

**Horno SM-D, Balasch-Bernat M, Dueñas L, Reis F, Louw A, Lluch E. Laterality judgement and tactile acuity in patients with frozen shoulder: A cross-sectional study. *Musculoskelet Sci Pract.* 2020;47. doi:10.1016/j.msksp.2020.102136**

**Review Submitted by:** Anna Wilson

**Background/Objective:** Disrupted tactile acuity and poor laterality judgment have been shown in several chronic musculoskeletal pain conditions, however, this hasn't been specifically studied in the frozen shoulder population. This study's aim was to determine if there is impairment in tactile acuity and laterality judgment in subjects with frozen shoulder.

**Methods:** This study included 38 subjects with frozen shoulder and 38 sex and age-matched healthy controls. Testing included two-point discrimination threshold (TPDT) and a left/right judgment task (LRJT). Data for TPDT was collected for both the affected and unaffected shoulders of subjects with frozen shoulder and the dominant arm of subjects in the control group. Dependent t-tests were used to compare within group differences and independent t-tests were used to compare between group differences. They also performed correlation analysis between pain intensity and duration and LRJT and TPDT for the frozen shoulder group.

**Results:** The TPDT over the affected shoulder was significantly increased compared to the unaffected shoulder (mean difference 3.82 mm) and controls (mean difference 5.80 mm). Patients with frozen shoulder were less accurate (mean difference 5.90%) and slower (mean difference 0.26 s) responding to images of their affected shoulder compared to their unaffected shoulder. No associations were found between pain intensity and duration and either TPDT or laterality judgment.

**Conclusion:** Participants with frozen shoulder demonstrated reduced tactile acuity over their affected shoulder when compared to their unaffected shoulder and controls. In comparison to the unaffected shoulder, less accuracy and a delayed response time in a LRJT was found in the affected shoulder of the frozen shoulder group. The authors concluded, however, that the results should be interpreted with caution, as the clinical meaningfulness of these findings remains unknown.

**Commentary:** I thought this was an interesting article that aimed to identify changes in clinical measures that may be indicative of cortical reorganization. A few notable limitations of the article include no blinding of assessors, practice trials for LRJT was not in line with previous recommendations to ensure atomicity of response, a relatively small sample size (however did meet power analysis), and no specified MCID for comparison. The authors did make note of the size of the changes they observed and questioned the clinical relevance of this. I still think that this provides interesting information for considering effects of chronic pain states on cortical reorganization and the clinical manifestations of that. Even in patients that you might not classify in the "central sensitization category" but have had significant

pain for long periods of time, like with frozen shoulder, are there specific interventions that may help us improve our treatment? Or are we naturally reversing these potential changes through just promoting use of the affected arm through range of motion and strength interventions? I think there would need to be more research to answer that specific question but some food for thought!

**Räisänen AM, Kulmala T, Parkkari J, et al. There Is No Relationship Between Lower Extremity Alignment During Unilateral and Bilateral Drop Jumps and the Risk of Knee or Ankle Injury: A Prospective Study. Journal of Orthopaedic & Sports Physical Therapy. 2020;50(5):267-274. doi:10.2519/jospt.2020.9247**

Review Submitted By: Barrett Coleman

## **Objectives**

Investigate the relationship between LE alignment during unilateral and bilateral drop jump tests and the risks of future noncontact knee/ankle injuries in sports athletes.

## **Methods**

A 2-dimensional video analysis was used to measure the frontal plane knee projection angle in the single-leg vertical drop jump (VDJ) and the bilateral VDJ in young team sport athletes. Out of the 364 athletes (187 male, 177 female), 189 played basketball and 175 played floorball (floor hockey). Athletes were then followed during their season for noncontact injuries that held them out of their sport.

## **Results**

Six male athletes sustained knee injuries and 23 sustained ankle injuries. Frontal plane knee projection angle in the single-leg VDJ or the bilateral VDJ was not associated with ankle injuries among male athletes. No statistical analysis was performed for the knee injuries. Among female athletes, 28 sustained knee and 41 sustained ankle injuries. Frontal plane knee projection angle during the single-leg VDJ or the bilateral VDJ was not a risk factor for knee or ankle injuries.

