June Article Review Compilation

Gillespie et al. (2016). Rotator Cuff-Related Pain: Patients' Understanding and Experiences. ***Musculoskelet Sci Pract,*** **10.1016/j.msksp.2017.05.009**

Review submitted by Justin Bittner

Purpose:
To investigate patient beliefs about the cause of their persistent shoulder pain and to understand the effect patients feel this pain has on their daily lives.

Methods:
The study included semi-structured interviews and outcome measures. Participants were recruited via local newspaper and additional advertising on social media. Inclusion criteria consisted of: >40 years old, pain >3 months, ROM grossly intact, pain with resisted ABD and ER. Exclusion criteria consisted of: shoulder surgery previously, systemic inflammatory disorders, cervical movements provoke shoulder pain, other injuries to the affected arm. Participants were screened until 10 participants were obtained. These 10 underwent interviews consisting of open ended questions. Interviews were audiotaped; transcribed and digital analysis was used to look for common themes amongst answers. Prior to interviews, all participants filled out SPADI, QuickDASH, FABQ, and PCS questionnaires.

Results:
Four themes were found from analysis of interviews. The first was "understanding the pain". Most participants believed there pain was from pulled or torn muscles or their shoulder was malpositioned. Most tried to look information up online and found it difficulty to understand. Others felt their pain was from "getting old". The other theme was "it affects everything". Most participants felt their pain impacted all aspects of life, decreasing concentration or function with ADLs and their occupation. The third theme was "pain associated behaviors". Some avoided painful activities, others sought professional help, and some did nothing adopting the life goes on mentality. The last theme was "emotional responses and the future". Participants reported that the pain was impacting their lives emotionally and was contributing to negative thoughts about their future.

Conclusion:
Subjects in this study emphasized the structures of the shoulder when describing their pain although this in is not always the cause of one's pain. Although the pain was affecting most of their activities, participants reported adapting their lives and behaviors to be able to continue occupational, sporting and social activities. Therapist should consider pain physiology education in addition to tailoring treatment to the individuals' experiences and goals.

Comments:
One thing I know I still struggle with is communicating with patients and understanding their thoughts and fears. Implementing education on pain physiology for structures other than the low back. This study demonstrates the importance of asking patients about their fear of movements and make sure we are addressing them. It shows that just because patients are continuing to perform all their ADLs they still have fear about the future. This article also showed that although people may not seem fear avoidant via the FABQ, they still avoid movements they know will cause pain. Several participants described their days as dragging on and making concentration difficulty. This can absolutely affect a patient's emotional stability. Peter O'Sullivan talks about asking distressed patients the impact pain has on their life. Describing their answers as surprising

to PTs. Although I think we can sometimes do a good job at this. We need to be able to better identify patients initially, based on personality and verbal/nonverbal cues as to whether or not they would benefit from longer educational periods for treatment.

Pratt KA, Sigward SM. Knee Loading Deficits During Dynamic Tasks in Individuals Following Anterior Cruciate Ligament Reconstruction. *J Orthop Sports Phys Ther.* 47(6); 411-419.

Review Submitted by: Nicolas Hoover

PURPOSE:
To investigate how individuals following ACLR perform dynamic knee loading tasks in comparison to controls at the time they progress to running protocols in rehabilitation.

METHODS:
Two groups of recreationally active individuals participated: 15 healthy controls and 15 individuals post-ACLR (ACLR group). Participants performed 3 trials of overground running and a single-limb loading (SLL) task. Sagittal plane range of motion, peak knee extensor moment, peak knee flexion angular velocity, peak knee power absorption, and rate of knee extensor moment were calculated during deceleration.

INCLUSION/EXCLUSION:
ACLR group: (1) were not cleared by a physical therapist to perform the study tasks, or (2) had prior ACL injury and knee surgery on the contralateral limb.
Either group: reported any of the following: (1) concurrent pathology or morphology that could cause pain or discomfort during physical activity; and (2) any physical, cognitive, or other condition that may impair an individual's ability to perform the tasks proposed in this study.

