UNIVERSITY OF DELAWARE
HEALTH SCIENCES

RESEARCH & INNOVATION DAY *2026*

ABSTRACTS

POSTER PRESENTATIONS

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Dietary Sodium and Potassium on Blood Pressure and Blood Pressure Variability in Normotensive Adults

Thomas Silva, Andrea J. Lobene, Cesar E. Jacintho Mortiz, Kathryn E. Kaseman, Jessica M. Irwin, Dae Sik Song, Shannon L. Lennon

Abstract: Elevated blood pressure variability (BPV) is associated with increased cardiovascular disease risk. High sodium consumption has been shown to increase BPV in rodents; however, the role of potassium is less well-known. The study objective was to examine 24-hour blood pressure (BP) and BPV in response to varying dietary levels of sodium and potassium in healthy, normotensive adults. Forty-two participants were enrolled in a randomized, cross-over design feeding study (17M/25F, 29.9±7.5years, BMI 24.1±3.4kg/m2, BP 106±8/67±7mmHg) consisting of three 10-day diets: moderate potassium/low sodium (MK/LS; 65mmol potassium/50mmol sodium), moderate potassium/high sodium (MK/HS; 65mmol potassium/300mmol sodium), and high potassium/high sodium (HK/HS; 120mmol potassium/300mmol sodium). Participants wore a 24-hour ambulatory BP monitor and collected urine on day 9 of each diet. BPV was quantified using the average real variability (ARV) index. Urinary sodium excretion was elevated on MK/HS (227±76 mmol/24-h; $p<0.0001$) and HK/HS 245±148 mmol/24-h; $p<0.0001$) compared to MK/LS (57±26 mmol/24-h) and urinary potassium was increased on HK/HS (77±31 mmol/24-h) compared to MK/LS (30±10 mmol/24-h; $p<0.0001$) and MK/HS (40±14 mmol/24-h; $p<0.0001$) illustrating dietary compliance. 24-hour SBP was not different across the diets ($p=0.42$) nor 24-hour DBP ($p=0.69$). Furthermore, there was no difference in daytime or nighttime SBP or DBP (all $p>0.05$). There were no differences in 24-hour SBP-ARV ($p=0.75$) or 24-hour DBP-ARV ($p=0.74$) across the diets. Additionally, there were no differences in daytime or nighttime SBP-ARV and DBP-ARV (all $p>0.05$). Our current data show that neither 24-hour BP nor BPV was altered by sodium or potassium intake in healthy, normotensive adults.

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The Impact of Endogenous Estrogen on Microvascular Function in Middle-Aged Premenopausal Women: The Role of Oxidative Stress

Madison Evering, Virginia Nuckols, Megan Wenner, Freda Patterson, Jody Greaney

Abstract: Although endogenous estradiol (E2) is purported to be cardioprotective, its impact on microvascular function in middle-aged premenopausal women remains limited. We hypothesized that nitric oxide (NO)-mediated endothelium-dependent dilation (EDD) would be blunted during menstrual cycle phases with lower compared to higher concentrations of endogenous. Given the role of oxidative stress in mediating endothelial dysfunction, we further hypothesized that acute antioxidant administration would improve NO-mediated EDD during lower, but not higher, concentrations of endogenous estrogen. Eight middle-aged naturally-cycling premenopausal women (44±2yrs; 25±3kg/m 2) completed two within-subjects assessments of microvascular function: one during the first 5 days of the onset of menstruation (i.e., lower estrogen) and another 10 days later (i.e., higher estrogen). Red cell flux (laser-Doppler flowmetry) was measured in response to a standard local heating protocol alone (control, CON) or during concurrent administration of the non-specific antioxidant ascorbate (AA), each followed by perfusion of N(G)-nitro-l-

arginine methyl ester (L-NAME; 15mM) to inhibit NO synthase (intradermal microdialysis). By design, endogenous E2 concentration was different between days (51±29 vs 148±103pg/mL; p=0.04). Neither EDD (89±10% lower E2 vs 91±8% max higher E2; p=0.66) nor NO-dependent dilation (64±17% lower E2 vs 58±22% higher E2; p=0.85) were different between conditions. During lower E2, AA did not affect either EDD (89±10% CON vs 87±12% max AA; p=0.74) or NO-dependent dilation (60±19% CON vs 64±17% AA; p=0.68). In conclusion, microvascular function was not reduced during lower endogenous E2 or improved by acute ascorbate administration, suggesting that menstrual cycle-related changes in endogenous E2 do not influence NO-mediated EDD in middle-aged premenopausal women.

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Elevated glucose impairs endothelial Kir2.1 via disruption of the glycocalyx in vitro

Emma Hudgins, Arielle Mahugu, Masoumeh

Abtract: Hyperglycemia is a prevalent metabolic disorder and known risk factor for cardiovascular disease. Endothelial dysfunction is a hallmark of cardiovascular disease and is characterized by impaired flow-induced vasodilation, which has been shown to critically depend on the inwardly-rectifying potassium channel Kir2.1. We examined the effects of elevated glucose on endothelial Kir2.1 using patch-clamp electrophysiology on human adipose microvascular endothelial cells (HAMECs) in culture. Elevated glucose resulted in an impairment of Kir2.1 currents that was independent of increased osmolality or changes in channel expression. The impairment was not due to all sugars as fructose and sorbitol had no effect. As Kir2.1 function depends on the glycocalyx, an extracellular matrix composed of proteoglycan and glycosaminoglycans, we next examined the effect of hyperglycemia on the glycocalyx. Elevated glucose resulted in reduced expression of the proteoglycan syndecan-1 and the glycosaminoglycan heparan sulfate, while glypican-1 and hyaluronic acid were unaffected. We next used sulodexide, an exogenous mixture of glycosaminoglycans, to restore the glycocalyx in hyperglycemia and showed that syndecan-1 and heparan sulfate expression was restored. Finally, sulodexide resulted in recovery of Kir2.1 channel function in hyperglycemia. We conclude that hyperglycemia causes an impairment of Kir2.1 function that is mediated by degradation of the glycocalyx.

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Exaggerated Exercise Blood Pressure Response in Hypertension: Influence of Fitness

Joseph Larsen MS, Jayson Gifford PhD

Abstract: Purpose: Determine if the previously reported exaggerated systolic blood pressure response to moderate exercise amongst hypertensive adults could be accounted for by differences in fitness. Methods: 30 normotensives adults (15 low fitness (LF) and 15 high fitness (HF)) and 15 unmedicated adults with ambulatory hypertension (HTN) participated in this study. Participants completed 24-hour ambulatory blood pressure monitoring (ABPM) and lactate threshold (LT) testing. Blood pressure was measured while participants completed 5-minute bouts of treadmill exercise at fixed absolute intensities (2.5 mph 0% and 12% grade) and intensities relative to their LT (80% and 120% LT).

Results: Hypertensive adults exhibited lower LT than HF (P<0.05), but not LF (P>0.05). They also exhibited a greater metabolic strain (e.g., lactate) and a greater increase in systolic blood pressure (SBP) during absolute intensity exercise (2.5 mph, 12% grade) than HF (P<0.05), but not LF (P>0.05). When performing exercise at intensities relative to LT, no differences in the change from resting SBP were observed between groups (P>0.05). Conclusion: Low fitness levels contribute to elevated SBP during moderate intensity exercise in hypertension. When controlling for fitness level, adults with hypertension do not exhibit an exaggerated SBP response to exercise. Interventions to improve fitness level may reduce blood pressure responses during moderate exercise.

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A Person-Centered Approach to Understanding Physical Activity and Sedentary Behavior After Stroke (Preliminary Findings)

Jemma Kim, Darcy Reisman, Dan White, Ryan Pohlig, Jeremy Crenshaw

Abstract: Background: Many individuals with chronic stroke have low physical activity (PA) and high sedentary behavior (SB), both independently associated with increased cardiovascular disease risk, recurrent stroke, and mortality. Fewer than 30% meet PA guidelines, and more than 78% of waking hours are spent sedentary. Prior studies focus on one or two factors, recruit from a single geographic region, or rely on in-person procedures that limit participation among those with mobility or transportation barriers. Consequently, it remains unclear how multiple personal and environmental factors are associated with PA and SB levels post-stroke. To address these gaps, this study uses nationwide recruitment and remote activity monitoring to examine a broad range of contextual factors. Methods: Individuals ages ≥21 years with chronic stroke who can walk independently are recruited through community/online outreach, ResearchMatch, and the UD Stroke Research Registry to support geographic and socioeconomic diversity. Participants are mailed an activPAL™ activity monitor to wear for seven days to objectively quantify PA and SB. Personal and environmental factors including fatigue, self-efficacy, social support, neighborhood walkability, and recreation resource density are collected. Results: This study is ongoing. Two pilot participants from Mississippi and Pennsylvania have completed the protocol. Preliminary data demonstrates variability in Walk Scores (15, and 77), self-efficacy scores (42 and 28), balance confidence (59 and 67), steps per day (1,752 and 2,128), and sedentary time (9h17min and 14h22min), supporting feasibility and heterogeneity in outcomes. Conclusion: This remote, person-centered approach enables nationwide participation and will inform development of tailored, scalable interventions to improve PA and reduce SB post-stroke.

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Association between carotid-femoral pulse wave velocity and VO 2 peak in individuals with chronic kidney disease

Kaylen R. Clark, Danielle L. Kirkman, David G. Edwards

Abstract: Cardiovascular disease (CVD) is the leading cause of mortality in chronic kidney disease (CKD). Vascular dysfunction and a decline in exercise capacity are hallmarks of CKD that contribute to CVD burden. Arterial stiffness is a nontraditional

risk factor for CVD that increases with CKD progression. Compliant central arteries are important during exercise to accommodate increases in cardiac output. Therefore, increased arterial stiffness may contribute to the impaired exercise capacity in CKD patients by altering ventricular-vascular coupling. The present study investigated the relation between arterial stiffness and exercise capacity in stages 3 to 4 CKD patients. We studied 35 patients with non-dialysis CKD (11F/24M, 59±12y, eGFR 43.3±12.9mL/min/1.73m 2). Arterial stiffness (carotid-femoral pulse wave velocity, cfPWV) was assessed by simultaneous recording of carotid (applanation tonometry) and femoral pressure (oscillometric) waves. Central pressure and augmentation index (AI, a measure of wave reflection) were assessed via radial applanation tonometry and a generalized transfer function. VO 2 peak was assessed via cardiopulmonary exercise testing on a cycle ergometer with workload increased by 15W/min. cfPWV averaged (±SD) 9.6±1.9 m/s, central pulse pressure (PP) 51±19 mmHg, AI 29±13%, and VO 2 peak 17.5±5.5 mL/kg/min. cfPWV, PP, and AI were inversely associated with VO 2 peak. Multiple linear regression revealed that cfPWV was a significant predictor of VO 2 peak (R 2 = 0.28, p = 0.001). An increase in cfPWV of 1 m/s predicted 1.50mL/kg/min lower VO 2 peak. These findings suggest arterial stiffness may impair exercise capacity and contribute to exercise intolerance and subsequent reduction in physical activity in patients with CKD.

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Potassium and Sodium Intake and Blood Pressure Variability in Normotensive Adults

Dae Sik Song, Cesar E. Jacintho Moritz, Kathryn E. Kaseman, Jessica M. Irwin, Shannon L. Lennon

Abstract: Sodium and potassium are known for their effects on blood pressure (BP). Additionally, sodium has been shown to increase blood pressure variability (BPV) in rodents while the role of potassium on BPV is less understood. The aim of this study was to examine the relation between 24-hour BP and BPV in response to potassium and sodium intake in healthy normotensive adults. Sixteen participants were enrolled in a randomized cross-over controlled feeding study (8F/8M, 29±6years; BMI 24.6±2.8kg/m^2; BP 13±8/69±7mmHg) including two dietary conditions: a moderate potassium/high sodium (MK/HS; 55 mmol K/300 mmol Na) and a high potassium/high sodium (HK/HS; 120 mmol K/300 mmol Na) diet. Potassium was increased using potassium chloride supplements. 24-hour ambulatory BP monitoring (ABPM) and urine was completed on day 9 of each diet. BPV was calculated using average real variability (ARV). 24-hour urinary potassium was higher on HK/HS compared to MK/HS (55.4±19.1 vs 93.9±29.5 mmol; p=0.001) while 24-hour urinary sodium was not different between diets (258±119 vs 225±44 mmol; p>0.05) highlighting diet compliance. 24-hour systolic BP (SBP) and diastolic BP (DBP) were not different between the MK/HS and HK/HS conditions (SBP: 114±8 vs 115±12 mmHg; DBP: 64±5 vs 65±6 mmHg; both p>0.05). Daytime and nighttime SBP and DBP were also not different between diets (p>0.05). For BPV, 24-hour, daytime, and nighttime SBP and DBP ARV were not different between the MK/HS and HK/HS conditions (p>0.05). In conclusion, potassium intake during a high sodium diet did not alter ambulatory BP or BPV in healthy normotensive adults.

POSTER PRESENTATIONS

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Evaluating Type 2 Diabetes: A Comparative Study of University of Delaware and National Diabetes Prevention Program (DPP) Participants

Kaitlin Sauer, Alisha Rovner, Donna Paulhamus

Abstract: INTRODUCTION: The National Diabetes Prevention Program (DPP) is a U.S. Centers for Disease Control and Prevention-led effort to prevent type 2 diabetes in those at risk through a 12-month evidenced-based lifestyle change program. METHODS: The DPP was implemented in the Nutrition Clinic at University of Delaware (UD) beginning in January 2020. Weight, height, and self-reported activity minutes were collected for participants at each of the 26 sessions conducted over the 12-month program. UD DPP participant results were compared to published national DPP participants' results (Ely, 2017). RESULTS: One hundred thirty two UD DPP participants (84% females, 62 yrs) attended a median of 23.5 sessions over an average of 265 days in the program (median 336) compared to national DPP participants (n=14,747, 80% females) who participated in 14 sessions over an average of 172 days (median 134 days). Overall, 35.6% of UD participants achieved the 5% weight loss goal (average weight loss 4.3%, median 2.7%) compared to 35.5% of national DPP participants who achieved the 5% weight loss goal (average weight loss 4.2%, median 3.1%). UD DPP participants reported a weekly average of 170 minutes of physical activity (median 132 min) with 42.0% meeting the goal of 150 minutes/week compared to the national DPP participants (152 minutes per week, median 128 minutes, 41.8% meeting goal). CONCLUSION: The percentage of UD DPP participants who met their weight loss and physical activity goals were similar to national DPP participants.

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Limitations of Visual Compensation for Proprioceptive Impairments in Individuals with Stroke Authors

Devin S. Austin, Jennifer A. Semrau

Abstract: Background: Proprioceptive impairment after stroke may be associated with disrupted sensorimotor integration, a process fundamental for movement coordination. During typical reaching movements, vision and proprioception work together to guide precise limb control. However, many individuals with stroke continue to show coordination deficits even when visual feedback is available, suggesting that the compensatory role of vision for proprioceptive impairments remains unclear. This highlights the complexity of multisensory integration after stroke and raises important questions about the extent that visual feedback can compensate for impaired proprioceptive function. Objectives: We aimed to investigate if individuals with stroke can compensate for impaired temporal movement estimation with and without visual feedback during a passive limb timing task. Methods: We tested individuals with stroke (N=28) and controls (N=28) using a passive-limb timing task using the Kinarm Exoskeleton. Participants' unseen limb was passively moved along a circular path and they pressed a button with the opposite hand when they felt that their fingertip intercepted a visual target. Trials were conducted with and without visual feedback of the fingertip and timing error was the primary measure. Results: Both groups showed improvements in timing error with visual feedback (Control:p<0.01, Stroke:p<0.01). Despite

improvement, individuals with stroke failed to reach control-level performance with visual feedback (p<0.01). Conclusions: Visual feedback improves temporal movement estimation after stroke, yet proprioceptive impairments may limit optimal movement timing. These findings suggest that vision may only provide partial compensation for proprioceptive loss. Rehabilitation strategies that promote proprioceptive integration could promote more effective sensorimotor coordination and functional recovery.

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Impaired Proprioception After Stroke Affects The Ability To Perform Complex, Sequenced Movements

Amelia Decarie, Joanna E. Hoh, Tarkeshwar Singh and Jennifer A. Semrau

Abstract: Background: Everyday tasks such as self-care and driving require the execution of complex movements. This requires proprioception, our sense of limb position and movement. Proprioception is often impaired after stroke, likely contributing to impairments in functional tasks. Surprisingly, little research has been done to understand how these impairments contribute to disordered complex movements. Objective: To understand how proprioceptive impairments after stroke affect the ability to perform complex, sequenced movements. Methods: Controls (N=20) and individuals with stroke (N=30) were tested using a KINARM Exoskeleton. Complex movement sequencing was quantified by passively moving the upper- limb (more-affected for stroke) through a sequence of targets without visual feedback. Participants then actively reproduced the sequence with the same limb. Sequence length ranged from 1-5 unseen targets and was presented pseudo-randomly. To quantify movement performance, Dynamic Time Warping (DTW) was calculated, with lower values indicating better matching between passive and active movements. Motor and proprioceptive function was quantified using KINARM standard tasks. Group-level comparisons quantified differences between controls and individuals with stroke with and without proprioceptive impairments. Results: No difference in motor function was found between stroke participants with and without proprioceptive impairments (p=0.38). However, stroke participants with proprioceptive impairments had significantly worse DTW scores (DTW=391) compared to stroke participants without proprioceptive impairments (DTW=160, p=0.01) and controls (DTW=119, p<0.01). Conclusions: Impaired proprioception after stroke significantly affects the ability to perceive and reproduce complex, sequenced movements. This suggests that proprioceptive working memory needed for movement execution may be impaired after stroke, which subsequently impacts complex motor execution.

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Prefrontal Oxygenation Differences Across Cognitive Status Groups in Older Adults

Papili, S., Orsega-Smith, E., Getchell, N., & Schade, S.

Abstract: The number of older adults in the U.S. continues to increase, accompanied by heightened risk of age-related cognitive decline. These declines can be quantified through measures of neurovascular coupling, particularly in the prefrontal cortex as it indicates how effectively blood flow is regulated in response to cognitive demand. This can be assessed non-invasively through

functional near infrared spectroscopy (fNIRS). The Saint Louis University Mental Status (SLUMS) examination is a screening test of cognitive function; combining the SLUMS with fNIRS may provide insight into understanding links between behavior and cognitive function. Additionally, relationships between oxygenation status and factors known to influence cognition (age, quality of life scores, living situation, daily step count, average sedentary behavior) can be explored to better understand contributors to cognitive health in older adults. This study examined these factors in 20 participants (17F/3M; 75.5 + 6.2 years) divided into groups with normal, mild cognitive impairment (MCI), and dementia classifications. Participants underwent SLUMS testing while simultaneously being monitored with fNIRS. Results showed significant group differences ($p<0.05$) in average oxygen hemoglobin, with the normal cognitive group having greater oxygenation than the MCI group. Patterns of oxygenation during SLUMS testing demonstrated differences in cognitive reserves based on group. Examination of other factors known to influence cognition demonstrated significant inverse relationships ($p<0.05$) between age and BMI and age and average daily step counts. These results demonstrate the importance of a multifaceted approach when examining cognition and developing strategies to impact cognition in older adults.

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Effect of Race on ImPACT Test Performance at the Conclusion of a Collegiate Athletic Career

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Abstract: Social constructs, including race, are a critical component to understanding the long-term effects of repetitive head impacts on later life health. METHODS: 730 former collegiate athletes and military cadets (50.5% male, age: 21.6 ± 0.94 years, WT: 80.3±19.4 kgs, HT: 1.77±0.11 m, concussion history: 1.6 ± 0.9) enrolled in the Concussion Assessment, Research and Education (CARE) 2.0 cohort who completed the Immediate Post-Concussion Assessment and Cognitive Testing (ImPACT) near the end of their collegiate career. Participants self-identified as White (78.2%), African American (10.9%), or Additional Races (10.9%). Group differences were analyzed using one-way ANOVAs with Tukey post-hoc tests. Significant post-hoc differences were compared against established reliable change index (RCI) values. RESULTS: Significant main effects for Reaction Time (p<0.001, =0.061), Verbal Memory (p=0.007, =0.016), Visual Memory (p=0.005, =0.017), and Visual Motor Speed (p=0.001, =0.025). Post hoc testing identified differences for reaction time between African American (0.65+0.11 s) and both White (0.58+0.08 s, p<0.001, d=0.84) and Additional Races (0.58+0.07 s, p<0.001, d=0.75) exceeding the RCI (0.06s). Post-hoc differences in Verbal Memory between African American and both Additional Races and White participants, Visual Memory between African American and White participants, and Visual Motor Speed between African American and White participants were also identified but these differences did not exceed

RCI thresholds. DISCUSSION: Differences in ImPACT test performance was noted by race, but only reaction time exceeded the RCI. Moving forward, continued examination of social determinants of health are critical to improving health related outcomes for all former collegiate athletes.

