Substantial RRIs <sup>†</sup>
Muscle and tendon injuries (eg, jumper's knee or tendinitis)	188 (46.7)	87 (43.3)
Overuse RRIs	127 (31.5)	58 (28.9)
Distortion	22 (5.5)	15 (7.5)
Spinal injury or hernia	15 (3.7)	13 (6.5)
Contusion	8 (2.0)	2 (1.0)
Cartilage injury	6 (1.5)	3 (1.5)
Joint luxation	3 (0.7)	0 (0.0)
Bone fracture	3 (0.7)	1 (0.5)
Other	31 (7.7)	22 (11.0)
Total	403 (100.0)	201 (100.0)

Abbreviation: OSTRC, Oslo Sports Trauma Research Center; RRI, running-related injury.

\* Values are n (percent).

<sup>†</sup> Substantial RRIs are defined as scores of 13 or greater on questions 2 and/or 3 on the OSTRC questionnaire.

**NEDERLANDSE VERSIE VAN DE OSLO SPORTS TRAUMA RESEARCH CENTER (OSTRC)  
VRAGENLIJST MONITOREN VAN BLESSURES EN ZIEKTES\***

De volgende vragen gaan over de afgelopen twee weken. Geef alle vragen te beantwoorden, ongeacht of u gezondheidsproblemen heeft meegemaakt gedurende deze periode. Kies het antwoord dat het beste bij u past. In geval van twijfel, wilt u dan de meest geschikte optie selecteren.

Indien u verscheidene ziekten en/of blessures ondervindt, refereer a.u.b. naar de klacht die u het heftigste ondervond gedurende de afgelopen 2 weken. Aan het eind van de vragenlijst krijgt u de mogelijkheid om additionele gezondheidsproblemen te rapporteren.

Vraag 1: Heeft u problemen ondervonden bij het uitvoeren van een training en/of wedstrijd ten gevolge van een blessure, ziekte of andere gezondheidsproblemen gedurende de afgelopen 2 weken?

- Volledige uitvoering zonder gezondheidsproblemen 0  
 Volledige uitvoering, inclusief blessure/ziekte 8  
 Verminderde uitvoering vanwege blessure/ziekte 17  
 Geen uitvoering vanwege blessure/ziekte 25

Vraag 2: In hoeverre heeft u uw trainingsomvang moeten aanpassen ten gevolge van een blessure, ziekte of andere gezondheidsproblemen gedurende de afgelopen 2 weken?

- Geen vermindering 0  
 In minimale hoeveelheid 6  
 In matige hoeveelheid 13  
 In grote hoeveelheid 19  
 Niet in staat tot uitvoering 25

Vraag 3: In hoeverre heeft een blessure, ziekte of andere gezondheidsproblemen effect gehad op uw prestaties gedurende de afgelopen 2 weken?

- Geen effect 0  
 In minimale hoeveelheid 6  
 In matige hoeveelheid 13  
 In grote hoeveelheid 19  
 Niet in staat tot uitvoering 25

Vraag 4: In hoeverre heeft u symptomen/gezondheidsklachten ervaren gedurende de afgelopen 2 weken?

- Geen symptomen/gezondheidsklachten 0  
 Milde symptomen/gezondheidsklachten 8  
 Matige symptomen/gezondheidsklachten 17  
 Ernstige symptomen/gezondheidsklachten 25

De OSTRC somscore berekent u door de antwoordscores per vraag bij elkaar op te tellen. Indien bij vraag 2 en/of 3 de score  $\geq 13$  is spreekt men van een "substantiële" gezondheidsklacht.

## OSTRC Questionnaire

**Citation:** Liu JN, Gowd AK, Garcia GH, et al. Analysis of Return to Sport and Weight Training After Repair of the Pectoralis Major Tendon. *The American Journal of Sports Medicine*. 2019;47(9):2151-2157. doi:10.1177/0363546519851506.

**Review Submitted By:** Jon Lester

**Objective:** To evaluate the level of return to sport and return to weight lifting in subjects after a pectoralis major repair (PMR).

**Methods:** 60 subjects (39.6 +/- 8.8 years old) were recruited for this study. The study design was a retrospective analysis of subjects s/p PMR after either acute (<6 months) or chronic PMT rupture. Subjects were provided with a standardized questionnaire to determine several outcomes after their surgery; preinjury sport participation, level of competition, postoperative sport participation, level of competition, and time to return to sport. American Shoulder and Elbow Surgeon (ASES) scores were also recorded pre-op and at latest post-op follow-up. Outcome measures were the differences in pre-injury and post-operative sport participation/level of competition, 1RM barbell bench press, 5RM barbell bench press, 1RM dumbbell fly, and consecutive pushups. Additionally, they evaluated satisfaction levels in several categories; the surgery itself, RTS ability, return to lifting ability, and general cosmetic appearance.

