Louw, A., Farrell, K., Landers, M, et al. (2016). The effect of manual therapy and neuroplasticity education on chronic low back pain: A randomized clinical trial. *Journal of Manual & Manipulative Therapy,* doi:10.1080/10669817.2016.1231860

Review submitted by Justin Bittner

Purpose: To determine if a neuroplasticity educational explanation for manual therapy would have a different outcome than a more traditional biomechanical explanation.

Methods: Patients with chronic LBP were recruited for the study. The sample size was 62 patients. Outcomes used were: low back pain with the numeric pain rating scale, leg pain with the numeric pain rating scale, forward flexion, and straight leg raise test. Subjects were randomized into 2 groups; one to receive neuroplasticity education explanation and the other to receive biomechanical explanations of manual therapy. All therapist collecting data were orthopedic residents. All patients received the same manual therapy treatment (10 minutes of central PAs to the lumbar spine), the only difference was the explanation of the benefits of PA mobilizations. Immediately following treatment, again, each patient completed NPRS for back and leg, underwent forward flexion and SLR testing. Mixed factorial ANOVAs were ran for the four different outcome measures.

Results: A total of 62 patients were enrolled. Mean age was 60.14 and mean duration of symptoms was 9.26 years. The study showed no significant difference between the to treatment groups in regards to LBP ($p=0.325$), leg pain ($p=0.172$) and trunk flexion ($p=0.818$). However, the group receiving neuroplasticity educational explanation of manual therapy demonstrated a significantly greater improvement in SLR test ($p=0.041$) when compared to the group receiving a biomechanical explanation. The neuroplasticity education group were 7.2 times more likely to improve greater than the MDC for the SLR test (5.7 degrees) compared to the biomechanical group.

Conclusion: This study demonstrated that using a neuroplasticity explanation for manual therapy resulted in a significantly greater improvement in SLR compared to using a biomechanical explanation for chronic LBP patients. There was no significant difference between the 2 groups in regards to pain, and forward flexion. Future studies should look at long term effects of neuroscience education in combination with other therapies.

Comments: This article provides evidence that the use of a neuroscience education can be more beneficial to patients than a traditional biomechanical explanation. This particularly study was an immediacy study looking only at the immediate changes following the manual therapy intervention. It would be interesting to see if greater differences were found several months after interventions. I feel the neuroscience group would show a greater improvements several months after intervention, especially with the negative effects biomechanical explanations can have that were laid out by Louw et al. in JOSPT this past March. Also, this study looked at only one 10-minute treatment, with pre and post results. It would have been better to treat the patient for at least a couple weeks to see if greater differences were found with concept reinforcement. That would have made it more applicable to the clinic, as we do not typically see patients for one 10-minute session. It would also be interesting to see if neuroscience education has the same effect with other orthopedic pathologies and body regions, as most studies have looked at chronic LBP due to it being the number one condition treated by the medical profession. I like how easy it is to implement in the clinic to reduce patient “thought viruses.” Instead of using terms like “stiff” and “stuck” that may have a negative connotation, we can use

neuroscience explanations to reduce the patient's perceived threat. Excited to see where the PT world is in 5 years regarding pain neuroscience education.

O'Keeffe M, Cullinane P, Hurley J. What Influences Patient-Therapist Interactions in Musculoskeletal Physical Therapy? Qualitative Systematic Review and Meta-Synthesis. *J Phys Ther*. 2016: 96(5);609-622.

