

their dominant distal thumb on the anterior finger placement and index distal phalanx on the posterior finger location. Subjects were given 2 attempts to squeeze both finger digits at maximal effort while the researcher recorded the best pinch strength in pounds. Participants were then provided a 5-button (1.0 cm button width) shirt made by the same manufacturer. All sized shirts were fitted for each participant according to their shirt size before the time trials. The researcher digitally timed the participants in seconds on how fast the participant could button down the shirt, starting with both hands touching the top button, taking the best time trial of 2 attempts. A Pearson correlation using SPSS analyzed if a relationship existed between the 2 variables.

RESULTS: The relationship between both variables displayed a moderate negative correlation between the dominant index finger phalanx and thumb digit pinch strength to buttoning speed in seconds ($r = -0.412$; $p < .036$).

DISCUSSION: Past therapies have focused on repetition of fine motor skills to develop the ability to button a shirt. The relationship between pinch strength of the thumb and index finger ($r = -0.412$) could create an ability to change current therapy methods and focus on pinch strength skill development to restore fine motor skills of the fingers, especially with sport or activities of daily living (ADL).

APPLICATION TO THE FIELD: This discovery could change therapy or physical training towards restoration of this motor skill with care givers or therapists. Replication of a sport skill or daily task might not be the only practical use towards motor skill restoration.

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(P100003)

Determining the Neuromuscular Adaptations to Strength Training in Older Adults: A Systematic Review and Meta-analysis

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Introduction: There are observable decreases in muscle strength as a result of ageing that occur from the age 50. The age-related loss of maximal force production is thought to occur as a result of changes within the neuromuscular system. Changes in both maximal force production and rate of force development (RFD) are due to age-related changes within supraspinal (i.e., reduced motor cortex excitability, increased cortical inhibition), spinal (reduced spinal motoneurone excitability which influences motor unit recruitment and discharge rates) and muscular changes (mainly reduced muscle mass). Strength training in older adults is a suitable intervention that may counteract the age-related loss in force production. However, the neuromuscular adaptations to strength-training in older adults is largely equivocal and therefore, a systematic review with meta-analysis will serve to clarify the present circumstances regarding the benefits of strength-training in older adults

Methods: The review was conducted in accordance with the latest Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines. Post standardized search strategy using different electronic databases and full text screening of selected articles, 54 studies that were heterogenous in relation to sample size, settings, outcomes and intervention characteristics were

selected. Meta-analyses were performed using a random-effects model. A best evidence synthesis (BES) was performed for variables that had insufficient data for meta-analysis.

Results: 19 randomized controlled trials (RCTs) studies ($n=306$) reported a moderate increase in strength (26.13%; SMD 0.67; 95% CI 0.37, 0.97; $P < 0.0001$) post strength training. Additionally, rate of force development (RFD) (SMD 0.65; 95% CI 0.09, 1.22; $P = 0.02$; $n = 48$) and surface electromyography (sEMG) (SMD 0.28; 95% CI -0.41, 0.97; $P = 0.42$; $n = 20$) also improved following training in older adults. Results from BES reported strong evidence to suggest that strength-training increases maximal force production and RFD in older adults and moderate evidence for increased agonist activity. There was limited evidence from the included studies for strength-training to improve voluntary activation, spinal excitability and muscle mass.

Discussion: Overall, the findings suggest that strength-training performed between two and twelve weeks increases strength, RFD and muscle activity, which likely improves motoneurone excitability by increased motor unit recruitment and improved discharge rates. The review identified important gaps in the literature as there is a need to explore the sites of adaptation within the nervous system, using synergistic electrophysiological techniques, such as transcranial magnetic stimulation to probe the elements of the neuromuscular system from the cortex to the muscle.

Impact and application to the field: Strength-training in older adults is a suitable intervention that may counteract the age-related loss in force production.

Conflict of Interest Statement: “My co-authors and I acknowledge that we have no conflict of interest of relevance to the submission of this abstract”

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Does BMI influence foot reaction time and balance scores in elderly women?

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Introduction: Older adults who are obese have a higher chance of experiencing falls and according to the American Journal of Physical Anthropology, if you have a Body Mass Index (BMI) of 30 or higher you are considered obese. A longitudinal panel study stated that over 35 percent of older adults have had at least one fall in the past two years. BMI levels are significantly higher with elderly women compared to younger women and could possibly lead to future falls.

Methods: 10 females (age 82.6 ± 7.23 years; height 161.80 ± 7.29 cm; mass 75.33 ± 21.0 kg; BMI 28.73 ± 7.53) from a local senior living community volunteered to participate in this study. No recent falls or lower extremity injuries were reported at the beginning of the research. All female participants were qualified for this study by being over the age of 65 and having signed informed consents. A Bertec computerized posturography plate (Bertec Corp. Columbus, OH) assessed every participant for Center of Pressure (CoP) measurements of eyes open stable surface (EOSS) and eyes closed stable surface (ECSS) without their shoes on. Foot reaction time was assessed using a Lafayette Instruments 3x4 switch mat connected to a digital multi-function timer (model 54035A, Lafayette, IN). With their shoes on, each participant responded to an auditory stimulus that started the timer by the researcher, responding by stepping quickly onto the switch mat to stop the

timer with their foot. Two trials were performed with the left and right foot in that exact order. Foot reaction time was recorded for each foot and both scores for each foot were then averaged as the mean score for each foot time.