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Descriptive Results of Exposure to a Nintendo Switch E-Bowling Pilot Based on SLUMS Scores

Schade, S.A., Getchell, N., Dominick, G., Orsega-Smith, E.,

Abstract: There are 61.2+ million older adults in the U.S., and nearly 33% experience some level of cognitive dysfunction. Exergames, such as the Nintendo Wii bowling, are popular amongst seniors. We conducted a 4-week feasibility/acceptability trial of Nintendo Switch e-bowling with senior center members; preliminary health and cognitive outcomes associated with game play are reported here. Participant data were grouped by cognitive status as assessed by the St. Louis Mental Status Exam (SLUMS): normal (NOR; n=3), mild cognitive disorder (MCD; n=12), or probable dementia (DEM; n=4). Participants completed a questionnaire including demographics, the Physical Activity Readiness Questionnaire (PAR-Q), and self-efficacy for gameplay. Participants were given a hip-worn accelerometer for 3 days, including 1 day of gameplay. The NOR group (age:81.0±9.6 yrs.; BMI:28.6±4.3) were female (n=3, 100%), managing 2+ chronic health conditions (n=3, 100%), and had an average bowling score of 178.2±23.5. The MCD group (age:74.2±5.2yrs.; BMI:33.7±6.4) were primarily female (n=11, 91.7%), nearly half managing 2+ chronic health conditions (n=5, 41.7%), and an average bowling score of 164.8±20.0. The DEM group (age:76.5±4.9yrs.; BMI:29.3±5.0) was female (n=4, 100%), with half managing 2+ chronic health conditions (n=2, 50%), and an average bowling score of 162.1±30.1. Daily steps were significantly different between groups (χ^2 (2)=6.6, p=0.037), with the NOR group having significantly fewer daily steps than the MCD group (NOR: 1504.3±164.5 v. MCD: 3654.6±1363.8; p=0.04). There were no significant differences between groups in average bowling scores (χ^2 (2) =0.5, p=0.78), steps during game play (χ^2 (2) =4.9, p=0.08), and self-efficacy (χ^2 (2)=4.86, p=0.09). Given the limited sample size, inferences should not be drawn; however, age alone may not be wholly responsible for cognitive changes. While this research is preliminary, further research should examine how a Nintendo Switch based intervention could impact daily steps and cognitive health.

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Nursing Students' Knowledge and Attitudes Toward Gerontological Nursing

Kashish Patel, Kristen Hopkins, and Ju Young Shin, PhD, APRN, ANP-C, FAAN

Abstract: The purpose of this research study is to evaluate the knowledge and attitudes toward gerontological nursing among undergraduate nursing students at the University of Delaware. This research aims to assess the knowledge level of students per academic class, previous experiences, and educational factors that may impact nursing students' attitudes toward the gerontological nursing specialty. Methods: An email with a Qualtrics survey will be sent to undergraduate nursing students who voluntarily choose to participate in the study. Nursing organizations on the University of Delaware's Newark Campus

will be contacted to distribute the survey voluntarily. Fliers with a Quick Response (QR) code will be posted in the nursing building at the University of Delaware's Newark Campus. Responses will be kept anonymous. A random sample of 20-30% of students per academic class will complete the Qualtrics survey adapted from the University of Minnesota, School of Nursing, Nursing Care of Older Adults Nursing Students Survey. Age, gender, prior experience, and academic class status will be reported, then analyzed using descriptive statistics with means and percentages to assess nursing students' knowledge and attitudes regarding gerontological nursing. Results: This study is currently collecting data that will be presented at the CHS Research and Innovation Day. Implications: Understanding the knowledge and beliefs of undergraduate nursing students is essential for improving nursing education and clinical outcomes. Identifying gaps in their understanding helps assess the need for further education in this area, which can improve quality of care in healthcare facilities for the gerontological population.

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Influences of Prenatal Phthalate Exposure on Early Childhood BMI and Potentially Protective Dietary Strategies in the Environmental Influences on Child Health Outcomes Cohort

Mary D. Webb, Drew B. Day, Jee Won Park, Sheela Sathyanarayana, Jillian C. Trabulsi, Melissa M. Melough

Abstract: OBJECTIVES: In utero exposure to phthalates may be linked with altered early childhood weight. However, there is mixed evidence from previous epidemiological analyses. We used data from a large and diverse US cohort to examine associations between gestational phthalate exposure and early childhood BMI z-scores and overweight/obesity (OWOB), assess critical exposure windows, and explore modification by dietary strategies. METHODS: The study included 2,679 mother-child dyads from the Environmental influences on Child Health Outcomes cohort. Nine urinary phthalate metabolites were measured during gestation. Outcomes were early childhood (2–5 years) BMI z-score and OWOB status. Exposure-outcome associations were assessed with multivariable weighted quantile sum regressions. We modeled predicted metabolite levels across gestation for children in the 10th versus 85th BMI percentiles to assess critical exposure windows and explored modification by maternal dietary factors with product terms. RESULTS: A one-decile increase in prenatal phthalate mixtures dominated by monobenzyl phthalate and monoethyl phthalate was associated with lower BMI z-score (β= -0.04 [-0.06, - 0.01]) and odds of OWOB (OR = 0.93 [0.87, 1.00]) in all children and in males (βmales = -0.06 [-0.10, -0.02]). Monoethyl phthalate exposure later in pregnancy was higher among children in the 10th versus 85th BMI percentile. Higher prenatal HEI-2015 Greens and Beans scores attenuated associations with lower BMI z-score in males. CONCLUSION: Prenatal phthalate exposure was associated with lower early childhood BMI and odds of OWOB, particularly among males. Late in pregnancy may be a critical time for these effects and prenatal dietary factors may attenuate these associations.

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Development and Optimization of a Digestion Protocol for Extraction and Characterization of Microplastics in

Infant Formula
Liam McArdle, Lauren Ziegler, Sanaz Pourreza, Mary D. Webb, Melissa M. Melough
Abstract: Background: Preliminary evidence suggests that exposure to microplastics (<5mm) may induce oxidative stress, apoptosis, and inflammation. Evaluation of health effects requires improved exposure assessment, particularly among vulnerable populations. Infants are a high-risk group due to rapid developmental processes. The majority of US infants rely on formulas as a key nutrition source; however, microplastic content of these formulas is unknown. Objective: To compare 4 digestion protocols for their effectiveness in preparing powdered infant formula for subsequent microplastic characterization and quantification. Methods: Top-selling US powdered infant formulas were reconstituted with water and treated with 4 digestion protocols: (1) 30% hydrogen peroxide (H 2 O 2) (2) 10% potassium hydroxide (KOH); (3) enzymatic digestion using 1% lipase and trypsin followed by H 2 O 2 ; and (4) pretreatment with .15g sodium citrate tribasic and ultrasonication (20 minutes, 30 ˚C) followed by enzymatic digestion and H 2 O 2 . Results: H 2 O 2 alone resulted in incomplete digestion, evidenced by residual floating material and precipitate. KOH digestion yielded a homogenous liquid matrix with dark coloration and residual opacity. Enzymatic digestion followed by oxidative treatment produced the clearest liquid matrix with fewer undigested particles and white precipitate. The addition of sodium citrate and ultrasonication prior to enzymatic and oxidative digestion yielded no floating undigested residue, limited precipitate, and a largely homogenous aqueous matrix. Conclusions: Pretreatment using ultrasonication and chelation combined with enzymatic and oxidative digestion results in the highest degree of digestion and appears most suitable for subsequent microplastic characterization. Further analyses will quantify microplastic recovery and assess potential impacts of digestion protocols on particle integrity. Upon completion of reviewing the abstract content, attendees will be able to understand effective methods of formula digestion for sequestration and characterization of microplastics.

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Pilot study of farmers' markets as a community-based opportunity to reach and educate people about fruit and vegetable intake
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Abstract: INTRODUCTION: A small proportion of adults meet daily recommendations for fruit and vegetable intake. Farmers' markets offer point of purchase opportunities to educate people about fruit and vegetable preparation and consumption. This project examined the feasibility and acceptability of healthy recipe demonstrations and education at local Farmers markets. METHODS: Cooperative Extension provided educational outreach at two local farmers' markets. Outreach included a healthy recipe demonstration and tasting featuring in-season fresh fruits and vegetables, recipe handouts, and educational tips about healthy eating. Adults were invited to complete a brief, anonymous survey. The survey

addressed acceptability (e.g., satisfaction, learning) of the educational approach and attitudes (e.g., readiness, confidence, perceived ease, barriers, motivation) about preparing the recipe at home. A 10- point scale (10 = most favorable) was used for acceptability and attitude questions. Descriptive analyses were conducted. RESULTS: Greater than 150 adults and youth attended the educational outreach. Survey participants (n=37) reported eating an average of 2.35 fruits and vegetables per day and 7.71 (out of 10) for amount of information learned, 9.43 for satisfaction with the recipe demo, 8.94 for readiness to try the recipe, 9.30 for confidence in ability to make the recipe, and 9.17 for perceived ease of preparing the recipe. Lessons learned about feasibility will be presented. CONCLUSION: Educational outreach was well-received and associated with positive attitudes about trying the recipe at home. Healthy recipe demonstrations and healthy eating education at farmers markets may help promote positive attitudes about produce preparation and consumption. Feasibility lessons will guide future work.

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Barriers and Facilitators to Vaccination in Adults with Disabilities: A Systematic Review

Agrim Gupta, Alissa Ni, B.A, Tarang Parekh, PhD, MBBS

Abstract: Background: Adults with disabilities experience significant health disparities, including reduced vaccination uptake compared to the general population. This systematic review synthesizes evidence on multi-level barriers and facilitators to vaccination access in this population. Methods: A systematic search of PubMed for studies published between 2000 and 2025 yielded 258 records. Using PRISMA guidelines, title and abstract screening identified 128 articles for full- text assessment. Eighteen studies met inclusion criteria; twelve from the United States and Canada were included in the synthesis. Results: Twelve studies spanning physical, intellectual, sensory, and developmental disabilities identified three primary categories of barriers: communication and information accessibility (particularly affecting individuals with intellectual disabilities), structural access barriers including transportation and facility design (affecting those with physical disabilities), and mental health related hesitancy (among individuals with sensory disabilities). Healthcare provider recommendations emerged as the most consistent facilitator. Effective interventions included sensory-friendly vaccine clinics (achieving 100% completion rates), easy-read materials paired with peer support, staff-assisted residential-based approaches, and improved caregiver information availability. Conclusions: While individual hesitancy exists, structural and communication barriers represent the primary obstacles to vaccine equity for adults with disabilities. Public health interventions must transition from generalized outreach to disability-inclusive strategies prioritizing physical accessibility and tailored communication formats. Future policy should mandate accessibility standards in vaccine delivery systems and support healthcare providers in delivering disability-specific recommendations

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Moving From Belief to Behavior: Increasing Dynamometry Use Within Clinical Practice

Andrew Valente, PT, DPT, CSCS, Greg Seymour, PT, DPT
Abstract: INTRODUCTION: Dynamometry provides objective data to guide evidence-based clinical decisions. 1,2,3,4,5 Although clinicians value objective strength measurement, many still rely on subjective assessment or do not measure strength, reflecting a gap between evidence awareness and practice. 5 The purpose of this project is to describe the development and implementation of a clinician survey to identify barriers and facilitators to HHD integration and how the results informed a follow-up session to support implementation and improve clinical standards. METHODS: Our process required: 1) identifying a clear practice gap, 2) engaging stakeholders, 3) surveying clinicians, 4) delivering a focused educational intervention based on survey results, and 5) planned reassessment. An anonymous survey (n=6 clinicians) explored current strength assessment practices, confidence using dynamometry, perceived value, and implementation needs. This directly informs a clinic wide intervention emphasizing practical workflow integration, interpretation of results, and peer mentorship. RESULTS: The most common barriers were perceived time burden (33.3%), limited confidence using the device (33.3%), and disruption of normal treatment flow (16.7%). Key facilitators included training opportunities (50%), simple printed protocols (50%), and equipment location (50%). Notably, 100% agreed objective measures influence clinical decision-making, highlighting a gap between attitudes and behavior. A clinical meeting provided hands-on practice to improve confidence and workflow integration. A follow-up survey will reassess HHD use and previously reported barriers to support ongoing integration. CONCLUSION: This quality improvement project identified knowledge gaps, incorporated simple questionnaires and resulted in a clinic specific training session focused on improving patient care while considering local stakeholder input.

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Enhancing Mental Health in Adults Through an Accessible Mindfulness App Intervention

Gifty Botchway, Jennifer Graber, Caren Coffy-McCormick, Bernard Addogoh
Abstract: Purpose: Anxiety disorders and major depressive disorders remain common in adults, and access to mindfulness interventions is often not a standard clinical practice. The purpose of this project is to evaluate the effect of a four-week online mindfulness intervention delivered via the Insight Timer mobile app among adults at an outpatient mental health practice. Methods: A pre-post intervention design was used with adults (N=18) aged 18-50 diagnosed with anxiety and/or depression at an outpatient mental health practice in Newark, Delaware. Participants engaged in a guided mindfulness session using the Insight Timer app over four weeks. Anxiety and depression symptoms were measured pre- and post-intervention using the Generalized Anxiety Disorder -7 (GAD-7) and Patient Health Questionnaire-9 (PHQ-9). Descriptive statistical analyses were conducted. Results: The sample was evenly distributed by gender, with 50% (n=9) identifying as male. Participants were primarily aged 35-44 years (44.4%). Mean GAD-7 scores decreased from 9.8 (SD = 4.1) preintervention to 6.3 (SD = 3.7) postintervention, showing a

mean difference of 3.5 points (35.7%). Mean PHQ-9 scores decreased from 11.2 (SD = 5.3) to 7.5 (SD = 4.8), showing a reduction of 3.7 points (33.0%). Participants' engagement with the mindfulness app decreased over time, as shown by fewer completed weekly check-in questionnaires. The app was highly accepted: 94% found it easy to navigate, 89% rated its convenience, and 90% found it helpful. Implications: Mobile mindfulness apps can serve as a feasible and accessible adjunct intervention for reducing anxiety and depression symptoms in outpatient mental health patients.

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A Sleep Coaching Chatbot for Adolescents with Autism Spectrum Disorder: A Pilot Study

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Abstract: Objectives: Poor sleep health is highly prevalent among autistic adolescents and negatively affects cognitive functioning and emotional regulation. Artificial intelligence (AI) chatbots offer a scalable platform for behavioral sleep interventions; however, existing tools have not been adapted for autistic adolescents. This pilot study evaluated the feasibility, usability, acceptability, and preliminary outcomes of an AI-driven, chatbot-delivered sleep intervention for autistic adolescents. Methods: In this single-arm study, 12 autistic adolescents with self-reported sleep concerns participated in a 4-week transdiagnostic sleep intervention delivered via a chatbot mobile application. Feasibility, usability, and acceptability were measured using retention rates, questionnaires [e.g., Adapted System Usability Scale (SUS)], and semi-structured interviews. Sleep outcomes were measured pre- and post-intervention using the Pittsburgh Sleep Quality Index (PSQI), Epworth Sleepiness Scale (ESS), Sleep Self-Efficacy (SSE), and Dysfunctional Beliefs and Attitudes about Sleep (DBAS-16). Results: As of 2/25/26, seven participants (ages 12-17, 2 males) completed the end-of- intervention assessment. They all completed weekly sleep coaching modules and rated the sleep chatbot intervention as acceptable or highly acceptable. The mean SUS score was 71, exceeding the favorable usability cutoff (68). Interview feedback highlighted the app's user-friendliness and flexibility, with suggestions for refinement. Compared to baseline, participants showed improved PSQI (10.17±3.12 vs 8.17±2.79), ESS (11.33±3.61 vs.10.00±4.19), and DBAS scores (91.17±22.15 vs. 89.00±23.71), while SSE scores remained unchanged. Conclusion: Findings from this ongoing pilot study support the feasibility and preliminary efficacy of this digital approach to improving sleep outcomes, sleep quality, and sleep hygiene among autistic adolescents, highlighting its potential as a scalable behavioral health tool.

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Temporal Trends, Screening Patterns, and Determinants of STI Positivity Among Adolescents in Delaware School-Based Health Centres: A Retrospective Cohort Study

Fadzai Nicola Dube, Wayne Duffus, Jee Won Park

Abstract: Adolescents account for nearly half of incident sexually transmitted infections (STIs) in the United States, yet longitudinal evidence describing infection dynamics, co-infection patterns, and reinfection risk within school-based

health centres (SBHCs) remains limited. Trichomonas vaginalis (TV), despite documented prevalence in high-burden settings, is rarely evaluated alongside Chlamydia trachomatis (CT) and Neisseria gonorrhoeae (NG) in adolescent screening programs. We conducted a retrospective cohort study using de-identified laboratory and demographic records from adolescents aged 13–19 years screened for CT, NG, and TV at ChristianaCare SBHCs in Delaware between January 2019 and December 2024. Descriptive analyses characterized testing trends. Multivariable regression models examined predictors of STI positivity, pathogen co-infection, and repeat positivity, adjusting for socio-demographics, testing history, specimen source, and calendar year. Among 7,435 samples, 87.6% were negative, 11.2% demonstrated single infections, and 1.3% showed co-infections. STI positivity ranged from 9.3% to 16.9% annually, with reduced testing during COVID-19 followed by higher positivity in 2024. Black adolescents experienced more than twice the odds of infection compared with White adolescents. Prior infection was the strongest predictor of subsequent positivity (adjusted OR=11.27; 95% CI: 9.69–13.10). Conversely, each additional prior test was associated with a 30% reduction in positivity odds. TV infection was independently associated with increased odds of co-infection (adjusted OR=5.61; 95% CI: 4.38–7.16). Findings highlight persistent disparities, the importance of TV in adolescent STI burden, and a potential protective role of repeat testing. Strengthening routine screening and follow-up strategies within SBHCs may improve adolescent STI prevention and care delivery.

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Multilevel Resilience Factors, Discrimination, and Physical and Mental Health Among Older Adults

Aditya Chandel, Yendelela L. Cuffee, Isabella Tullio, Jennifer Moss, Jee Won Park

Abstract: Background: Resilience factors at multiple levels (e.g., self-efficacy, social support) may reduce the negative physical and emotional effects of discrimination and enhance health and well-being among older adults. We examined associations between multilevel resilience factors and health-related quality of life, measured by Physical and Mental Component Summary (PCS, MCS) scores, and assessed effect measure modification (EMM) by type of discrimination (age-, race-, or gender-based). Methods: Adults aged ≥50 from seven mid-Atlantic states completed a cross-sectional survey. Adjusted linear regression models estimated associations between resilience factors (Brief Resilience Scale [BRS], self-care self-efficacy, social support, trust in the medical profession, and social cohesion), categorized as high/moderate versus low, and continuous PCS/MCS scores. EMM by discrimination type was assessed. Results: Among 2,407 adults (median age: 67; 57.3% female; 79.4% non-Hispanic White), higher BRS scores were positively associated with PCS (b=4.33, 95% CL:2.80, 5.85) and MCS (b=13.14, 95% CL:11.76, 14.52). Positive associations between self-efficacy and both outcomes were most compatible with the data. Weak positive associations were observed for social support, trust in the medical profession, and social cohesion with MCS; however, inverse associations were observed for PCS. There was some evidence for EMM by discrimination type. For instance, social

cohesion was positively associated with PCS among those reporting gender discrimination (b=1.60, 95% CL: -0.53, 3.73) but negatively associated among others (b=-0.86, 95% CL: -1.69, -0.03; p=0.03). Conclusion: Individual-level resilience factors were associated with better physical and mental health. Self-care, self-efficacy, and social cohesion may improve physical health in older adults experiencing gender discrimination.

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Everyday Discrimination and Healthcare Utilization Among U.S. Adults With Hypertension

Charlotte Asiedu, Yendelela Cuffee

Abstract: Background: More than half of U.S. adults report experiencing some form of discrimination, which has been linked to delayed care seeking and reduced healthcare utilization. Adults with hypertension require ongoing clinical monitoring and routine healthcare visits, making them a priority population for understanding how discriminatory experiences may influence healthcare utilization. Objective: To examine the association between everyday discrimination and healthcare utilization, and to assess whether this relationship differs among adults with hypertension. Methods: We analyzed data from the 2023 National Health Interview Survey. The study included adults aged ≥18years. The exposure was the 5-item Everyday Discrimination Scale, and outcome was healthcare utilization, defined as any visit with a healthcare provider in the past year. Survey-weighted logistic regression models were estimated, adjusting for covariates. Results: The analytic sample included 29,471 U.S. adults (78.8% White and 12% Black), of whom 37.6% reported a diagnosis of hypertension. Among adults with hypertension, discrimination was not significantly associated with seeing a healthcare provider in the past year after adjustment (aOR = 0.99, 95% CI: 0.96–1.02; p = 0.396). In the overall sample, higher discrimination scores were associated with lower odds of provider visits, and the association was marginally significant (aOR = 0.99, 95% CI: 0.97–1.00; p = 0.050). Conclusion: Findings may reflect the necessity of routine monitoring and treatment among adults with hypertension, while modest associations in the overall population suggest that discrimination may still influence healthcare utilization; subsequent analyses will examine whether these relationships vary across racial, ethnic and socioeconomic subgroups.

