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NATIVE AMERICAN LIFE EXPECTANCY DURING COVID-19

During the early stages of the COVID-19 pandemic, life expectancy for Native Americans (American Indian and Alaska Native (AIAN) individuals), fell more than six years below that calculated in 2019. In the aftermath of the COVID-19 pandemic, this study explored the resulting changes in life expectancy of Native Americans.

This observational, cross-sectional study used death and population data for persons identifying as single-race non-Hispanic Native American. Data were obtained from the Centers for Disease Control and Prevention Wide-Ranging Online Data for Epidemiologic Research (CDC WONDER) database as of July 28, 2023. The main outcome variable was life expectancy at birth.

Large reductions in COVID-19 related death rates were noted for Native Americans in 2021 and 2022. However, the cause-specific death rates due to many of the leading causes of death increased over this same period. In 2022, the death rate for heart disease, the leading cause of death, was slightly higher than in 2021 and considerably higher than in 2020. In 2022, the death rate for unintentional injuries, including drug overdose fatalities, exceeded that of 2021. The combined effects resulted in an overall decline in life expectancy. Compared to 2019, life expectancy for Native Americans fell in 2022 by four years (from 71.8 to 67.8). This is approximately equal to that of the life-expectancy for the total population of the United States in 1950.

Conclusion: This study of the life expectancy of Native Americans since the COVID-19 pandemic reveals that the average life expectancy fell from 71.8 years in 2019 to 67.8 years in 2022.

Goldman, N., et al. Life Expectancy among Native Americans during the COVID-19 Pandemic: Estimates,

Uncertainty, and Obstacles. *Am J Epidemiol.* 2024, June; 193 (6): 846-852.

BNT162B2 XBB COVID-19 VACCINE

For the week ending December 9, 2023, there were 23,432 new COVID-19 related hospital admissions in the US, the highest rate since the winter of 2022. As XBB and its sublineages were the predominant circulating SARS-CoV-2 strains in the US between January and December 2023, the US Food and Drug Administration authorized or approved updated monovalent messenger RNA (mRNA) COVID-19 vaccines targeting the XBB sublineage. This study assessed the efficacy of these new vaccines for COVID-19.

The subjects were 18 years of age or older and presented for medical care with an acute respiratory infection. Cases were those who had a positive SARS-CoV-2 polymerase chain reaction test; controls had an acute respiratory illness but tested negative for SARS-CoV-19. The primary exposure was receipt of the BNT162b2 XBB vaccine, compared with not receiving a vaccine, and with older vaccines.

The estimation of vaccine effectiveness (VE) for the BNT162b2 XBB vaccine was 62% for protecting against a COVID-19 related hospital admission and 58% for protecting against COVID-19 related medical center encounters (after a median of 34 days from BNT162b2 XBB inoculation). Compared to those who were not vaccinated, those who had received one of the older versions of COVID-19 vaccines had no significant reduction in risk of COVID-19 outcomes, including hospital admission.

Conclusion: This case control study found the BNT162b2 XBB vaccine to be 62% effective against COVID-19 related hospital admissions and 58% effective against receiving medical care for COVID-19

infections, while the older vaccines were virtually ineffective.

Tartof, S., et al. Estimated Effectiveness of the BNT162b2 XBB Vaccine against COVID-19. *JAMA Intern Med.* Published Online June 24, 2024. Doi:10.1001/Jamainternmed.2024.1640.

HEAVY RESISTANCE TRAINING AT RETIREMENT AGE

The L1ve active Successful Ageing (LISA) study, a large-scale randomized controlled trial (n=451), showed that strength can be maintained over 12 months following one year of heavy resistance training (HRT), but not after moderate training. This study of retirees reviewed the lasting effects of a one-year supervised resistance training program at three years follow-up.

The subjects were 451 older adults, at retirement age, stratified according to sex, body mass index, and chair rise test performance. The patients were randomized to one year of heavy resistance training (HRT), moderate intensity training (MIT) or a control condition. The HRT program occurred three times per week, with each exercise including three sets of 6–12 repetitions at 70%–85% of the one repetition maximum weight (1 RM). The MIT protocol mimicked the exercises in HRT but were performed with three sets of 10–18 repetitions at 50%–60% of the 1 RM. A control group was encouraged to maintain their routine. The subjects were assessed up to three years after the programs ended.

Of the 451 subjects, 369 attended a follow up session in year four. At the year four assessment, strength was unaltered in the HRT group, but decreased in the MIT (p=0.01) and the control (p=0.001) group. Changes in lean leg mass and visceral fat percentage also favored the HRT group (p=0.03 and p=0.005).

Conclusion: This study of adults, with an average age of 71 years,

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found that one year of heavy resistance training may induce long-lasting beneficial effects by preserving muscle function.