Review submitted by Nicolas Hoover

Purpose: This qualitative systematic review and meta-synthesis investigated patients' and physical therapists' perceptions of factors that influence patient-therapist interactions.
Methods:
Study Selection Qualitative studies examining physical therapists' and patients' perceptions of factors that influence patient-therapist interactions in musculoskeletal settings were included.
Data Extraction Two reviewers independently selected articles, assessed methodological quality using the Critical Appraisal Skills Programme (CASP), and performed the 3 stages of analysis: extraction of findings, grouping of findings (codes), and abstraction of findings.
Data Synthesis Thirteen studies were included. Four themes were perceived to influence patient-therapist interactions: (1) physical therapist interpersonal and communication skills (ie, presence of skills such as listening, encouragement, confidence, being empathetic and friendly, and nonverbal communication), (2) physical therapist practical skills (ie, physical therapist expertise and level of training, although the ability to provide good education was considered as important only by patients), (3) individualized patient-centered care (ie, individualizing the treatment to the patient and taking patient's opinions into account), and (4) organizational and environmental factors (ie, time and flexibility with care and appointments).
Conclusions: A mix of interpersonal, clinical, and organizational factors are perceived to influence patient-therapist interactions, although research is needed to identify which of these factors actually influence patient-therapist interactions. Physical therapists' awareness of these factors could enhance patient interactions and treatment outcomes. Mechanisms to best enhance these factors in clinical practice warrant further study.

Comments: This article examines the factors of importance in the patient-therapist relationship from the patient perspective and the PT perspective. Responses were broken down into 4 themes as noted in the Data Synthesis section above. The strong suit of this article in my opinion is the strict inclusion criteria in order to identify the factors important in the musculoskeletal setting specific to physical therapy rather than including information relevant to general health care visits. The majority of the gathered information falls in line with the already established "core values" but I believe this article reinforces some of those concepts. The importance of our profession is not just physical rehabilitation. There is a growing understanding of the biopsychosocial aspects involved in our care and this article provides further evidence of that. We have to treat the patient and not just the injury. More often than not, providing the positive environment for the patient and listening to them can make the difference in returning to PLOF.

Barton, C. J., et al. "Running retraining to treat lower limb injuries: a mixed-methods study of current evidence synthesised with expert opinion." *Br J of Sports Med* 50.9 (2016): 513-526.

Review by Erik Lineberry

Objective: This study was mixed-methods and aimed to systematically review clinical and biomechanical evidence for implementing running retraining as an intervention for patients with running-related lower limb injury. Beyond the systematic review of literature, the authors wanted to provide clinical reasoning related to the use of running retraining and guidance for clinicians that are looking to implement running retraining into their practice.

Methods: The systematic review included a total of 46 studies. MEDLINE, CINAHL, and Current contents were searched in June 2015. Studies included had to measure pain and/or functional change in symptomatic runners or biomechanical change in symptomatic or asymptomatic runners. Studies with less than 10 participants were not included. Methodical quality assessment was performed using Black and Downs criteria and administered by 2 reviewers with a third available if necessary. Qualitative findings were synthesized by a physiotherapist and sports physician using a framework approach to produce themes and subthemes of injury and retraining cues.

Results: Of the 46 studies included 13 were found to be high quality, 25 were moderate quality, and 8 were low quality. No study attempted blinding of participant or observer. 27 of the 46 studies did not show adequate statistics to prove a change based on running retraining intervention. 15 studies were in the asymptomatic population. Only 4 studies measured clinical outcomes, however all 46 measured biomechanical outcomes. The studies included interventions that focused on step rate manipulation, altering strike pattern, proximal retraining, modifying rearfoot/forefoot mechanics, and modifying impact loading. The SR found 29 themes and 75 subthemes for running retraining, all of which can be found in the summary and appendices of the article.

Conclusions: The article advocates for running retraining in cases of chronic and recurrent injury where a biomechanical deficiency is noted. After review of the literature expert opinion recommended the use of running retraining for exertional lower leg pain, plantar fasciopathy, Achilles tendinopathy, calf pain, medial tibial stress syndrome, patellofemoral pain, iliotibial band syndrome, patellar tendinopathy, and gluteal tendinopathy. Due to limited evidence with most conditions listed the study suggests that running retraining intervention be used when biomechanical change is possible in patients with a biomechanical impairment, however further research can be done with these populations. The article did find strong evidence for intervention to decrease patellofemoral joint stress and peak knee flexion in patients with patellofemoral pain syndrome. Moderate evidence is shown for decreasing peak knee flexion in patellar tendinopathy. The article includes multiple tables with expert opinion and cueing from the reviewed articles on how to obtain these biomechanical changes during intervention.