Dynamic Tasks: SLL and Running
SLL: Participants were instructed to leap forward to the target location onto a single limb, lower themselves as far as they could, and then return to the starting force plate on 2 limbs. Participants were told that the goal of the task was to go as low as possible and return to the starting position without pausing.
RUNNING: participants were instructed to run at a self-selected speed over ground for 15 m.

RESULTS:
The nonsurgical limb exhibited greater ROM, peak knee extensor moment, peak knee flexion angular velocity, rate of knee extensor moment, and peak knee power absorption compared to the reconstructed limb. Peak knee extensor moment, peak angular flexion velocity, rate of knee extensor moment, and peak knee power absorption were greater during running compared to SLL. Knee ROM was greater during SLL compared to running. No significant differences were observed between control and nonsurgical limbs for any variable in running.

CONCLUSION:

Impairments in knee dynamics, as measured by rate of knee extensor moment, knee power absorption, and knee flexion angular velocity, are present in individuals following ACLR at the time during rehabilitation when they are initiating running progression. Deficits in these variables are not only observed during running, but also during a less demanding SLL task, highlighting an inability or reluctance to dynamically accommodate forces at the knee. These findings suggest that, in addition to a progression of exercise to increase the magnitude of knee loading demands, inclusion of dynamic exercises that target increasing the speed at which individuals accommodate loads may be warranted.

COMMENTS:
This article was of particular meaning to me as I am currently treating a patient s/p ACLR who is a high level athlete looking to return to sport. I am interested in gaining a better understanding of the variables in loading forces that will effect my patient's rehab progress for return to sport, and ultimately, for prevention of reinjury. To summarize my understanding of this article, patients post-op ACLR demonstrate reduced dynamic stability of the knee during return to running. The focus of this article was to assess the elements of dynamic stability in a lower level exercise, like the SLL task. What they found was that patients post-op ACLR demonstrate reduced dynamic stability of the knee during the lower level exercise as well, indicating that they have not been adequately prepared via exercises for eccentric loading. These patients would be better served training the aspects of SLL prior to return to running in order to improve dynamic stability and prevent reinjury.
Two aspects of rehab that were not tested in this article are biopsychosocial factors and muscle strength. The authors discussed both of these as potential limitations and areas of need for further study and I agree. This type of traumatic injury has the potential for profound psychological effects that may increase risk for future injuries, thus demonstrating need for inclusion in rehab programs. However, when appropriate based on protocol time frames, it is essential to gradually progress to return to running via increased training of dynamic loading in part task elements. I think it would also be of particular importance to compare different types of ACL graft as this study included bone-patella tendon-bone grafts and my patient had a hamstring tendon graft.

Bunzli, S., McEvoy, S., Dankaerts, W., O'Sullivan, P., & O'Sullivan, K. (2016). Patient Perspectives on Participation in Cognitive Functional Therapy for Chronic Low Back Pain. *PTJ*, 96(9), 1397-1407.

Reviewed by: Erik Lineberry

Background: Cognitive functional therapy (CFT) has been shown to reduce pain and disability in people with chronic low back pain. CFT consists of 4 components:

1. Pain education: reconceptualizing pain with biopsychosocial context related to patients' story
2. Specific posture or movement retraining: graded exposure to pain provoking tasks
3. Functional integration: incorporating functional behaviors into daily tasks
4. Physical activity and lifestyle retraining: increasing physical activity levels while developing skills to improve sleep and stress management

Objective: The purpose of this study was to investigate participants' experience of CFT by comparing participants who reported differing levels of improvement after participation in CFT, potentially yielding insight into the implementation of this approach.

Methods: This was a noninterventional, cross-sectional, qualitative study with an interpretive description framework. Individuals who had participated in CFT in 2 physical therapy settings (in Ireland and Australia) were recruited through purposive sampling based on disability outcomes postintervention (n=9), and theoretical sampling (n=5). This sampling strategy was used to capture a range of participant experiences but was not used to define the final qualitative groupings. Semi-structured interviews were conducted 3 to 6 months postintervention.