Bloch-Ibenfeldt, M., et al. Heavy Resistance Training at Retirement Age Induces 4-Year Lasting Beneficial Effects in Muscle Strength: A Long-Term Follow-Up of An RCT. **BMJ Open Sp Ex Med.** 2024;10(2): doi:10.1136/bmjsem-2024-001899.

ISOMETRIC EXERCISE AND ARTERIAL HYPERTENSION

Non-communicable diseases are responsible for an estimated 73% of deaths globally, among which cardiovascular disease remains the principal offender. Elevated blood pressure (BP) is recognized as the leading risk factor for both cardiovascular disease and mortality. Isometric exercise refers to a sustained muscle contracture which occurs with the length of the muscle static. This study reviewed the literature concerning the blood pressure lowering benefits of isometric exercise training (IET).

A literature search was performed using PubMed (MEDLINE), the Cochrane Library, and SPORTDiscus. The review included randomized, controlled trials published from January 1, 2000, to April 1, 2023, all of which investigated BP changes following an IET intervention.

The data support the use of IET as an effective anti-hypertensive intervention across a range of key BP markers. Comparing the IET methods of wall squat, leg extension, and handgrip, the data demonstrate that the wall squat method may be the most effective option. The wall-squat protocol can be accomplished in <15 minutes with the wall-squat performed in two-minute bouts, repeated four times, separated by two-minute rests. A meta-analysis found that the wall-squat method produced >10mmHg reduction in systolic blood pressure.

Conclusion: This literature review found that isometric exercise training, using training sessions of <15 minutes, can effectively reduce blood pressure, with the wall squat method found to be the most effective.

Edwards, J., et al. Isometric Exercise Training and Arterial Hypertension: An Updated Review. **Sports Med.** 2024, May 19. doi.org/10.1007/s40279-024-02036-x

LONGITUDINAL ASSOCIATIONS BETWEEN 24-HOUR MOVEMENT AND CARDIOMETABOLIC BIOMARKERS

Studies which compare regular physical activity and cardiovascular risk often treat physical activity, sleep, and sedentary behavior as independent variables. Given the dependency among these behaviors, this study used composite data analysis to examine how individual changes in 24-hour movement behaviors are associated with changes in health conditions.

The sample comprised participants from the Finnish Retirement and Aging Study, an ongoing, longitudinal cohort of older individuals, established in 2013. All participants were working at the time of enrollment. The 241 subjects completed accelerometer and laboratory measurements before and after the transition to full-time statutory retirement, with an average of one year between the measurements.

Those measures were used to identify sedentary behavior (SED), light physical activity (LPA), and moderate-to-vigorous physical activity (MVPA). The participants wore a triaxial accelerometer and filled out a daily diary to estimate 24-hour movement behaviors, including sleep, SED, LPA, and MVPA. The data were processed to determine 24-hour movement behaviors. In addition, blood draws were used to measure cholesterol, triglycerides, and C-reactive protein (CRP).

The results indicated that increasing LPA in relation to the remaining behaviors was associated with an increase in HDL-cholesterol and a decrease in the total/HDL-cholesterol ratio and LDL-cholesterol. Increasing MVPA in relation to the remaining behaviors was associated with a decrease in triglycerides ($p=0.02$).

Conclusion: This study of Finnish adults transitioning to retirement found that increasing light and moderate to vigorous physical activity at the expense of sedentary behavior and sleep was associated with improvements in the lipid profile.

Suorsa, K., et al. Longitudinal Associations between 24-Hour Movement Behaviors and Cardiometabolic Biomarkers: A Natural Experiment over Retirement. **Med Sci Sports Exerc.** 2024; 56(7): 1297-1306.

MINIMAL DOSE RESISTANCE EXERCISE

Many individuals fail to meet the recommended guidelines for resistance exercise or strength-building activities. A commonly cited barrier is the perceived lack of time. Therefore, it is important to understand the minimum dose of exercise needed to provide meaningful benefits. This study was designed to define and characterize resistance exercise strategies that embody the concept of minimal dose, and to summarize their impact on muscle strength.

A literature search was conducted to identify studies involving patients with no history of resistance exercise who started resistance training. Five strategies were identified that align with the minimal dose concept. Those that were found to have strength and health advancing benefits included: 1) Weekend Warrior (45-60 minutes/week): This involves resistance exercise programs completed once a week, consisting of at least four exercises per session with coupled eccentric-concentric repetitions. 2) Single-set Resistance Exercise (60-90 minutes/week): These are exercise programs completed at least twice a week, consisting of one set of at least four exercises with coupled eccentric-concentric repetitions. 3) Snacks (70 minutes/week): This involves multiple, low-volume exercise sessions completed five or seven days a week. 4) Maximal Strength Test (10-15 minutes per exercise): This involves performing one repetition per set with maximal resistance and repeating this for one or more sets within a session. It involves five to seven sessions per week, each completed in three minutes or less, and involves a minimal number of repetitions at maximal resistance. 5) Eccentric Only (1-20 minutes per exercise): This minimal dose resistance exercise program consists of eccentric-only repetitions at sub-maximal or maximal resistance.