**Results:** The average duration from injury to surgery was 3.8 +/- 9.4 months, while average time from injury to survey was 55.4 +/- 25.5 months. There was a 6.8% complication rate that required return to the operating room (re-rupture, infection). ASES scores were statistically improved when comparing pre-op scores (63.4 +/- 21.8) to last follow-up appointment (90.9 +/- 17.0), (P<.001). 97.7% of subjects reported return to sport post surgery, however only 50% reported a return at or above their PLOF in that sport. 38.6% of subjects reported apprehension with weight lifting post-op. Satisfaction levels with the surgery, RTS, return to lifting, and general aesthetics are reported in Table 2. Additionally, Table 2

lists the above weight lifting/push up strength levels and reports the percentage change when comparing pre-op to post-op.

**TABLE 2**  
**Postoperative Outcomes After Pectoralis Major Repair<sup>a</sup>**

	Mean ± SD or n (%)
<b>Complications</b>	
Return to operating room	3 (6.8)
Infection: irrigation and debridement	1 (2.3)
Infection: irrigation and debridement + implant removal	1 (2.3)
Failure: revision pectoralis major repair	1 (2.3)
<b>Sporting outcomes</b>	
Apprehension with lifting	17 (38.6)
1RM barbell bench, lbs	
Preoperative	297.7 ± 81.0
Postoperative	212.2 ± 74.5
Percentage change, decrease	23.3 ± 45.6
5RM barbell bench, lbs	
Preoperative	246.3 ± 73.0
Postoperative	183.7 ± 62.6
Percentage change, decrease	14.7 ± 62.3
1RM dumbbell bench, lbs	
Preoperative	113.8 ± 51.8
Postoperative	79.8 ± 35.1
Percentage change, decrease	24.3 ± 21.8
1RM dumbbell fly, lbs	
Preoperative	55.2 ± 25.5
Postoperative	39.7 ± 18.9
Percentage change, decrease	35.7 ± 32.1
Consecutive push-ups, reps	
Preoperative	53.5 ± 27.5
Postoperative	41.0 ± 22.5
Percentage change, decrease	15.6 ± 39.8
Return to sport	43 of 44 (97.7)
Return to sport: same or better intensity	22 (50.0)
Change in overall fitness since surgery	
Better	6 (13.6)
Same	22 (50.0)
Worse	16 (36.4)
<b>Good/excellent satisfaction</b>	
<b>Surgery</b>	
Excellent	35 (79.5)
Good	25 (56.8)
<b>Sport</b>	
Excellent	10 (22.7)
Good	30 (68.2)
<b>Fitness</b>	
Excellent	15 (34.1)
Good	15 (34.1)
<b>Cosmesis</b>	
Excellent	29 (65.9)
Good	11 (25.0)
<b>Cosmesis</b>	
Excellent	18 (40.9)
Good	29 (65.9)
Excellent	18 (40.9)
Good	11 (25.0)

**Conclusions:** Low complication rates and a very high likelihood of returning to sport can be expected post PMR. However, only 50% of subjects post PMR reported a return to their PLOF in regards to intensity of sport. Additionally, strength levels are considerably lessened for exercises that recruit the pec major as a primary mover (bench press and push ups).

**Commentary:** The findings of this study give us insight on what we can expect for patients that undergo a PMR and are involved in sports/weight lifting. The high likelihood 97.7% of returning to sport is promising, but providing the realistic expectation (for us and the patient) that return to prior level of intensity is not always attainable is beneficial from an educational standpoint. The incidence of only 3 out of 60 subjects reporting complications is also an education piece that can potentially reduce fear upon return to a lifting routine or sports integration programs. This could decrease the likelihood of being fearful with lifting, which might have contributed to the occurrence of lifting apprehension in the present study. Overall, this study gives us a great educational tool to show that good functional outcome and RTS s/p PMR is expected, however return to strength levels with exercises that rely on the pec major might not reach pre-op levels in the time table utilized in this study (51.1 +/- 24.1 months).