## **Conclusions**

Lower extremity alignment during unilateral and bilateral drop jump tests was not associated with future noncontact knee or ankle injuries among young team sport athletes. The findings should be interpreted cautiously due to the small number of injuries

## **Commentary**

At first, I thought this article was going to disavow the idea that frontal plane deviations are the scourge of all cutting sports. After looking more deeply into the purpose of the study, I think this study more supports that idea that injuries are multi-factorial and valgus is only A factor instead of THE factor.

The study was an attempt to find an easy way for people to be screened for injuries. From there, we could easily identify those at risk and put them into injury prevention programs. This reduced the variables investigated to just two: 1) the amount of front plane deviation 2) the binary of injury or no injury. In the discussion, the authors talked about the myriad of other factors not captured, like the lack of DF affecting functional deviations. They came to the conclusion that functional testing alone is probably not enough to get a clear picture of someone's risk profile.

This fits well with what we know from clinical reasoning in other domains: one finding is no finding - we need a collection of impairments to feel comfortable with diagnosing and treating. When it comes to injury prevention, it seems to be no different. While these tests alone do not predict future injuries, they still provide valuable information within a bigger clinical reasoning picture and shouldn't be thrown away.

**Blood Flow Restriction Training Applied With High-Intensity Exercise Does Not Improve Quadriceps Muscle Function After Anterior Cruciate Ligament Reconstruction A Randomized Controlled Trial Michael T. Curran,\* MEd, ATC, Asheesh Bedi,y MD, Christopher L. Mendias,yz§ PhD, ATC, Edward M. Wojtys,y MD, Megan V. Kujawa,\* and Riann M. Palmieri-Smith,\*y|| PhD, ATC Investigation performed at the University of Michigan, Ann Arbor, Michigan, USA**

**Review Submitted by: Brandon Reynolds**

**Objective :** To examine the efficacy of BFRT with high-intensity exercise on the recovery of quadriceps muscle function in patients undergoing ACLR.

**Methods :** Randomized clinical trial with randomization generated by the principal investigator with the assignment was placed in a sealed envelope. Patients scheduled to undergo ACLR were randomly assigned, using block randomization, into one of four groups: 1) concentric exercise only, 2) eccentric exercise only, 3) concentric exercise with BFRT, and 4) eccentric exercise with BFRT. The study started at 10 weeks post-op and was delivered for 8 weeks. Study testing was completed at 4 time points 1) within 2 weeks pre-operatively, 2) before starting the intervention, 3) within 2 weeks after completing the study intervention, 4) after clearance to return to activity. Primary outcome measures were change in isometric and isokinetic quadriceps muscle strength from preoperative to post-intervention and from preoperative to RTA. Secondary outcome measures include change in rectus femoris muscle volume and central activation ratio (CAR) from preoperative to post-interventions and from preoperative to RTA. Tertiary outcome measures are the following: 1) change in rectus femoris muscle volume from pre-intervention to post-intervention, 2) change in the International Knee Documentation Committee (IKDC) score from preoperative to post-intervention, 3) change in the IKDC score from preintervention to postintervention, 4) change in the 1-repetition maximum leg press from preintervention to postintervention, and 5) change in the IKDC score from preoperative to RTA.

Inclusion criteria include: age 14-30 years, willing to participate in interventions and follow-up testing as outlined in the protocol. Exclusion criteria includes: 1) prior knee surgery, 2) previous ACL injury, 3) received surgical interventions on a knee ligament other than the ACL, 4) a cardiac demand-type pacemaker, 5) a history of blood clots or DVT, 6) a history of cerebrovascular disease, 7) using estrogen or progestin contraceptives, 8) a history of sickle cell anemia, 9) history of diabetes,

and 10) history of severe hypertension. Also, any female patient who was pregnant or planning to become pregnant over the next year was excluded.

Thirty-four patients (19 female, 15 male) participated in the three testing sessions and study interventions.

The exercise component of the intervention consisted of patients performing a single-leg isokinetic leg press, at an intensity of 70% of the patients' 1-repetition maximum during either the concentric or eccentric action, for 4 sets of 10 repetitions 2 times per week for 8 weeks beginning at 10 weeks postoperatively. Patients randomized to the BFRT groups performed the leg-press exercise with a cuff applied to the thigh, set to a limb occlusion pressure of 80%. Isometric and isokinetic (60 deg/s) quadriceps peak torque, quadriceps muscle activation, and rectus femoris muscle volume were assessed before ACLR, after BFRT, and at the time that patients returned to activity.