Conclusion: This literature review identifies various strategies of minimal resistance exercise that demonstrate health benefits with as few as one session per week. This is encouraging for those who do not have sufficient time to engage in the traditional recommendation of 150 minutes per week.

Nuzzo, J., et al. Resistance Exercise Minimal Dose Strategies for Increasing Muscle Strength in The General Population: An Overview.

Sports Med. 2024, March 20; 54 (5):1139-1162.

ADOLESCENT GAIT PATTERNS FOLLOWING ACL REPAIR

Studies of adults have demonstrated that, after an anterior cruciate ligament (ACL) tear, gait patterns change significantly, even following ACL reconstruction (ACLR). This study assessed the changes in gait patterns among children and adolescents with ACL tears who underwent ACLR.

This prospective study included 42 patients 6-16 years of age with symptomatic ACL deficiency who underwent ACLR. Gait analyses were completed prior to surgery and up to 24 months after surgery. The kinetics and kinematics were measured for both legs and compared to a matched control group of healthy children.

Compared to the control group, both the ACL-deficient limbs and the contralateral limbs demonstrated significantly different knee flexion/extension measurements, with differences noted at 24-month follow-up. Knee flexion was decreased during stride, and ankle dorsiflexion was decreased during most of the gait cycle. Prior to ACLR, ankle dorsiflexion was decreased during most of the gait cycle.

At 24 months, ankle kinematics showed no significant differences when compared to the control group, except for the initial contact. Compared to the control group, at baseline, knee flexion was decreased during stride (with normal values at terminal stance). Differences persisted at 24-month follow-up.

Conclusion: This study of children's anterior cruciate ligament injuries found abnormal gait patterns after injury as well as after surgical repair, with abnormal patterns persisting for two years after ligament reconstruction.

Ursei, M., et al. Changes in Gait Patterns after Anterior Cruciate Ligament Reconstruction in Children. *Int Orthop (SICOT)*. 2024, June; 48 (6): 1517-1523.

CASTLE SURGERY FOR CEREBRAL PALSY

Among children with cerebral palsy (CP), hip dislocation is the most frequent cause of pain. This study assessed the outcomes of patients with CP who were treated surgically with the castle salvage procedure.

This single center, cross sectional study included all patients with painful spastic cerebral palsy hip deformities, seen between 1989 and 2017. Baseline functional grade was assigned using the Gross Motor Functional Classification System (GMFCS). Radiographs were taken at baseline, immediately postoperatively, and at follow-up. The subjects were 112 patients with CP and hip deformities, including 41 (70 hips) undergoing the castle procedure. All patients had a baseline GMFCS functional status classification of Grade V and were diagnosed with scoliosis at the initial evaluation.

At a mean follow-up of 77.9 months, 90% of the patients (94% of the hips) had a satisfactory outcome, without complications (absence of pain, free mobility of the lower limbs, and ability to sit in a wheelchair). Major complications were noted in 10% of the patients, with those cases considered to be unsatisfactory. Quality of life, as judged by caregivers, was judged to have improved in 85% of the cases.

Conclusion: This study of consecutive patients with cerebral palsy, treated with castle surgery, found that 90% experienced a satisfactory outcome without complications or pain.

Yamada, H., et al. Quality of Life and Clinical Outcomes in Severely Involved Cerebral Palsy Patients and Spastic Hips Undergoing Castle Surgery: A Cross-Sectional Study. *Intern Orthop*. 2024, June; 48(6): 1657-1655.

MULTIPLE INTRAARTICULAR HIP INJECTIONS FOR OSTEOARTHRITIS

Hip osteoarthritis (OA) is a degenerative disease associated with pain, stiffness, and reduced mobility. Many people fail more conservative treatments and elect to undergo articular injections. This study investigated the clinical outcomes of several intraarticular injection options for the treatment of hip OA.

This systematic review searched multiple databases for studies which included intraarticular injections using one of the following: hyaluronic acid (HA), platelet rich plasma, corticosteroids, local anesthetics, HA plus platelet rich plasma, steroid plus local anesthetic, and placebo. Clinical outcomes were compared.

From the literature search, the authors selected 16 randomized,

controlled trials involving 1,809 patients. From the outcomes of these studies, the authors ranked the effects of the different interventions. With this ranking process, steroid injections were found to provide the most significant pain relief and functional improvement within the initial three months. At six months, placebo injections provided the best pain relief, and HA provided the best functional relief.

