

**Rotem-Lehrer N, Singer N, Reshit O, Springer S. Measuring Up to Expectation: Cognitive Bias in Wrist Range-of-Motion Measurement. J Orthop Sports Phys Ther. 2016 Dec;46(12):1037-1041.**

### **Background**

The role of cognitive biases and their effect on a wide range of aspects relevant to clinical medicine has become the focus of a growing body of research, yet their effect in physical therapy is not well established.

### **Objectives**

To test whether anchoring information provided to physical therapists prior to assessment of wrist range of motion (ROM) may induce bias in the measurement.

### **Methods**

A total of 120 physical therapists participated in the study. Participants were asked to measure passive wrist extension ROM of a 65-year-old woman with no history of injury to the upper limb using a universal goniometer. Before initiating the measurement, some participants received a clinical description, which included sham information about the patient's health history. Three groups were differentiated according to the provided clinical content: no bias (n = 38), moderate bias (n = 41), and substantial bias (n = 41). An analysis of covariance was applied to test for differences between the 3 groups while controlling for any potential sex and experience effects.

### **Results**

The analysis of covariance yielded a significant group effect ( $P = .009$ ), with no significant effect for sex and experience. The adjusted mean wrist ROM was  $80.2^\circ$  for the no-bias group,  $74.5^\circ$  for the moderate-bias group, and  $72.4^\circ$  for the substantial-bias group. Post hoc tests demonstrated significant difference only between the group with no bias and the substantial-bias group (mean difference,  $7.7^\circ$ ;  $P = .009$ ).

### **Conclusion**

Anchoring information was associated with differential results of an objective test. Physical therapists should increase their awareness of biases and consider employing debiasing strategies.

### **Comments:**

The focus of this study is demonstrating the potential cognitive biases that make “objective examinations” less objective. It is important for clinicians to reflect on daily practice, even in aspects as simple as goniometric measurement, and understand where we can be led astray. As growing practitioners I think we are more susceptible to being influenced by subjective information or PMH that may bias us into fitting measurements to what we think should be the clinical presentation vs what actually is, or being hesitant to use force or cause discomfort. This study discusses that previous literature has found a 1-7 degree error of measure to be standard with goniometric measures; but comparing cognitive biases in this study found 7.7 degrees difference between the “no bias” group and the “substantial bias” group which indicates that the subjective information given as cognitive bias has an effect outside the norms for standard error of goniometric measurement.

It is also important to note that this study focused on PROM suggesting that the biasing information has an effect on perceived end feel and/or amount of overpressure provided and not just a visual/numerical value bias.

**Michiels et al. (2016). Does multi-modal cervical physical therapy improve tinnitus in patients with cervicogenic somatic tinnitus? *Man Ther*, doi:10.1016/j.math.2016.08.005**

Review submitted by Justin Bittner

**Purpose:**

To investigate the effects a multimodal cervical physical therapy treatment has on patients with tinnitus complaints related to cervicogenic somatic tinnitus.

**Methods:**

The study was a delayed start RTC. Outcome measures used were the Tinnitus Functional Index (TFI) and Neck Bournemouth Questionnaire (NBQ). Two groups consisting of 19 participants each were used for this study. One group received 6 weeks (12 sessions) of cervical intervention while the other group went through a “wait and see” period”. Following the delayed start, group 2 received 6 weeks of cervical physical therapy. Interventions consisted of cervical spine mobilizations, cervical exercises and a home exercise program. Exercises consisted of strengthening for the deep neck flexors and self-mobilizations of the cervical spine. The treating therapists in this study were free to adapt the manual mobilization techniques and exercises used to address the current presentation of the patient. To maintain some consistency, no manipulations were performed. Outcome measures were assess at baseline, after wait and see period, after treatment, and after 6-week follow-up.

**Results:**

At baseline all participants had a baseline TFI indicative of severe tinnitus. Immediately after treatment the TFI scores had significantly decreased. There was no significant difference between the delayed start and immediate start groups.

The average NBQ score significantly decreased from baseline to post intervention for both groups. The group that received immediate intervention had a significantly greater improvement in NBQ score compared to delayed intervention group. Both groups maintained the improvements at the 6 week follow-up assessment.

**Conclusion:** A multimodal cervical physical therapy treatment can have a positive effect on the treatment of tinnitus in some patients with a combination of tinnitus and cervical pain.