**Results:** No significant differences between groups in the change from preoperative to postintervention for maximal isokinetic knee extension, maximal isometric knee extension, and rectus femoris muscle volume. There were also no significant between-group differences in the change from preoperative to RTA for maximal isokinetic knee extension, maximal isometric knee extension, and rectus femoris muscle volume. No significant differences were noted in the change from preintervention to postintervention for the IKDC score, rectus femoris muscle volume, or 1RM. No group differences were found in the change from preoperative to postintervention or the change from preoperative to RTA for the IKDC score.

**Conclusions:** An 8-week BFRT plus high-intensity exercise intervention did not significantly improve quadriceps muscle strength, activation, or volume. The researchers state that on the basis of their findings, the use of BFRT in conjunction with high-intensity resistance exercise in patients undergoing ACLR to improve quadriceps muscle function may not be warranted.

**Commentary:** This study, according to authors, is the only study which blood flow restriction therapy was coupled with high-intensity resistance exercise in the ACLR population and they state that this may be why their results are so different from previous research studies. This study they also suggest that the duration of BFR treatment was less than that of previous research studies and may also explain the differences compared to previous studies. The sample size for this study is relatively low and experienced participant drop out rates. This study also utilized patients

with multiple graft types and meniscal injuries, which increased the variability of findings. Another weakness of this study is that the outcome measures were focused on isolated quadriceps strengthening and the intervention itself was a closed-chain leg press, which is a non-isolated movement. It would be interesting to see another study with a more inclusive population and larger sample size and see the effects.

**Truong, L. K., Mosewich, A. D., Holt, C. J., Le, C. Y., Miciak, M., & Whittaker, J. L. (2020). Psychological, social and contextual factors across recovery stages following a sport-related knee injury: a scoping review. *British Journal of Sports Medicine*. doi: 10.1136/bjsports-2019-101206**

**Review submitted by:** Helen Shepard

**Purpose:** The purpose of this article was to assess the impact of psychological, social, and contextual factors on recovery stages after a traumatic time-loss sport-related knee injury. As a scoping review, the aim is to identify knowledge gaps and key themes.

**Methods:** The Preferred Reporting Items for Systematic Reviews and Meta-Analyses Extension for Scoping Reviews was used to guide the conduction and reporting of this study. Six online databases were searched using specific search terms and strategies to identify relevant articles. Articles were included if they described or assessed a psychological, social, or contextual factor during acute, rehabilitation, or return to sport stages of recovery after a knee injury interfering with sport participation.

**Results:** A total of 77 studies were included in this review. Most studies were quantitative and included participants ranging in age from 14 to 60 years with females accounting for 37% of participants. 84% of studies assessed individuals after an ACL injury or ACLR. Psychological factors were reported in all included studies, however, only 39% of studies discussed social factors and 21% discussed contextual factors. Most studies examined participants in the rehabilitation stage. Within the psychological domain, several themes were identified: barriers to progress, active coping, independence, and recovery expectations. Themes for the social domain include social support and engagement in care while contextual domain themes include environmental influences and sport culture. The broad concept of “individualisation” was the overarching main idea across all domains.

**Conclusion:** Many psychological, social, and contextual themes exist that impact the 3 recovery stages after a traumatic knee injury. Fear and anxiety are barriers to recovery, however, athletes tend to respond well to having an active role in their recovery process with guidance to set realistic expectations. Authors recommend acknowledging the importance of these factors and their dynamic nature across recovery stages. These factors should be addressed individually for optimal care and recovery.



**Commentary:** I think this article did an excellent job highlighting the importance of psychological, social, and contextual factors that influence recovery after a traumatic injury. One of the factors that stuck out to me was engagement in care. Athletes had better outcomes when they felt like their autonomy was respected but they had a good relationship with their healthcare providers and were involved in decision making. This emphasizes the art of leading, since we as PTs are the experts in recovery, while also engaging the patient in the process. The importance of education about expectations and the healing process as well as pain neuroscience education is crucial. A well rounded, holistic approach to caring for athletes after a traumatic injury will lead to the best outcomes. While the article focuses on knee specific injuries, I think many of these themes and ideas can be broadly applied across all types of sport and non-sport specific injuries. Wouldn't all of our patients benefit from addressing these non-physical aspects of recovery?

