

**Makizako H, Shimada H, Doi T, Tsutsumimoto K, Nakakubo S, Hotta R, Suzuki T. Predictive Cutoff Values of the Five-Times Sit-to-Stand Test and the Timed “Up & Go” Test for Disability Incidence in Older People Dwelling in the Community. Phys Ther. 2017;97(4):417-424.**

Review submitted by: Katie Stokely, PT, DPT

**Objective:** There are several factors that influence the development of disability in aging community dwelling adults. These include physical function, cognitive function, and depressive symptoms. Physical function can be further categorized into lower extremity strength, unstable standing balance, and lower extremity mobility performance. In particular, lower extremity mobility performance, evaluated with tests such as the five-time sit-to-stand (FTSS) and Timed “Up & Go” (TUG), has been associated with maintaining independence. The goal of this study was two-fold; first, to determine the appropriate cutoff points of the FTSS and TUG for the development of disability and second, to evaluate the benefits of using these two tests together and separately in predicting the risk of developing disability in community dwelling elderly adults.

**Study Design:** The study performed was a prospective cohort study.

**Methods:** Community dwelling adults 65 years or older from Obu, Japan, were selected to participate in this study. Subjects underwent face-to-face interview, as well as cognitive and functional testing. Inclusionary criteria comprised of participants being 65 years or older at the first examination, ability to participate in follow-up sessions, and no previous participation in research studies. Exclusionary criteria included the need for support or care as determined by a long-term care insurance (LTCI) system level greater than or equal to three out of five, disability in basic activities of daily living (ADLs), history of confounding illness (Parkinson’s disease, stroke, and/or Mini-Mental State Examination (MMSE) score less than 18), inability to perform FTSS or TUG test in accordance to testing procedure, and/or inability to complete two-year follow-up. FTSS and TUG were proctored by licensed physical therapists. Participants completed one trial of the FTSS and two trials of the TUG. Participants were allowed to use an appropriate assistive device for the TUG and the fastest of the two trials was recorded for analysis. Subjects were monitored monthly to determine need for physical and/or mental disability based on their LTCI classification.

**Results:** 4,335 participants with the average age of 71.7 years were included in the final study analysis. Over the two-year follow-up, 161 (3.7%) of subjects developed disability; those who were female, older, had a higher number of prescribed medications, had diagnosed hypertension and/or osteoporosis were more likely to develop disability. Additionally, they were more likely to score lower MMSE scores, high depression scale scores, and have poorer performance on both lower extremity mobility performance tests. Based on data analysis, the cutoff point for predicting disability in the overall group was a score of ten or more seconds on the FTSS and nine or more seconds on the TUG. Cutoff scores were found to be the same for men and women. The TUG was found to have a better sensitivity than the FTSS with a similar specificity. Participants who did poorly on one or both tests were found to be at a higher risk for developing disability as compared to those who did better initially in lower extremity mobility performance testing. Those who performed poorly on both tests were at greater risk of developing disability (11.8%) than those who performed poorly on one.

**Conclusion:** Poor performance on the FTSS (12-15 seconds) and TUG (10-15 seconds) has been previously associated with an increased risk of falls. The current study concluded that

cutoff points for the FTSS and TUG of greater than or equal to 10 seconds and greater than or equal to 9 seconds, respectively, has been associated with an increased risk of developing disability in community dwelling adults. Moreover, poor performance on both tests, as compared to one alone, results in a threefold increased risk for developing disability in this population.

**Commentary:** As a clinician in an area consisting of a large population base that fits this demographic, I thought this article provided insight and evidence that supports the use of easy to use, lower extremity mobility performance tests as a part of a comprehensive examination. These tests have provided cutoff scores to determine the risk of fall, and the further use of these tests and their ability to evaluate the risk for developing disability provide justification for further physical therapy care. In terms of this study, I would like to have known whether the subject group included those with previous orthopedic injuries or joint replacements. Reflecting on this article will increase my utilization of these tests with patients who may come in with orthopedic injuries or post joint replacement as they may improve my ability to identify and assess those who may be at risk for developing disability that places more strain on our health care system.

