good health and signed a voluntary consent for academy data to be released and analyzed. Cadets were then screened for five physical fitness components: vertical jump, 1-minute push-up test, 1-minute sit-up test, 300-m run, and 2.4-km run. For the entirety of the 16-week academy, physical training was completed daily in addition to academic lectures and tactical skills training. All practitioners followed the same exact protocols while testing for the five physical fitness components. A combination of academic and situational skill performance was assessed throughout the duration of the academy. Primary investigators were provided with participant academic data for analysis.

Results: A Pearson correlation (SPSS ver. 26, New York, NY) revealed no statistical significance ($p=0.52$) existed between physical fitness testing components and academic scores. Of all the fitness components, the vertical jump had a weak to moderate negative relationship with academic scores ($r = -.357$). The results of this investigation indicate there is not a direct relationship between commonly performed physical fitness tests and academic scores during academy training.

Discussion/Conclusion: All police academy classes are tested on physical fitness and academic proficiencies, including occupational skill work. Cadet physical fitness levels could indirectly affect academic and skill performance based on the cadet's ability to recover from physical stressors. Past research indicates increased fatigue and stress from high-intensity activity potentially decreases an individuals' cognitive abilities. Subsequently, increases in inflammation due to high physical stress may lead to a reduction in physical performance. While no statistically significant correlations were discovered in this study, previous observations suggest increases in perceptual motor skill learning have been shown to improve academic scores. By gathering insight into possible correlations between physical fitness components and academic scores, law enforcement agencies could reduce overall costs and improve upon current academy training procedures, thus improving cadet graduation rate.

Impact/Application to the field:

- While statistically significant relationships were not discovered, the data and information collected may be used to direct law enforcement academy personnel toward an emphasis on improving cadets' physical and academic performance.
- Improvements in the academy preparation of cadets could increase the current pool of active law enforcement officers, thus reducing stress and improving on positive outlook of veteran law enforcement officers.

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(P12)

Towards defining muscular regions of interest from axial magnetic resonance imaging with anatomical cross-reference: A scoping review of lateral hip musculature

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Introduction: Measures of hip muscle morphology and composition (e.g., muscle size and fatty infiltration) are possible with magnetic resonance imaging (MRI). Standardised protocols or guidelines do not exist for evaluation of hip muscle characteristics, hindering reliable and valid inter-study analysis. This scoping review aimed to collate and synthesise MRI methods for measuring lateral hip muscle size and fatty infiltration to inform the future development of standardised protocols.

Methods: Five electronic databases (Medline, CINAHL, Embase, SportsDISCUS and AMED) were searched. Healthy or musculoskeletal pain populations that used MRI to assess lateral hip muscle size and fatty infiltration were included. Lateral hip muscles of interest included tensor fascia late (TFL), gluteus maximus, gluteus medius, and gluteus minimus. Data on MRI parameters, axial slice location, muscle size and fatty infiltrate measures were collected and analysed. Cross referencing for anatomical locations were made between MRI axial slice and E-12 anatomical plastinate sections.

Results: From 2692 identified publications, 79 studies contributed data on volume ($n=31$), cross sectional area (CSA) ($n=24$), and fatty infiltration ($n=40$). Heterogeneity was observed for MRI parameters and anatomical boundaries scrutinizing hip muscle size and fatty infiltration. Seven single level axial slices were identified that provided consistent CSA measurement, including three for both gluteus maximus and TFL, and four for both gluteus medius and minimus. For assessment of fatty infiltration, six axial slice locations were identified including two for TFL, and four for each of the gluteal muscles.

Discussion: Several consistent anatomical levels were identified for single axial MR slice to facilitate muscle size and fatty infiltration muscle measures at the hip, providing the basis for reliable and accurate data synthesis and improvements in the validity of future between studies analyses. Further studies into whole muscle measures are required to further optimise methodological parameters for hip muscle assessment.

Impact and application to the field: This work establishes the platform for standardised methods for the MRI assessment of lateral hip musculature and will aid in the examination of musculoskeletal conditions around the hip joint.

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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(P13)

Does distal phalanx pinch strength correlate to buttoning speed in female adults?

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INTRODUCTION: Hand usage is substantial in physical sports and daily activities. However, the use of fingers with physical activities requires force between the thumb and index finger when discussing improving or maintaining fine motor skill development, especially with older adults. The purpose of this study was to determine if a relationship existed between distal phalanx pinch strength and the speed of buttoning down a shirt.

METHODS: Subjects ($n = 20$)) from a Midwestern facility volunteered to participate in this study (age: 40.75 ± 13.56 years). All female participants were healthy with no upper extremity injuries. A Jamar Hydraulic Pinch Gauge, (model# H&PC-10192; JLW Instruments) was used to measure the pinch strength of the thumb and index distal phalanx of the subject's dominant hand. All subjects stood upright in a comfortable stance, grasped the dynamometer's circular head with their opposite hand, and placed

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.

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

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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