**Comments:** Studies have shown, Physical Therapy can effectively treat patients with cervicogenic dizziness due to the cervical spine’s relationship with the trigeminal nucleus. This study shows that physical therapy can play a role in treating tinnitus in patients with cervicogenic somatic tinnitus (due to the cervical somatosensory system’s influence at the inferior colliculus and auditory cortex). Tinnitus is prevalent in about 15% of the adult population. Studies show that about 1/3 to 1/2 of patients with tinnitus have tinnitus related to cervicogenic somatic tinnitus. I feel that a majority of physicians understand the relationship between the cervical spine and dizziness, however, the relationship between the cervical spine and tinnitus is less known amongst MDs. I believe Physical therapist play a role in the treatment of tinnitus related to cervical spine dysfunction just as PTs play a role in dizziness related to the cervical spine; and we should have a greater hand in providing them treatment than we currently do.

**Karas S, Olson Hunt MJ, Temes B, Thiel M, Swoverland T, Windsor B. The effect of direction specific thoracic spine manipulation on the cervical spine: a randomized controlled trial. *J Man Manip Ther.* November 2016:1-8. doi:10.1080/10669817.2016.1260674.**

Review submitted by: Katie Stokely, PT, DPT

**Objective:** The use of thoracic manipulation for patients with mechanical neck pain is widely supported in the literature; however, there is limited evidence on the difference of directional specific thoracic manipulation with regards to symptom improvement. The purpose of this study was to address this gap and determine if there is a difference in neck pain outcome measures when utilizing direction specific thoracic spine manipulation.

**Methods:**

69 participants with primary complaints of mechanical neck pain between the ages of 18-60 years old were chosen for this study. Exclusionary criteria included suspicion of serious cervical pathologies including fracture, osteoporosis, and infection, as well as previous neck surgery or cervical nerve root compression. Following initial screenings and selection for participation, subjects completed the Neck Disability Index (NDI) and Numeric Pain Rating Scale (NPRS). As a part of the physical examination, thoracic mobility was assessed utilizing posterior to anterior (PA) passive accessory intervertebral motion (PAIM) to determine the presence of thoracic spine hypomobility. Therapists then determined whether thoracic hypomobility was more apparent in flexion or extension based on palpation with flexion and extension active range of motion. Subjects were randomized to receive direction specific supine thoracic manipulation corresponding to the direction of greatest motion limitation (matched) or opposite (unmatched). Manipulation was followed up with individualized manual therapy and therapeutic exercise. At two day and two week follow-ups, participants completed a NDI, NPRS, and Global Rating of Change (GROC) outcome, then the same manipulation was performed along with further manual treatment and exercise.

**Results:** Overall, both the matched and unmatched groups improved over time and no significant difference between treatment groups with respect to the amount of improvement reported via outcome measures was found. Matching direction specific thoracic manipulation with assessed limited motion did not affect participants' scores on the NDI, NPRS, or GROC.

**Conclusion:** Collected data suggests that while thoracic spine manipulation that is directional specific had a positive effect on neck outcome measures, there was no difference when the direction of thrust was matched or unmatched with clinically identified hypomobilities.

**Commentary:** While the authors of this study reported several limitations, including variations in treatment, exercise, and educational components provided to its subjects, results demonstrate that whether or not participants were placed in biomechanically driven groups, participants still showed improvement in neck pain. Clinically, this may support that just the movement of hypomobile segments and the neurophysiological effect of manipulation may be beneficial to

patients with mechanical neck pain. This study did not include duration of symptoms, primary diagnosis, or mechanism of onset. While this did not impact the studies baseline statistics between groups, these may be factors to consider when individualizing specific manipulation techniques.

**Level of Evidence:** 1b

**Kise NJ, Risberg MA, Stensrud S, Ranstam J, Engebretsen L, Roos EM. Exercise therapy versus arthroscopic partial meniscectomy for degenerative meniscal tear in middle aged patients: randomised controlled trial with two year follow-up. Br J Sports Med 2016;50:1473-1480 doi:10.1136/bjsports-2016-i3740rep**

Review submitted by: August Winter, PT, DPT

**Objective:** The objective of this study was to compare whether exercise or arthroscopic surgery is more effective for improving knee function in middle-aged patients with degenerative meniscal tears that have been verified by MRI.