**Zhao et al. (2017). The Effectiveness of Combined Exercise Interventions for Preventing Postmenopausal Bone Loss: A systematic Review and Meta-analysis *J Orthop Sports Phys Ther*, doi:10.2519/jospt.2017.6969**

Review submitted by Justin Bittner

**Purpose:** To analyze the literature and examine the effect that combining exercise interventions has on bone mineral density in postmenopausal women, particularly at the femoral neck, total hip, lumbar spine, and total body.

**Methods:** A search of the literature was performed up to January 1, 2016. Only randomized controlled trials were included in the study and required that the interventions needed to be combined exercise intervention with BMD being the primary outcome. Exclusion criteria were articles that subjects had previously been treated with glucocorticoid or hormone replacement therapy. However, participants could use supplements such as vitamin D and calcium. Exercise intervention needed to last for at least 6 months to be included. Eleven RTCs were included in the systematic review for analysis.

**Results:** Exercises that incorporated several different physical activities (walking, resistance training, aerobic training, balance, jumping, stairs, dancing, etc.) demonstrated significant improvements in BMD. Overall, significant improvements in BMD were seen in the lumbar spine, femoral neck, total hip, and total body; with all P values less than 0.05. A subgroup analysis was performed to determine if skeletal responses to exercise differed based on age. Through this subgroup analysis, it was determined that postmenopausal women aged >60 demonstrated more significant improvements in lumbar spine BMD while women <60 years-old demonstrated more significant improvements in femoral neck BMD.

**Conclusion:** Through this systematic review, it can be concluded that exercises combining several different physical activities are effective in maintaining postmenopausal women's BMD at the femoral neck, lumbar spine, total hip, and total body. This study supports that concept that combined exercise produces non-site specific effect at mechanical loading sites. Combined exercise demonstrated the ability to prevent bone loss and would be beneficial in reducing the risk of a fracture.

**Comments:** As physical therapists, one area we play a vital role in is prevention. Prevention of surgery, prevention of obesity, prevention of injury, fall prevention, etc. One area, I feel we have lacked at educating the general public on is our role in prevention of bone loss. There are over 300,000 hip fractures alone annually (not to mention humeral fractures or compression fractures). 95% of those are related to falls in the elderly population. Following hip fracture, it has been reported that the 1-year mortality rate is between 14-53%. Unfortunately, I don't think insurance companies would find it medically necessary and would likely not pay for it, but seeing patients who are considered osteoporotic or osteopenic monthly (or bi-monthly) for education and modification of exercise programs could be beneficial in reducing fractures and ultimately death. I have been to a program that was bi-weekly for 6-weeks and educated patients on the "Meek's Method" of BMD loss. Unfortunately, the patients in the class had to pay out of pocket for this class, which is something many elderly cannot do, particularly in rural areas. I think, along with this study, future studies implementing this type of treatment from physical therapy could allow us as a profession to better treat the general public and tap into loss of BMD prevention. This would likely overflow into the fall prevention and injury prevention mentioned above.

**Richard Ellis, Samantha Osborne, Janessa Whitfield, Priya Parmar & Wayne Hing (2017)  
The effect of spinal position on sciatic nerve excursion during seated neural mobilisation exercises: an in vivo study using ultrasound imaging, Journal of Manual & Manipulative Therapy, 25:2, 98-105**

Review submitted by Nicolas Hoover

**Purpose:**

The aim of this study was to determine whether different spinal postures (slump-sitting versus upright-sitting) altered the amount of longitudinal sciatic nerve movement during neural mobilisation exercises commonly used in clinical practice.

**Methods:**

Study design: single group, observational, repeated measures comparison of 34 healthy adults  
Inclusion/Exclusion: Participants were excluded if they had a history of major trauma or surgery to the lumbar, hip, buttock (gluteal) or hamstring (posterior thigh) regions; symptoms consistent with sciatic nerve impairment (i.e. paraesthesia, weakness, etc.); or a positive slump test.

Participants were also excluded if they had a neurological condition or other systemic disorders (e.g. diabetes) that might alter the function of the peripheral nervous system.