Results: Three groups emerged from the qualitative analysis: large improvers, small improvers, and unchanged. Two themes encapsulating the key requirements in achieving a successful outcome through CFT were identified: (1) changing pain beliefs and (2) achieving independence. Changing pain beliefs to a more biopsychosocial perspective required a strong therapeutic alliance, development of body awareness, and the experience of control over pain. Independence was achieved by large improvers through newly cultivated problem-solving skills, self-efficacy, decreased fear of pain, and improved stress coping. Residual fear and poor stress coping meant that small improvers were easily distressed and lacked independence. Those who were unchanged continued to feel defined by their pain and retained a biomedical perspective.

Conclusion: A successful outcome after CFT is dependent on instilling biopsychosocial pain beliefs and developing independence among participants. Small improvers may require ongoing support to maintain results. Further study is needed to elucidate the optimal approach for those who were unchanged.

Commentary: This was an interesting look at few patients' perspectives on their experience with CFT to treat their CLBP. There have been numerous studies recently showing that perspectives play a large role in the successfulness of intervention, so I found this study to be helpful in describing personalities that may respond well to CFT and subjective reports that indicate our interventions are

effective. The design of this study has its limitations with a small sample size and it being based on one single interview with each patient. The study addresses this with one patient that was listed as a large improver even though their problem-solving responses show both positive and negative codes.
I have added some plots that the study used to show the coded responses and the differences in responses in a large improver and unchanged patient. The comments that jumped out to me were mostly from the unchanged patients, but I thought they painted a good picture of just how powerful perception is. Several the responses showed signs of fear and the belief that, despite imaging findings and physical exams being negative, there is still an underlying mechanical dysfunction. One other report that hit me in the face was, "The Physical Therapist kind of laughed at me sometimes… He was like, 'Oh, your pain is silly. Don't worry about it. Just relax' And I was, 'I can't really do that." I tend to use down play as a way to reduce pain catastrophizing behavior, so this was an eyeopener for me. It shows the importance of gauging patient response and adjust for verbiage as needed.