**Methods:** Inclusion criteria included age 35-60 years, medial degenerative meniscal tear verified by MRI and history of more than 2 months of unilateral knee pain without trauma, and grade 2 or lower radiographic osteoarthritis (OA) on the Kellgren-Lawrence scale. The participants randomly assigned to the exercise group received neuromuscular and strength training over twelve weeks for a desired total of 24-36 sessions. Those assigned to the knee arthroscopy group received the surgical intervention and 4 basic exercises immediately post-operatively. Thigh muscle (quadriceps and hamstring) strength assessed via dynamometer at three months and patient reported knee function via the knee injury and osteoarthritis outcome score (KOOS) at two years were the primary outcomes measured. Secondary outcomes included the mental component of the SF-36, individual subscales of the KOOS, and lower extremity functional tests (one leg hop test, 6 m timed hop test, and knee bend test). Assessors were blinded to participant group.

**Results:** 70 participants were randomized to each group. On average the exercise group participated in 25 exercise sessions. The mean improvement for the KOOS after 2 years was not statistically different between groups (25.3 points exercise group versus 24.4 points meniscectomy group). At three months the exercise group had significantly greater values for all muscle strength variables tested. For secondary outcomes, the exercise group had greater 6 m timed hop test results at three months, while all other outcomes did not differ significantly. Thirteen of the exercise participants crossed over to the surgical group.

**Conclusions:** Supervised exercise provides similar improvements in knee function and increased thigh muscle strength when compared to arthroscopic surgery for individuals with degenerative meniscal tears and no signs of osteoarthritis.

**Commentary:** The start of this article puts this subject into perspective: in North America and Europe, up to 300 out of 100,000 people will receive an arthroscopic partial meniscectomy

annually. In line with these statistics, we frequently see patients in clinic that have had their knee “cleaned up” at an earlier time. This article provides evidence that physical therapy can provide similar and even better outcomes for patients with degenerative meniscal tears when compared to partial menisectomies. The major positives of this research design were the long term follow up, multiple outcomes including functional tests, strength measures, and patient reported function, and blinding of the groups to the assessors. Interestingly the authors plan to continue to follow this cohort of participants for an additional three years to determine possible differences in the rate of OA in each group. As for limitations, part of the study’s inclusion criteria was grade II OA or lower (definite osteophytes and possible joint space narrowing), however, only 4% of the participants had evidence of OA on radiograph. As many of our patients, even those in their 40’s, may have evidence of OA on radiograph it would be interesting to see this study replicated with a higher rate of mild to moderate OA present. Another flaw was the number of sessions and length of treatment, as the exercise group was treated for 25 sessions over 12 weeks. In the United States where a patient may be paying a substantial amount out of pocket for each session this number of treatments may not be feasible depending on how the potential surgical intervention might be covered.

**Overmeer, T., & Boersma, K. (2016). What Messages Do Patients Remember? Relationships Among Patients' Perceptions of Physical Therapists' Messages, Patient Characteristics, Satisfaction, and Outcome. *Physical Therapy*, 96(3), 275-283.**

Reviewed by: Erik Lineberry, DPT

**Objective:** The aim of this study was to explore the relationships between perceptions of treatment delivery that are related to an evidence-based approach and psychological factors, treatment outcome, and treatment satisfaction.

**Methods:** This study was a secondary analysis of a previous RCT. Data on 281 participants was collected. The study was carried out in primary care in several counties in Sweden. The inclusion criteria for patients enrolling in the study were musculoskeletal pain and age between 18 and 65 years. The exclusion criteria were sick leave for more than 3 months during the previous year as a result of the present musculoskeletal pain problem and the presence of red-flags, such as progressive motor weakness or gait disturbance, history of violent trauma, difficulty with micturition, fecal incontinence, and saddle anesthesia. All participants were asked to fill out questionnaires at 3 different occasions. First, participants completed an initial questionnaire at baseline. Second, they completed a different questionnaire at 6 weeks after treatment start dealing with how they perceived treatment. Third, a follow-up was conducted at 6 months with the same questionnaire as at baseline. The questionnaire at baseline and at 6 months included demographic questions, a question about pain intensity during the previous week, the Quebec Back Pain Disability Scale, the Pain Catastrophizing Scale, and the Hospital Anxiety and Depression Scale.

This study selected 3 questions for use as an evidence-based approach to a biopsychosocial framework:

(1) Did your physical therapist ensure you your complaint is not a sign of a serious disease?

- (2) Did your physical therapist advise you to stay active despite your complaint?
- (3) Were you satisfied with the physical examination your physical therapist conducted?"

Responses were dichotomized into “perceived the biopsychosocial message” or “not perceived the biopsychosocial message.” Perceived the biopsychosocial message was defined as answering yes to at least 2 of the 3 questions. If the participant answered “no” or “do not remember” on 2 or more of the questions their response was dichotomized to “did not perceive the biopsychosocial message.”