Procedures: For all neural mobilizations, knee extension was passive using Biodex isokinetic dynamometer. Leg to be tested was randomly chosen, hip flexion was fixed at 90 deg and the knee was passively extended from 90 deg flexion until pt perceived 4/10 hamstring stretch on NRS (0-10) to represent moderate stretch. Slump position was standardized using 45cm stability ball with a seatbelt for maintaining position. Upright position was standardized by pt resting against backrest of Biodex machine. 2 reps of each position were performed for familiarization and timing of cervical movement, followed by 3 reps of each for data collection with 1min rest between reps.

Neural mobilization exercises:

Single-joint mobilisation (knee): Passive knee extension, performed by the Biodex from 90u flexion to the pre-determined point of 4/10 stretch discomfort (moving of the sciatic nerve caudally via the tibial nerve). Each participant was instructed to look straight ahead to maintain consistency of cervical spine position

Slider mobilisation: Simultaneous passive knee extension performed by the Biodex from 90u flexion to the pre-determined ROM of 4/10 stretch (moving of the sciatic nerve caudally via the tibial nerve) and active cervical spine extension from full comfortable cervical flexion to full comfortable cervical extension (unloading of nervous system cranially)

Tensioner mobilisation: Simultaneous passive knee extension performed by the Biodex from 90u flexion to the pre-determined ROM of 4/10 stretch discomfort (moving of the sciatic nerve caudally via the tibial nerve) and active cervical flexion from full comfortable cervical extension to full comfortable cervical flexion (loading of nervous system cranially)

**\*\*SEE LAST PAGE FOR DIAGRAM OF POSITIONS\*\***

Outcomes Measures: Longitudinal excursion of the sciatic nerve was assessed at the level of the posterior mid-thigh (half-way between the gluteal and popliteal creases). Real-time ultrasound imaging was converted to digital video for analysis of sciatic nerve excursion.

Secondary outcomes measures were intrarater reliability of measuring sciatic nerve excursion and predictive variability of demographic data.

**Results:**

Sciatic nerve excursion was slightly greater across all positions in upright sitting compared to slump sitting but not significantly. For all data, the movement of the sciatic nerve was in a distal direction. The reliability of measuring excursion across two trials for the three neural mobilization positions was excellent for both the slump position (ICC 0.86, 95% CI, 0.84–0.92; SEM, 0.25 mm) and the upright position (ICC 0.89, 95% CI, 0.85–0.92; SEM, 0.21 mm). Greater BMI, knee ROM and younger age were associated with higher levels of sciatic nerve excursion.