Commentary: This article did a good job providing a resource for ideas on running retraining and illustrates that most of these interventions are not well supported by evidence. It also shows the areas research is lacking in regards to these interventions. I reviewed this article with a specific patient of mine that has plantar fasciopathy-related symptoms in mind, so my commentary will be biased on the results related to this condition. However, I think some great points were made throughout the result and conclusions and some stronger conclusions were found for other disorders that I will also comment on.

The article points out the controversy surrounding the diagnosis of Plantar Fasciopathy and even more surrounding its treatment. The article showed running retraining had limited support for cueing/interventions including decreasing step force and increasing step rate. There was also expert opinion for improving rearfoot/forefoot strike pattern, however studies have shown both positive and negative effects from this intervention.

A few take-aways from the study overall were that the only running injuries that have moderate-strong evidence in support of specific running retraining intervention were patellofemoral pain and patellar tendinopathy. The interventions that were shown to be beneficial for these injuries were reducing hip adduction angle and peak knee flexion angle. It was suggested that improvements could be made with most running related injuries by decreasing over-stride and increasing step rate. Both strategies were shown to decrease stress throughout the lower extremity during running.

I feel that the takeaway of this review is the need to find the "cause of the cause" when we see patients with this condition. The article points out that assessing adjacent joints to determine adjunctive treatments to running retraining. The conditions listed could be caused by the repetitive strain placed on the body from the cumulative effect of exercise on these patients. Determining if their symptoms are truly due to a biomechanical breakdown near their source of pain versus another part of the body is important for care. If anything should be taken away from this article is should be that there is no magic bullet for these conditions and having a one-dimensional approach to care will not work for everyone.

Walton DM, Krebs D, Moulden D, et al. The Traumatic Injuries Distress Scale: A New Tool That Quantifies Distress and Has Predictive Validity With Patient-Reported Outcomes. J Orthop Sports Phys Ther. 2016;46(10):920-928.

Pubmed link: https://www.ncbi.nlm.nih.gov/pubmed/27594662

Review Submitted by: Scott Resetar, PT, DPT

Objective: To describe the development and preliminary concurrent and longitudinal validation of the Traumatic Injuries Distress Scale (TIDS), a new tool intended to provide the magnitude and nature of risk for persistent problems following acute MSK injuries.

Methods: The TIDS started development in 2008 with over 100 items, and through subsequent studies the tool was refined to include 17 questions in 3 subdomains (negative affect, sense of uncontrollability of pain, intrusion/hyperarousal). This scale was given to patients recruited in Canadian primary PT clinics and USA emergency rooms to patients who had sustained an acute MSK injury less than 30 days prior and were free of major systemic illness including cancer, organ disease, blood clotting disorder, neuromuscular disorder, rheumatoid condition, concussion or uncontrolled psychopathology. Those recruited completed the TIDS, an appropriate region specific disability scale (RSDS) such as the NDI, LEFS, Oswestry, etc, the pain catastrophizing scale (PCS), Numeric Pain Rating Scale (NPRS), and the Hospital Anxiety and Depression Scale (HADS). 1 week later and 12 weeks later, the group filled out the same scales, and also completed the GROC and the Satisfaction and Recovery Index (SRI). The results of these scales were then analyzed statistically to determine their predictive qualities and throw out items from the TIDS that were not useful.

Results: 206 people provided initial data for T0, of those, 76 successfully completed followup at 1 (T1) week and 12 weeks (T2). It was found the 5 of the 17 items could be excluded from the scale without affecting the properties of the scale. Total TIDS score at T0 showed strong and significant correlations in the expected directions with scores at T2 on health-related satisfaction, HADS, and the appropriate RSDS. PCS score at T0 was a better predictor of T2 pain intensity. The negative affect and uncontrolled pain subscales were better predictors of SRI (recovery), and RSDS (disability), while the intrusion/hyperarousal scale was the better predictor of the HADS (depression/anxiety).

Conclusions: High Negative Affect scale scores may suggest the patient is appropriate for early cognitive intervention or targeted pharmacotherapy in addition to physical rehabilitation; Uncontrolled Pain would suggest an early target of addressing pain control through pharmacological or non-pharmacological means, while Intrusion/Hyperarousal may indicate stress or anxiety management strategies are most appropriate.