Conclusion: This systematic review and meta-analysis of intraarticular injections for osteoarthritis of the hip found that the best pain relief and functional improvement at three months occurred in those who were treated with corticosteroids.

Lei, T., et al. Clinical Efficacy of Multiple Intraarticular Injection for Hip Osteoarthritis. **Bone Joint J.** 2024;106-B (6): 532-539.

MANAGEMENT OF OSTEOPOROSIS IN MEN

Historically, osteoporosis has been characterized as a disease in women. In many populations, one in five men over the age of 50 will experience an osteoporotic fracture. This paper documents the development and presentation of recommendations for the diagnosis, monitoring, and treatment of osteoporosis in men.

In 2023, the European Society for Clinical and Economic Aspects of Osteoporosis, Osteoarthritis and Musculoskeletal Diseases (ESCEO) convened to address osteoporosis in men. The working group completed a literature search for studies focused on the screening, diagnosis and therapeutic interventions for osteoporosis. The evidence was reviewed using a grade process to determine recommendations for men.

The actions which received a strong recommendation included 1) A reference database should be used for the densitometric diagnosis of osteoporosis. 2) The appropriate assessment tool for the assessment of fracture risk is the FRAX and should be age dependent. 3) All men with a prior fragility fracture should be considered for treatment with anti-osteoporosis medications. 4) The anti-osteoporosis treatment regimen in men should be adapted to an individual's baseline fracture risk. 5) Vitamin D and calcium repletion should be undertaken in all men over 65 years of age. 6) Oral bisphosphonates (alendronate or

risedronate) should be the first line treatment options. 7) For men at a high risk of fracture, denosumab or zoledronate should be considered. 8) A sequential therapy, starting with a bone-forming agent, followed by an anti-resorptive agent, should be considered for men at very high risk of fracture. 9) Physical exercise and a balanced diet should be recommended to all men with osteoporosis.

Conclusion: This paper reports on consensus recommendations concerning the treatment of osteoporosis in men.

Fuggle, N., et al. Evidence Based Guideline for the Management of Osteoporosis in Men. **Nature Reviews Rheumatol.** 2024, April; 20: 241-351.

ULTRASONIC FASCIOTOMY FOR CHRONIC PLANTAR FASCIOPATHY

Plantar fasciitis is the most common cause of heel pain, affecting approximately 10% of the US population. When conservative options fail to provide sufficient improvement, an ultrasonic fasciotomy may present as an option before considering more invasive procedures. This study assessed the efficacy of this procedure.

This prospective observational study included patients with chronic plantar fasciopathy who underwent ultrasonic fasciotomy between January 2020 and March 2023. After a tibial nerve block, a TX2 device (Tenex Health, Lake Forest, CA) was used to debride the pathologic tissue. The patients were allowed to bear weight with the use of air Cam Walker boot for five to seven days post procedure. The primary outcome measure was the change in visual analog scale (VAS) for pain at 12 weeks compared to baseline. Data were obtained from the records of 67 patients. The average VAS for pain was 6.57 at baseline and 0.81 at 12 weeks ($p<0.001$), and 0.72 at one year ($p<0.001$). The Foot and Ankle Ability Measure significantly improved at all follow-up visits compared with baseline ($p<0.0001$), with no changes noted from 12 to 52 weeks.

Conclusion: This study of patients with chronic plantar fasciopathy found that ultrasonic fasciotomy may be an effective and safe treatment option, with high satisfaction rates at one year.

Kruse, R., et al. Ultrasonic Fasciotomy for the Treatment of Chronic Plantar Fasciopathy: A Prospective Study. **Clin J Sport Med.** 2024, July; 34(4): 335-340.

NEUROPATHIC PAIN AFTER TOTAL KNEE ARTHROPLASTY

After a total knee arthroplasty (TKA) between 15% and 20% will continue to experience ongoing pain. Chronic post-surgical pain (CPSP) is defined as pain at least three months after surgery. This study was designed to better understand the prevalence and patterns of neuropathic pain over one year in a cohort of patients reporting CPSP at three months after TKA.

This paper was a secondary analysis data obtained from Support and Treatment After Replacement (STAR) multicenter randomized trial in the United Kingdom. This study screened over 5,000 patients for pain-related outcomes at ten weeks post-TKA, and 363 with troublesome pain at three months post-surgery were recruited into the STAR trial. The prevalence and pattern of neuropathic pain was assessed using two patient-reported neuropathic pain screening tools: painDETECT and DN4.

Of those reporting pain at three months neuropathic pain was diagnosed in 53% using the painDETECT and 74% using the DSM 4 questionnaires. Of those with neuropathic pain at three months, at 15 months 56% continued to have neuropathic pain using the painDETECT and 57% using the DSM 4 questionnaire. Commonly reported symptoms with painDETECT and DN4 questionnaires at three months post-TKA were numbness (50%, 79%), electric shocks (36%, 60%), and burning sensations (28%, 73%), respectively.