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Greater stress-related reductions in positive affect are associated with blunted endothelium-dependent dilation in adults with major depressive disorder

Aaron Autler, Madison Evering, Jacqueline Mogle, Freda Patterson, Keith Bredemeier, David Almeida, Erika Saunders, and Jody Greaney

Abstract: Background: Greater instability of positive affect (PA) in the face of stressful situations is associated with increased cardiovascular disease (CVD) risk, but the underlying biological mechanisms remain poorly specified. We tested the hypothesis that greater declines in PA in response to daily stressors (i.e., positive affective responsivity, PA-R) would be associated with reduced endothelium-dependent dilation (EDD)—a predictor of future CVD. Because the core pathology of major depressive disorder (MDD) includes affective dysregulation, we further hypothesized that the magnitude of this

association would be greater in adults with MDD compared to non-depressed healthy adults (HA). Methods: Daily stress processes and affective dynamics were assessed for 14 consecutive days in 11 adults with MDD (unmedicated; 9 female; 37±15 yrs) and 20 HA (16 female; 40±12 yrs). On day 15, microvascular EDD in response to rapid local heating (42°C) was assessed via laser Doppler flowmetry. Results: PA was lower both on stressor versus stressor-free days in the full sample and in adults with MDD compared to HA (both p<0.05), but there were no group differences in PA-R (MDD: -0.27±0.24 vs. HA: -0.26±0.23; p=0.89). MDD moderated the association between PA-R to daily stressors and EDD such that greater PA-R was related to blunted EDD only in adults with MDD [b=38.51 (SE=13.6), p=0.02] but not in HA [b=5.68 (SE=9.0), p=0.54]. Conclusions: These preliminary data suggest that greater declines in PA in response to everyday stressors are associated with poorer endothelial health in adults with MDD, potentially contributing to increased CVD risk.

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The Effect of Added Mass on Limb Contributions to the Lateral Center of Mass Trajectory

Ahmed Alkaye, Nancy Nguyen, Jeremy Crenshaw

Abstract: During Walking Obesity is associated with altered limb- and phase specific contributions to lateral center of mass (COM) motion during walking. It is unknown if these changes are due to added mass or concomitant factors associated with obesity. The purpose of this study was to investigate the role of added mass on the biomechanical control of lateral COM motion during walking. Fifteen older adults (7 male/8 female; age: 54–69 years; BMI: 20.31–27.3 kg/m2) participated in this study. Participants walked on a force-plate dual-belt treadmill with and without a weighted vest of up to 15% body weight at their preferred speed (0.5–1.15 m/s). Lead- and trail-limb contributions to the COM lateral change in velocity were quantified using a force-plate–only approach. Dependent t-tests were used to compare limb contributions with and without the weighted vest. Lead-limb contributions decreased in weighted conditions compared to unweighted conditions. Trail-limb contributions increased in weighted conditions compared to unweighted conditions. These changes were accompanied by decreasing the distance between the COM and center of pressure, increasing double-support time, and altering the vertical ground reaction forces. Adults alter limb-specific contributions to lateral center of mass motion with added weight. This change could be an adaptive strategy that may help mitigate fall risk. This work partially aligns with our cross-sectional study on body size, where we observed increased trail-limb contributions with greater non-muscular mass, but no relationship with lead-limb contributions. Future studies should investigate how concomitant factors outside of added mass influence limb contributions.

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Mechanism of dysregulation of transcription factor MEF2C in spastic cerebral palsy

Brigette Romero, Karyn G Robinson, Stephanie K Lee, Vijay Parashar, Robert E Akins, M. Wade Shrader, and Mona Batish

Abstract: Spastic cerebral palsy (CP), accounting for more than 80% of total CP cases, is a debilitating neurodevelopmental disorder characterized by persistent muscle stiffness and contractures. Myocyte-specific enhancer factor 2C (MEF2C) is a transcription factor that controls muscle development and mediates later stages of myogenesis. Recently, our group identified a marked downregulation of MEF2C levels in CP, which contributes to disrupted sarcomere organization and muscle pathologies reported in CP. In CP, circNFIX is downregulated and thus miR373-3p can target MEF2C RNA and reduce its expression. However, we observed a very marked decrease in MEF2C levels, while miR373-3p is a low-copy-number miRNA, suggesting that other pathways may also regulate MEF2C. Satellite cell-derived myoblasts (SC-MBs) were isolated from skeletal muscle biopsies from CP and control subjects under an IRB-approved protocol. SC-MBs were cultured and differentiated into myotubes (SC-MTs). RNA-binding proteins (RBPs) that interact with circNFIX were identified using the CRISPR-assisted RNA-protein detection (CARPID) method. Total RNA was isolated, and qRT-PCR was performed to assess RNA expression of the identified RBPs. CircNFIX and RBPs were imaged using single-molecule resolution fluorescence in situ hybridization (smFISH) and immunofluorescence (IF) to determine copy number, cellular localization, and potential colocalization. CARPID pull-down of circNFIX identified TBCE, TBCA, and additional novel muscle development-associated proteins that could potentially regulate MEF2C expression and/or mediate its function. Interactions between RBPs and circNFIX were shown by smFISH and IF. Future work aims to identify and validate mechanisms of MEF2C regulation to enable its use as a potential therapeutic target.

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Functional Interactions within Complex ABCA4 Alleles in Inherited Retinal Degeneration

Sadeghi, Masi; Jayarathne, Nadee N.; Biswas, Subhasis; and Biswas-Fiss, Esther E.

Abstract: Purpose Mutations in ABCA4 are a major cause of inherited retinal degeneration, including Stargardt disease. In some patients, two or more variants occur on the same chromosome (in cis), forming “complex alleles.” These variant combinations can modify disease severity in ways that are not predictable from studying single variants alone. This study examines how interactions within five ABCA4 complex alleles affect protein function and how these molecular effects relate to clinical outcomes. Methods Five patient-derived complex alleles (A1038V/L541P; R1443H/L541P; G1961E/T1253M; N1868I/G863A; R2106C/P1761R) were analyzed. Each individual variant and its corresponding cis combination were evaluated using Computational structural modeling (AlphaFold and available experimental ABCA4 structures) and In vitro expression assays in a virus-like particle (VLP) system by quantification of total protein expression, membrane surface localization, and basal and retinal-stimulated ATPase activity. Functional findings were compared with REVEL pathogenicity predictions and available clinical data to assess modifying or synergistic effects. Results: Distinct functional interaction patterns were identified. Combinations of two benign variants had minimal additive effects on protein stability and activity,

consistent with milder or later-onset disease. In several cases, a variant predicted to be benign exacerbated the defect caused by a pathogenic variant, reducing membrane localization and ATPase activity beyond that observed with the pathogenic variant alone. Pairs of pathogenic variants produced the most severe functional deficits, including markedly reduced stability, near-absent surface expression, and substantial loss of ATPase activity consistent with early and severe disease presentations. Structural modeling supported these findings, revealing local destabilization or disrupted intramolecular interactions in damaging cis combinations. Notably, computational pathogenicity scores alone often underestimated the impact of variant–variant interactions. Conclusions: This study demonstrates that ABCA4 complex alleles fall into distinct mechanistic categories, with predictable consequences for protein function and clinical severity. Variants considered benign in isolation may act as modifiers in specific cis contexts. These findings highlight the importance of evaluating genetic variants within their genomic context to improve variant interpretation, disease prediction, and genetic counseling in inherited retinal degeneration.

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A Multilayer Computational Framework for Scalable Characterization of ABCA4 ECD2 Variants

Jones, Jazzlyn; Biswas, Subhasis; Biswas-Fiss, Esther E.

Abstract: Introduction: ABCA4 plays a critical role in the visual cycle by transporting and recycling retinoids. More than 4,500 ABCA4 variants have been identified, many of which impair retinoid transport and contribute to retinal degenerations such as Stargardt disease. The extracytoplasmic domains (ECDs) support ABCA4 function, with ECD2 specifically binding retinoid, and cryo-EM structures show corresponding conformational changes upon retinoid interaction. Over 230 ECD2 variants have been reported, suggesting clinical relevance; however, the number of variants makes functional assays impractical. This study introduces a computational framework to streamline ECD2 variant characterization and guide reclassification. Methods: ECD2 variants were obtained from ClinVar and evaluated using ClinVar classifications, standard in silico tools (PolyPhen-2, SIFT, MutationTaster), and ensemble predictors (CADD, REVEL, MetaRNN). Structural features including electrostatics, clashes, and ΔΔG were assessed for potential functional disruption. Conservation across ABCA members was examined through sequence alignment and GERP scoring. Results: Traditional and ensemble tools identified pathogenic ECD2 variants, with MetaRNN showing sensitivity of >97%. Structural analyses revealed notable disruptions, particularly clashes and surface changes near the retinoid binding site. Sequence alignment and GERP scores indicated moderate to high conservation across ECD2. Integrated approaches enabled prioritization of variants for functional analysis and will support reclassification using ACMG/AMP guidelines. Conclusions: Integrated computational approaches provide an effective strategy for predicting functional impact of ABCA4 variants and offer a scalable model for variant classification. By identifying high-priority candidates for biochemical validation, this framework accelerates ABCA4 variant interpretation and improves prognostic assessment, contributing to a deeper understanding of ABCA4 disease mechanisms.

POSTER PRESENTATIONS

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The Effect of Acute Moderate-Intensity Aerobic Exercise on Neuroprotective Biomarkers

Rizzi, N., Decker, K., Romberger, N., Luddy, A., Daga, K., Hoefer, R., Seeley, C., Lanzi, A., Cohen, M., Johnson, C., Witman, M., Erickson, K., Edwards, D., Martens, C.

Abstract: While exercise may improve cognitive outcomes in people with amnestic mild cognitive impairment (aMCI), individual responses are variable, possibly reflecting differences in the production of neuroprotective biomarkers, such as cathepsin-B (CTSB) and lactate, which are produced by skeletal muscle during exercise. HYPOTHESIS: We hypothesized that the increases in CTSB and lactate following an acute bout of moderate-intensity aerobic exercise (Mod-AEx) would be blunted in older adults with aMCI. Further, we hypothesized lower body muscle volume (LBMV) would be positively associated with the areas under the curves (AUCs) of CTSB and lactate. METHODS: Older adults with and without aMCI were recruited to participate in this study. LBMV was assessed using skinfold measurements, and participants completed 15 minutes of Mod-AEx (defined as 45%-55% of heart rate reserve) on a cycle ergometer. Blood was drawn immediately before, immediately after, 30 minutes after, and 90 minutes after the exercise session. RESULTS: 5 older adults with aMCI (3 females, 2 males aged 67±5 years) and 5 older adults without aMCI (3 females, 2 males aged 67±2 years) completed the study. CTSB and lactate were significantly elevated immediately following exercise in participants without aMCI compared **to** those with aMCI (CTSB: 6808±5406 vs. 3345±790, p=0.035; lactate: 2.95±0.63 vs. 2.19±0.86, p=0.017). However, there was no significant association between either of the AUCs of CTSB or lactate and LBMV (CTSB: r=-0.068, p=0.861; lactate: r=-0.34, p=0.34).

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Three-Way Synergistic Antibiotic Potentiation by Novel Probiotic Strains and Piceatannol Against ESBL-Producing Escherichia coli

Jiddu Joseph, Sanya Boby, Muhammed Shafeekh Muyyarikkandy

Abstract: Gram-negative pathogens like ESBL E. coli and Salmonella Typhimurium drive antimicrobial resistance (AMR), resulting in millions of annual direct medical costs. With few new antibiotic classes in development, discovering novel compounds and potentiating existing ones is critical. This study examined the antibiotic-potentiating activity of two phytochemicals, Methyl trans-cinnamaldehyde (MTC) and Piceatannol (PIC). Antibiotic-phytochemical combinations were screened by broth dilution, identifying promising synergistic pairs. Checkerboard assays were evaluated using the Bliss independence model to quantify synergy. Tetracycline (0.87–900 µM) with MTC (12.5–800 µM) was tested against S. Typhimurium (ATCC 13311), and ceftriaxone (0–800 µM) with PIC (0–800 µM) against ESBL E. coli (ATCC BAA 196). MTC's effect on virulence was studied in adhesion/invasion assays using Caco-2 monolayers (106 cells/well) infected with S. Typhimurium (107 CFU/well, MOI 1:10) at 200, 400, 800, and 1200 µM MTC. Synergy data were analyzed with the Bliss model over multiple points. Moreover, adhesion/invasion results were analyzed by ANOVA in GraphPad Prism. Tetracycline-MTC pairs showed 53.24% high synergy (>0.25) and 46.76% moderate synergy (0–0.25). Ceftriaxone-PIC showed 74% high synergy, with 26%

low synergy or antagonism (<0). MTC reduced adhesion by 38%, 77%, 85%, and 89%, and invasion by 92%, 95%, 100%, and 100% at 200, 400, 800, and 1200 µM, respectively, versus controls. Combinations lowered basal respiration compared to the untreated groups when analyzed using a Seahorse bioanalyzer. Overall, both phytochemicals exhibited strong synergistic interactions with antibiotics, while MTC markedly inhibited S. Typhimurium adhesion and invasion in intestinal cells, combating AMR.

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Enhanced Purification Strategies for ABCA4 Extracellular Domains

Tayyaba Sajjad, Jazzyln Jones, Dr. Esther Biswas-Fiss

Abstract: Introduction: The retina-specific ABCA transporter, ABCA4, is essential for vision, and its genetic variants are associated with a wide range of inherited retinal degenerative diseases leading to blindness, including Stargardt disease. The ABCA4 protein consists of characteristic functional domains: ECD1, ECD2, NBD1, and NBD2, alongside transmembrane domains (TMDs). The extracytoplasmic domains, ECD1 and ECD2, work together to facilitate retinoid transport. As many disease-associated mutations map to these domains, studying ECD1 and ECD2 individually would provide important insight into ABCA4 variant pathogenicity. The goal of this project is to develop a method to express and purify the ECD1 and ECD2 domains of ABCA4. Methods: Protein expression was carried out in E. coli cells and verified by SDS-PAGE and Western blot analysis. After initial purification, a fos-choline (FC-14) detergent-based purification was conducted. The final step of the purification was carried out by performing nickel affinity chromatography. The data was analyzed using SDS-PAGE and Western blot. Results: We confirmed that FC-14 greatly improves protein solubility, particularly for ECD1, resulting in clearer bands and improved recovery. Meanwhile, there was some improvement in the solubility of ECD2 by FC-14, the yield and consistency were moderate hence, further optimization is needed in this area. Conclusion: We were successful able to purify and characterize ECD1. Eventhough, ECD2 expression was verified, its solubility and purification needs further optimization via different detergents and purification methods. The successful purification of both extracytoplasmic domains is essential for enabling future functional analyses and the study of disease-causing variants of ABCA4.

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Direct lncRNA Interactome Mapping: Amplification-Based Proteomics

Jadira Fuentes Bautista, Brigette Romero, and Mona Batish

Abstract: Long non-coding RNAs (lncRNAs) were once considered “junk” due to their inability to produce proteins. However, research has demonstrated that lncRNAs regulate essential cellular processes. To carry out their diverse functions, lncRNAs interact with RNA-binding proteins (RBPs). Understanding these proteins is crucial for understanding how the body functions, the origins and progression of various diseases, and identifying targets for these diseases. A conventional strategy for identifying RBPs is an RNA pull-down assay, in which the RNA of interest serves as bait to capture interacting proteins for subsequent analysis. However, this approach has several limitations, including the detection of only strongly interacting proteins and the potential for RNA degradation. To

overcome some of these challenges, we modified a recently developed pull-down-free method that leverages the idea that RNA binding alters protein structure, thereby altering the protein's susceptibility to enzymatic digestion. The lncRNA was transcribed in vitro and incubated with cell extract; then, large amounts of trypsin (an enzyme) were added to generate short chains of amino acids (peptides). The peptides were separated from the partially digested proteins and analyzed by mass spectrometry, which provided peptide identities. This method can identify where the lncRNA binds and which proteins it binds to by comparing the presence or absence of peptides in cell extract incubated with and without the lncRNA. Analysis revealed that the most significant proteins identified correspond to known RNA-binding proteins. Once fully optimized, this protocol has the potential to open new avenues for identification of RNA-protein interactions.

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Investigating Critical Residues for ATP-Dependent Regulation and Catalytic Activity in the Diadenylate Cyclase MtbDisA

Leif Boddie, Vijay Parashar, Mona Batish

Abstract: Tuberculosis remains a leading global infectious disease with rising antibiotic resistance, necessitating novel therapeutic targets. The diadenylate cyclase (DAC) DisA from Mycobacterium tuberculosis (MtbDisA) synthesizes c-di-AMP, a critical regulator of bacterial homeostasis and host immune activation via the STING pathway. However, MtbDisA activity is paradoxically inhibited by high ATP concentrations, a regulatory mechanism that remains poorly understood and unexploited therapeutically. To further understand the molecular basis of substrate-mediated inhibition, we employed integrated structural and evolutionary analyses. PDBePISA structural analysis and amino acid conservation studies identified key residues within the DAC domain and regulatory interfaces likely responsible for ATP inhibition. Based on these predictions, we rationally designed seven point mutations targeting putative allosteric sites and catalytic residues. Wild-type DisA and all seven mutants were engineered using site-directed mutagenesis and purified via Nickel Affinity and Size Chromatography (SEC), with expression confirmed by SDS-PAGE. SEC revealed unexpected oligomeric behavior: wild-type DisA exhibited an apparent decameric assembly rather than the predicted octamer, suggesting dynamic oligomerization. Critically, specific mutations produced distinct shifts in elution volumes and peak multiplicity, providing direct evidence that these residues govern oligomeric stability and potentially allosteric regulation. These findings establish a mechanistic framework linking quaternary structure to enzymatic regulation in MtbDisA. Forthcoming DAC activity and DNA-binding assays will definitively characterize how these mutations modulate c-di-AMP production. This work advances fundamental understanding of bacterial second messenger signaling and provides validated molecular targets for structure-based drug design against tuberculosis.

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Optimizing the isolation and characterization of cytosolic DNA from human cell lines

Maryia Hrynashka, Brigette Romero, and Mona Batish

Abstract: Cytosolic DNA refers to

genomic fragments that leak from the nucleus into the cytoplasm following cellular damage or genomic instability. This process is frequently triggered by infections, malignancy, or DNA damage repair (DDR) inhibitor drugs, which induce double-stranded breaks that result in chromosome-free DNA. The presence of cytosolic DNA can be indicative of several cancers. Because these fragments serve as direct indicators of DNA damage, they hold the potential to be accurate pharmacodynamic markers for evaluating DDR-inhibiting cancer therapies. We aimed to isolate high-purity cytosolic DNA that is entirely free of mitochondrial and nuclear genomic contaminants. This study optimized a protocol for isolating high-purity cytosolic DNA from multiple human cancer cell lines. To achieve this, cells were carefully lysed and treated using Proteinase K and RNase A to eliminate protein and RNA interference. To verify sample purity, PCR was conducted using specific primers targeting genomic DNA, RNA, and mitochondrial DNA to ensure the absence of nuclear leakage during processing. Furthermore, we adapted single-molecule fluorescence in situ hybridization (smFISH) to visualize and quantify cytosolic DNA at the individual molecule level. Successfully isolating and imaging these fragments provides us with a way to visualize and localize this cytosolic DNA and allows for comparison across cell lines to further assess its potential as a cancer biomarker.