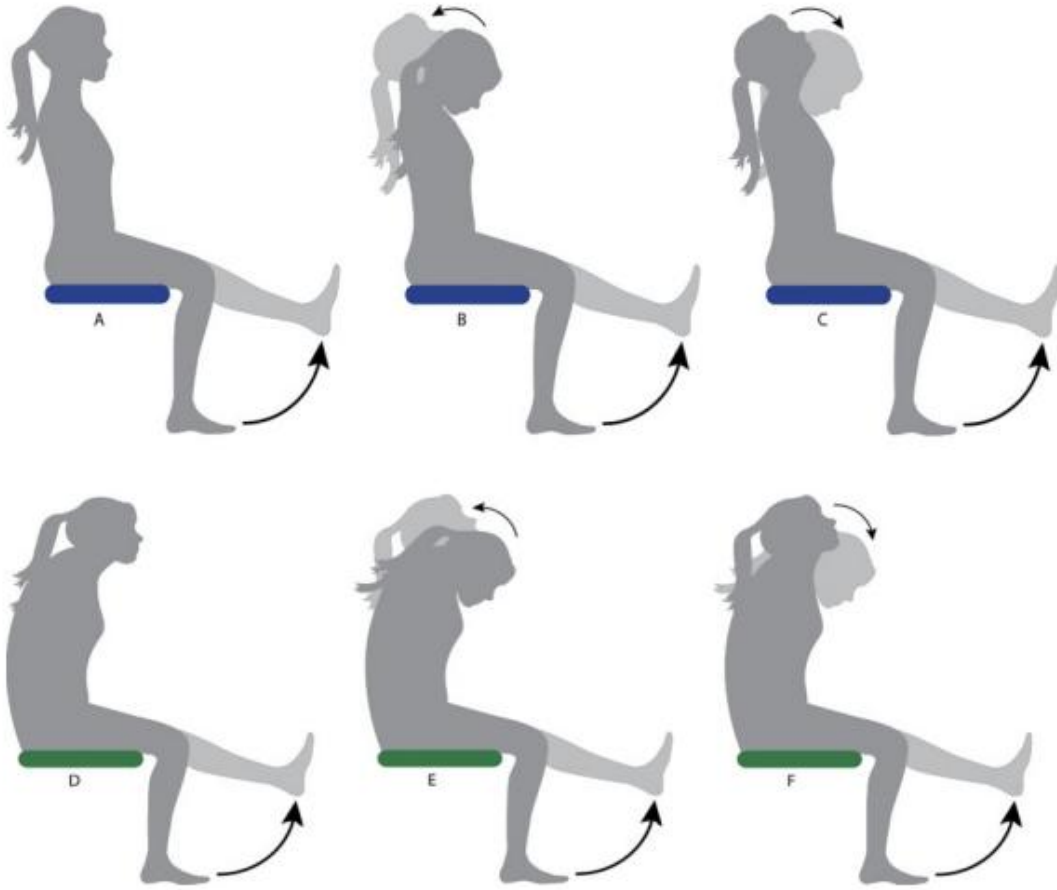
### **Conclusions:**

The lack of statistical significance in this study coupled, with the fact that the  $R^2$  statistic was low (22%), indicates that there is more than 75% variability in our study data that is unaccounted for by the variables in our model. This suggests that there are other variables (that are either unknown or not currently collected) that may better predict sciatic nerve excursion among healthy participants utilising neural mobilisation exercises in different sitting positions. The clinical implications of the research are that spinal posture has little effect on sciatic nerve excursion between different sitting-based neural mobilisation exercises for the sciatic nerve and associated tracts in healthy participants. Although the current study assessed healthy participants, it can be inferred from the results that clinicians are able to individualise seated neural mobilisation exercises with regard to lumbar position, to meet the requirements of individual patients, without compromising sciatic nerve excursion.

### **Comments:**

The results of this study are beneficial to our clinical practice in that it provides some evidence toward our ability to individualize neural mobilizations for each patient based on their level of irritability. We have had several discussions about providing pt's with neural glide exercises for HEP prescription and when might be the best time to administer these. I have personally struggled with that decision making process but have more confidence with being able to utilize these different postured positions in hopes of eliminating adverse reactions or, at the very least, minimizing them.

One other aspect of this article that I was pleased to see was the recognition of limiting factors and acknowledgment of their possible impact on the outcomes. While I was reading the description of testing positions, I questioned the use of the stability ball and how it would impact pt's of different sizes, active cervical mvmt vs passive knee mvmt, and the lack of tensioning at the foot/ankle. These were all discussed as limitations but justified as the purpose of this study was focused on spinal position rather than full neural tension. The authors also discussed the use of cervical mvmt and whether it provided enough tension to effect the results of a LE tension test. I would like to see a similar study utilizing lumbopelvic positional variations in order to assess the closer relationships to the LE.



**Nicolson PJA, Bennell KL, Dobson FL, Van ginckel A, Holden MA, Hinman RS. Interventions to increase adherence to therapeutic exercise in older adults with low back pain and/or hip/knee osteoarthritis: a systematic review and meta-analysis. Br J Sports Med. 2017;51(10):791-799.**

Reviewed by: August Winter

**Objective:** Low back pain and osteoarthritis of the hip and knee joints are common causes of pain, disability, and loss of quality of life. Therapeutic exercise has been shown to be beneficial in populations with these conditions, however lack of adherence to an exercise program diminishes the potential benefits. The objective of this study was to perform a systematic review of RCTs that compared adherence interventions to control groups for therapeutic exercise performance in these populations.