Conclusion: This study of patients undergoing total knee arthroplasty, with continued pain reported at three months follow up found that neuropathic pain was common among these patients and decreased over 15 months, though the prevalence remained high.

Bertram W., et al. Prevalence and Patterns of Neuropathic Pain in People with Chronic Post-Surgical Pain After Total Knee Arthroplasty. **Bone Joint J.** 2024;106-B(6):582-588.

PEDIATRIC SKI INJURIES OVER TEN YEARS

Skiing is a popular winter sport with an estimated 15,000,000 participants in the United States and approximately 200 million worldwide. Though the pediatric population makes up approximately 20% of skiers, this demographic has historically made up a large proportion of injuries. This study was designed to assess injury trends in pediatric ski injuries over 10 years.

The National Electronic Injury Surveillance System (NEISS) database was queried for snow ski related pediatric injuries between 2012 and 2022. The NEISS data are collected from a stratified probability sample of approximately 100 US hospitals with a minimum of six beds and a 24-hour operating ED. This system is used to calculate national estimates (NEs). The risk of injury was reviewed over time.

The NEISS database query found 2,951 cases (NE = 123,386) of skiing-related injuries in pediatric patients between January 1, 2012, and December 31, 2022. A linear regression analysis of annual injuries revealed no significant trend between 2012 and 2022 ($p=0.17$), with injuries fluctuating over time. There were 13,268 injuries reported in 2022, a 29.9% increase from 2021 and the highest level since 2014. Fractures were the most common primary injury diagnosis (31.2%), followed by strains/sprains, contusions/abrasions, and concussions. The most common mechanism of injury was impact with the snow/ground, making up 70.8% of the injuries.

Conclusion: This study of skiing-related injuries in the US pediatric population fluctuated between 2012 and 2022, with no significant linear trend.

Yendluri, A., et al. Skiing Injuries in the US Pediatric Population: An Analysis of National Injury Trends and Mechanisms Between 2012 and 2022. *Orthop J Sports Med.* 2024, June;12(6): 23259671241255704.

OLYMPIC WEIGHTLIFTING TRAINING FOR SPRINT PERFORMANCE

Olympic weightlifting (OW) is the sport in which an athlete takes three attempts to successfully accumulate the greatest combined weight lifted. As OW exercises emphasize explosive movement and power production from a static position, a

critical component of sprint performance, this literature review was designed to better understand the effects of OW training on sprint performance.

Data were reviewed from databases including Medline, Web of Science, SportDiscus, CINAHL, and Biological Science. The review included randomized controlled trials or non-randomized controlled studies involving healthy human subjects of both sexes of at least college age, comparing OW training to another intervention. The primary outcome was sprint performance. Eight papers were selected, including 206 athletes (196 male, 10 female) with a combined mean age of 20.4 years.

The data analysis found that sprint performance did not differ significantly between those engaged in OW and those in the control intervention ($p=0.75$). As the early portion of the sprint is most in need of explosive movement from a standing position, the acceleration phase of the sprint was isolated for comparison. The comparison of this phase also failed to demonstrate an advantage among those who engaged in OW.

Conclusion: This literature review of studies assessing the use of Olympic weightlifting to improve sprint performance found no evidence that this technique was more effective than specific sports training, traditional resistance exercises, or plyometric exercises.

Crenshaw, K., et al. Olympic Weightlifting Training for Sprint Performance in Athletes: A Systematic Review with Meta-analysis. *Int J Sports Med.* 2024;45(06):411-421.

HIT-BY-PITCH RATES BEFORE AND AFTER THE CRACKDOWN ON FOREIGN SUBSTANCE USE

In major league baseball it is illegal for a pitcher to alter the baseball by the application of a foreign substance or by altering the ball's surface. This rule was not rigorously enforced until June 21st, 2021, when strict enforcement guidelines were enacted, including the mandatory inspection of pitchers and baseballs. This study reviewed the impact this decision may have had on the ball control of pitchers, using the metric, the rate at which batters are hit by pitches (HBP).

Databases were queried for all MLB games played before and after the rule change. League totals were

collected, including pitches thrown, pitches thrown by pitch type, as well as characteristics of the pitcher and the batter.

For the combined 2017 to 2019 seasons, the overall HBP incidence rate was 2.66/1000 pitches (TP). This rate significantly increased by 15% to 3.06/1000 TP for the combined 2021 to 2022 seasons ($p<0.0001$). The increased rates were most evident when pitchers faced opposite-handed batters.

Conclusion: This study of Major League Baseball pitchers found that after a decision to strictly enforce rules against doctoring baseballs with foreign substances, the batters have been at an increased risk of being hit by the pitches.

