

SEEING THE WORLD THROUGH THEIR SENSES

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The internship at KidSense Therapy Group in Danbury, Connecticut, provided an opportunity to explore pediatric physical therapy within a multidisciplinary clinic assisting diverse developmental needs. **PURPOSE:** This project focused on children diagnosed with Autism Spectrum Disorder (ASD), aiming to bridge the gap between clinical interventions and home-based care. **METHODS:** The project was a combination of observational learning, hands-on experience, literature review, and therapist interviews. Time spent in therapy sessions allowed for direct insight into the challenges and strategies used in pediatric physical rehabilitation for children with ASD. Scientific research was conducted to understand neurological differences in the hippocampus and amygdala that contribute to emotional regulation and interaction difficulties. Based on these findings, educational posters using Canva were designed to be visually engaging, using bright colors and images suitable for a pediatric setting. I translated them in Spanish and Portuguese to reflect the diversity of the clinic's clientele, ensuring that families from different backgrounds could understand the content. **OUTCOMES:** The educational posters were displayed in the clinic's lobby and received enthusiastic feedback from both therapists and families. Parents expressed appreciation for the inclusive language options and the clarity of the information presented. Therapists noted that the materials helped initiate meaningful conversations with caregivers about neurodiversity, behavior management, and the importance of physical activity in supporting emotional and physical well-being. The posters also emphasized the value of consistent communication between therapists and families, highlighting how shared updates on a child's interests, progress, or regressions can enhance therapeutic outcomes. The project fostered a collaborative environment where caregivers felt more informed and involved in their child's care. **CONCLUSION:** This project underscored the critical role of culturally responsive education in pediatric therapy settings. By integrating neuroscience, therapist expertise, and inclusive communication the initiative supported both clinical goals and family empowerment. The experience reinforced the viewing of autism not as a deficit but as a variation in neurodevelopment, deserving understanding and respect. Through this project, I did not only contributed resources to the clinic but also the experience deepened my own understanding of neurodiversity and the holistic nature of physical therapy in supporting children with ASD.

ACUTE EFFECTS OF CYCLING MODALITY AND INTENSITY ON EXECUTIVE FUNCTION IN PARKINSON'S DISEASE

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Individuals with Parkinson's Disease (PD) experience significant motor and neurocognitive impairments. Stationary cycling is a safe aerobic exercise that supports cardiometabolic and brain health in PD, but the optimal modality and intensity remain unclear. Active-assisted (AA) cycling might be an optimal modality to improve health outcomes in individuals with limited motor function compared to Recumbent-Bike (RB) cycling. Additionally, exercise intensities that are prescribed according to heart rate calculations can produce differential outcomes compared to intensities that are self-selected. **PURPOSE:** This study investigated the effects of acute cycling interventions on neurocognitive function in PD, compared to healthy older adults (HOA), with particular emphasis on identifying optimal cycling modalities and intensities for brain health. **METHODS:** 21 older adults (HOA=10; PD=11), aged 63.5±8.8 years (HOA=58.6±6.7 years; PD=67.9±8.3 years), completed a baseline assessment and four randomized 25-minute cycling sessions: AA-1 and RB-1 at 65-70% of age-predicted heart rate max (Tanaka formula), and AA-2 and RB-2 at 12-13 on the Borg Rate of Perceived Exertion scale. Event-related potentials (ERPs) were recorded via electroencephalography during an auditory oddball task post-exercise and extracted from regions of interest (ROI) within a 400 to 700 ms time window reflective of the P3 component. A mixed-design MANOVA examined effects across group (HOA, PD), modality and intensity sessions (AA-1, RB-1, AA-2, RB-2), cognitive task condition (standard, deviant, difference), and ROI (midline, fronto-central, central, central-parietal, and parietal), with Tukey-adjusted post hoc comparisons for significant interactions. **RESULTS:** A significant interaction was observed for group x exercise session x task condition x ROI ($F(24,456)=1.62, p=0.03$). Post hoc comparisons revealed PD participants had higher P3 amplitudes than HOA for the fronto-central ROI at the AA-2 session (HOA=0.81μV±1.76μV, PD=2.02μV±1.68μV, $p=0.04$) and the central-parietal ROI at the baseline session (HOA=0.95μV±1.67μV, PD=2.13μV±1.59μV, $p=0.04$). **CONCLUSIONS:** Active-assisted cycling interventions at self-selected intensities (AA-2) may enhance cognitive processing in individuals with PD, as evidenced by increased P3 amplitude. These findings suggest that incorporating motorized assistance and perceived exertion-based intensity into exercise interventions may optimize neurocognitive outcomes in PD populations.