Results: Pearson correlations (SPSS ver. 28) showed EOSS and ECSS balance scores had no significant relationship to the BMI or foot reaction time with the participants. There however was a negative relationship ($r = -0.72$; $p = 0.20$) between the right foot reaction time vs BMI of the participants.

Discussion: Our investigation did not show statistical significance. This may be due to low power based on a smaller sample size even though a strong negative correlation was discovered with the right foot reaction time and BMI. This study attempted to determine if there was a significant correlation between BMI, foot reaction time, and balance scores in elderly women. Compared to previous studies concluding that high BMI increases CoP scores, this study did not reflect past findings. Also, dominant foot reaction time was slower for those participants with higher BMI scores. A higher sample size could have increased the power of the study.

Application to the field: Reduction in body fat percentage have been known to improve mobility, decreasing postural sway. In elderly women, these variables could impact the chances of reducing falls and potential injuries.

All co-authors have no conflict of interest towards the relevance of this submission

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(P100009)

No measures of fear-avoidance following concussion can be recommended for use: a systematic review using the COSMIN Criteria

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Introduction: Concussion is a global concern across various populations. Fear avoidance behaviour is a prognostic risk factor for chronicity for musculoskeletal pain conditions, and is present in people with persistent post-concussion symptoms. Various patient-reported outcome measures (PROMs) have previously been used to quantify fear-avoidance behaviour in people following concussion. However, before being used, PROMs should be evaluated to ensure that they accurately measure the construct that they aim to quantify. The aims of this study were to: 1) identify PROMs that have assessed fear avoidance behaviour following concussion, and 2) assess the measurement properties of all identified PROMs.

Methods: A systematic review was conducted following the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines. A search of seven online databases was performed from database inception to 5 November 2021. We included cross-sectional and longitudinal interventional or

observational studies published in peer reviewed journals that evaluated tool(s) that measure fear avoidance behaviour in participants with concussion. Two authors independently screened all articles and extracted relevant data. Assessment of methodological quality for included PROMs was performed following the COSMIN guidelines. The quality of the evidence was assessed using the GRADE approach. The assessment of PROM methodological quality and the quality of the evidence was assessed by two authors independently before a final consensus judgement was confirmed by the authorship team. This systematic review was prospectively registered on PROSPERO (CRD42021287565).

Results: A total of 1,397 records were identified by our search strategy, with 39 studies reported to have measured some aspect of avoidance behaviours. Only three PROMs had sufficient evidence to qualify for quality assessment: 1) modified Fear-Avoidance Beliefs Questionnaire (FABQ), Fear Avoidance Behaviour after Traumatic Brain Injury Questionnaire (FAB-TBI) and the Paediatric FAB-TBI Questionnaire (PFAB-TBI). There were no development studies identified for any of these PROMs. Both the modified FABQ and FAB-TBI had very-low level evidence of insufficient content validity and sufficient structural validity. The PFAB-TBI had very-low level evidence of insufficient content validity and the structural validity could not be assessed.

Conclusion: Quantifying fear avoidance behaviours in patients following concussion may help identify patients who require alternative management strategies. However, no current PROM can be recommended to assess fear-avoidance behaviours in a concussion population due to insufficient quality and very low levels of evidence. The development of PROMs that measure fear-avoidance behaviours in concussion, and are developed according to the COSMIN guidelines, are needed before the importance of fear-avoidance can be quantified.

Impact and application to the field: This review highlights that existing outcome measures to quantify fear-avoidance behaviours following concussion cannot be recommended for use due to either insufficient validity and/or a very-low-level of evidence. Furthermore, due to the poor quality of current measures, existing studies that have used these measures to quantify fear-avoidance behaviours following concussion are at risk of erroneous conclusions.

Conflicts of interest: The authors declare no competing interests.

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Three-year durability of pain and disability improvements in patients treated with Restorative Neurostimulation for chronic mechanical low back pain

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Introduction: Mechanical chronic low back pain (CLBP) can be caused by impaired neuromuscular control and degeneration of the multifidus muscles, the most important stabilizers of the lumbar spine. An implantable Restorative Neurostimulation system (ReActiv8® by Mainstay Medical) bilaterally stimulates the medial branches of the L2 dorsal rami to override underlying multifidus inhibition to facilitate motor control restoration. The ReActiv8-B randomized sham-controlled pivotal trial provided published evidence of safety, effectiveness, and durability of this therapy (clinicaltrials.gov/show/NCT02577354). Here we will report the three-year durability results.

Methods: Eligible patients had activity limiting mechanical CLBP with Visual Analog Scale (VAS) ≥ 6 cm; Oswestry Disability Index (ODI) ≥ 21 points despite medical management, including at least