**Methods:** RCTs were included if they involved individuals older than 45 with low back pain, hip OA, or knee OA for greater than 3 months. Studies were included if the only difference between control and intervention groups was the adherence intervention. Studies were required to demonstrate some quantitative measure of exercise adherence.

**Results:** Two reviewers selected 9 studies out of 4899 titles, yielding a total of 1045 participants. Three studies investigated chronic low back pain, three knee OA, and three either hip or knee OA. The most common metric of adherence was the exercise log book, but data for these logs was lacking in some cases, with one study reporting complete data for 55% of the total subject pool at 12 month follow up. One study did use the Sport Injury Rehabilitation Adherence Scale to measure adherence. For low back pain, two studies demonstrated that programs to target self efficacy through reinforcement and education were superior to control groups. Examples of these interventions include positive cues to action in the patients' environment, a treatment contract, and the use of an exercise diary. For lower limb arthritis, a behavioral graded activity approach and using 'booster' sessions improved adherence compared to control. Behavioral graded exercise aims to increase exercise intensity gradually while incorporating it into daily life. Goal setting, strategies to overcome barriers, action coping plans, and audio/video exercise cues were not found to be of statistically significant benefit.

**Conclusions:** Evidence exists to suggest that motivational strategies can be effective for improving exercise adherence for individuals with low back pain, and behavioral graded exercise can provide a similar benefit for individuals with OA. 'Booster' sessions provide a small, but statistically significant benefit to patient adherence.

**Commentary:** Much like other health education and adherence research, the topic of therapeutic exercise adherence for musculoskeletal conditions is still developing. This systematic review provides a summary of the current literature for some of the most common MSK conditions in a common patient population. As mentioned by the authors of this paper, this area is currently hampered by inconsistency in intervention reporting and a heterogeneity of interventions and outcomes. Like cigarette smoking or eating fast food, most people know that inactivity, or in this case non-compliance with home exercise, is bad for them. The problem is taking that knowledge and translating it into adherence, something that many therapists struggle with. It doesn't matter if you perfectly prescribe exercises if patients do not perform them. This article nicely summarizes the existing evidence on the topic. I have used the idea of 'booster' sessions with patients with more chronic conditions like OA, and it is good to find that it has

some data to support it. I have not resorted to using an exercise log, but maybe this is relevant for certain patients that need that structure. Having looked at the brief Sport Injury Rehabilitation Adherence Scale, this might be a nice way to facilitate adherence in patients who are at least somewhat invested in taking an active role in their symptom management.



**Kweon, C., Gagnier, J. J., Robbins, C. B., Bedi, A., Carpenter, J. E., & Miller, B. S. (2015). Surgical Versus Nonsurgical Management of Rotator Cuff Tears Predictors of Treatment Allocation. *AJSM*, 0363546515593954.**

Reviewed By Erik Lineberry

**Objective:** To identify independent variables at the time of initial clinical presentation that are associated with preferred allocation to surgical versus nonsurgical management for patients with known full-thickness rotator cuff tears.

**Methods:** A total of 196 consecutive adult patients with known full-thickness rotator cuff tears were enrolled into a prospective cohort study. Robust data were collected for each subject at baseline, including age, sex, body mass index (BMI), shoulder activity score, smoking status, size of cuff tear, duration of symptoms, functional comorbidity index, the American Shoulder and Elbow Surgeons (ASES) score, the Western Ontario Rotator Cuff index (WORC), and the Veterans Rand 12-Item Health Survey (VR-12). Logistic regression was performed to identify variables associated with treatment allocation, and the corresponding odds ratios were calculated.

**Results:** Of the 196 patients enrolled, 112 underwent surgical intervention and 84 nonoperative management. With covariates controlled for, significant baseline patient characteristics predictive of eventual allocation to surgical treatment included younger age, lower BMI, and durations of symptoms less than 1 year. Increasing age, higher BMI, and duration of symptoms longer than 1 year were predictive of nonsurgical treatment. Factors that were not associated with treatment allocation included sex, tear size, functional comorbidity score, or any of the patient-derived outcome scores at presentation (ASES, WORC, VR-12, shoulder activity score).