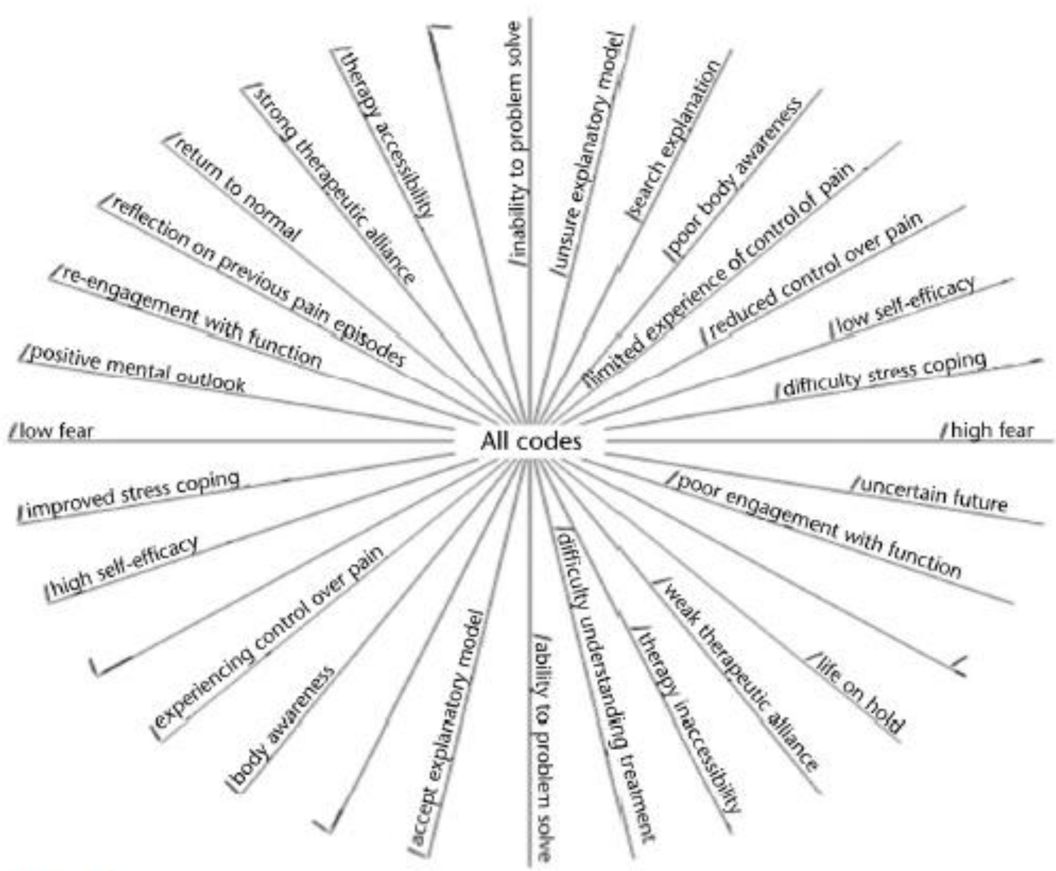

Figure 1.
Code plot, a visual representation of the sorted data produced by Codesort, containing complete list of codes used in the coding of raw data.

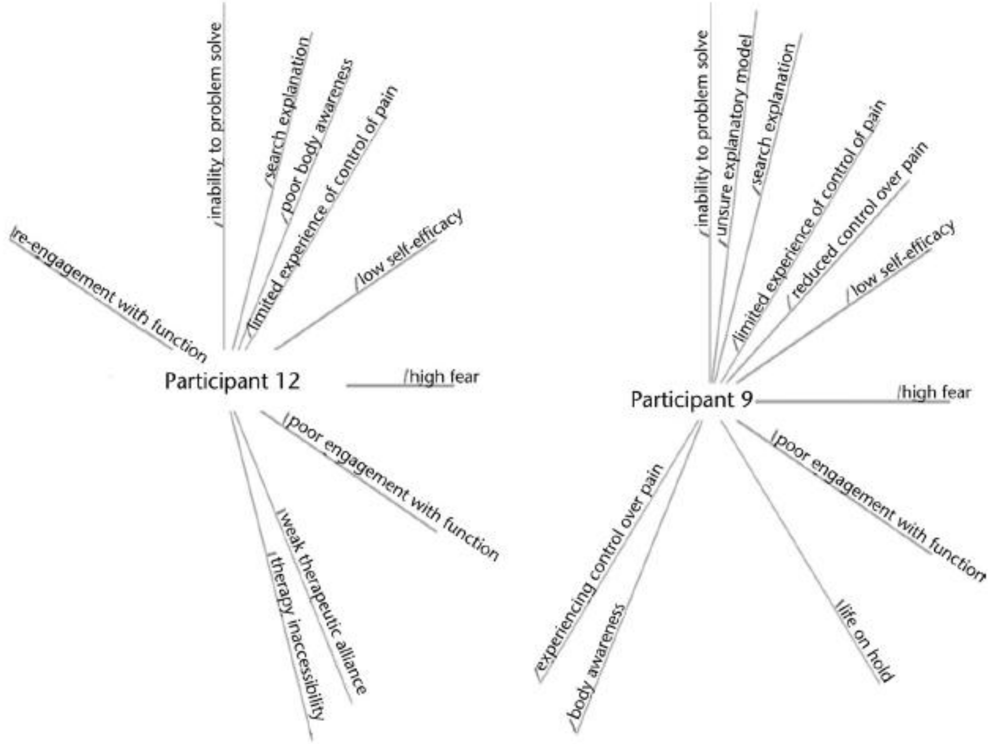

Figure 2.
Code plots of codes used in the coding of 2 sample unchanged participants.