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The Center for Health Profession Studies: Supporting UD students navigating the many paths to a career in health care
Jennifer Nauen, Elena Lynn, Caroline Tillman, Saskia Richter

Abstract: Introduction: Academic and professional preparation are significant factors in shaping the healthcare workforce. Since 2011, UD's Center for Health Profession Studies (CHPS) has supported students across UD and recent alumni in preparing for health care careers in medicine, dentistry and related fields. Methods: CHPS provides advising and programs and services including the Pre-Health Professions Living Learning Community (LLC, first-year residential cohort model), the Medical Scholars Program (4+4 program with three medical school partners), the Health Professions Evaluation Committee (HPEC, structured committee letter process), and international clinical experiences. Impact: Students show strong interest and involvement in CHPS offerings. For example, about 800 students have opted in to receive CHPS communications through a Stellic pre-health interest tag, and there were 545 advising appointments in 2024-2025. Twenty-seven freshmen elected to join the 2025-2026 LLC. In 2025, 63 candidates (students and recent alumni) participated in the HPEC process. Finally, over 85% of the Medical Scholars class of 2025 matriculated to a partner medical school. Conclusion: CHPS engages with students across UD from freshmen to seniors and recent alumni. Its programs and services complement CAS, CHS, UD Career Services and the State of Delaware efforts to support education and career development for students interested in health care.

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Exercised Induced Anaphylaxis (EIA): Type 4 Clinical CASE Study
Megan Smith
Abstract: Background: 19-year-old men's lacrosse player was diagnosed

in spring 2024, when he was 17 years old, with exercise induced anaphylaxis. He would get severe allergic reactions when working out or doing something "stressful". After a few occurrences he determined it was necessary to see his PCP because it wasn't correlating with his peanut allergy. Differential Diagnosis: Food- Dependent Exercise Induced Anaphylaxis (FDEIA) Treatment: Athlete was diagnosed with a peanut allergy from adolescence and can lead to anaphylaxis. Athlete does not need exposure to moderate or high intensity activity for him to have an allergic reaction. After completing a full allergy panel to assess his allergic response, it was deemed that he cannot ingest NSAIDs or some soy products before physical activity. His primary symptoms include dermatitis, urticaria, itchy eyes, and constricted breathing. If the event continues to go untreated, then he will begin to vomit with continued labored breathing and swelling eyes. Athlete is to refrain from ingesting NSAIDs, peanuts, and soy foods before any moderate or strenuous activity. To engage in preventative measures, the athlete takes a daily antihistamine, Allegra, and also takes a prescribed medication of montelukast once a day. If athlete begins to experience symptoms while exercising, he will stop activity and take a dose of Benadryl to see if that helps with symptom management. If his symptoms continue to progress, he will administer a dose of epinephrine. Uniqueness: Both of his parents have bad allergies, but they do not have this specific diagnosis, nor does anyone else in his family. "Epidemiological studies show a lifetime prevalence variable of 0.05-2.0% and a mortality rate of 1-2%" (Del Giacco). Exercise induced anaphylaxis is broken down into two groups of food- dependent exercise induced anaphylaxis and non-food exercise induced anaphylaxis. When looking at prevalence, there is no research to indicate that there are pre-disposing factors to race, but there is some slight research on the correlation with gender. In a study there was no correlation with gender specifically for exercise induced anaphylaxis, but there is with food-dependent exercise induced anaphylaxis. With adolescence diagnosis of food-dependent exercise induced anaphylaxis there is a higher rate of diagnosis in boys than are for girls. If looking at overall research for exercise induced anaphylaxis for children and adults, the incidence rate his higher in women (Barg). Conclusions: Even though this diagnosis is very rare in the general population, athletic trainers in the traditional setting work with active patients on a daily basis. This rare condition is something that all athletic trainers should be aware of as they work with their patients on and off the field. When discussing this case with one of my team physicians when we learned of it, I was told "this is one of those conditions you learn about in medical school but are told you will never see". I had never heard of this condition before this athlete, but I never want an athletic trainer to learn of this condition after an event happens. Athletic trainers being aware of this condition could help athletic trainers inquire further for diagnosis and hopefully save someone's life.

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Electrically Assisted Cycling to Enhance Performance, Self-Efficacy, and Enjoyment in Adults with Intellectual Disability: A Single-Subject Multiple Baseline Design

Iva Obrusnikova, Richard R. Suminski,

Cora J. Firkin, Albert R. Cavalier, Sabrina Vodovoz

Abstract: INTRODUCTION: Adults with intellectual disability (ID) experience elevated rates of obesity andcardiometabolic disease, partly due to barriers to effective aerobic exercise. Electrically assisted cycling (EAC), delivered through a real e-bike integrated with a virtual simulation platform, may reduce motor and fitness-related barriers while enhancing self-efficacy and enjoyment. Guided by Social Cognitive Theory, this study evaluates the feasibility and preliminary efficacy of an indoor EAC intervention on cycling performance and psychosocial outcomes in adults with ID. METHODS: Six adults (ages 18–44) with mild-to-moderate ID will participate in a multiple-probe-across-participants single-subject experimental design conducted at the UD Health and Disability Lab. Following consent, screening, and physical assessments, participants will complete bi-weekly 50-min sessions. During baseline, participants will engage in unassisted cycling. The treatment phase introduces EAC at staggered time points after stable baseline performance (≤10% variability across three sessions). Electric assistance will be gradually faded. Two maintenance probes will occur at 2 and 4 weeks post-treatment. Primary outcomes include cycling performance (power output, cadence, heart rate reserve zone adherence), self-efficacy, and enjoyment. Data will be analyzed using visual inspection and Percentage of Non-Overlapping Data. EXPECTED OUTCOMES: Introduction of EAC is expected to produce immediate and sustained increases in cycling performance, accompanied by improvements in self-efficacy and enjoyment and adaptive changes in perceived exertion, while stable baseline responding will support experimental control. CONCLUSION: This study advances inclusive exercise science by applying rigorous single-case methodology to evaluate electrically assisted cycling for adults with ID, informing scalable community-based approaches to improving cardiovascular health.

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Pain Processing Measures are Associated with Pain Interference and Tolerance, Not Intensity, in Adults with Low Back Pain

Abigail Hughes, Steven George, Emily Fox, Gregory Hicks, Katie Butera

Abstract: Understanding the impact of sensory processing on variability in clinical outcomes may better guide tailored low back pain (LBP) care. This secondary analysis assessed cross-sectional relationships between quantitative sensory tests (QST) and clinical measures in 76 adults with LBP (39 females; mean age=45; mean LBP=3.14/10; mean disability=9%). QST measures included temporal summation (TS), conditioned pain modulation (CPM), and local and remote pressure pain thresholds (PPT). Clinical measures included a pain interference questionnaire and participants' ratings of pain unpleasantness and movement-evoked pain (MEP) intensity during functional tasks. Associations between QST and clinical measures were assessed via Pearson correlations and regression models (independent variables=4 QST measures; dependent variables=interference, unpleasantness, MEP). Lower local-PPT and CPM were associated with higher interference (r=-0.25 & -0.27, respectively; p<0.05)

and higher unpleasantness (r=-0.32 & -0.29, respectively; p<0.05). Lower local- and remote-PPTs were associated with higher MEP (r=-0.36 & -0.30, respectively; p<0.05). After adjusting for age, sex, and BMI, local-PPT and CPM explained 13% variance in interference (Total R 2 =0.19; R 2 -change for QST measures =0.13; beta=-0.31 & -0.28, respectively, p<0.05) and 16% variance in unpleasantness (Total R 2 =0.25; R 2 -change for QST measures =0.16; beta=-0.31 & -0.28, respectively, p<0.05). PPTs did not contribute to additional variance in the final MEP model. Although associations were small-moderate, findings suggest pain processing contributes to perceived impact and tolerance of pain, but not intensity of pain during movement. Our low pain/disability sample may limit generalizability, warranting more comprehensive investigation of sensory and functional aspects of pain in those with more severe or high-impact LBP presentations.

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Passive-Dynamic Ankle Foot Orthosis Can Modulate Achilles Tendon Loading during Dynamic Tasks in a Patient with Achilles Tendinopathy

Zahra McKee, Stephanie G. Cone, Karin Grävare Silbernagel, Elisa S. Arch

Abstract: Achilles tendinopathy is a common and chronic overuse injury of the Achilles tendon. Managing the load experienced in the Achilles tendon is important during rehabilitation. Passive-dynamic ankle foot orthoses (PD-AFOs) may be able to modulate Achilles tendon loading by providing eccentric plantarflexion assistance through dorsiflexion stiffness and concentric plantarflexion assistance through energy release. This study aimed to investigate if PD-AFOs can modulate Achilles tendon loading for individuals with Achilles tendinopathy. One individual with unilateral right Achilles tendinopathy (37 y.o., Female, Right VISA-A: 47, Left VISA-A: 85) was fitted for a right PD-AFO. Two PD-AFO conditions were tested: unengaged (no stiffness), and stiff (1.5 Nm/deg). The participant performed bilateral heel raises at a rate of 30 heel raises per minute, and walking and running at self-selected speeds. Shear wave tensiometry data was collected to assess Achilles tendon loading as squared shear wave speed is a proxy for tendon loading. Peak squared shear wave speed in the tendinopathic leg was averaged for each activity and compared between conditions. Average peak squared shear wave speed was lower in the stiff PD-AFO condition than the unengaged condition for all three activities, with reductions in peak squared shear wave speeds of 39.8% for bilateral heel raises, 55.6% for walking, and 42.8% for running. If results are consistent with additional participants (being recruited), our findings may indicate that PD-AFOs enable reductions in peak Achilles tendon loading during various dynamic activities for patients with Achilles tendinopathy.

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Tracking Excursion of the Musculotendinous Junction Between Medial Gastrocnemius and Achilles Tendon During Heel Rises and Walking– A Pilot Study

Camille Nguyen, Stephanie G. Cone, Karin Gravare Silbernagel

Abstract: Introduction The Achilles tendon is connected to the triceps surae by three individual subtendons. These subtendons may be differentially affected with injury. Tracking muscle-tendon junction (MTJ) excursions during dynamic motion

can improve researcher and clinician understanding of Achilles tendon function. This pilot aimed to establish ultrasound methods to measure medial gastrocnemius (MG) MTJ excursion during functional rehabilitation tasks in healthy individuals. Four participants (4 female, 28±4.4yrs, 163±5.0cm, 67.7±16.9kg) with no lower extremity injury in the last 6 months were evaluated. Ultrasound imaging helped identify superior calcaneal notch and MG MTJ of dominant leg [1]. A ProbeFix holder with a VScan Air transducer was affixed over the MTJ while the participant was standing [4]. Three, 10-s ultrasound videos captured treadmill walking at 3 mph. Participants completed 30 bilateral heel rises on a 10° incline while ultrasound captured two, 10-s ultrasound videos of the MTJ. Distance between most distal and proximal MTJ locations were measured in Kinovea. A paired t-test was used with alpha set at 0.05. There were significant differences between walking and heel rise activities (p<0.05, Table 1). Across subjects, mean excursion values were higher during heel rise (1.45±0.16cm) compared to walking (0.77±0.04cm). Variable excursions emerged between subjects despite similar participant heights (Table 1). This study establishes a wearable ultrasound method to quantify the excursion of the Achilles-medial gastrocnemius MTJ during clinically important movements. Experimental challenges with low (10Hz) sampling frequency may impede quantifying higher velocity tasks and implementing probes with longer imaging footprints may help measuring tendon excursions in taller subjects.

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Differences in Daily Pain Variability in Achilles Tendinopathy on the Basis of Age and Sex

Nate A. Mange, PT, DPT, Morgan N. Potter, PT, DPT, Andy K. Smith, PT, DPT, MS, Karin Grävare Silbernagel, PT, ATC, PhD, FAPTA

Abstract: Pain is the hallmark clinical symptom of Achilles tendinopathy (AT) and the main reason for seeking care. However, there is limited knowledge regarding sex and age differences in how daily pain fluctuates. The purpose of this study was to determine if tendon pain variability differs by age and sex during exercise rehabilitation in individuals with AT. 139 individuals with AT (78F, 61M) were divided by age and sex into four groups: Younger Males (YM, n=23, 35±8yrs), Younger Females (YF, n=31, 34±8yrs), Older Males (OM, n=38, 57±6yrs), and Older Females (OF, n=47, 55±6yrs). Participants received exercise treatment and recorded three daily ratings of AT pain: Morning, Lowest, and Highest (Numeric Pain Rating Scale, 0-10). They were included if they had ≥7 entries over the first 14 days. Mean and standard deviation were calculated for each participant's three daily pain ratings. To determine pain variability, Coefficients of Variation (CV) for each pain rating were calculated for each participant. CV>100% indicated high variability. Separate 1x4 ANOVAs (α=0.05) determined differences in the four groups' CVs. The whole sample averages CV for the pain ratings were: Morning: 50±41%, Lowest: 80±61%, and Highest: 33±19%. The Lowest pain CV differed by groups (p=0.021): YF (109±86%) had more variability than OM (65±48%, p=0.022) but not OF (72±53%, p=0.066) or YM (80±44%, p=0.467). There were no differences in Morning (p=0.055) or Highest pain CV (p=0.885) between groups. Pain variability in AT was low, with YF being the only group demonstrating high variability in their Lowest pain ratings.

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NFIX Regulation of Muscle Development in Cerebral Palsy

Elissa Kouemeni, Brigette Romero, Mona Batish

Abstract: Spastic cerebral palsy (CP) is characterized by muscle dysfunction that contributes significantly to long-term disability. Despite advances in clinical management, the molecular mechanisms underlying altered muscle development in CP remain poorly understood. Recent research has highlighted the circular RNA circNFIX as a crucial regulator of muscle development and differentiation in CP-derived muscle cells. The absence of circNFIX results in reduced translation of the transcription factor MEF2C (myocyte enhancer factor 2C) due to the loss of miRNA sponging. Because circNFIX originates from the NFIX gene, we investigated whether dysregulation of the linear NFIX transcript also contributes to impaired muscle differentiation. We hypothesized that the knockdown of linear NFIX would disrupt myogenic differentiation and sarcomere gene expression. To characterize the role of NFIX, we designed an shRNA targeting the last exon of linear NFIX and performed lentiviral transduction in control-derived myoblasts. Myoblasts were then differentiated into myotubes, and the gene expression of MEF2C downstream sarcomere-associated targets was analyzed by qPCR.
Cells growing on coverslips were subsequently fixed and permeabilized for immunofluorescence analysis of myosin heavy chain (MYH) and MEF2C to assess protein expression and myoblast fusion. NFIX knockdown resulted in reduced MEF2C protein levels, decreased MYH expression, impaired myoblast fusion, and downregulated expression of sarcomere-associated genes, indicating an essential role for linear NFIX in muscle differentiation. Together, these findings suggest a potential framework where disruption of NFIX-dependent transcriptional regulation acts alongside circNFIX-mediated mechanisms, offering a possible avenue for exploring the molecular basis of altered muscle development in cerebral palsy.

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The Reliability of Achilles Tendon Insertional Images Via Ultrasound

Jess Orzelowski, Andy K. Smith, Karin Grävare Silbernagel

Abstract: Introduction: Ultrasound imaging is frequently used to assess insertional Achilles tendinopathy (IAT). Measures examining the thickness of the Achilles tendon across the tendon insertion may be beneficial for tracking recovery over time. However, the reliability of identifying anatomical landmarks and measuring insertional tendon thickness is unclear. This study aims to determine the reliability of ultrasound imaging for landmark identification and thickness measurement in individuals with and without IAT. Methods: Ultrasound images from 20 participants (10 healthy, 10 with IAT; 40 limbs total, including L and R sides) at the Achilles tendon insertion were analyzed using OsiriX software. Tendon thickness at the insertion, proximal calcaneal prominence, and calcaneal border regions were independently measured by two assessors. Tendon thickness was determined by identifying the anterior and posterior borders of the tendon at the insertional region. Interclass correlation coefficients (ICC) were used to assess inter-rater reliability. Results: Inter-rater reliability was excellent for all measures with ICC (3,1) values of 0.984 (95% CI, 0.957 - 0.993) for notch thickness,

0.982 (95% CI, 0.967 - 0.991) for proximal calcaneal prominence, and 0.944 (95% CI, 0.898 - 0.970) for calcaneal border regions. All comparisons were statistically significant ($p<0.001$). Discussion: All measures showed excellent reliability (ICC >.90), supporting that ultrasound imaging is a reliable tool for assessing Achilles tendon insertion morphology. These findings support its use in clinical and research settings for consistent evaluation of IAT. Reliable identification of anatomical landmarks and thickness measurements may improve diagnostic accuracy, monitor disease progression, and evaluate treatment outcomes.

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Agreement Between Smartphone- and Research-Grade Accelerometer-Measured Step Counts in Autistic Adults in Free-Living Conditions

Lia McNulty, Bogoan Kim, Matthew L. Mauriello, Amy E. Bodde, Brian C. Helsel, Daehyoung "DH" Lee

Abstract: There is growing interest in leveraging smartphones to monitor physical activity (PA) in autistic adults. However, reliability of smartphone-derived step counts in this population lacks empirical evidence. Purpose: To examine agreement and variability between iPhone- and accelerometer-derived step counts among free-living autistic adults. Methods: Fifty-eight participants (Mage 33.6±9.7; 44 females) wore research-grade accelerometers (CentrePoint Insight Watch; CPIW, ActiGraph) on their non-dominant wrist for seven consecutive days. Step counts were concurrently obtained from the Apple Health app on participants' iPhones. Three predefined wear-time thresholds (≥600, ≥1000, and 1440 min/day) were used to account for wear compliance. Device agreement was examined using Pearson correlation and Bland–Altman analyses. Concurrent validity between the two measures was evaluated with linear regression analyses. Results: Participants generated M=5.7 ± 1.4 valid days of concurrent iPhone and accelerometer data (≥600 min/day). Bland–Altman analysis showed iPhones overestimated steps by +1,075/day. Correlation strength increased with longer monitor wear (r = 0.88 (600 min/day) to r = 0.93 (1440 min/day)), and analyses showed moderate-to-strong agreement across weekdays and weekends (r = 0.75–0.97). Regression analyses demonstrated a strong linear relationship (β_1 = 0.65, R^2 = 0.69), with accelerometer data explaining 69% of variance in iPhone step counts. Conclusions: Despite overestimation, iPhone-derived steps demonstrated moderate validity with accelerometry, with acceptable agreement across wear-time and temporal contexts. Although iPhone-based step tracking may serve as a practical supplement to research-grade devices, estimates should be interpreted with caution, given the tendency to overestimate steps.

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A Preliminary Evaluation of Cognitive Interviewing Ability in Mixed-Methods Aphasia Research

Patrycja Puzio, Rebecca Hunting Pompon, Kristen Palmer, Cassandra O'Meara, and Carolyn Baylor

Abstract: Introduction: Cognitive interviewing is a qualitative method used primarily in patient-reported outcome measure (PROM) development, including in post-stroke aphasia research. Alternatively, this approach has been used to elicit perspectives on specific concepts or constructs. Given the relative complexity of cognitive interview

questions and the communication limitations of aphasia, it is important to evaluate PWA's abilities to engage in cognitive interviewing in research of participant construct/concept perceptions. Method: As part of an ongoing research project, 62 participants (53.81y ±12.02, 53% female) with post-stroke aphasia, apraxia of speech, and/or dysarthria were administered six PROMs on communicative participation, chronic stress, mood, resilience, self-efficacy, and communication confidence. Following each PROM, the examiner asked questions about the related construct's impact in participant-identified communicative situations. Interview responses were thematically coded and included codes to capture incomplete, unrelated, or otherwise limited responses to capture any relative difficulty in the participant's responses. Participants were stratified according to the number/type of the primary response codes and analyzed descriptively to understand their relative ability to respond to cognitive interview questions. Results: Overall, 45 participants (72%) demonstrated little to no difficulty, 8 participants (13%) demonstrated a moderate level of difficulty, and 9 participants (15%) demonstrated a pronounced level responding to the cognitive interview questions. Discussion: Results indicate that most participants were able to respond to relatively complex questions about specific constructs/concepts, with minimal to no associations between language abilities and the relative difficulty experienced during the cognitive interview. These preliminary data may inform future use of cognitive interviewing with this population.

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Closing the Surveillance Gap: A Veteran Crisis Integrated Surveillance Framework for Suicide and Overdose Prevention

Mackenzie Partridge

Abstract: Delaware has one of the highest veteran population densities in the Mid-Atlantic region. Veterans experience disproportionately high rates of suicide and drug overdose, yet current surveillance systems fail to consistently identify veterans across the behavioral health crisis continuum, limiting opportunities for early intervention. This study used literature review and system evaluation to examine how existing surveillance systems capture veteran behavioral health crises and identify structural gaps preventing coordinated responses. Systems evaluated included mortality surveillance (DVDRS/NVDRS), emergency department syndromic surveillance (ESSENCE), overdose event tracking (ODMAP), Veterans Affairs clinical monitoring, and research data platforms such as REDCap. Results showed that DVDRS captures confirmed suicide mortality but functions retroactively; ESSENCE detects timely emergency department behavioral health encounters without reliable veteran identification; ODMAP records suspected overdoses but is voluntary and inconsistently executed; VA systems monitor enrolled veterans but exclude those outside VA care; and REDCap-based registries support targeted data collection but are not integrated into statewide crisis surveillance. These systems capture isolated stages of the crisis continuum, leaving veterans at risk of appearing across multiple systems without recognition. To address these gaps, this study proposes the Veteran Crisis

Integrated Surveillance System (VCISS), a statewide framework designed to capture multiple crisis signals by linking mortality data, emergency encounters, overdose reports, and VA alerts through a standardized veteran identifier. By transforming fragmented monitoring into an integrated prevention model, VCISS improves timeliness, representativeness, and sensitivity while maintaining ethical safeguards. Closing surveillance gaps can strengthen coordinated behavioral health response and reduce preventable veteran deaths.