**Discussion:** Patient demographics at the time of initial presentation for a symptomatic rotator cuff tear are more predictive of treatment allocation to a surgical or nonoperative approach than the patient-derived outcome scores for activity level and shoulder disability. Further study is warranted to help define appropriate indications for treatment allocation in patients with rotator cuff tears.

**Commentary:** I found it interesting that the size of the tear and functional comorbidity score were both found not to be a factor in surgical allocation. I would have expected larger tears to be more likely operated on and increased comorbidities to decrease the likelihood of surgical allocation. Functional outcome scores do not always give a full picture of a patient's functional level, but it is hard to believe these did not affect allocation at all. The age differences in allocation did not surprise and reminded me of Louis CK's bit about doctors making a shoulder out of an ear for younger folks. I would be interested in a follow up study that recommended best practice guidelines for these patients. This was a good look into how some patients are selected for surgery, but an RCT aimed at determining if this is an appropriate way to allocate patients would be useful. I have a feeling it would show different results.

**Rabey M, Hall T, Hebron C, Palsson TS, Christensen SW, Moloney N. Reconceptualising manual therapy skills in contemporary practice. *Musculoskelet Sci Pract.* 2017;29:28-32. Review Submitted by: Scott Resetar, PT, DPT**

**Objective:** The place for manual examination findings within complex, multidimensional presentations is considered using vignettes describing the presentations of five people with low back pain. A reconceptualization of the importance of manual examination findings is put forward, based upon a contemporary understanding of pain science

**Results:** The authors start by going through the evidence of poor reliability of passive accessory testing, and studies showing a randomly selected segmental mobilization is just as effective short term as a clinician selected one. In general, the current research evidence indicates that manual therapy would have small effects in people with chronic low back pain (CLBP), possibly providing short-term pain relief, but unlikely to be more effective than other interventions like medications. However, these studies are performed at the population level, and other studies show that within CLBP, groups exist which respond to manual therapy.

They state that integrating manual therapy findings into clinical reasoning has been shown to improve outcomes, particularly in complex, changeable pain states. Therefore, instead of considering manual examination findings only in terms of how they should “guide” manual therapy interventions (i.e. this motion segment is perceived as hypomobile by the clinician and/or painful by the patient, so mobilization is indicated), they propose that interpretation of manual examination findings should be based upon a contemporary, multidimensional understanding of pain disorders, and viewed as just one, albeit important, part of the information gathered during an examination.

Overall, any beneficial manual treatment responses are likely to be short-lived, particularly in complex presentations. For instance, positive responses to radiofrequency neurotomy (which arguably aims to eliminate peripheral nociceptive input from affected motion segments) are not long-standing in people with whiplash. However, this does not mean we should abandon manual therapy techniques, as they have other benefits. The demonstrable short-term hypoalgesic effects of manual therapy can be used for other means.

For example, following education regarding pain mechanisms and the challenging of maladaptive cognitions, a lumbar spine mobilization with movement into forward bending may reduce kinesiophobia, facilitating more relaxed, confident, and therefore more comfortable movement. This can then be appropriately encouraged during home exercises or daily activities to facilitate carry-over of both the movement and more appropriate cognitions.

Empirical evidence has demonstrated that people want a physical examination, and ignoring patient preferences negatively impacts on the therapeutic relationship. Conducting a physical examination may in part contribute to the perceived credibility of the clinician and help establish trust and a positive therapeutic alliance.

The authors suggest that where manual therapy is used it should be applied alongside an honest explanation of its short-term hypoalgesic effects whilst challenging any associated biomedical beliefs. Matched home exercises should be employed to consciously move the locus

of control to the person experiencing pain.

**Commentary:** This was a great article that really helps put manual therapy findings in context with our modern understanding of pain science. You should read the 5 vignettes and their reasoning for or against manual therapy in each case. I learned something from each one! We need to be better about communicating why/how manual therapy works to our patients to facilitate the locus of control remaining with the patient!