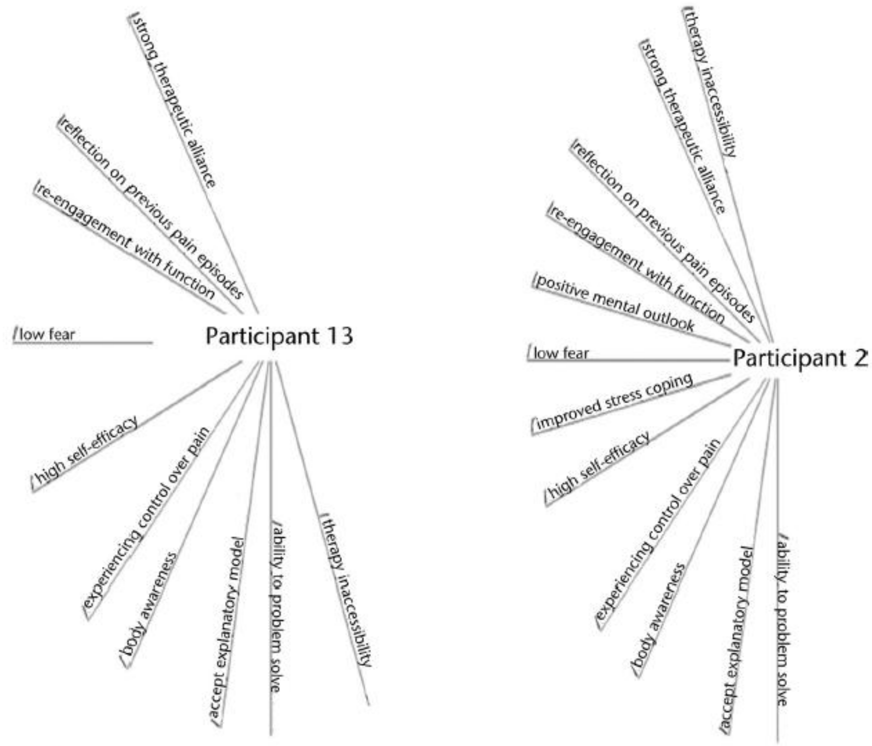

Figure 3.
Code plots of codes used in the coding of 2 sample large improvers.

Hall M, Wrigley TV, Metcalf BR, et al. Knee Biomechanics During Jogging After Arthroscopic Partial Meniscectomy: A Longitudinal Study. Am J Sports Med. 2017;45(8):1872-1880.

Pubmed Link: https://www.ncbi.nlm.nih.gov/pubmed/28419809

Review Submitted by: Scott Resetar, PT, DPT

Objective: This study aimed to investigate knee joint biomechanics after arthroscopic partial meniscectomy (APM). Many studies have been previously performed on biomechanics of walking after APM, but none in jogging.

Methods: Analyzed data from a previously published 2 year prospective study. N = 82 patients and N= 38 health controls. Patients ran on a 10 m runway with an 8 camera motion analysis system. All participants ran barefoot to attempt to negate the influence of footwear. Data was collected 3 months post surgery, as well as at 2 year follow up. Volunteers between the ages of 30-50 y.o. were recruited 3 months post medial APM. Patients were excluded if they had any of the following: evidence of lateral meniscal resection; greater than half of the medial meniscus resected; greater than 2 tibiofemoral cartilage lesions; a single tibiofemoral cartilage lesion greater than half of the cartilage thickness or 10 mm in diameter; previous knee or lower limb surgery (aside from the current procedure); history of knee pain (other than knee pain contributing to the decision to undergo surgery); postoperative complications; cardiac, circulatory, or neuromuscular conditions; diabetes; stroke; or multiple sclerosis.