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Use of Knowledge Translation Framework with Clinical Protocol Integration

Natasha Lobo, Christopher Cutsail, William G. Seymour, Airelle Giordano

Abstract: Background: Although rehabilitation protocols are developed to reflect best available evidence, consistent and sustainable implementation in clinical practice remains challenging. At University of Delaware Physical Therapy clinic, a post-operative Achilles tendon repair protocol was developed; however, uncertainty persisted regarding clinician adoption, fidelity, and integration into treatment, all which impact patient outcomes. Identifying barriers and facilitators to implementation is critical to optimize translation of evidence into clinical practice. Methods: Using a knowledge translation framework, a literature review informed the development of a clinician-based survey to assess barriers, facilitators, and implementation strategies. The survey focused on clinicians' adoption of, and fidelity to, clinical protocols. The literature review emphasized identifying common challenges to protocol use and factors supporting implementation. Results: Existing literature identifies barriers to clinical implementation as time constraints, workload demands, limited confidence in applying research to individual patients, and difficulty accessing evidence. Facilitators include positive attitudes toward evidence-based practice, advanced education, mentorship, organizational support and discussion. Evidence suggests multifaceted strategies can promote sustained behavior change. A comprehensive survey was developed assessing protocol utilization, attitudes toward evidence-based practice, perceived clinical relevance, and challenges related to protocol integration. Survey findings will guide dissemination strategies and address barriers to improving fidelity. Conclusion: Effective integration of protocols requires evidence dissemination with inclusion of contextual, cognitive, and organizational factors influencing clinician behavior. The knowledge translation framework supported development of a comprehensive survey to identify barriers and facilitators to protocol implementation. Findings can inform future protocol development and integration considering clinician autonomy and clinical reasoning to promote consistent, high-fidelity protocol use.

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A Cognitive Behavioral Therapy Based Session for Postpartum Mothers

Nikita Ramdass, PMHNP, DNP Student, Jennifer Graber, EdD, APRN, PMHCNS-BC

Abstract: Background: Perinatal Mood and Anxiety Disorders (PMADs) affect approximately one in five mothers

and can impair functioning, maternal–infant bonding, and family well-being. Although Cognitive Behavioral Therapy (CBT) is an evidence-based treatment, many postpartum mothers face barriers to care, highlighting the need for an accessible intervention. Purpose: To evaluate the impact of a two-hour CBT-based refresher session on PMAD's. Methods: This project used a pre–post design with 13 participants who were 18 years of age or older and within 12 months postpartum who participated in a group CBT session at a local maternal wellness center. Participants completed the Edinburgh Postnatal Depression Scale (EPDS) and the Generalized Anxiety Disorder-7 (GAD-7) scales pre-session and 2 weeks post intervention. Results: Immediate post-intervention assessments reflected participant-reported improvements in anxiety symptoms, coping confidence, mood stability, and irritability. These findings suggest that the brief CBT-based refresher session is beneficial immediately after the session. Findings include 12 participants, of whom only 9 (N = 9) completed follow-up measures, yielding a 31% attrition rate. After two weeks, mean GAD-7 scores decreased from 9.67 to 6.33, reflecting a 3.34-point reduction in anxiety symptoms, while mean EPDS scores increased slightly from 18.22 to 19.33. Conclusions & Implications: Findings suggest that a brief CBT-based refresher session may promote coping and resilience as well as provide short-term reductions in postpartum anxiety. Further evaluation with larger samples and extended follow-up is warranted.

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Drivers of Bedsharing: A Systematic Review Exploring Factors Beyond Culture Among U.S. Families and the Effectiveness of Interventions

Bree Jawaharlal Nehru, Lauren Covington, and Sarah Katz

Abstract: Introduction: Bedsharing is the leading cause of sudden unexpected infant deaths, yet over 60% of U.S. families still choose to bedshare despite knowing that national safe sleep guidelines prohibit it. Although often considered a cultural practice, only few studies have examined culture as a primary reason for bedsharing in the U.S., and many interventions aimed at improving awareness against bedsharing have failed. This systematic review explores whether U.S. families' decisions to bedshare are culturally driven, identifies additional reasons for bedsharing, and evaluates whether interventions are effective in reducing bedsharing practices. Methods: We searched CINAHL, Web of Science, PubMed, Sociological Abstracts and PsychINFO databases for US studies published since 2015 that included infants, reasons for bedsharing, cultural differences and interventions modifying bedsharing practices. After title/abstract screening and full text review using PRISMA guidelines, 9 studies identifying reasons for bedsharing and 11 intervention studies decreasing bedsharing met inclusion criteria. Results: Infant safety/monitoring (n=7) and infant sleep/ mothers' comfort (n=8) were the most highlighted reasons for bedsharing, with culture being mentioned only four times. Lacking understanding of safe sleep recommendations rationale and misconception such as crib death were also identified as contributing factors. Most interventions aimed to increase knowledge, attitudes and practices around safe sleep guidelines. Two interventions incorporated culturally sensitive messaging, with no success in decreasing bedsharing rates. Six

interventions significantly decreased bedsharing occurrence. Conclusion: Reasons for bedsharing are multifaceted and go beyond culture. Understanding and addressing these motivations may contribute to successful future interventions.

POSTER PRESENTATIONS

2

Examining the Relationship Between Adverse Childhood Events (ACEs) and Cardiovascular Outcomes

Elena Lynn, Yendelela Cuffee

Abstract: Introduction: Cardiovascular disease remains the leading cause of mortality in the United States and worldwide. Emerging evidence suggests that early-life factors influence cardiovascular outcomes in adulthood. Adverse Childhood Experiences (ACEs) are indicators of childhood trauma, with approximately two-thirds of U.S. adults reporting at least one ACE. This study examines the association between ACE exposure and heart attack and coronary heart disease outcomes. Methods: Data were obtained from the 2023 CDC Behavioral Risk Factor Surveillance System and included 48,686 U.S. adults aged 18 years and older. ACE exposure was categorized as none (0), low (1–2), or high (3+). Cardiovascular outcomes included self-reported heart attack, coronary heart disease, or history of having either condition. Chi-square tests and logistic regression analyses were conducted, with adjusted models controlling for confounders. Results: Approximately 9% of participants reported a cardiovascular event, and nearly two-thirds reported at least one ACE. In the unadjusted analyses, ACE exposure was not significantly associated with cardiovascular outcomes (OR = 0.97, p = 0.11). After adjustment, a dose–response relationship emerged. Compared to individuals with no ACEs, those with high ACE exposure had 1.5 times higher odds of reporting a cardiovascular event (p < 0.0001), while those with low exposure had 1.12 times higher odds (p = 0.0042). Conclusion: Greater ACE exposure is associated with an increased likelihood of experiencing cardiovascular events in adulthood after controlling for confounders, highlighting the importance of childhood trauma prevention to reduce long-term cardiovascular risk and providing support for individuals who have experienced trauma.

4

24-Hour Ambulatory Blood Pressure Responses to Circadian-Based Exercise Timing

Thomas Keiser, Jody L. Greaney, Shannon M. Robson, Vahid Farrahi, Elise R. Facer-Childs, and Freda Patterson

Abstract: INTRODUCTION: Blood pressure (BP) follows a natural circadian (24-hour) rhythm, demonstrated by a peak in the morning following waking, plateau throughout the waking day, and nocturnal dipping during sleep. A single bout of aerobic exercise elicits reductions in BP, termed post-exercise hypotension (PEH). This ongoing study elucidates the extent to which PEH varies by circadian timing of exercise. METHODS: Prehypertensive adults (BP ≥120/80 mmHg and ≤140/90 mmHg) complete a circadian phase assessment via dim light melatonin onset (DLMO). Participants then complete 30 minutes of treadmill exercise at a heart rate corresponding to 70% VO 2 peak at three circadian times: 'morning' (10 hours post-DLMO), 'afternoon' (15 hours post-DLMO), and 'evening' (20 hours post-DLMO). 24-hour ambulatory BP assessments are completed pre- and post-exercise to determine the post-exercise BP response (post-exercise BP – pre-exercise BP). RESULTS: Five participants (Age M=28.1± 7.9y, 60% female, resting BP M=127/84±

11/3 mmHg) have completed the protocol so far. Morning and evening exercise elicited a 3.4±3.1 mmHg and 2.6±3.8 mmHg reduction in 24h average systolic BP, respectively, while afternoon showed no change. However, average asleep systolic BP reductions were greatest following afternoon exercise (5.4±5.4 mmHg) compared to morning (2.8±5.6 mmHg) and evening (4.8±2.5 mmHg). CONCLUSION: Descriptive results from this on-going study suggest differential post-exercise BP responses by circadian time-of-day. Afternoon exercise may support greater reductions in systolic BP at night; however, additional data is needed to statistically compare the post-exercise BP response by circadian time-of-day.

6

Circulating Apoptosis-derived Endothelial Microvesicles in Healthy Young, Midlife, and Older Adults

Samuel A.W. Zercher, Vinicius P. Garcia, Nicholas V. Chouramanis, Justin D. Mehrer, Jordan C. Patik, Arit Ghosh, David G. Edwards

Abstract: Vascular aging is characterized by endothelial apoptosis and increased arterial stiffness. During apoptosis, endothelial cells release endothelial microvesicles (EMVs)(CD31+/CD42b-). The purpose was to assess the effects of age on plasma concentrations of large apoptosis-derived EMVs and their association with arterial stiffness. We hypothesized that aging and arterial stiffness would be associated with higher concentrations of large apoptosis-derived EMVs. Venous blood samples were collected from thirty-six healthy (no chronic disease, BP <140/90, non-obese) young (6M/6F, 25.8 ± 2.4 y/o), midlife (6M/6F, 48.9 ± 6.3 y/o), and older adults (5M/7F, 66.6 ± 5.2 y/o). Platelet-free plasma was incubated with fluorochrome-labeled CD31–APC and CD42b–PE antibodies. EMV concentrations were determined via nanoscale flowcytometry (CytoFLEX LX). CD31+/CD42b- events between 200nm and 900nm were considered large apoptosis-derived EMVs. Arterial stiffness (carotid-femoral pulse wave velocity; cfPWV) was assessed via applanation tonometry (Sphygmocor CVMS). CD31+/CD42b- EMV concentrations were different across age groups (Young: 163.8 ± 55.0 EMVs/μL, Midlife: 204.1 ± 37.2 EMVs/μL, Older: 306.1 ± 129.3 EMVs/μL, p=0.0023). Older adults had higher concentrations of CD31+/CD42b- EMVs compared to young adults (p=0.0016). CD31+/CD42b- EMVs concentrations were positively associated with age (r2= 0.2505, p=0.0023). cfPWV was different across age groups (Young: 5.7 ± 0.5 m/s, Midlife: 6.2 ± 1.3 m/s, Older: 8.4 ± 2.0 m/s, p=0.0002) and higher in older adults compared to young (p=0.0002) and midlife adults (p=0.0091). CD31+/CD42b- EMV concentrations were positively associated with cfPWV (r 2 =0.1607, p=0.0365). These data indicate that an age-related increase in apoptosis-derived EMVs is associated with increased arterial stiffness.

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Effects of Tart Cherry Juice Consumption on 24-Hour Ambulatory Blood Pressure and Wave Reflection in Postmenopausal Women

Ayham Ghith, Oyefemiwa Fadaini, Bingqing Luo, Anita Dini, Matthew Overstreet, Zugui Zhang, David Edwards, Freda Patterson, Sheau Ching Chai

Abstract: Objective: This study examines the effects of tart cherry

juice on 24-hour ambulatory blood pressure (BP) and endothelial function in postmenopausal women. Methods: In this 12-week randomized controlled trial, 35 postmenopausal women aged 45-60 years were randomly assigned to consume 480 ml of tart cherry juice (n=19) or control drink (n=16) daily for 12 weeks. Cardiovascular outcomes were assessed at baseline and after 12-week. Between-group differences at baseline, post-intervention, and for change scores were evaluated using appropriate statistical methods. Results: Baseline measures of 24-hour heart rate (HR), 24-hour central augmentation index (AI), AI normalized to a HR of 75 (AI@75), nocturnal HR, nocturnal AI, nocturnal AI@75, augmented pressure (AP) did not differ significantly between the two groups. After 12 weeks, significant between-group differences in change from baseline were observed in 24-hour HR and nocturnal HR, with reductions in the tart cherry group and increases in the control group. Additionally, significant between-group differences at 12 weeks were observed for 24-hour AI@75, nocturnal AI, and nocturnal AI@75, with lower values in the tart cherry group. However, between-group differences in change from baseline were not statistically significant, which may reflect the limited statistical power due to the modest sample size. 24-hour central systolic BP, diastolic BP and pulse pressure were not significantly affected by the 12-week intervention in either group. Conclusion: These findings suggest that tart cherry juice consumption may have beneficial effects on cardiovascular measures in postmenopausal women. Larger adequately powered trials are warranted to confirm these preliminary observations.

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The effect of potassium supplementation on blood pressure reactivity under high-sodium conditions in normotensive men and women

Jessica M. Irwin, Andrea J. Lobene, Kathryn E. Kaseman, Cesar E. Jacintho Moritz, Shannon L. Lennon

Abstract: The objective of this study was to determine the effects of potassium supplementation (KS) on 24-hr blood pressure (BP) and BP reactivity (BPR) under a high sodium (HS) diet in normotensive men and women. Nineteen participants (13W/6M, 27±4y, BP 111±9/68±9mmHg) completed three 10-day diets: moderate potassium/low sodium (MK/LS, 55mmol/50mmol), moderate potassium/high sodium (MK/HS, 55mmol/300mmol), and high potassium/high sodium (HK/HS, 120mmol/300mmol). Potassium chloride capsules were used to increase K + intake. Placebo capsules were administered during the MK/LS and MK/HS diets. Twenty-four-hour BP was assessed on day 9. On day 10, BPR was assessed by a change in mean arterial pressure (ΔMAP) during isometric handgrip (IHG, 40% maximal voluntary contraction) with post-exercise ischemia (PEI) and the cold pressor test (CPT). During MK/HS, men exhibited higher 24-hour MAP than women (82±1mmHg vs. 78±5mmHg, p=0.03); no differences were observed during MK/LS and HK/HS. There were no effects of sex, diet, or an interaction on ΔMAP during IHG however, men had higher ΔMAP on MK/LS (35±5mmHg vs. 22±12mmHg, p=0.006) and MK/HS (34±10mmHg vs. 21±11mmHg, p=0.03) compared to women but there was no difference on HK/HS. There were no effects of sex or diet on ΔMAP during PEI, but a trending interaction (p=0.052), driven by a greater ΔMAP in men on MK/LS (27±4 mmHg vs.18±11 mmHg p=0.02).

There were no effects of sex, diet, or interaction on ΔMAP during CPT. These data suggest men may have greater BPR to IHG under LS and HS conditions compared to women, a difference not observed with KS.

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Impact of Housing Stress on Prediabetes Risk in the U.S. Hispanic/Latinx Adults: Moderation by Acculturation

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Abstract: Introduction: Prediabetes disproportionately affects US Hispanic/Latinx adults. Housing stress may increase prediabetes risk through stress and acculturation-related behavioral pathways, yet evidence is limited. This study examined the effect of housing stress on prediabetes risk in the US Hispanic/Latinx adults and assessed effect modification by acculturation. Methods: Cross-sectional data from the National Health and Nutrition Examination Survey 2011–2018 and 2021–2023 cycles were analyzed using survey-weighted multivariable logistic regression. Housing stress was defined using a composite of overcrowding (persons per room >1) and income strain (poverty income ratio <1.3). Prediabetes was defined as hemoglobin A1c 5.7–6.4% or fasting plasma glucose 100–125 mg/dL. Acculturation (more vs less) was assessed using a composite of language spoken at home (English vs Spanish dominant), birth country (U.S. vs foreign) and length of U.S. residence (≥20 vs <20 years). Models were adjusted for age, sex, body mass index, education and health insurance status. Results: The analytic sample included 5,873 Hispanic/Latinx adults (mean age 42.4±15.3 years; 50.4% female). Prediabetes prevalence was 35.4%, housing stress 41.7% and 47% were more acculturated. In adjusted models, predicted prediabetes prevalence among less-acculturated was similar with (32.8%; 95% CI: 29.0-36.5%) and without housing stress (33.2%; 95% CI: 30.3-36.1%). Among more-acculturated, predicted prevalence increased from 34.1% (95% CI: 31.0-37.2%) without housing stress to 39.7% (95% CI: 36.8-42.7%). Conclusion: These data indicate that acculturation may amplify vulnerability to metabolic effects of housing stress, highlighting the need for prediabetes prevention strategies addressing both housing conditions and acculturation-related stress pathways in this population.

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Effects of a 12-week Exercise Intervention on Balance and Strength in Veterans

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Abstract: Veterans experience greater functional limitations than age-matched adults, particularly in balance and muscle strength. The Functional Reach Test (FRT) assesses dynamic balance, while grip strength (GS) predicts long-term health outcomes. Exercise interventions in Veteran populations have emphasized health-related quality of life (HRQoL), with less focus on functional performance. The Veterans and Collegiate Athletes Together program integrates functional strength and cardiovascular training between Veterans and collegiate athletes. PURPOSE: To assess changes in balance and strength in Veterans across a 12-week exercise intervention. METHODS: Eleven male Veterans (Age: 50.6 ± 9.5 y.o, Height: 177.1 ± 5.5 cm, Weight: 92.5 ± 17.6 kg) were enrolled. After self-reporting hand dominance, participants completed

four trials of GS (Dominant and Non-Dominant) and three trials of the FRT at both pre-intervention (PRE) and post-intervention (POST). Outcome measures included grip strength (kg) and reach distance (cm) and were analyzed using paired samples t-test with Cohen's d effect sizes reported. Veterans who reached >25 centimeters on the FRT, the threshold for "normal" performance, are reported as percentages. RESULTS: FRT improved significantly (PRE = 20.4 ± 6.4 cm, POST = 24.7 ± 5.6 cm, p = 0.032, d =0.75). The proportion exceeding >25 cm increased from 27% at PRE to 64% at POST. No significant improvements for GS for Dominant (p = 0.621, d = 0.15), or non-dominant (p = 0.895, d = -0.04) hands were found. CONCLUSIONS: A 12-week exercise intervention improved dynamic balance but not grip strength in middle-aged Veterans, supporting targeted strategies to enhance functional health and HRQoL.

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Added sugar intake and microvascular endothelial function in emerging adults

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Abstract: Depression is a highly prevalent psychiatric disorder characterized by persistent depressive mood that is also independently associated with increased cardiovascular disease (CVD) risk. Among the maladaptive health behaviors characteristic of MDD, added sugar consumption is both a common and modifiable exposure that is mechanistically linked to vascular dysfunction––a primary antecedent of CVD. Indeed, excess added sugars contribute to insulin–glucose dysregulation, mitochondrial dysfunction, and inflammatory activation, all of which converge to reduce endothelial nitric oxide (NO) bioavailability, a key regulator of vascular homeostasis. These pathways may be especially consequential during emerging adulthood (18–25 years), a period of heightened MDD vulnerability. In this pilot study, twenty emerging adults (18 women, 2 men) completed 8 consecutive days of dietary assessment (4-day diet record; 4-day 24-hour recalls). Microvascular endothelial function was assessed using laser-Doppler flowmetry to measure red blood cell flux during a standardized local heating protocol (42°C), followed by intradermal microdialysis perfusion of N(G)-nitro-L-arginine methyl ester (L-NAME; 15 mM) to quantify nitric oxide (NO)-dependent dilation (%). Higher percent of energy intake from added sugars was inversely associated with NO-dependent dilation (r=0.54, p=0.0205) and NO- dependent dilation expressed as %CVCmax (r=0.65, p=0.0025). Higher added sugar intake was significantly associated with greater depressive symptom severity, as measured by PROMIS T- scores (r=0.65, p = 0.05). These findings suggest that higher added sugar intake may be associated with poorer vascular function in emerging adults, identifying a modifiable behavioral factor linking depressive symptoms and early vascular dysfunction.