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**Khan T, Alvand A, Prieto-Alhambra D, et al.(2019). ACL and meniscal injuries increase the risk of primary total knee replacement for osteoarthritis: a matched case-control study using the Clinical Practice Research Datalink (CPRD). *British Journal of Sports Medicine*, 53, 965-968.**

**Review Submitted By:** Casey Moler

**Objective:** Compare and quantify the risk of undergoing a TKR for end stage knee OA in individuals with a history of meniscal injury or ACL rupture compared to the risk of those without a history of ACL or meniscal injury.

**Methods:** A matched case–control study of all TKRs performed in the UK over a 20 year period recorded in the Clinical Practice Research Datalink (CPRD) was undertaken. The CPRD used in this study contains longitudinal data on approximately 3.6 million patients and spans over 480 practices. Two controls were selected for each case of TKR (excluding those with hx of inflammatory arthritis). Criteria for matching cases to controls were based on age, sex and general practitioner location as a proxy for socioeconomic status. Risk of having a TKR for individuals with ACL injury were compared to those without using conditional logistical regression. Adjustments were made to account for BMI, previous meniscal and knee fracture injuries. The adjusted odds of TKR in individuals with a recorded meniscal injury (read codes using “acute” pathology) compared with those without were calculated as well.

**Results:** After exclusion of individuals with inflammatory arthritis, there were 49, 723 in the case group and 104, 353 controls. 153 (0.31%) cases had a history of ACLi compared with 41 (0.04%) controls. The adjusted OR of TKR after ACLi was 6.96 (95% CI 4.73 to 10.31). There were 4217 (8.48%) individuals in the TKR group were recorded with meniscal injury compared with 669 (0.64%) controls. The adjusted OR of TKR after meniscal injury was 15.24 (95% CI 13.88 to 16.69).

**Conclusion:** This study demonstrates that sustaining an ACL injury is associated with a sevenfold increase in odds of TKR resulting from OA. Meniscal injury is associated with a 15-fold increase odds of TKR for OA.

**Commentary:** The authors state this is the first epidemiological study to study the link between acl and meniscal injury to TKR with 20-year longitudinal data.

Prior studies found similar results with RR of injury being ~3.84, however cohort was very small. This study, despite its inability to truly calculate relative risk, found a very strong association between exposure and the outcome with a large sample size. Therefore suggesting a much higher association than other studies, and may be due to longer follow-up and comparison from a control group rather than the contralateral knee in previous studies.

The results from this study also found those individuals with a history of ACL or meniscal pathology were treated with TKR at significantly younger ages compared to the control group. Previous ACL injury treated by TKR compared to no prior history of ACL injury was found on average to have the surgery **15 years younger than the control group**. The case group with meniscal pathology compared to the control was ~5 years younger than the control group.

There are some flaws to the study decision and assumptions made that perhaps were important potential confounders. Knowing that both the ACL and meniscal injuries that were extracted from the medical records did not specify whether these pathologies were treated conservatively or surgically. It was also not in their ability to establish the laterality of the TKR and the ALC therefore these numbers are based on the assumption that the side of injury was the same side that underwent the TKR.

Based on this research, the authors suggest that 25,000-30,000 TKRs per year are attributable to ACL injuries and could be used to support further research and strategies for injury prevention, rehabilitation protocols and treatment methods after meniscal or ACL injury.

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**Citation:** Whittaker, Glen A., et al. "Effectiveness of Foot Orthoses Versus Corticosteroid Injection for Plantar Heel Pain: The SOOTHE Randomized Clinical Trial." *Journal of Orthopaedic & Sports Physical Therapy*, vol. 49, no. 7, 2019, pp. 491–500., doi:10.2519/jospt.2019.8807.

**Review Submitted By:** Jeff Peckins

**Objective:** To determine if foot orthoses or corticosteroid injections are more effective at treating short, medium, and long-term plantar heel pain.

**Methods:** The RCT had an inclusion criteria of 100 participants 18 years old or greater, diagnosis of plantar heel pain of minimum 4 weeks duration, and a self-reported average pain of 30/100 via visual analog scale (VAS). The foot orthosis group were given a prefabricated foot orthosis from a podiatrist, who made the orthosis specifically for each participant in the group. The corticosteroid injection group was given one ultrasound guided injection by a radiologist. Participants in both groups were given a plantar fascia and calf stretching program, as well as education. Participants in the foot orthosis group were asked about adherence to usage, and participants in both groups were asked about adherence to their HEP. The primary outcome measure was the foot pain subscale of Foot Health Status Questionnaire (FHSQ). There were numerous secondary outcomes looking at function, overall improvement in symptoms, average pain on first-steps, and other outcomes.