Sitton, Z., et al. A Retrospective Analysis of Major League Baseball Hit-by-Pitch Rates before and after the Crackdown on Foreign Substance Use. *Clin J Sport Med.* 2024, July:381-385.

BLOOD BIOMARKERS FOR POST-STROKE COGNITION

Post-stroke cognitive impairment (PSCI) is an independent predictor of recurrent ischemic stroke. This literature review and meta-analysis reviewed the association between blood biomarkers and the development of PSCI.

A literature review was completed for studies published through April of 2022 which reviewed biomarker status after an acute stroke. From the search, 63 studies were chosen, with 95 biomarkers assessed. Thirty were included in the meta-analysis. The most frequent measures of PSCI were the Montreal Cognitive Assessment (MoCA) and the Mini-Mental State Examination (MMSE). The results of these measures were used to identify those with PSCI, and then compared to the biomarkers.

Data were pooled for 84,551 patients, of whom 80.95% had sustained an ischemic stroke. A meta-analysis revealed that factors correlated with PSCI included higher levels of homocysteine ($p<0.00001$), c-reactive protein ($p=0.0008$), uric acid ($p=0.02$), interleukin 6 ($p=0.005$), cystatin C ($p=0.0001$), creatinine ($p<0.00001$), and tumor necrosis factor-alpha ($p=0.02$).

Conclusion: This study of patients hospitalized with acute ischemic strokes found that those with post-stroke cognitive decline had significantly elevated blood levels of homocysteine, c-reactive protein, uric

acid, interleukin 6, cystatin C, creatinine, and tumor necrosis factor- α .

Ma, Y., et al. Blood Biomarkers for Post-Stroke Cognitive Impairment: A Systematic Review and Meta Analysis. *J Stroke Cerebrovas Dis.* 2024, August; 33(8):107632.

SUICIDE ATTEMPTS OF VETERANS AFTER A BRAIN INJURY

Previous data have suggested that individuals with a traumatic brain injury (tbi) are at increased risk for suicide attempts (SA) and death by suicide. This study was designed to understand the rates of suicide ideation (SI) and suicide attempts (SA) during the first five years after a tbi, and to compare these rates in veterans and service members with those of non-veterans.

Subjects were selected from the National Institute on Disability, Independent Living, and Rehabilitation Research (NIDILRR) Model Systems National Database and the VA Polytrauma Rehabilitation Centers (PRCs) TBI National Database. All completed the Patient Health Questionnaire-9 (PHQ-9) at follow-up interview. The main outcome measures were the history of SA in past year and SI in the previous two weeks assessed by the Patient Health Questionnaire-9 (PHQ-9).

The rates of SA among the military veterans were 1.87% at year one, 1.46% at year two, and 1.59% at year five. The rates of SI were 9.63% at year one, 10.05% at year two, and 8.74% at year five. Compared to non-military subjects (from the NIDILRR), those with military service had significantly greater odds of SI at years 1, 2, and 5 (Odds Ratios (ORs) 1.54-1.97). Among the continuous variables, younger age at injury and lower (worse) FIM Cognitive scores were associated with an increased odds of both SA and SI. Lower (worse) FIM Motor scores were associated with an increased odds of SI.

Conclusion: This study found that the risk of suicide ideation and suicide attempts were significantly greater among military service members and veterans than among the civilian population.

Klyce, D., et al. Suicide Attempts and Ideation Among Veterans/Service Members and Non-Veterans Over 5 Years Following Traumatic Brain

Injury: A Combined NIDILRR and VA TBI Model Systems Study. *J Head Trauma Rehab.* 2024, May/June;39(3):183-195.

TRANSCRANIAL ALTERNATING CURRENT STIMULATION FOR DEPRESSION

Major depressive disorder (MDD) is a common disease affecting over 300 million people worldwide. Preliminary studies have suggested that transcranial alternating current stimulation (tACS) can enhance levels of endorphins and neurotransmitters (including serotonin). This study evaluated the efficacy of this modality for the treatment of MDD.

The subjects were 66 adults, 18 to 55 years of age, diagnosed with MDD. All patients were treated with escitalopram, titrated up to a maximum of 20 mg/day. The subjects were randomly assigned to a placebo group, or a treatment group, the latter to receive 20, 40-minute sessions of tACS stimulation (77.5 Hz at 15 mA). The primary outcome measure was the change in Hamilton D-17 (HAMD-17) depression scores from baseline to week four.

Compared to the control group, the treatment group demonstrated significantly greater improvements on HAMD-17 scores by week four ($p < 0.001$) and week eight ($p = 0.002$). Compared to the placebo group, twice as many patients in the tACS group had $\geq 50\%$ improvement in HAMD-17 scores by week four ($p = 0.007$).

Conclusion: This study of patients with major depressive disorder who were receiving an antidepressant found that those who received adjunct transcranial alternating current stimulation had a significantly greater improvement in depression scores.