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Food Security and Cardiovascular Disease Mortality among Economically Disadvantaged U.S. Adults: National Health and Nutrition Examination Survey (NHANES) 2011-2018

Fadzai Nicola Dube, June Pressley, Tarang Parekh, Jee Won

Abstract: Food security is a key social determinant of cardiovascular health, yet evidence on its relationship with cardiovascular disease (CVD) mortality among economically disadvantaged U.S.

adults is limited. We examined adult food security and CVD mortality and assessed effect measure modification (EMM) by age, sex, race/ethnicity, and SNAP participation. Using NHANES 2011-2018 data, linked to the 2019 National Death Index, we analyzed 6,905 non-pregnant adults aged ≥ 20 years with a poverty-income ratio <2. Adult food security was categorized as high (ref), marginal, low, and very low. Cox proportional hazards models estimated HRs and 95% CIs adjusting for sociodemographic factors, healthcare use, health behaviors, and SNAP. Sensitivity analysis used Fine-Gray sub-distribution hazards models to account for competing risks due to non-CVD deaths. During a median follow-up of 5.08 person-years, 164 CVD deaths occurred. Compared to high food security, adjusted HRs (95% CIs) for marginal, low, and very low food security were 0.91 (0.55-1.51), 1.12 (0.70-1.81), and 1.29 (0.75-2.21), respectively. Fine-Gray analysis showed similar results. While there was no robust evidence of effect modification, potential differences emerged in subgroup analyses: non-Hispanic Black adults and SNAP recipients showed higher risk estimates, whereas Hispanic and non-SNAP recipients showed neutral or inverse associations. Findings were mixed, suggesting that food insecurity may disproportionately affect racial/ethnic and SNAP subgroups, warranting further study of causal pathways that may explain these differences.

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ANKLE JOINT INDEX AND HIP POWER CHANGES WITH INCREASING FOOTPLATE STIFFNESS

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Abstract: The University of Delaware Functional Joint Indices (FJI) determine percentages of each joint's spring, motor, damper, and strut-like behavior 1 . Post-stroke, individuals commonly have reduced propulsion during walking due to plantar flexor weakness, demonstrated by a decrease in the ankle's motor role2 . We are investigating if deformable foot orthoses (DFOs) can improve post-stroke gait by storing and returning energy to improve ankle-foot energetics, including the ankle's motor role. This may reduce compensatory mechanisms at other lower limb joints. This study aims to determine whether varying DFO stiffness impacted the ankle's FJI and, if so, whether other joints were affected. Four stroke survivors walked on an instrumented treadmill under four conditions: No DFO, and three DFOs with different stiffnesses (5-ply, 7-ply, 9-ply). All trials were conducted at participant's self-selected speed, determined from 10-meter walk tests. Six degree-of-freedom kinematics and kinetic data were collected. Ankle FJI1, lower extremity kinematics, and kinetics were calculated. For Participant 1, the ankle's motor-like behavior doubled while walking with the 7-ply and 9-ply DFOs compared to No DFO and 5-ply DFO. Late-stance hip power showed a decrease in the 7-ply and 9-ply conditions. DFO use showed potential in impacting the ankle's functional role and higher-level joint compensations in one participant. For slow gait (0.995m/s), normalized hip powers are around 0.4w/kg in late stance3. For this participant (1.02m/s) while using the two stiffest DFOs, normalized late-stance hip powers decrease from near 0.5w/kg to 0.35w/kg while doubling ankle motor-like behavior. This may signify improved propulsion at the ankle and reduced hip compensations commonly observed.

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Effects of a Single Session of High-Definition tDCS over the Sensorimotor Cortex on Lower Limb fMRI Activity in Parkinson's Disease - A Pilot Study

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Abstract: Parkinson's disease (PD) is a progressive neurodegenerative disorder characterized by dopamine depletion, leading to motor impairments, including walking and balance deficits that are often less responsive to dopaminergic medication. Acute dopaminergic fMRI studies show increased activity in the striatum and thalamus, but minimal effects in the primary motor cortex (M1). In this proof-of-concept pilot study, we use high-definition transcranial direct current stimulation (HD-tDCS), which delivers more focal and deeper currents compared to conventional tDCS. Applied concurrently while participants are inside the MRI scanner, this approach uniquely allows the examination of the brain's response to stimulation. Thus far, 3 older adults and 1 participant with PD have completed two randomized sessions: one stimulation session and one sham session. We targeted the medial sensorimotor cortex, which controls lower extremity movements, using a 4×1 HD-tDCS montage to deliver focal stimulation (1.67 mA). We measured ankle dorsiflexion activity - a key component of gait and balance - inside the MRI scanner. Brain activity was recorded before and after both the stimulation and sham sessions. The PD participant was tested off PD medication. Initial findings suggest that while stimulation alters M1, sham sessions produce minimal to no change in either group. Importantly, we show fMRI changes after one session of HD-tDCS, that was well tolerated across participants. Moreover, we demonstrated the feasibility of delivering the current in the MRI, without any artifacts appearing in fMRI scans. Data collection is ongoing, focusing on reaching target sample sizes.

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Quantifying Language Differences in Mild Cognitive Impairment: Inter-rater Reliability of Main Concept Analysis

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Abstract: INTRODUCTION: Analysis of discourse (i.e., connected spoken language) is an emerging tool for identifying and characterizing language differences between people with mild cognitive impairment (pwMCI) and cognitively unpaired (CU) older adults. Discourse analysis could improve early detection of MCI and support intervention development. METHODS: The clinical feasibility of discourse analysis has increased through standardized discourse protocols and measures, such as main concept analysis (MCA), which portrays how accurately and completely speakers convey essential information about core story elements. Previous research has supported the inter-rater reliability of MCA in CU adults and other relevant clinical populations (i.e., persons with post-stroke aphasia), but not been extended to pwMCI. Therefore, this study aimed to evaluate the inter-rater reliability of MCA for pwMCI and CU adult participants. Transcripts for 22 individuals (MCI = 9, CU = 13) were retrieved from the Delaware DementiaBank corpus, and MCA was applied by two raters to a known story narrative (i.e., the story of Cinderella) using a closed list of main concepts established in the literature. RESULTS: Cohen's kappa was calculated, and overall inter-rater reliability was high

(k = .85), with slightly lower inter-rater reliability for pwMCI (k = .83) than CU adults (k = .87). Certain main concepts produced lower agreement (e.g., productions accurate but incomplete). Overall, this study provides initial evidence of excellent to almost perfect agreement of inter-rater reliability for MCA for pwMCI. CONCLUSION: Lower inter-rater reliability in pwMCI underscores the need to further refine MCA for pwMCI to improve scoring fidelity and future clinical utility.

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Associations between Adipose and Lean Tissue Compartments and Bone Mineral Density among Postmenopausal Women

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Abstract: Objective: Investigate independent associations between total and regional body composition and total body (TB) and lumbar spine (LS) bone mineral density (BMD) among postmenopausal women. Methods: Analyzed data from 1,035 postmenopausal women using NHANES 2011-2018. Estimated associations between TB and LS BMD, using survey-weighted linear regression adjusting for key covariates. Subgroup analyses were conducted for natural menopause. Results: Total lean mass was positively associated with TB BMD (β = 0.006, p < 0.001) and LS BMD (β = 0.007, p <0.001), and total fat mass showed inverse associations (TB BMD: β = -0.003, p < 0.001; LS BMD: β = -0.004, p = 0.004). Regional analysis revealed trunk lean mass as a significant predictor of BMD (TB: β = 0.008, p = 0.001; LS: β = 0.008, p = 0.025). Visceral adipose tissue (VAT) showed an inverse association with BMD (TB: β= -0.056, p = 0.021; LS: β = -0.085, p = 0.014). When the analysis was limited to the natural menopause subgroup (n = 610), appendicular lean mass became the primary predictor of BMD (TB: β = 0.010, p = 0.005; LS: β = 0.012, p = 0.050), while trunk lean and VAT were no longer significant. Conclusions: Findings suggest total and regional body composition play distinct roles in bone health. Future studies are needed to understand underlying mechanisms and to evaluate preventive strategies targeting these factors to support bone health in postmenopausal women.

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Cardiovagal baroreceptor sensitivity is associated with whole-brain cerebral perfusion and arterial transit time across the lifespan

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Abstract: INTRODUCTION: The cardiovagal baroreceptor reflex is important in the short-term regulation of blood pressure (BP), and the sensitivity of this reflex (cBRS) is a measure of autonomic function. Lower cBRS is associated with aging and cognitive decline. Previous studies have shown that cBRS is associated with regional cerebral blood flow measured using arterial spin labeling (ASL) in middle aged adults. The purpose of this study was to determine whether these associations generalize to whole-brain metrics and persist across a wider age range. METHODS: Forty-eight adults (22–79 years, 19 male) underwent supine resting electrocardiography and finger photoplethysmography. cBRS was determined using the sequence method for all sequences (cBRSall),

which included up sequences (systolic BP and R-R interval increase) and down sequences (systolic BP and R-R interval decrease). Cerebral perfusion was quantified using ASL to derive gray and white matter cerebral blood flow and arterial transit time (ATT). Associations between cBRS and perfusion metrics were assessed using Pearson correlations (r). RESULTS: cBRS was positively associated with grey matter blood flow (r=0.29, p=0.045), but not white matter blood flow (r=-0.06, p=0.708). cBRS was negatively associated with white matter ATT (r=-0.31, p=0.03) and grey matter ATT (r=-0.50, p=0.001). CONCLUSION: These data suggest that higher cBRS is associated with better whole brain cerebral perfusion across the lifespan. Future directions include longitudinal investigation to determine whether within-subject changes in cerebral perfusion correspond to changes in BRS over time.

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Mapping ASD/DD Services Across Delaware: Identifying Gaps and Opportunities

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Abstract: BACKGROUND: Young adults with Autism Spectrum Disorder (ASD) and other Developmental Disabilities (DD) often face challenges in accessing resources during the period of transition from school to adulthood. Access to transition services varies across Delaware, presenting barriers for families seeking diagnostic, therapeutic, respite, and community-based support. Currently, no comprehensive statewide tool exists to identify service locations or highlight areas with limited access. This study seeks to address this gap by developing an interactive ArcGIS based map that visually displays ASD/DD service resources and geographic disparities across the state. METHODS: Semi-structured interviews were conducted with caregivers of individuals with ASD/DD living in Delaware recruited via community networks, listservs, and partner organizations connected to the University of Delaware Center for Disabilities Studies. An interview guide allowed caregivers to share information about services they consider most essential, those that are difficult to find, and features that would enhance the usefulness of this mapping tool. Interviews were recorded with permission and deductively coded to identify themes. All procedures were reviewed by the University of Delaware Institutional Review Board and determined to be exempt (IRB 2377494). RESULTS: Themes identified through caregiver interviews guided the categorization, presentation, and design of the ArcGIS map. The final product, a publicly accessible digital map and analytical report, will empower families, providers, and policymakers in understanding the distribution of ASD/DD services and identifying opportunities to improve equitable access across Delaware. CONCLUSION: Findings will be disseminated through partner organizations serving young adults with ASD/DD to reduce information barriers and expand statewide awareness of available services.

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Community Assessment of Hurricane Helene Recovery in Rural Western North Carolina

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Abstract: Intersecting vulnerabilities including limited housing and transportation, income and employment

loss, and fewer emergency response and recovery resources cause unique challenges for rural communities during disasters. Hurricane Helene made landfall in Florida as a Category 4 hurricane, and later impacted Western North Carolina. Severe flooding, landslides, and hurricane-force winds resulted in the interruption of communications, transportation, and other infrastructures for months, which caused misinformation, recovery disruptions, and a loss of trust in the emergency response. A modified 29-question Community Assessment for Public Health Emergency Response (CASPER) was conducted in two rural Western North Carolina counties to assess household impacts and recovery from Hurricane Helene. The survey was adapted from a CASPER previously administered in Buncombe County, a nearby urban county. Thirty clusters were selected in Mitchell and Yancey Counties with probability proportionate to population. 183 interviews were completed (completion rate of 87.1%). More than 35% of households evacuated due to Hurricane Helene, although 18% evacuated in the week following the storm due to communication and utility outages. While less than 10% of households reported experiencing new or worsening environmental health or chronic conditions, 30% reported depression and difficulty sleeping, 40% reported anxiety, and 60% of households reported worrying about another disaster affecting their home. Much work remains in terms of long-term recovery and resilience building nearly one year after the direct impacts of the hurricane in Western North Carolina. Necessary response and recovery services can be disrupted in rural areas because of small populations and limited infrastructure.

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Wide Awake in Delaware: Why Social Determinants Matter for Young Adult Sleep

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Abstract: Prevention Completed Research Background Seven in ten Delawareans are at risk for cardiometabolic disease (CMD). Poor sleep—short duration, late timing, and low quality—is an independent CMD risk factor. Social determinants of health (SDOH), including economic instability and limited healthcare access, are linked to poor sleep and higher CMD risk. Emerging adulthood (18–25) is a vulnerable period, yet the impact of SDOH on sleep in this group is less understood. This study examines sleep–SDOH associations among Delaware college students. Methods: This ongoing micro-longitudinal study enrolled 75 Delaware college students (ages 19–24). Sleep metrics (duration, timing, quality) were measured over one week using wrist-worn monitors and sleep diaries. Participants completed REDCap surveys with validated sleep questionnaires and the NIH PhenX SDOH core measures. Descriptive statistics summarized sleep and SDOH data, and t-tests examined associations. Results: Participants were 19-24 years old ($\bar{x}$=20.5); 68% were female, 43% White, 47% Asian, and 8% Black, Hispanic, or mixed. One-quarter were uninsured and 57% employed. Average bedtime was 12:46 AM, sleep duration 7.21 hours, and 86% efficiency. Half slept less than 7 hours per night, 20% reported poor sleep quality, and one-third had efficiency below 85%. Insured students had shorter sleep duration (p=0.04) and faster sleep onset

(p=0.02). Employed students had less wakefulness (p=0.02) and higher sleep efficiency (p=0.008). Conclusions & Implications: Delaware college students experience poor sleep health, with SDOH like insurance and employment affecting sleep patterns. Future research should examine how SDOH impact sleep and contribute to long-term CMD risk.

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Gamified digital health interventions for physical activity and sedentary behavior changes in individuals with autism spectrum disorder: A scoping review

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Abstract: INTRODUCTION: Individuals with autism spectrum disorder (ASD) experience disproportionately higher rates of preventable chronic diseases. Gamified digital health interventions (DHIs) targeting physical activity (PA) and sedentary behavior (SB) represent a promising approach to help reduce these risks. This scoping review explored and characterized gamified DHIs developed to support PA and SB behavior change among individuals with ASD. METHODS: Following JBI Scoping Review Methodology and PRISMA Extension for Scoping Review guidelines, six databases were searched, and 808 records were identified, with an additional five studies found through hand-searching. RESULTS: Following eligibility screening, 13 studies were included in this review. Relevant data from included studies were extracted, charted, and narratively described. This review examined intervention characteristics, including target populations (i.e., youth, adults), implementation settings (e.g., school, home), intervention modalities (e.g., gaming systems, mobile apps), gamification elements (e.g., avatars, points, stories/themes), and outcome measures for PA and SB (e.g., self-report or objective instruments). Seven studies specifically compared the effectiveness of DHIs to a control condition. Findings were mixed with five studies reporting significant improvements in PA and/or SB through gamified DHIs when compared to a control condition, whereas two studies showed limited or non-significant effects. CONCLUSION: This scoping review underscores the potential of gamified DHIs to support PA- and SB-related behavior change in individuals with ASD by enhancing enjoyment and motivation. Nevertheless, the mixed evidence on effectiveness highlights the need for further research to identify the most impactful gamification strategies for promoting long-term behavioral health in this population.

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Examining Resilience Factors, Discrimination, and Comorbidity Severity Among Older Adults in the United States

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Abstract: Background: Resilience resources may buffer the adverse effects of experiencing discrimination, which contributes to a greater comorbidity burden among older adults. Objective: To examine associations between resilience factors and comorbidity burden, measured by the Charleston Comorbidity Index (CCI), among older adults, and to assess whether this relationship differed by experiences of age-, gender-, or race-based discrimination. Methods: A total of 2,926 adults aged ≥50 years completed an online cross-sectional

survey. Exposures included resilience (Brief Resilience Scale), self-efficacy, social support, trust in the medical profession, and social cohesion (high/moderate versus low). CCI was categorized as low (no/mild) or high (moderate/severe). Adjusted logistic regression models estimated the odds of high versus low CCI, and product terms assessed effect modification by discrimination type. Results: Negative relationships between higher versus lower self-efficacy (adjusted OR = 0.91, 95% CI: 0.70–1.17), social support (0.89, 0.70–1.11), and resilience (0.79, 0.51–1.22), and higher CCI were most compatible with the data. Positive relationships were observed for trust in medical professions (1.13, 0.90-1.42) and social cohesion (1.15, 0.92-1.44). Only race-based discrimination significantly modified the association between self-efficacy and CCI (p = 0.003). Among those reporting race-based discrimination, high self-efficacy was associated with lower odds of high CCI (0.30, 0.14–0.65), while a null relationship among those with no race-based discrimination was most compatible (1.03, 0.78-1.35). Conclusion: Self-efficacy may be beneficial among those experiencing race-based discrimination. Prospective studies on the role of resilience in mitigating negative impacts of discrimination in shaping health outcomes among older adults are needed.

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Socioeconomic Barriers to Medication Adherence Among Medicare Beneficiaries: Evidence from 2022-2024 the National Health Interview Survey

Grace Hrustich

Abstract: Introduction: Medication adherence is important to successfully managing health conditions, but older adults, especially racial and ethnic minorities, are at higher risk for medication nonadherence due to many factors. The objective of this study aimed to assess the prevalence of medication nonadherence for Medicare beneficiaries due to socioeconomic factors from 2022 to 2024. Methods: The National Health Interview Survey is a nationally conducted cross-sectional survey in the United States via phone interviews where participants are selected to represent their household through random sampling. Three cycles (2022, 2023, and 2024) were used in the analysis. Medication adherence was measured through the creation of a binary variable based on participant responses to skipping medications due to socioeconomic factors. Prevalence trends for medication adherence and related socioeconomic barriers were assessed by race and ethnicity and education, which was used as a proxy for income. Results: The sample size of the study population was N= 59792. From 2022 to 2024, medication adherence improved from 71.10% to 74.09%. Those who identified as Hispanic (43.40%), Black (30.87%), Asian (42.19%), and AIAN (34.34%) had a higher prevalence of medication nonadherence than their white counterparts (22.48%). Delaying prescriptions to save money was reported the most as a socioeconomic factor contributing to nonadherence. Those who identified as AIAN and Black had the highest prevalence of delaying prescriptions to save money. Conclusion: Overall medication adherence improved from 2022-2024, but racial and ethnic minorities face disproportionate socioeconomic barriers for adhering to a medication regimen.

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Reducing Burnout Among School Nurses Using a Mobile App-Based Mindfulness Intervention

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Abstract: Background: School nurses experience significant occupational stress, which contributes to burnout and decreased professional quality of life. Sustainable, accessible interventions are needed to support the workforce's well-being in school-based settings. The purpose of this quality improvement project was to evaluate the feasibility and preliminary impact of a mobile app-based mindfulness intervention on burnout and professional quality of life among school nurses. Methods: A descriptive pre-post design was implemented within a public school district. Participants used the Headspace mobile application 3-4 days per week for 5-10 minutes each time over 4 weeks. Participants completed the Burnout Assessment Tool (BAT), and the Professional Quality of Life (ProQOL-5) scale. Descriptive statistics examined pre- and post- intervention trends. Results: Eleven school nurses completed baseline surveys, and seven completed post-intervention assessments yielding a 63.6% retention rate. Participants were all female, predominantly White (81.8%), most aged 45-54 years (36.4%), and holding graduate degrees (81.8%). Primary burnout domains decreased, including exhaustion (3.00 to 2.39), mental distance (2.11 to 1.37), cognitive impairment (2.25 to 2.11), and emotional impairment (2.04 to 1.49). Psychological and psychosomatic complaints showed minimal change. Compassion satisfaction increased (2.79 to 3.07), and secondary traumatic stress remained relatively stable. Participants reported the intervention as feasible and easily integrated into their workflow. Conclusion: Findings support the feasibility and acceptability of mobile mindfulness applications among school nurses, suggesting possible improvements in professional fulfillment. Further research with a larger sample and longer follow-up is needed to better understand sustained effects on burnout and professional quality of life.