Results: At 3 months post surgery, The APM leg displayed a decreased peak knee flexion during stance, decreased peak knee flexion moment (KFM), and decreased peak knee adduction moment when compared to the non-APM leg., however there were no statistical differences between the surgical leg and the control leg, either at 3 months or at 2 years. The non-APM leg, however, displayed an increased peak knee adduction moment, increased peak KFM (35% higher) when compared to the control legs at 3 months post. All of these changes disappeared by the 2 year follow up

Conclusions: Basically, we see these kinematic differences at 3 months which disappear by 2 years, but the authors don’t know at what point these changes start to go away, and we need better data. The authors believe that the peak knee flexion angle difference at 3 months is of little clinical value. The results of this study contrast with a previous study which showed an increase in peak KFMs in the APM leg at long term follow up. The large change in peak KFM in the contralateral leg may be evidence of a mechanism for increased OA in that knee. The authors caution that even though the biomechanics look pretty similar at 2 years, jogging still may be damaging to the joint because of increased joint contact forces, which weren’t measured here.

Commentary: A lot of gold in the introduction and discussion sections of this article. They go through previous research about kinematic changes and their effects on joint loading. For example: greater knee flexion angle at initial contact is associated with cartilage thinning in OA; increased peak knee flexion moment is known to increase the magnitude of medial, lateral, and total tibiofemoral joint contact force; increased peak knee flexion moment may lead to increase in PFJ contact force; In those with APM there is an increased prevalence of PFJ cartilage defects and a decrease in patellar cartilage volume; Increased risk of OA in the contralateral knee post APM.

I also like how they made everyone run barefoot as that could be a large confounding variable. This research is pretty interesting and is going to lead to great debate among surgeons, as well as a lot future research.

Mouraux D, Brassinne E, Sobczak S, Nonclercq A, Warzée N, Sizer P, Tuna T, Penelle, B. 3D augmented reality mirror visual feedback therapy applied to the treatment of persistent, unilateral upper extremity neuropathic pain: a preliminary study. J Man Manip Ther. 2017;25(3)137-143.

Review submitted by: Katie Stokely

Objective: While the underlying mechanisms of traditional mirror therapy for pain reduction and functional improvement remain unknown, there is literary support for this treatment for patients with neuropathic pain. With technology ever evolving, virtual reality has been introduced as another intervention method in the management of neuropathic pain. The purpose of this study is two-fold; to investigate the use of a new virtual reality method, 3-D augmented virtual reality system (3DARS) to provide pain relief, and to evaluate the effectiveness of this system in the treatment of patients with chronic neuropathic pain that did not respond to traditional mirror therapy or pharmaceutical management.

Study Design: This is a level four evidence, preliminary study.

Methods: A convenient sample of twenty-two participants was recruited from a pain department clinic in Belgium. Subjects had to be over the age of eighteen, have neuropathic pain in a unilateral limb of the upper extremity as defined by appropriate scoring on the DN4 questionnaire, greater than or equal to three months' duration of symptoms following injury, a minimum score of forty on the visual analog scale (VAS), and a stable pharmaceutical regimen for at least two weeks. In addition to fitting the inclusionary criteria, participates had to be diagnosed with one of the following: chronic regional pain syndrome (CRPS) as defined by the International Association for the Study of Pain criteria, phantom limb pain (PLP), spinal cord injury (SCI), or plexopathy, and were not responsive to traditional mirror therapy. Participants were excluded if there was bilateral upper extremity involvement, if they had a history of epilepsy or known side effects to 3-D imaging, or if they were diagnosed with a cognitive disorder.

Subjects underwent five, twenty-minute sessions of 3DARS treatment over the course of one week. 3DARS utilized virtual reality to create an image of the participants' symptomatic limb from their unaffected, contralateral limb. The system then allowed participants to manipulate virtually with what they perceived as their affected limb. Using 3DARS, subjects underwent two training procedures; one, creating the illusion of moving both hands, and two, only moving the affected limb. With each procedure, participants performed upper extremity range of motion and a simple game of touching targets of various shapes and sizes on the screen. Pain level was assessed prior to and after each treatment utilizing the VAS. In addition, they were asked how long their reduction in pain lasted following each session. Subjects completed the McGill pain scale and DN4 questionnaire prior to the first session and twenty-four hours after the last session.