Zhou, J., et al. Effect of Add-on Transcranial Alternating Current Stimulation (tACS) on Major Depressive Disorder: A Randomized, Controlled Trial. *Brain Stimul.* 2024, July-August; 17(4): 760-768.

TRENDS IN MODIFIABLE RISK FACTORS FOR DEMENTIA

Dementia is the leading cause of disability adjusted life years in the United Kingdom. With a lack of disease-modifying drugs, it is important to understand and target modifiable risk factors (MRFs). The

population attributable fraction (PAF) is used to quantify the proportion of cases that could be averted assuming causality, if specific risk factors were eradicated. This study reviewed the temporal trend of MRFs in England from 2004-2019.

This study incorporated all 12 factors proposed by the Lancet Commission for the assessment of dementia risk factors. The authors used these to calculate the PAF as the proportion of dementia cases attributable to a specific risk factor, considering its prevalence and relative risk.

Temporal trends were calculated for each risk factor. From 2004 to 2019 the overall MRF PAF for dementia decreased from 46.73% to 36.79%. However, this trend was not statistically significant. Overall, a review of the individual weighted PAFs for dementia demonstrated that hypertension has the highest average PAF (8.21%) followed by obesity (6.16%) social isolation (5.61%) hearing loss (4.81%) depression (4.72%) low education (4.63%) physical activity (3.26%) diabetes (2.49%) smoking (2.0%) excess alcohol consumption (1.16%) air pollution (0.43%) and TBI (0.26%).

Conclusion: This study of the English population found that the proportion of dementia attributed to modifiable risk factors is 38%, with hypertension being the risk factor with the greatest effect.

Chen, S., et al. Temporal Trends in Population Attributable Fractions of Modifiable Risk Factors for Dementia: A Time Series Study of The English Longitudinal Study of Aging 2004-2019. *Al. BMC Med.* 2024;22:268. doi.org/10.1186/s12916-024-03464-2.

EPIGENETIC AGE ACCELERATION, FRAILITY, AND DISABILITY

Fraility is a complex geriatric syndrome characterized by cumulative pathologic deficits across biological and physiologic systems. Epigenetic age (EA), also known as the epigenetic clock or DNA methylation (DNAm) derived biological age, is one of the emerging biomarkers of ageing. Epigenetic age acceleration (EAA) is defined as when an individual's EA is greater than their chronologic age. This study investigates whether EAA is associated with change in frailty scores over time.

The subjects were 560 Australians, ≥ 70 years of age, who

were free of dementia or major cardiovascular disease at enrollment. At baseline, epigenome-wide DNAm was extracted with EA calculated using first generation methods (HorvathAge, HannumAge), second generation methods (PhenoAge GrimAge, GrimAge-version-2 (GrimAge2) FitAge), and the latest method (DunedinPACE). Frailty was measured, at baseline and a mean follow-up of seven years, using the Frailty Index (FI) and the modified Fried phenotype (Fried). Six activities of daily living (ADL) were assessed, including walking across a room, bathing, dressing, transferring from a bed or chair, toileting and eating.

At baseline, the mean chronological age of the subjects was 74.5 years. The EA calculations ranged from a mean of 70.1 years (GrimAge) to 75.2 (FitAge), while the baseline frailty scores ranged from 0.1 (FI) to 0.41 (Fried). The yearly changes in FI were compared to EAAs.

A baseline EAA, measured by GrimAge, GrimAge2, FitAge and DunedinPACE were associated with increasing FI scores per year ($p < 0.05$). An EAA measured by GrimAge and GrimAge2 were associated with an increased risk of FI-defined frailty ($p < 0.05$). Among the AA measures only DunedinPACE was associated with worsening Fried scores ($p = 0.04$).

Conclusion: This longitudinal study of elderly community dwelling adults found that epigenic age acceleration, using DNA methylation-derived biological age, may be a predictor of future frailty among healthy older adults.

Phyo, A., et al. Epigenetic Age Acceleration and the Risk of Frailty, And Persistent Activities of Daily Living (ADL) Disability. *Age Ageing*. 2024, June 28; 53(6): afae127, <https://doi-org.proxy.library.emory.edu/10.1093/ageing/afae127>.

TIRZEPATIDE FOR OBESITY AND SLEEP APNEA

Obstructive sleep apnea (OSA) is accompanied by clinically relevant symptoms such as daytime sleepiness and is an independent risk factor for cardiovascular disease. This publication reports on the SURMOUNT-OSA phase 3 trials evaluating the safety and efficacy of tirzepatide for the treatment of adults with obstructive sleep apnea and obesity.