**Results:** At 4 weeks, those in the corticosteroid injection group demonstrated larger improvements in the FHSQ foot pain subscale compared to the foot orthosis group. At 8 weeks the groups had similar pain levels. At 12 weeks, the foot orthosis group demonstrated larger improvements in the FHSQ foot pain subscale compared to the corticosteroid injection group.

The foot orthosis group demonstrated decreased first-step pain at week 12 compared to the corticosteroid injection group, while they had similar results at weeks 4 and 8. Overall improvement favored the corticosteroid injection group at week 4 and favored the foot orthosis group at weeks 8 and 12, although this did not reach statistical significance.

**Conclusion:** The RCT found that corticosteroid injection group demonstrated more effectiveness in reducing short-term pain, however the foot orthosis group demonstrated more effectiveness in reducing long-term pain.

**Commentary:** The results of this RCT are similar to what previous studies have found, therefore the findings should be very solid. If a patient is having a lot of pain, or has a need to have quick pain relief (such as an upcoming athletic event), I think that a corticosteroid injection would be the preferred intervention. In contrast, the results support the use of prefab foot orthoses for longer-term pain relief. There is no mention if there is an additive benefit to using both interventions, so further research could answer this question.

It is worth noting that both groups improved in both primary and secondary outcomes measures from baseline. I think it is interesting that both groups improved without having any formal physical therapy. This could potentially indicate that physical therapy is not always necessary in those with plantar heel pain. It would be interesting to see if PT demonstrated better or worse outcomes compared to these interventions, or if PT in addition to these intervention demonstrated even better outcomes.

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**Griswold, D., Wilhelm, M., Donaldson, M., Learman, K., & Cleland, J. (2019). The effectiveness of superficial versus deep dry needling or acupuncture for reducing pain and disability in individuals with spine-related painful conditions: a systematic review with meta-analysis. *Journal of Manual & Manipulative Therapy*, 1-13.**

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

**Objective:** The purpose of this systematic review was to evaluate the effects of deep versus superficial dry needling (acupuncture) on pain and disability for spine-related painful conditions. A secondary purpose was to account for the difference of needling location in relation to the painful area.

**Methods:** This PROSPERO registered review found 691 titles through a multi-database search. Following a comprehensive search, 12 studies were included in the systematic review and 10 in the meta-analysis. Standardized mean differences (SMD) with 95% CI were calculated for pain and disability. Each of the studies included in the study addressed the effectiveness of dry needling or acupuncture on musculoskeletal complaints with an emphasis on chronic spinal conditions.

**Results:** The included studies demonstrated an unclear to high risk of bias recommending a *cautious* interpretation of the results. A consistent effect supporting deep needling over superficial with an SMD of 0.585 (0.335-0.835),  $p < 0.001$  from 10 articles for pain but a non-significant effect of 0.197 (-0.066, 0.461),  $p = 0.14$  from 2 studies for disability. A temporal examination was similar for effects on pain with an SMD of 0.470 (0.135, 0.805) for time-points  $\geq 12$  weeks. Regionally, there was a greater effect needling the area of pain locally (SMD = 0.754) compared to remotely (SMD = 0.501).

**Conclusions:** Statistically significant between-group differences were observed favoring deep needling over superficial. Both superficial and deep needling resulted in clinically meaningful changes in pain scores over time. However, differences between groups may not be clinically meaningful. More high-quality trials are needed to better estimate the effect size of deep versus superficial needling while controlling for location and depth of the lesion. Level of evidence: 1a.

**Commentary:** The risk of bias assessment was a key component to this article. The risk of bias analysis demonstrated unclear risk of bias due to the variability of risk with the studies used in this systematic review and meta-analysis. Because of that, the results of this study should be used with caution. After taking the bias into consideration, this study found significant differences favoring deep vs superficial needling in regard to pain. There were no differences in disability measures. This was surprising because both pain and disability measures are subjective. So the individual may acknowledge that their spinal pain improved following deep dry needling yet, their function remained the same. This may indicate the use of dry needling in combination of other interventions for spinal pathology to help improve disability scores. I think this paper also highlights the difference between superficial needling with acupuncture and deep dry needling with physical therapy. The performance of dry needling by physical therapists still continues to be a highly debated topic as acupuncturists continue to speak against the current dry needling regulations in Virginia. This paper highlights that there are differences in pain reduction with deep dry needling versus superficial acupuncture needling. This most recent JMMT issue has many dry needling articles to aid to the literature of dry needling within physical therapy. Again, despite the high level of evidence, interpreting the results of this study should be viewed with caution.

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