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Children with Increased Variability in Sleep Duration are Less Physically Active, Independent of Sleep Duration

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Abstract: Regular physical activity (PA) and sufficient sleep may bidirectionally influence each other. Sleep and PA are both known to play roles in the development of cardiometabolic disease (CMD) throughout life. However, the relations between sleep and PA metrics in free-living healthy, young children has not been well elucidated. PURPOSE: To determine if there are relations between sleep duration and sleep regularity with PA in typically developing children. We hypothesized that children with longer and more regular sleep durations would be more physically active. METHODS: Participants included 46 apparently healthy young children ages 7-12 yrs. Sleep and physical activity data were collected via non-dominant wrist accelerometry across 7 days of 24/7 monitoring. Sleep duration was defined as total sleep time (TST), sleep regularity as sleep duration standard deviation (SDSD), and PA was assessed by moderate to vigorous physical activity

(MVPA) and step count per day (SC). RESULTS: TST was unrelated to MVPA or SC (P>0.89). Conversely, SDSD was negatively associated with both MVPA (p=0.01, r= -0.37) and SC (p=0.02, r= -0.34) and remained significant in multivariable regression models which adjusted for TST, sex, and body mass index (all p<0.05). CONCLUSION: Independent of sleep duration, higher variability in sleep duration is associated with significantly lower PA in typically developing children. SIGNIFICANCE/NOVELTY: These findings highlight the important interrelatedness between two modifiable behaviors: sleep patterns and PA, with further studies needed to better understand the underlying mechanisms and directionality of their relation. Supported by NIH 1R01HL155764 (MW). The authors declare no conflicts of interest.

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Fragmented Daily Physical Activity Rhythms are Associated with Reduced Vagal Tone in Adults with Lower-Limb Loss

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Abstract: Introduction. Circadian rhythm fragmentation is increasingly recognized as a nontraditional cardiovascular risk factor, yet its association with cardiac parasympathetic function in adults with lower-limb loss (LLL) remains unclear. Respiratory sinus arrhythmia (RSA) reflects cardiac vagal modulation and autonomic balance. Greater circadian fragmentation, indexed by higher intradaily variability (IV), may impair autonomic rhythmicity and reduce parasympathetic modulation. Objective. The purpose of this study was to examine whether higher IV is associated with lower RSA, independent of age and sex. Methods. In this cross-sectional study, 25 adults with unilateral below-knee LLL (54.9±13.2 years; 56% male) completed the Deep Breathing Test, where cardiac autonomic function was assessed via electrocardiography-derived median RSA. Participants wore a Stepwatch activity monitor on their prosthesis for seven days to quantify IV (60-minute epoch). Linear regression modeling was used to evaluate associations between IV and RSA while controlling for known covariates, i.e., age and sex. Results. Median RSA (8.4±5.5 beats/minute) was low and IV (1.13±0.32) was high among the sample. Advancing age (B=-.170, p=0.024) and greater IV (B=-7.588; p=0.015) were associated with lower median RSA, while male sex was associated with higher RSA (B=4.172; p=0.040). The model explained 40.1% of the variance in median RSA, with IV explaining 16.4% of the variance beyond covariates. Conclusion. Findings suggest fragmented daily activity rhythms are associated with reduced vagal tone in adults with LLL. Interventions targeting circadian stabilization or exercise-based autonomic modulation may offer novel approaches to improve autonomic balance and reduce cardiovascular risk after LLL.

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Physical Function Modifies Change in Steps/day Following Telehealth Physical Therapy for Adults with Knee Osteoarthritis

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Abstract: Purpose: Treatment guidelines recommend physical activity to reduce symptoms of knee osteoarthritis (OA); however, adults with knee OA remain inactive. Interventions to increase physical activity (steps/day) only show

modest improvements, though baseline function could affect response. We explored whether baseline function modifies response to a telehealth physical therapy (PT) intervention, including daily step goals in adults with knee OA. Methods: We performed a secondary analysis of a clinical intervention trial. Participants who met NICE criteria for knee OA and did not regularly exercise were randomized into telehealth PT, including strength training, step goals, and education or control. The primary outcome was a 12-week change in steps/day. Physical function was assessed using KOOS-ADL: descending stairs, rising from chair, and walking over a flat surface, categorized as no-mild or moderate-extreme difficulty. Linear regressions were used to examine group differences and group x function interactions. Results: 80 participants (age 60.3 ± 9.0, BMI 35.1 ± 7.9, and 86.3% Female) were included. Change in steps/day over 12 weeks were similar between groups (p = 0.22). Significant group x function interactions were observed for descending stairs (p = 0.005) and walking over flat surface (p = 0.05). Among participants with no-mild difficulty descending stairs, the intervention group increased their steps/day by 1911[651.8, 3170.5] more than the control. Among those with no-mild difficulty walking over a flat surface, the intervention group increased their steps/day by 1065 [133.5, 1995.9] more than the control. Conclusions: Baseline function may influence response to a telehealth PT intervention for knee OA.

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Evaluating Our Progress: The Delaware State Health Improvement Plan (SHIP) Annual Review 2026

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Abstract: Introduction: The Delaware State Health Improvement Plan (SHIP) is led by the Delaware Division of Public Health in partnership with the University of Delaware's Partnership for Healthy Communities and Epidemiology Department. A SHIP is a strategic framework that identifies a state's health priorities and actions to address them. The purpose of the SHIP Annual Report is to assess progress toward goals, address gaps, and inform data-driven decision-making to strengthen public health initiatives across Delaware. Methods: The SHIP team developed measurable goals, objectives, and strategies for each of the five priority health outcomes (mental health, chronic disease, maternal and infant health, premature death, and avoidable injury) to be achieved by 2028, based on the State Health Assessment. Progress was evaluated using state and national data sources to assess health trends, identify gaps, and measure alignment. Results: Of the 42 objectives, 12 showed measurable improvements, six met their goals, and three remained unchanged. For example, adult obesity decreased from 37.9% in 2022 to 36.6% in 2024. However, 15 objectives showed worsening trends. One objective portrayed how the uninsured rate increased from 5.6% in 2022 to 6.9% in 2024. Mental health emerged as the top priority outcome, with zero progressing objectives and worsening trends requiring greater attention. Conclusion: Together, these findings demonstrate meaningful progress towards meeting the SHIP goals by 2028, while underscoring the need for continued, data-driven action to achieve the goals. Continued monitoring, targeted resource allocation, and cross-sector partnerships are

essential to address worsening trends and advance health equity statewide.

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The impact of a time restricted eating intervention on eating patterns in emerging adult Women

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Abstract: Irregular "snacking" in place of traditional meals may have an adverse effect on diet quality and body adiposity. Time-restricted eating (TRE) limits eating to the same window each day, aligning eating with the circadian rhythm and potentially encouraging regular eating routines. Thus, the purpose of this study is to assess whether a TRE intervention reduces snacking and increases meal consumption among emerging adult women and whether said intervention changes the macronutrient composition of the diet. Methods: 36 emerging adult women with eating windows 12 hours or longer completed a 4-week TRE intervention in which the eating window was decreased to 10 hours and ended by 8:00pm. Participants completed 3-day food logs (2 weekdays and 1 weekend day) using food photography during a baseline week and the final week of TRE. Results: 27 participants with at least 2 days of diet data at each visit were represented in this analysis, and a total of 753 eating occasions were analyzed, comprised of 473 meals and 280 snacks. For every 1 meal, participants ate an average of 0.72 snacks at baseline and 0.44 snacks at the end of TRE. From baseline to end of TRE, on average, participants consumed 0.21 fewer meals (t=2.06, df=24, p<0.05) and 0.69 fewer snacks (t=3.66, df=18, p<0.05) per day. No significant change occurred in percent of calories from carbohydrates, protein, fat, saturated fat, or sugar. Implications: A 4-week TRE intervention decreased eating occasions and increased the ratio of meals to snacks in emerging adult women.

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A Comparative Analysis of Maternal and Infant Health Programs Across Maryland, New Jersey, Pennsylvania, and Delaware

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Abstract: Introduction: Maternal and infant health outcomes are shaped by persistent racial, geographic, and socioeconomic disparities, highlighting the need for coordinated, equity-focused public health approaches. Black and Hispanic women in Delaware experience disproportionately higher rates of maternal morbidity and preterm birth. In Delaware's Southern rural counties, pregnant and postpartum individuals face barriers, including limited OBGYN availability and limited public transportation. The Delaware State Health Improvement Plan (SHIP) prioritizes maternal and infant health to address these disparities. A comparative analysis of state-level maternal and infant health programs across three states surrounding Delaware was conducted. The purpose was to identify evidence-based program models, funding mechanisms, and policy approaches that can inform and strengthen Delaware's maternal and infant health initiatives. Methods: A review of state health websites and programming was conducted from 2025 to 2026 to assess prenatal, postpartum, mental health, workforce development, and early childhood initiatives across Maryland, New Jersey, Pennsylvania, and Delaware. Results: Key findings demonstrate the

importance of statewide coordination, Medicaid-supported services, maternal mortality review systems, and strong community-based partnerships. States with integrated quality improvement systems, continual access to perinatal mental health services, enhanced insurance coverage, and expanded perinatal workforces show greater capacity to address maternal health inequities. Conclusion: Findings from this analysis will provide actionable insights for Delaware SHIP, including opportunities to enhance care coordination, diversify funding sources, and expand equity-centered maternal health programs. This report offers a policy-informed roadmap and evidence-based framework to strengthen current programs, reduce disparities, and improve maternal and infant health outcomes across Delaware.

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Cellismo: a user-friendly graphics-based interface for visualization and rapid analyses of multi-omic single cell-RNA sequencing data

Aeila Chesley, Hayden Harach, Mark Shaw, Brewster Kingham & Arit Ghosh

Abstract: Introduction: Multi-omic single cell RNA sequencing experiments produce large amounts of data, and bottlenecks for rapid analysis of such large datasets. Running bioinformatic analyses of scRNA-seq datasets requires using R and knowledge of code troubleshooting which can be intimidating for researchers since the skills required to navigate these programs are not trivial. The Cellismo platform offers a gui-based interface which allows for analysis without knowledge of coding. Methods: An untreated control and MG132 treated MELds19 cell samples were sequenced using the BD Rhapsody platform. The scRNAseq data was uploaded to the cellismo platform and using its various tooltabs UMAP plots were generated and manipulated to display data for kmeans (k=15) clustering and overall gene expression of a target gene (Tfrc). Using the UMAP plots, clusters of cells containing varying levels of Tfrc expression were selected and compared in differential gene analysis plots. Volcano plots of gene expression were used to label genes of high expression change Results: The tools cellismo offers were capable of generating meaningful graphs which allowed for uncovering genes of potential significance in understanding treatment with MG132 in these cells. Conclusion: Cellismo has a multitude of capabilities involved in the analysis of single cell sequencing data, allowing for increased accessibility in single cell sequencing analysis.

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Unraveling the Pathogenic Impact of ABCA4 Uncharacterized Variants in Inherited Retinal Diseases

Nadee N. J. Matarage Don, Subhasis B. Biswas and Esther E. Biswas

Abstract: Mutations in ABCA4 cause inherited retinal diseases, particularly Stargardt disease. Many missense variants remain classified as variants of uncertain significance (VUS), especially within extracellular domains (ECDs). The largest uncharacterized region of ABCA4 is located in ECD1, where limited structural information and inconsistent computational predictions impede clinical interpretation. This study integrates in-silico modeling with in-vitro functional assays to evaluate the pathogenicity of VUSs in this region to improve their diagnostic interpretation. Missense VUS in ECD1 were compiled from ClinVar and analyzed for mutation hotspots. Pathogenicity was

predicted using multiple algorithms. Structural models were generated with AlphaFold-3, variant-induced perturbations were visualized in PyMol, and ΔΔG values were calculated with YASARA. Recombinant ABCA4 variants were expressed in virus-like particles, and protein expression, membrane localization, and ATPase activity (basal and N-retinylidene-phosphatidylethanolamine–stimulated) were quantified relative to wild type. Six VUS clusters were identified: R140, H193, D197, N269, V195, and I214. Variants with high destabilization energies (R140P, H193P, N269S, I214F) showed reduced expression, membrane trafficking, and loss or reduced NRPE-stimulated ATPase activity. All variants at R140, V195, and I214 exhibited decreased NRPE-stimulated ATPase activities, suggesting these residues may contribute to substrate binding or access pathways. Together, these structural and biochemical findings demonstrate that VUS in the unresolved ECD1 region can perturb ABCA4 stability, trafficking, and functional activity—mechanisms consistent with Stargardt disease pathogenesis. The results highlight specific ECD1 residues likely to be disease-causing and underscore the value of integrating structural and functional analysis to improve VUS interpretation and advance precision diagnostics in inherited retinal degeneration.

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Machine Learning–Guided Variant Interpretation to Advance Precision Medicine in Inherited Retinal Disease

Zachary Davis, Subhasis Biswas, and Esther Biswas-Fiss

Abstract: Purpose: Variants of uncertain significance (VUS) within the regulatory domains RD1 and RD2 of the ABCA4 gene remain poorly characterized despite their potential contribution to inherited retinal degenerations, including Stargardt disease. Although more than 4,500 ABCA4 variants have been reported, many lack functional or structural evidence supporting pathogenicity. This study aimed to systematically prioritize RD1 and RD2 VUS for downstream functional investigation to improve variant classification and genetic risk interpretation. Methods: A localized machine learning model trained on curated missense variants within RD1 and RD2 was developed to predict pathogenicity. Predictions were compared against established in silico pathogenicity tools to assess concordance. Structural modeling and protein stability analyses were then performed to evaluate predicted effects on domain architecture and to refine prioritization for experimental validation. Results: Among 79 RD1/RD2 variants analyzed, 39 were classified by the localized ML model with directional confidence, including 21 predicted likely pathogenic and 18 predicted likely benign. Of these 39 variants, 25 demonstrated concordant classifications across additional pathogenicity prediction tools (19 pathogenic, 6 benign). Structural modeling further supported 16 of these variants, including 10 pathogenic variants predicted to disrupt domain architecture or stability and 6 benign variants predicted to preserve or enhance structural stability. Conclusion: Integrating domain-specific machine learning with structural modeling provides a systematic framework to reduce VUS burden in ABCA4 and enhances strategic selection of variants for mechanistic investigation.

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Structure-Based Computational Characterization of ABCA4 Missense Variants at the N-Ret-PE Binding Site in Inherited Retinal Degeneration

Abigail G. Thomas and Esther E. Biswas-Fiss

Abstract: The ABCA4 protein is essential for vision through recycling N-Ret-PE, a byproduct of phototransduction, and dysfunction from genetic variants leads to inherited retinal disease. Accurate identification of disease-causing variants is critical for clinical management, yet most reported ABCA4 variants (4,484) lack functional characterization and the N-Ret-PE binding site has not been systematically studied. Bioinformatics approaches enable rapid prediction of mutation impact and prioritization of variants for downstream validation. The purpose of this study is to define the structural and functional consequences of clinical ABCA4 N-Ret-PE binding site variants using integrated computational prediction, protein modeling, and molecular dynamics simulation. All 26 missense variants within the binding site were mapped onto the AlphaFold2-derived ABCA4 structure. Pathogenicity was assessed using six algorithms (SIFT, PolyPhen-2, REVEL, AlphaMissense, MutScore, and MetaRNN) integrating conservation and structural features. Structural effects were modeled with PyMOL and FoldX to calculate ΔΔG and detect steric and secondary structure changes. ATR docking was performed in Chimera to compare WT and variant RMSD values. Pathogenic/Likely Pathogenic variants showed prediction scores >0.7 (0–1 scale) and ΔΔG >0.5 kcal/mol, indicating destabilization. Twelve VUS met these thresholds and were prioritized for reclassification. Residues forming direct hydrogen bonds with N-Ret-PE (Y340, Y345, R653) showed RMSD shifts >1 Å and docking score changes >2. Variants within the binding pocket correlated with increased RMSD, ΔΔG destabilization, and predicted pathogenicity. These findings establish a mechanistic framework linking structural disruption to substrate coordination and provide a strategy to prioritize high-impact variants for experimental validation.

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In-Silico Structural and Energetic Profiling of Variants of Uncertain Significance in the ABCA4 Transporter

Sean Fletcher, Subhasis Biswas, Esther Biswas-Fiss

Abstract: Background: Stargardt disease (STGD1) is the most common inherited macular degeneration, caused by ABCA4 mutations. Many variants remain classified as Variants of Uncertain Significance (VUS). Standard prediction tools often miss functional defects affecting dynamic processes like ATP hydrolysis, focusing instead on global protein stability. The purpose of this study is to computationally evaluate ABCA4 VUSs to identify mutations specifically disrupting ATP binding and driving functional loss. Methods: We applied a structure-based computational workflow to characterize missense variants within the ABCA4 Nucleotide Binding Domains (NBDs), using high-resolution cryo-EM ATP-bound structures as templates. Initial mCSM-lig screening rapidly predicted mutational impacts on protein-ligand affinity. Variants exhibiting affinity loss underwent rigorous thermodynamic analysis using GROMACS. To overcome poor precision in binding free energy calculations, we employed multiple short, independent molecular dynamics (MD) simulations, significantly improving

statistical convergence of MM/PBSA estimates. Results: Structural mapping of ClinVar data identified VUS clusters near the highly conserved Walker A and B motifs, critical for ATP hydrolysis. While standard algorithms (e.g., FoldX) often predict these as benign, mCSM-lig screening indicated marked reductions in ligand affinity. Subsequent short-trajectory MD confirmed these mutations disrupt the obligate protein-ligand interface through direct contact loss or altered binding pocket geometry. We are utilizing these converged interaction energies to establish a thermodynamic threshold for loss-of-function. Conclusion: These findings suggest many ABCA4 VUSs drive pathogenesis through catalytic cycle disruption rather than structural destabilization. Combining rapid mCSM-lig screening with statistically robust short-simulation MD provides a more accurate metric for reclassifying Stargardt disease VUSs.

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Circular RNA as a Potential Biomarker for Ewing's Sarcoma

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Abstract: Ewing's sarcoma (EwS) is a pediatric bone and soft tissue cancer, caused by a chromosomalre arrangement of the EWSR1 gene (on chromosome 22) and members of the ETS gene family. This mutation creates the fusion protein EWS::FLI1, which acts as a "sponge" for miR-145-5p, binding to the 3' untranslated region of FLI1, preventing it from being transcribed, and preventing the fusion protein from being created. When this mutation occurs, the EWS::FLI1 protein forms, these regulatory miRNAs are unable to prevent EwS from forming. As various circular RNAs are known to play a role in cancer, with circZNF609 specifically known to contribute to EwS, other circRNAs were explored to determine if they also play a role in EwS. Expression of circRNAs NFIX, GLS, and PvTI were compared between knockdown and control cell lines of EwS. These cell lines were cultured, and then RNA was isolated from them to be used to create cDNA. Divergent primers were used to quantify expression by PCR. Changes were seen in the expression of circPvTI (upregulated in SKES and TC32 samples), circNFIX (upregulated across all three samples) and circGLS (upregulated in the A673 and SKES samples, but downregulated significantly in the TC32 sample) between control and experimental groups. As a result, these circRNAs may play a role in EwS, making them possible candidates for biomarkers.

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Variation in Guideline-Concordant Herpes Zoster Treatment Among Nursing Home Residents With and Without Dementia

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Abstract: Background: Herpes zoster causes substantial morbidity among older adults, and guidelines recommend oral antiviral, corticosteroid, and analgesics for symptoms. However, residents with dementia may receive suboptimal care due to communication challenges and concerns about medication harms. Our objective was to compare the use of recommended treatments for herpes zoster between residents with and without dementia. Methods: We used

nursing home electronic health record data to conduct a retrospective cohort study of residents diagnosed with herpes zoster (2017-2023). Administrations for antivirals, corticosteroids, and analgesics were measured in time periods before (e.g., 15–30 [baseline period], 0–7 days) and after diagnosis (e.g., 1–7, 46-60 days). The route of administration was extracted for antivirals and corticosteroids. We used logistic regression to describe relative changes in prevalence odds over time with 95% confidence intervals. Results: We identified 4,298 residents with herpes zoster (mean age=80.3 years; 33.5% had dementia). Antiviral use increased from 4.1% (baseline) to 76.8% during the 0–7 days after diagnosis (OR=77.09; 95% CI=65.28–91.03). Among residents who received acyclovir, there was greater topical use among those with dementia vs. without (0-7 days = 15.7% vs. 13.7%; 46-60 days = 33.3% vs. 11.1%). Topical steroid use was more common in residents with dementia vs. without (0-7 days = 54.1% vs. 52.5%; 46-60 days = 57.8% vs. 54.3%). Residents with dementia had lower use of analgesics across all periods. Conclusions: Nursing home residents with dementia were more likely to receive non-recommended care for herpes zoster compared to residents without dementia.