Results: There was a significant improvement in pain via VAS scoring after each treatment sessions (S1-S5). Participants had partial preservation of pain reduction following each session and a gradual increase in duration of symptom relief from an average of 1.8 hours after the first session to 8 hours after the last session. There was no significant correlation between the duration of symptoms prior to intervention and the level of pain relief achieved. There was a significant, 37% decrease of VAS scores from baseline to conclusion. There was a significant, 34% decrease in the McGill Pain Questionnaire and a significant improvement in DN4 scores.

Conclusion: 3DARS was effective in providing acute pain relief for participants with chronic, unilateral, upper extremity neuropathic pain. This may be an alternative treatment method for those who did not respond adequately to traditional mirror therapy.

Commentary: This article highlights the use of new technology in the practice of physical therapy. While expensive, virtual reality may be a new intervention method to utilize as a part of a multi-disciplinary approach for complex patients with neuropathic pain. I would like to have known the study's criteria for not responding adequately to pharmaceutical and traditional mirror therapy. In addition, there may be different subsets of neuropathic pain within each related diagnosis that may benefit more or less from mirror therapy. Therefore, more studies may need to be done to determine the mechanism of action to better determine who would be appropriate for mirror therapy or 3DARS.

Monthly Literature Review

Schneider KJ, Leddy JJ, Guskiewicz KM, *et al*. Rest and treatment/rehabilitation following sport-related concussion: a systematic review. *Br J Sports Med* 2017;51:930-934

Review submitted by: August Winter

Objective: The purpose of this systematic review was to determine the effectiveness of a rest period following a concussion, as well as investigate the effectiveness of active treatments on athletes who have suffered a sports related concussion (SRC).

Methods: Articles up till October 2016 were reviewed. Included articles needed to be original research, have the focus of the article be SRC, and needed to evaluate the effect of either rest or treatment. The Downs and Black checklist was used to assess methodological quality. Because of the heterogeneous nature of the intervention and outcomes, only a qualitative analysis of the data was performed versus a meta-analysis.

Results: 28 studies were identified out of a possible 5710 citations. 3218 participants were included. There is conflicting evidence on the efficacy of rest following SRC, with some studies reporting an increase in symptom duration and severity with a rest period, and other reporting the opposite effect. There is moderate evidence that cervical and vestibular PT is more effective than rest/graded exertion for return to sport, while there is conflicting evidence for the benefits of sub-symptom aerobic exercise.

Conclusions: The authors made several broad recommendations based upon the evidence they found in their systematic review. Athletes should utilize complete rest for 1-2 days following a SRC, followed by a period of gradual resumption of non-sport activities that do not exacerbate their symptoms. Heavy exertion during intense physical activity or strenuous mental effort should be avoided early on, although exacerbations from these events appear to be transient. For athletes that continue to experience headache, neck pain, or dizziness, a combination of cervical and vestibular PT is recommended. Sub-maximal and sub-symptom aerobic exercise is safe and may be of benefit to decrease persistent symptoms. Return to play and injury recognition during the first 10 days may be most important for risk of re-injury rather than pure symptom resolution.

Commentary: As with many systematic reviews, most of the topics covered in this article did not have sufficient statistical evidence in order to make strong recommendations for guiding rehabilitation. Based on their qualitative assessment however, the authors did make some general guidelines for the care of these athletes following an event. Given the incidence of SRC and increased awareness to the symptoms it likely is beneficial to have some concise suggestions for athletes, coaches, and parents in order to guide the initial stages of rehabilitation. This article and the accompanying article by Grant et al. discussing the predictors of recovery following concussion are good resources for any orthopedic physical therapist, even if you do not specialize in treating SRC. Future research should help to determine the optimal parameters of physical activity following a SRC, as well as differing recommendations based upon the severity of symptoms or length of symptoms.