Commentary: The authors note that a previous clinical prediction rule has developed and externally validated by Ritchie et al 2015 (PMID: 25827122) that predicts disability in whiplash associated disorder. That CPR includes a scale called the Postraumatic Distress Scale (PDS), which is not free, and not readily available to clinicians unless you work at the VA. The authors state that the TIDS may be an appropriate substitute for this scale for front line clinicians who don't have access to the PDS. The CPR uses age, NDI, and the PDS score to determine prognosis. The TIDS may be a great tool to use along the pain catastrophizing scale for any patient who has an acute injury and could direct your line of treatment or odds of referring the patient out. The scale is free, easy to fill out, and included at the end of the article.

Baumgarten KM, Osborn R, Schweinle WE, Zens MJ, Helsper EA. Are Pulley Exercises Initiated 6 Weeks After Rotator Cuff Repair a Safe and Effective Rehabilitative Treatment? A Randomized Controlled Trial. *Am J Sports Med*. 2016;44(7):1844-1851. doi:10.1177/0363546516640763.

Review submitted by: Katie Stokely, PT, DPT

Objective: The purpose of this study was to determine the efficacy of pulley exercise use in postoperative rehabilitation in patients with rotator cuff repairs. The authors of this study hypothesized that the use of pulley exercises would lead to increased scapular motion (scapular substitution), and inferior patient-reported outcome scores, range of motion, and strength as compared to outcomes of alternative rehabilitation programs that did not utilize pulley exercise.

Methods: 53 study participants were recruited from 2 outpatient physical therapy clinics referred from four surgeons with experience in arthroscopic rotator cuff repairs. Inclusionary criteria comprised of participants undergoing immediate postoperative care following an arthroscopic supraspinatus repair and individuals who underwent concomitant procedures were included to bolster the generalizability of the results. Those with a previous history of a rotator cuff tear on the ipsilateral or contralateral sides, preoperative adhesive capsulitis, history of dislocation, neuropathy, or those with weakness of the contralateral side were excluded. Participants were provided identical rehabilitation protocols until six weeks, at which time active assist and active range of motion was initiated. At this time, participants either received treatment using a pulley system or “Jackins exercises” for active assist range of motion. Outcome measures utilized for this study include patient-reported measures, quantification of scapular motion, active range of motion, and strength.

Results: The study showed significant improvements in the following patient reported outcome measures for both groups; the Western Ontario Rotator Cuff Index (WORC), Simple Shoulder Test (SST), American Shoulder and Elbow Surgeons Shoulder Score (ASES) and Single Assessment Numeric Evaluation (SANE) rating over time. There was no statistical difference between the pulley group and the Jackins groups for WORC, ASES, and SANE rating. Both groups demonstrated significant improvements in flexion ($P = 0.002$), abduction ($P = 0.0001$) and External Rotation ($P= 0.02$) over time. At the time of the last follow up, both groups regained statistically similar external rotation and internal rotation range of

motion. The pulley group regained statistically similar flexion, unlike the Jackins group, and in both groups abduction was inferior to that of the nonoperative side. There was no significant difference in flexion (P=0.69), abduction (P=0.53), external rotation (P=.71) or internal rotation (P=0.53) between groups. Both groups demonstrated significant increases with no difference between groups in strength at 6 and 12 months time; however, both groups were inferior as compared to nonoperative side at final follow up (P< 0.0001). Both groups demonstrated improvements in scapular substitution over time and there was no clinically or statistically significant differences seen for any scapular substitutions patterns (P≥ 0.17). Lastly, there was no difference in the incidence of postoperative complications between groups (P= 0.3).

Conclusion: This study found that the use of pulleys as an intervention method for postoperative rotator cuff repairs was at least as safe and effective as rehabilitation protocols that did not use pulleys. The study rejected the original hypothesis and demonstrated that there was no disadvantage to those who utilized pulley exercises as a part of a rotator cuff rehabilitation program when initiated at 6 weeks.