**Results:** High catastrophizing and lower mood in the participants were correlated to “not perceiving the biopsychosocial message” measured at 6 weeks after treatment start. Participants who did not perceive the biopsychosocial message were at higher risk for disability and had lower treatment satisfaction 6 months after treatment start even when controlling for pretreatment pain intensity. “Not perceiving the biopsychosocial message” was not a mediator for treatment outcome and treatment satisfaction. Physical therapists’ treatment orientations or attitudes were not related to the perception of the message by the patients.

**Conclusion:** Maladaptive cognitions and negative emotions appear to affect the way information provided during treatment is perceived by patients. The way information is perceived by patients influences treatment outcome and treatment satisfaction. Physical Therapists are advised to check that patients with higher levels of catastrophizing and lower mood are correctly perceiving and interpreting a biopsychosocial message.

**Commentary:** This study found that baseline depression and catastrophizing levels were strong predictors of disability at the 6 month follow-up. It also showed that these participants were more likely to “not perceive the BPS message”. It was also found that “not perceiving the BPS message” was an independent risk factor for decreased function at 6 months. This was an interesting finding to me more so than the others mentioned, because it shows the importance of patient perception of our care is meaningful regardless of known prognostic risk factors like depression and catastrophizing.

What I think the study hit home for me is the importance of identifying these patients early and spending the needed additional time with patient education and “coaching” to improve their outcomes. The measures used in this study and other more time efficient measure like the STarT back tool exist for this purpose and I should be utilizing them more in the clinic at the IE to help model my exam and subsequent visits. This study was an interesting look at patient’s perspectives of physical therapy care, something that I think is hard to measure. I wish that the article would have spent more time discussing the physical therapist’s training or any commonalities in their verbiage. Since our last OMPTS course I have been trying to pay more attention to my explanations of patient conditions, treatments, and outcomes. I would have found this article more helpful if it had offered an appendix with the language or explanations that the therapists involved used.

**Hewett TE, Ford KR, Xu YY, Khoury J, Myer GD. Utilization of ACL Injury Biomechanical and Neuromuscular Risk Profile Analysis to Determine the Effectiveness of Neuromuscular Training. Am J Sports Med. 2016;44(12):3146-3151.**

<https://www.ncbi.nlm.nih.gov/pubmed/27474385>

**Review Submitted by: Scott Resetar, PT, DPT**

**Objective:** This study aimed to use a statistical approach called latent profile analysis (LPA), commonly used in social science, to determine biomechanical and neuromuscular risk profiles of female athletes who at higher risk of ACL injury.

**Methods:** 624 athletes recruited. 467 athletes had usable data. Inclusion criteria = no knee, hip, or low back pain for which they sought treatment in the last year, no prior acl injury or knee surgery. Athletes had 55 reflective biomarkers placed on them and were recorded while they performed a double vertical jump (DVJ) and a single leg crossover drop (SCD). DVJ = jump off a 31 cm box, land on both feet, and immediately explode into a maximum vertical jump. SCD = standing on one leg on the 31 cm box, jump off the box forward and medially and land on the opposite leg. The order of tests and starting leg were randomized. Items measured were: ground reaction force during DVJ, hip abduction moment during SCD, hip adduction moment max during SCD, hip adduction moment min during SCD, Hip adduction moment min during DVJ, and peak frontal plane pelvis angle during SCD. These variables were analyzed using the LPA statistical approach.

**Results:** 14% of athletes were classified as low risk, 72% as moderate risk, and 14% as high risk. The higher risk groups tended to have larger and postpubertal athletes, while the lower risk groups tended to have smaller and prepubertal athletes. Large knee abduction moments, large hip abduction moments AND large hip adduction moments during the SCD test were the most sensitive at classifying athletes into the high risk category.

**Conclusions:** The authors note that previous studies to classify female athletes into risk categories were based only on one measure, the knee abduction moment. This research points to other factors that can be of use when determining future risk of ACL injury. Namely, postpubertal stage, larger size, large med/lat knee movements during SCD testing.

The authors note that for those patients who are classified as low risk, programs implemented as part of a team warm-up may be adequate. Alternatively, patients who are moderate or high risk may require supervised training with structured verbal and visual feedback as well as training that includes an emphasis on core and hip control. The effects of different types of ACL injury prevention programs across risk groups must, however, be assessed with future studies.

**Commentary:** These findings could be used for screening during pre-season activities and this easily sets the authors up for a study of targeted intervention in the future. Neuromuscular deficits associated with an increased knee abduction moment appear to increase with age, and their increased prevalence largely coincides with the onset of maturation.