The SURMOUNT-OSA Trials were two, 52-week, phase three, randomized controlled trials including obese adults (body-mass index [BMI] ≥ 30 [≥ 27 in Japan]) with moderate to severe obstructive sleep apnea (apnea-hypopnea index [AHI] ≥ 15 events per hour). The subjects were randomized to receive tirzepatide or placebo subcutaneously once weekly with the use of a single-dose pen autoinjector. Dosing was titrated to a maximum of 10 mg (trial 1) or 15 mg (trial 2) by week 20. The primary end point was the change in the apnea-hypopnea index (AHI), from baseline.

Of the 469 participants who began the study, 82.9% completed the trial. In trial 1 the mean reduction of AHI events at week 52 was 25.3 events per hour in the treatment group and 5.3 in the placebo group ($p < 0.001$). In group 2 the mean reduction of AHI events per hour at week 52 was 27.4 in the treatment group and 4.8 in the placebo group ($p < 0.001$). A pooled analysis of both groups demonstrated that the treatment group had significant reductions in systolic blood pressure, and high sensitivity c-reactive protein concentrations.

Conclusion: This study of obese patients with obstructive sleep apnea found that a weekly injection with tirzepatide resulted in a significant reduction in episodes of sleep apnea and improvements in cardiovascular risk factors.

Maljotra, A., et al. Tirzepatide for the Treatment of Obstructive Sleep Apnea and Obesity. *N Engl J Med*. 2024. DOI: 10.1056/NEJMoa2404881.

PLAYING SURFACE AND CONCUSSION IN YOUNG AMERICAN FOOTBALL PLAYERS

Currently American football is played on either natural grass or artificial turf. This study compares the influence of the playing surface on the incidence and severity of concussion symptoms.

Participants were selected from the North Texas Concussion Registry, a prospective longitudinal multi-institutional collaboration of specialty concussion clinics. The sample included males, ages 10-24 years of age who sustained a helmet to ground concussion while playing football. The primary outcome measure was self-reported post-injury symptoms using the Sport Concussion Assessment Tool 5th Edition (SCAT5) symptom evaluation

that includes 22 items rated by the participants on a 0-6 rating scale.

Data were analyzed for 33 players concussed on natural grass and 29 concussed on artificial turf. Compared to those injured on artificial turf, those injured on natural grass reported significantly higher mean symptom severity ($p = 0.005$) and a higher total number of symptoms ($p = 0.006$). Compared to injuries on artificial turf the risk was higher for those injured on natural grass for dizziness (< 0.001), blurred vision (< 0.001), sensitivity to noise ($p = 0.027$), feeling in a fog ($p = 0.029$), difficulty remembering ($p = 0.004$), fatigue or low energy ($p = 0.024$), and confusion ($p = 0.031$).

Conclusion: This study of youth American football players with a sports related concussion found that, compared to those injured on artificial turf, those injured on natural grass have higher symptom severity scores and a higher total number of symptoms.

Heinzelmann, M., et al. Impact of Playing Surface on Concussion Symptoms in Young American Football Players. *Clin J Sport Med*. 2024, July; 34(4):p 357-361.

APPLE CIDER VINEGAR IN ADOLESCENTS AND YOUNG ADULTS

In Lebanon, obesity prevalence is higher than the regional average, and is considered the most important health problem by 27.6% of the population. This study assessed the efficacy and safety of apple cider vinegar (ACV) for reducing weight among Lebanese adolescents and young adults.

The subjects were young adults with a body mass index (BMI) of 27 - 34 kg/m². The participants were randomized to groups receiving either a placebo or ACV at doses of 5ml, 10ml, or 15 ml/day (mixed in 250 ml of water) for 12 weeks. A control group received a placebo water with additives to produce a similar taste and appearance. Subjects consumed their normal diets throughout the study. At weeks zero, four, eight, and 12, anthropometric measurements were taken, with blood draws to measure glucose triglycerides and total cholesterol. BMI was calculated at baseline and follow-up.

Compared to baseline, all groups receiving ACV experienced significant decreases in BMI at weeks four, eight, and 12 ($p < 0.05$). The decrease in body weight was dose dependent,

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with those receiving 15 ml per day showing the greatest reduction. In addition, all ACV groups experienced significant reductions in fasting glucose at weeks four, eight and 12. Triglycerides and total cholesterol were significantly reduced at weeks eight and 12, with the 15 ml dose most effective for all of the blood parameters. The changes in the placebo group did not reach statistical significance for any of the measurements in the study.

Conclusion: This study of Lebanese young adults and adolescents found that once per day intake of apple cider vinegar significantly reduced body mass index and improved blood glucose and cholesterol levels.

Abou-Khalil, R., et al. Apple Cider Vinegar for Weight Management in Lebanese Adolescents and Young Adults with Overweight and Obesity: A Randomized, Double-Blind, Placebo-Controlled Study. *BMJ Nutr Prev Health*. 2024; 0:e000823. doi: 10.1136/bmjnph-2023-000823.

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