**Deal, M. J., Richey, B. P., Pumilia, C. A., Zeini, I. M., Wolf, C., Furman, T., & Osbahr, D. C. (2020). Regional Interdependence and the Role of the Lower Body in Elbow Injury in Baseball Players: A Systematic Review. *The American Journal of Sports Medicine*. April 2020. doi: 10.1177/0363546520910138**

**Review Submitted By:** Lauren Carroll

**Objective:** Examine the relationship between lower extremity and trunk deficits with elbow injury and pain in youth-professional baseball players.

**Methods:** Systematic review performed with Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines; search was conducted through PubMed/MEDLINE database.

**Results:** Systematic review that included 14 studies from 2013-2020 with 4984 baseball players, including pitchers and position players, from youth to professional players. Limitations deemed to be independent risk factors for elbow pain/injury in specific player populations included hip flexibility, hip ROM, balance, lower extremity injury, foot arch posture, and noncompliance with preventative programming.

**Conclusion:** This article concluded that deficiencies in hip ROM and flexibility, posture, and lower extremity injury, along with noncompliance with prevention programs were risk factors for youth players; abnormal arch posture of the foot was the greatest risk factor for advanced athletes; and balance and neuromuscular control deficits were factors most concerning for the intermediate level athlete.

**Commentary:** This systematic review attempts to identify lower extremity and trunk deficits that could contribute to elbow pain and injury in throwing athletes, but there are multiple limitations to this review. Many of the deficits that were noted within the studies utilized for this review used different metrics and outcomes, leading to discordant results for the data. There was also a huge variability in the spectrum of the subjects. There were some studies that looked only at youth and novice throwers, while others look at elite and professional athletes, so there is a wide range of variables within this data subset, and it is very difficult to definitely state that there are specific impairments that lead to elbow dysfunction in these athletes.

With that being said, I feel like this review highlights the importance of looking at the patient as a whole. It's a good reminder to clinicians that there may be other factors contributing to elbow pain outside of the arm, especially with developing athletes. Factors like dynamic balance and preventative programs can make a large impact on these athletes, and potentially reduce the risk of injury, while also facilitating improvements in their performance.

**Daher, A., Carel, R. S., Tzipi, K., Esther, H., & Dar, G. (2020). The effectiveness of an aerobic exercise training on patients with neck pain during a short- and long-term follow-up: a prospective double-blind randomized controlled trial. *Clinical Rehabilitation*. <https://doi.org/10.1177/0269215520912000>**

**Review Submitted by:** Steven J. Lagasse

**Objective:** The objective of this study was to assess the therapeutic effects of neck-specific versus neck-specific exercises paired with aerobic training for patients with non-specific neck pain. The study's primary measures were the Global Rating of Change (GROC), and the Visual Analogue Score (VAS). Secondary measures were the Neck Disability Index (NDI), Fear-Avoidance Beliefs Questionnaire (FABQ), the complaint of headache, the use of pain medication, and clinical examination performance.

**Methods:** This prospective study was a double-blind randomized controlled trial. Measures were taken at baseline, immediately post weeks of intervention, and at three and six months follow-up. Subjects were allowed to participate based on inclusion and exclusion criteria. Subjects were split into either a control group (neck-specific exercises) or experimental group (aerobic training + neck-specific exercises). Randomization was computer generated and carried out by an independent researcher. Participants were blinded to their group, study design, and intervention. Researchers were blinded to the assessment and treatment. Physical therapists were blinded to group allocation, and communication between the treating and the assessing therapist was not allowed.

The control and experimental groups participated in two supervised therapy sessions per week. Both groups were educated to perform an additional two therapy sessions at home as a home exercise program. Neck-specific exercises consisted of stretching and muscle performance. Aerobic consisted of stationary cycling or walking. Subjects were educated to perform aerobic training at a 60% target heart rate. The aerobic activity consisted of 20 minutes during the first week, 30 minutes during the second week and 45 minutes during weeks three to six. Exercise diaries were provided to promote adherence.

**Results:** For primary outcomes, after six weeks of intervention, the GROC demonstrated no significant differences between groups. Both groups demonstrated a decreased VAS, however, only the experimental group showed a significant difference. At three and six month follow-up, the experimental group showed

continual improvements in both the GROC and VAD, while the control group did not. These follow-up findings were significant.