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Pilot Trial Assessing the Effectiveness of Laser Hair Depilation on Pilonidal Disease Recurrence in Patients with Darker Skin Color

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Abstract: Pilonidal disease is a painful, chronic infection of the gluteal cleft affecting approximately 1% of adolescents and young adults.1 Despite treatment, recurrence rates can reach 40%, resulting in repeated procedures, prolonged wound care, and reduced quality of life.2-4 Chronic hair removal is recommended, but adherence to mechanical/chemical depilation is often poor.5 Laser depilation offers a potential solution, as evidenced by a recent randomized controlled trial (RCT) showing a reduction in 1-year recurrence from 33% to 10%. However, results suggested potential differences in treatment effectiveness across racial and ethnic groups, possibly reflecting varying skin types, with decreased effectiveness in patients with darker skin types (Fitzpatrick skin types IV-VI) .6 This pilot RCT will assess the effectiveness of laser depilation in preventing pilonidal disease recurrence among adolescents and young adults with Fitzpatrick skin types IV–VI.7 Participants, aged 10–21, with pilonidal disease are randomized to receive laser depilation plus standard care versus standard care alone, which includes mechanical/chemical hair removal and hygiene education. The primary outcome is disease recurrence at 1 year, defined as a new abscess, folliculitis, or draining sinus requiring treatment. Secondary outcomes include disability days, complications, and health-related quality of life measured using validated surveys. Assessing the laser's effectiveness in these patients can inform a larger multicenter trial to address treatment heterogeneity. The project incorporates recruitment strategies to include Hispanic and Non-Hispanic Black individuals, populations historically underrepresented in research. Laser depilation may offer a minimally invasive treatment that reduces pilonidal disease recurrence and improves health-related quality of life.

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Characterizing the Relationship between Upper Limb Proprioception, Motor Function, and Movement Self-Efficacy after Stroke

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Abstract: Proprioceptive impairments post-stroke have been associated with impaired upper limb movements, decreased self-care independence, and poorer recovery prognosis. Despite proprioception being essential for movement and recovery post-stroke, the contributions of proprioception to movement self-efficacy – the belief in one's ability to achieve movement-based outcomes – are not understood. Self-efficacy is a key factor in successful stroke rehabilitation, as higher self-efficacy has been linked to higher motivation and likelihood to overcome barriers. We aimed to characterize how proprioceptive impairments contribute to movement self-efficacy after stroke. We hypothesized that upper limb proprioceptive function would have a moderating effect on the relationship between motor function and movement self-efficacy. Sensorimotor function and movement self-efficacy were collected in 59 individuals with chronic, unilateral stroke. Motor function was evaluated by the Fugl-Meyer and movement self-efficacy was measured by the Confidence in Arm and Hand Movement (CAHM) scale. Proprioceptive function was assessed by the Kinesthetic Matching (KIN) task, which quantified sense of movement. A moderation analysis was used to determine if proprioceptive function changed the relationship between motor function and movement self-efficacy. Proprioceptive function (KIN) moderated the relationship between motor function (Fugl- Meyer) and movement self-efficacy (CAHM; beta=0.71, p =0.02). Motor function was associated with movement self-efficacy, and that relationship was moderated by proprioceptive function post-stroke. Importantly, individuals with greater proprioceptive impairment tended to have lower movement self-efficacy than individuals with similar motor, but better proprioceptive, function. Proprioceptive impairments may be a contributor that negatively affects movement self-efficacy, which could have implications on rehabilitation outcomes and recovery trajectory after stroke.

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Pain Characteristics and Recurrent Fall History Following Lower-Limb Amputation

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Abstract: Introduction: Among adults with lower-limb amputation (LLA), 50% report falling in the past year. After LLA, multisite pain is associated with future recurrent falling (i.e., >1 fall in the past year), yet clinical assessments typically focus only on amputated-region pain. This study aimed to identify pain locations significantly associated with recurrent falls among adults with LLA to inform future falls assessments. Methods: Participants with LLA ≥ 12 months (n=241) prior were included (mean age: 57.6±14.2 years; 72.6% male; 47.3% unilateral below-knee amputation, 21.6% bilateral amputation; median 5.4 [25th, 75th percentile: 2.5, 16.8] years since most recent LLA; 32.4% traumatic amputation etiology). Logistic regression models were conducted for multisite pain as well as each pain location (i.e., phantom limb [PL], contralateral limb, residual limb, low back) to assess association with 12-month

recurrent fall status, while controlling for age, sex, and bilateral versus unilateral limb involvement. Results: Of 241 participants, 87 (36.1%) reported recurrent falls. After controlling for covariates, PLP was associated with a 1.996x (Odds Ratio [OR]: 1.137, 3.504; p=.016) greater odds of recurrent falls. Multisite pain (i.e., pain in ≥2 sites of the residual, contralateral limb, and/or low back) was associated with a 2.068x (OR: 1.196, 3.576; p=.009) greater odds of recurrent falls. Other pain types were not significantly different based on fall status (all p>.099). Conclusion: Fall risk assessments following LLA should include evaluation for phantom limb pain in the amputated region and multisite pain presence.

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Patellar Tendon Ultrasound and Patient-Reported Return to Sport Confidence Post-ACLR

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Abstract: Introduction: After anterior cruciate ligament (ACL) reconstruction (ACLR), many struggle to return to sport1,2 . When ACLR uses a bone-patellar tendon-bone (BPTB) autograft, the graft-site patellar tendon is left with a central gap between portions of native tissue. As the tendon heals, cross-sectional area (CSA) changes are visible on ultrasound imaging3. The echotexture of native tissue is uniform, while new tissue and healing substances appear non-uniform. This study assesses the relationship between tendon macrostructure and readiness to return to sport at 3 and 7 months after ACLR using BPTB autograft. Methods: Thirty-two individuals (14F, 22.8±6.8 years) completed the ACL-Return to Sport Index (ACL- RSI) and underwent ultrasound imaging 3 and 7 months after ACLR. Using custom MATLAB scripts, patellar tendon CSA and that of the remaining medial and lateral portions were manually segmented and expressed as a percentage of overall CSA. Simple linear regressions compared the percentage of non-uniform echotexture within the surgical tendon to ACL-RSI scores at each timepoint. Alpha was set to 0.05. Results: At 3 months, there was a positive relationship between ACL-RSI scores (mean±SD=60.9±20.7) and the percentage of non-uniform echotexture in the surgical tendon (42.3±7.2%, r=0.41, p=0.282). A similar relationship was seen at the 7-month timepoint (ACL-RSI: 68.5±19.8, echotexture: 39.6±7.5%, r=0.52, p=0.003). Conclusions: Greater relative proliferation of tendon tissue was associated with greater psychological readiness to return to sport. This suggests that active tendon healing persists up to 7 months and relates to psychological recovery4 , highlighting tendon recovery as a potentially overlooked component of comprehensive rehabilitation after ACLR using BPTB autograft.

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Dual-Task Effects on Brain Activity and Bimanual Force Control in Older Adults With and Without Parkinson's Disease

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Abstract: Parkinson's Disease (PD) is a progressive neurodegenerative disorder, resulting in both motor and cognitive impairment. Previous studies examining motor-cognitive dual-tasking in PD have focused on gait, with little attention paid to upper limb tasks. The present study seeks to investigate the effect of dual-tasking on a bimanual force control task and underlying brain activity in individuals with and without PD. Fifteen older adults (OA) and nine

with PD performed a bimanual modified pinch-grip isometric sustained force task at 15% and 30% of their maximum voluntary contraction (MVC). Ten trials were completed at each force level, with each trial consisting of 20 s of sustained force, followed by 20 s of rest. This task was completed in isolation and with a concurrent selective attention task in the dual-task condition. Brain activity was measured in the prefrontal cortex (PFC) as ΔHbO with functional near-infrared spectroscopy. Both groups had greater force variability at 30% MVC, and PD demonstrated greater variability in the dual-task conditions compared to OA. Force error increased at 30% MVC and during dual-tasking for both OA and PD, with PD showing higher error than OA in all conditions. While no statistically significant differences in ΔHbO were observed between groups, there were patterns suggesting reduced PFC activity in PD. These results suggest that motor control deficits in PD may involve brain regions or network-level dysfunction beyond the prefrontal cortex. Next steps include finalizing data collection with a larger sample to better clarify these effects.

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Effects of Acute Exercise on Gait in Knee Osteoarthritis

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Abstract: Fatigue often causes changes in gait mechanics, which could be detrimental to long-term joint health. Adults with knee osteoarthritis (KOA) are more fatigable compared to their healthy counterparts; that is, they fatigue more in response to the same amount of exercise. However, it is not understood whether those with KOA and their healthy counterparts have similar changes in gait mechanics in response to the same amount of exercise. The purpose of this study was to understand if gait mechanics differ between those with and without KOA in response to an established fatigability walking protocol. We recruited 20 individuals: 10 with KOA (63.2±3.5 yrs) and 10 without (63.5±3.5 yrs). Participants performed knee extensor muscle testing before and after a 34-minute walking protocol, which mimicked the recommended dose of physical activity for older adults. Gait mechanics were analyzed at the first and last minutes of the walking protocol. A 2-way ANOVA was used to compare differences between groups and timepoints. Neither group fatigued (i.e., muscle power did not decrease), but there was a wide range of responses (Healthy: -6.4±65.3%; KOA: -16.7±42.2%). There were no significant differences in gait mechanics between groups (p= 0.17-0.81), and no interactions between time and group (p=0.25-0.96). Participants had varied responses to the 34-minute walk, potentially limiting our ability to detect significant differences. Therefore, future studies should recruit individuals with greater fatigue susceptibility (e.g., more severe KOA) to elicit more consistent declines in muscle power, which would allow for further investigation into fatigue-related effects on gait mechanics.

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No Sex Differences in Achilles Tendon Load and Torque During Voluntary and Electrically Evoked Contractions

Isabella da Silva Almeida, Claudia Kacmarcik, Andy Smith, Stephanie Cone, João Luiz Quagliotti Durigan, and Karin Grävare Silbernagel

Abstract: INTRODUCTION: Shear wave tensiometry is a novel method that can assess Achilles tendon load during ankle plantarflexion (PF) activities. Determining whether tendon loading responses differ between sexes is essential to establish the generalizability of the results and to guide the application of assessment methods. This study examined whether Achilles tendon load and PF torque differed between males and females during maximal voluntary isometric contraction (MVIC) and contractions evoked by neuromuscular electrical stimulation (NMES). METHODS: Twenty healthy participants (30.7 ± 7 years; 10 males and 10 females) performed PF under two conditions: voluntary MVIC and NMES-induced contraction at maximal tolerated intensity. Participants were positioned prone on a HUMAC dynamometer to measure PF torque output, while a shear wave tensiometer was simultaneously placed over the free Achilles tendon to quantify tendon tension. RESULTS: No significant sex differences were observed in shear wave velocities (MVIC: males 74.09 ± 29.82 m/s, females 92.28 ± 42.10 m/s; NMES: males 63.64 ± 34.26 m/s, females 69.32 ± 34.28 m/s; p = 0.409) or isometric PF torque in both analyzed conditions (MVIC: males 77.85 ± 19.43 Nm, females 79.85 ± 15.79 Nm; NMES: males 30.35 ± 10.26 Nm, females 28.95 ± 9.81 Nm; p = 0.237). CONCLUSION: These findings suggest that men and women have similar PF torque during both voluntary and maximal tolerated NMES calf muscle contractions, and that these provide similar loads in the Achilles tendon. Furthermore, NMES demonstrates potential as a controlled strategy to replicate voluntary tendon loading, supporting its application in rehabilitation interventions.

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Frailty Screening After Amputation: Use of Population Cut-Points

Revelant D, Stauffer S, Pohlig R, Sarlo F, Horne J, Sions J

Abstract: INTRODUCTION: Frailty syndrome marks systemic physiological decline in older adults, leading to negative health impacts. The Fried Frailty Index (FFI) lists five key markers of frailty: weight loss, inactivity, fatigue, slowness, and weakness. Adults with lower-limb loss (LLL) may exhibit higher prevalence of some frailty markers (e.g., slowness) secondary to LLL, rather than systemic decline, leading to misclassification. This study compared the FFI with LLL-specific cut-points to determine frailty prevalence of older adults with LLL.
METHODS: From 2017 to 2025, adults aged ≥60 years-old attending an interdisciplinary Limb Loss Clinic underwent assessment of frailty markers: weight loss >10 pounds, self-report fatigue, inactivity per the General Practice Physical Activity Questionnaire, slowness per the 10-Meter Walk Test, and weakness per handgrip dynamometry. LLL-specific cut-points were defined as the lowest quintile of the sample; weakness and slowness were stratified by sex. RESULTS: Among n=67 participants (median age 66 years-old; 76.1% male, 79.1% White, 58.2% unilateral transtibial-level; 52.2% dysvascular etiology), inactivity was the most prevalent marker (n=27; 40.3%). Of the sample, 22.4% and 13.4% were classified as frail per the FFI and LLL-specific cut-points respectively (p=.034). Individuals were significantly more likely to be classified as fatigued (p=.025), weak (p=.001), and slow (p=.002) per the FFI. CONCLUSION: Older adults with LLL present with a higher frailty prevalence than the general population, i.e., 9%. Frailty screening among older

adults with LLL is warranted; use of established FFI cut-points may misclassify individuals as frail more often than LLL-specific cut-points, secondary to amputation-induced changes in frailty markers.

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Exploring the Healthcare Experiences of Disabled College Students

Michaela Hodges-Fulton, Sarah Curtiss

Abstract: Healthcare provider (HCP) attitudes about people with disabilities have been a focus of study in recent years, with one notable finding that only 40.7 percent of physicians are very confident about their ability to provide the same quality of care to patients with disabilities as those without. There is less understanding of people with disabilities (PWD)'s attitudes and feelings about the HCPs they interact with and the healthcare they receive. Our study uses an interpretive qualitative approach to explore the healthcare experiences of disabled college students. In addition to being inclusive of multiple disability types, we focus on young adulthood as it is a key time for PWD as they experience healthcare transition. Healthcare transition is the move from pediatric to adult medical care. Young adults with special health care needs (a term which includes many PWD) often do not receive adequate support from their HCPs during this process. We will be sharing experiences of disabled college students in the healthcare system, their attitudes about how they have been treated, and their recommendations for future health professionals. Recent research on physician attitudes found that physicians feel that they have a "lack of sufficient knowledge, experience, and skills" to adequately treat patients with disabilities. We hope to help overcome this barrier to quality care by providing knowledge that can be used by providers and health professions students to better serve their disabled patients, and by health professions educators to empower their students by better equipping them for future practice.

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Examining the Relationship Between Cognitive Factors and Sensorimotor Adaptation After Stroke

Manzoor S, Cohen ML, Pohlig RT, Morton SM, Thompson ED, Wright H, Wright TR, Reisman DS

Abstract: Background & Objective: Motor learning underpins post-stroke rehabilitation1. A key form of learning is sensorimotor adaptation1,2. Previous studies have linked working memory (WM) to sensorimotor adaptation in neurologically intact participants 3,4 , but this has not been carefully examined after stroke, which often impairs interrelated cognitive domains 5,6,7,8 . The objective of this study was to investigate the relationship between latent cognitive constructs derived from a comprehensive cognitive battery and sensorimotor adaptation after stroke. Methods: 70 people ≥6 months post-stroke (65.7 ± 10.6 years) participated. Participants walked on a split-belt treadmill with a 2:1 speed ratio followed by walking on tied belts (post-adaptation) to assess sensorimotor adaptation after-effects. The magnitude of after-effects was defined as the average of the first 5 strides of post-adaptation. Cognitive scores were entered into an exploratory factor analysis (EFA), which then informed the measurement component of a Structural Equation Model (SEM), where the factors predicted the magnitude of sensorimotor adaptation after-effects.

Results: The EFA yielded three factors: Shifting (WCST indices), Memory (WMS-4 Designs I/II and Spatial Addition, NIHTB Picture Sequence Memory), and Inhibition-Updating (NIHTB Flanker, Dimensional Change Card Sort, Pattern Comparison, List Sorting; WMS-4 Spatial Addition). The SEM model fit was modest CFI=.91; RMSEA=.078 90% CI [.045, .108]. After adjusting for age, sex, time since stroke, and lower-extremity Fugl–Meyer score, the inhibition-updating construct significantly predicted after-effects (β=-0.33, p=.011). Conclusion: Inhibition-Updating, which included WM measures, was the only cognitive construct related to sensorimotor adaptation after-effects. This is consistent with prior evidence, which relates WM/global cognition to sensorimotor adaptation4,9,3 . These results suggest that sensorimotor adaptation may remain preserved in people with lower inhibition and updating cognitive abilities.

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The Relationship Between Subjective Language Complaints and Discourse Production in Older Adults

Ishani Vyas, Faith Stagge, Matthew L. Cohen, and Alyssa M. Lanzi

Abstract: Introduction: Subjective language complaints (SLCs), such as word-finding difficulties, are common in older adulthood and are often assessed using self-report instruments. Although SLCs are well documented, their relationship to objective measures of language production remains understudied. One objective method for assessing spoken language involves evaluating narrative discourse production, for example, by measuring storytelling abilities. The present study investigated the relationship between narrative discourse production and SLCs. We hypothesized that adults with higher SLCs would produce stories with less complete and accurate essential information (i.e., main concepts). Method: Cognitively unimpaired adults, ages 60-90, produced a narrative discourse sample (i.e., retelling the story of Cinderella) and completed a self-report measure of SLCs, the Language Subscale from the Everyday Cognition (ECog) scale. Narrative discourse samples were analyzed using main concept analysis (MCA), which quantifies the completeness and accuracy of essential information units in narrative speech. For example, there are 34 established main concepts in the story of Cinderella. Results: Discourse samples from the story of Cinderella were analyzed for 77 cognitively healthy adults. A simple linear regression examined whether ECog - Language Subscale scores significantly predicted main concept scores. The full model was not statistically significant, F(1, 74) = .30, p = .586, accounting for less than 1% of the variance in main concept scores (R2 = .009). Conclusion Thus, ECog - Language Subscale scores were not significant predictors of main concepts scores. Future research could explore additional discourse variables beyond the main concepts, such as the logical ordering of story components (i.e., sequencing).

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Adapting Verb Network Strengthening Treatment to Support Transitive Verb Knowledge in Children with Developmental Language Disorder

Nazmiye Atila Caglar, Elizabeth Kosmicki, Amanda Owen Van Horne

Abstract: INTRODUCTION: Children with developmental language disorder (DLD) have difficulty with verb knowledge, which may influence syntactic skills (Kueser et al., 2024). Here, we pilot an

adaptation of VNeST (Verb Network Strengthening Training; Edmonds, et al., 2009; Edmonds, 2014, 2016), a protocol for strengthening semantic associations in adults with aphasia (Edmonds et al., 2009) and ask about feasibility and early efficacy. METHODS: Children with DLD received 4 sessions of VNeST. Data from five children are currently available, with five more planned. Verb semantic knowledge was assessed via a repeated semantic association task (Kueser et al., 2024). RESULTS: Four children attended 100% of sessions as scheduled; a fifth child rescheduled two sessions to attend a funeral. Sessions averaged 52.15 minutes (SD = 10.52). Fidelity was high. On average, children with DLD produced 37.8/72 (SD= 14.99) semantic associates at pretest and 43.4/72 (SD= 11.12) at posttest; W = 0.00, p = .068. In contrast, children produced an average of 20.97/36 (SD= 5.87) nontargeted semantic associates at pretest and 21.55/36 (SD= 5.87) at posttest, a nonsignificant change, W = 4.00, p = .715. CONCLUSION: With regard to feasibility, results are strong. Regarding efficacy, gains are promising but inconclusive. Treated verbs grew more than untreated verbs with regard to semantic associations, but additional participants are required to confirm this.

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"Tell Me What This Means in Real Words": Caregiver and SLP Perspectives on Supporting Families of Children with DLD

Victoria Coons, Maura O'Fallon, Michelle Erskine, Sarah Curtiss, Amanda Owen Van Horne

Abstract: Parents of children with Developmental Language Disorder (DLD) report stress and uncertainty related to their child's language needs. Simultaneously, speech-language pathologists (SLPs) face barriers to parent collaboration. We used an implementation science framework to understand how SLPs can support parents of children with DLD. We conducted focus groups with parents of children with DLD (n=25) to understand their lived experiences and support needs, and focus groups with SLPs (n=11) to understand perspectives on supporting parents and children with DLD. Using rapid qualitative analysis, we identified preliminary themes across groups. Caregivers and SLPs recognized the emotional toll of parenting a child with DLD and the need for plain-language information. Although, caregivers prioritized emotional support while SLPs focused on sharing information. These mismatched foci likely hinder collaboration between families and clinicians. Participants in both groups also cited low familiarity with "DLD" as a diagnostic label. These data suggest that SLPs must strengthen their capacity in supporting caregivers' emotional needs, as well as their own knowledge of DLD as a diagnostic label. These data also underscore the need for easily accessible parent-friendly communication around DLD.

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