Commentary: This study demonstrated that the utilization of pulley exercises in the rehabilitation of patients with postoperative rotator cuff repairs was safe and as effective as protocols that do not utilize pulley exercise when instructed by an experienced physical therapist. This highlights not only the use of the exercise, but also how we cue and maintain proper performance of exercises in the clinic as this may have contributed to the results of this study. As therapists we are always looking for the strongest intervention for patients, but this could potentially re-affirm there are multiple interventions that may work, and we have the ability to choose out of our toolbox to individualize exercises that are patient specific.

Ris I, Søgaard K, Gram B, Agerbo K, Boyle E, Juul-kristensen B. Does a combination of physical training, specific exercises and pain education improve health-related quality of life in patients with chronic neck pain? A randomised control trial with a 4-month follow up. Man Ther. 2016;26:132-140.

Review submitted by: August Winter, PT, DPT

Objective: The objective of this study was to compare the effects of a pain education intervention alone to a multimodal intervention including graded physical activity, specific exercise, and pain education in patients with chronic neck pain.
Methods: Participants were recruited as part of a multicenter trial when initially presenting to the clinic for evaluation and treatment. At baseline and 4 month follow up patients were tested for the SF36-PCS, SF36-MCS, EuroQoL-5D, NDI, BDI-II, TSK, Global Perceived Effect, Patient Specific Functional Scale, submaximal cycle test, cervical ROM, pain pressure threshold (PPT) at the tibialis anterior, infraspinatus, and C5/6 facets, craniocervical flexion test, cervical extensor test, and measures of oculomotor function including gaze stability and the eye movement test. Initially only nontraumatic cases of neck pain lasting > 6 months were including, but due to recruitment difficulties, traumatic cases were included as well. Individuals with confirmed radiculopathies were excluded. All participants received four 1.5 hour education sessions on pain management, while the exercise group also received eight 30 minute sessions of physical therapy which involved cervical therapeutic exercise, balance and oculomotor training, and graded aerobic physical activity.
Results: The control group had a higher dropout rate compared to the exercise group (24% versus 12%). Intention to treat analysis showed significant improvement for several of the clinical measures including cervical extension ROM, PPT of the tibialis anterior and C5/6 facets, 3 components of the oculomotor

tests, and cervical extensor and craniocervical flexion tests for the exercise group versus the control group. The exercise group also had significant improvement on the SF36-PCS of -1.83 (95% CI: -3.86 to -0.21), as well as the BDI-II. The changes of the SF36-PCS, cervical extensor test, and craniocervical flexion test did not meet the Minimal Detectable Change (MDC). Participants with traumatic causes of injury had greater improvements in SF36-MCS while participants with atraumatic cases had greater improvements of the SF36-PCS. Participants in the exercise group with the greatest adherence to their home exercise program and compliance with the treatment sessions saw an increased effect on improvements for the above measures.

Conclusions: For patients with chronic traumatic and atraumatic cases of neck pain, an intervention including pain science education, specific therapeutic exercise targeting cervical muscle strength and endurance, and graded aerobic physical activity may produce better results for physical (ROM, muscular endurance, oculomotor function) and mental (BDI-II, SF36-PCS) outcomes than performing only a pain science education intervention.

Commentary: As we might expect, this study provides some evidence that a specific and progressive physical therapy intervention with pain science education produces more benefit than an intervention involving education only for individuals with chronic neck pain. Studies like this are important to validate our interventions for particular populations, both for our own knowledge and clinical practice, but also for justification for approval of continued therapy from third party payers. On the opposite end of the conversation, studies such as this often can reveal limited results for our interventions. This study falls somewhere in the middle, and is hindered by several limitations. For the outcome measures, no significant difference between the control and exercise groups was shown for several metrics including the NDI, Global Perceived Effect, and Patient Specific Functional Scale. For the outcome measures that did show significant differences, nearly all of them had overlapping CIs, indicating a possible lack of true statistical significance. As the authors mention, several of the outcomes which were significant did not meet the MDC. Another limitation was the clinical feasibility of the standard pain science education, which involved multiple lengthy education only sessions. This level of education is certainly not something that is common practice in PT clinics currently in the United States.