For secondary outcomes, after six weeks of intervention, NDI and FABQ improved in both groups, with significant differences occurring only in the experimental group. After six weeks of intervention, the experimental group demonstrated a significant difference in terms of cervical range of motion and on the deep neck flexor endurance test. Cervicogenic headache improved in both groups from baseline to six months follow-up, with the experimental group demonstrating significant differences while the control group did not. Finally, at a six-month follow-up, only 3.3% of all subjects reported continued use of pain medication.

**Conclusion:** Both the experimental and control groups improved. At six month follow-up, when compared to the control group, the experimental group demonstrated significantly longer-lasting benefits across all primary and secondary measures.

**Commentary:** There are many strengths to this study. The primary strength is the rigorous design and the absence of misleading findings or claims. This study also articulates how the authors came to their power, sample size, and how they accounted for attrition.

The imbalanced allocation of services to each group was a weakness of this study. The experimental group received two interventions, while the control group only received one. The authors did attempt to account for this by having the treating therapist providing similar attention to both groups. This design can sway the results in favor of the experimental group. To the authors' credit, this was acknowledged in the limitations section.

When assessing implications for practice, this study states a correlation between increased aerobic activity and successful outcomes. Those subjects who performed aerobic activity in conjunction with neck-specific exercises demonstrated longer-lasting symptom mitigation in the cervical spine. However, it is also important to understand that these findings may not be generalizable for all patients with neck pain. The inclusion criteria required patients to have neck pain for greater than four weeks, however, the average symptom duration was 226 days. Additionally, the majority of the subjects in this study are women (76%). Thus, this study reinforces the benefits of aerobic training for only those female patients with chronic neck pain.

**Bond BM, Kinslow CD, Yoder AW, Liu W. Effect of spinal manipulative therapy on mechanical pain sensitivity in patients with chronic nonspecific low back pain: a pilot randomized, controlled trial. *J Man Manip Ther.* 2019;28(1):15-27. doi:10.1080/10669817.2019.1572986**

Review Submitted by: Taylor Blattenberger PT, DPT

**Objective:** To improve the understanding of the mechanisms associated with spinal manipulative therapy (SMT) in patients with low back pain.

**Methods:** Twenty-nine subjects were randomly allocated into either an SMT group or a sham SMT group. Subjects were included if they had chronic non-specific low back pain lasting >12 weeks rated >3/10 over the past 24 hours on a numeric rating scale. Patients were excluded from the study if they had any contraindications to SMT.

Outcome measures were evaluated by a single assessor, which was blinded to group allocation. Subjects were also blinded of group allocation. Clinicians delivering treatment were not blinded. Primary outcome measures included Numerical Pain Rating Scale (NPRS) and Oswestry Disability Index (ODI). Pain Pressure Threshold (PPT) was also assessed at the dominant side tibialis anterior, dominant lateral epicondyle, and 5cm lateral to the L5 spinous process using a digital algometer. Pain pressure threshold was identified as the primary outcome measure.

Each group received treatments three times per week for two weeks. The SMT group underwent manipulation from a supine position with rotation and sidebending. The sham-SMT group received the same set up and thrust, but without accompanied rotation and sidebend. Both groups received four total thrusts, two to each side.

**Results:** There was a significant decrease in PPT assessed from immediately postintervention to 3 weeks postintervention at the local marker, lumbar paraspinal musculature, and the regional marker, dominant tibialis anterior muscle in both the SMT group and the sham-SMT group. All other within group measures were not statistically significant. There were no significant differences noted between groups

for any region over any time frame.

**Conclusion:** Patients with chronic non-specific low back pain experienced hypoalgesia in local and regional sites following a 3-week course of SMT or sham-SMT. There was no difference between treatment groups.

**Commentary:** The authors of this study remark in the introduction that this article is a pilot study and a piece of a larger research project to evaluate the mechanisms behind SMT. This study alone did not find what they were hoping to in significant changes in PPT in response to SMT vs. a sham. This study reinforces the idea of contextual factors and non-specific effects of touch and the clinician-client experience. Both groups experienced the same thing besides the exact technique.

I would have liked to have seen a third group in this study as a true “wait and see” control. This would allow an alternative reference to assess whether changes observed were due to natural history or the contextual factors mentioned above. I would have also liked to hear what the interactions between the clinician and subject were like to understand this experience further.