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WAIT...THERE'S A HILL? THE EFFECTS OF ANTICIPATED TASK DIFFICULTY ON PACING STRATEGY AND RUNNING PERFORMANCE

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Deception interventions can be a useful experimental tool for exploring the phenomenon of pacing and endurance performance. In this context, deception refers to researchers withholding task-relevant information, or providing inaccurate information about the task at hand, to assess the effect on pacing and performance. **PURPOSE:** To investigate the effects of incline deception on endurance performance, pacing, and psychophysiological variables in trained runners.

METHODS: Session 1 consisted of a $\text{VO}_{2\text{peak}}$ test and Session 2 was a baseline 3000 m time trial (TT) on the treadmill. For Session 3, participants ($N = 36$) were randomly allocated in equal numbers to one of three groups. Prior to the last TT, the Accurate Incline (ACC-I) group was correctly told the final 800 m would include a 7% incline. The Deceptive No-Incline (DEC-NI) group was told to expect a 7% incline but there was not one, while the Deceptive Incline (DEC-I) group was told to expect no incline but encountered a 7% incline in the final 800 m. **RESULTS:** No significant differences were found in pre-task assessments of anticipated task difficulty and state motivation across groups ($ps > 0.05$). There was no significant difference in time to completion (TTC) between groups across segments ($ps > 0.05$). Relative Running Speed (RRS) differed across groups: at 2200 m, the ACC-I group ran significantly slower than both the DEC-I and DEC-NI groups; in the final 800 m, both incline groups were slower than the no-incline group; and across the full 3000 m, RRS was lowest in ACC-I, followed by DEC-I, and highest in DEC-NI (all $ps < .05$). Heart rate, perceived effort, and affective valence, did not differ between groups. Cohen's kappa revealed no agreement between planned and executed pacing strategies: ACC-I ($\kappa = -0.02$), DEC-I ($\kappa = 0.06$), and DEC-NI ($\kappa = 0.16$; all $ps > .05$). In the first 1000 m, the most common attentional strategies reported across all groups were pacing and relaxing but varied across groups for other segments. **CONCLUSION:** Future research should continue to explore whether runners' pacing strategy is influenced by deceptive information in a real-world setting such as a cross-country course.

THE IMPACT OF EXERCISE IN THE HEAT ON LACTATION PERFORMANCE IN LACTATING WOMEN

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PURPOSE: to determine whether acute exercise in the heat alters 24-hr breastmilk production and composition among lactating women. **METHODS:** Seven participants (34 ± 5 yrs, 163.7 ± 4.8 cm, 66.7 ± 3.0 kg, 25.0 ± 14.2 weeks postpartum) completed the study. Participants were eligible if they were breastfeeding (6-week to 12-month infants), aged 18-45 years old, and delivered between 37 and 42 weeks. The study was a randomized, crossover design with three visits: 1) baseline and metabolic heat production testing; 2) acute exercise in the heat (HOT; 36°C , 40% relative humidity[RH]), and 3) acute exercise in a thermoneutral environment (THERM; 20°C , 20%RH). Participants walked for 60 minutes at 8 watts per total body weight (W/kg; 3.0-4.1 mph). Core temperature (T_{core}), Skin temperature (T_{sk}), and heart rate (HR) were measured during exercise. Lactation performance was assessed by logging lactation frequency (LF) and 24-hour breast milk production before (PRE24) and after (POST24) each trial using an infant scale. Breastmilk lipid ($\text{kcal} \cdot \text{dL}^{-1}$) and energy ($\text{g} \cdot \text{L}^{-1}$) composition was analyzed at PRE24, 1 hour post (POST1), and POST24 exercise via the creatatocrit technique. Statistical analyses were performed using paired t-tests and repeated measures analysis of variance. Data are presented as mean $\pm$ standard deviation. **RESULTS:** Max T_{core} and T_{sk} ($^\circ\text{C}$) were higher in HOT ($T_{\text{core}}: 38.25 \pm 0.60$, $T_{\text{sk}}: 35.9 \pm 0.4$) compared to THERM ($T_{\text{core}}: 37.79 \pm 0.33$, $T_{\text{sk}}: 31.62 \pm 1.31$; $p=0.045$, $p<0.001$, respectively). Max HR (bpm) was higher in HOT ($p=0.012$). Total milk production (mL) and LF (feeds) did not differ between HOT (milk production, LF: PRE24= 648.1 ± 275.1 mL, 6 ± 1 ; POST24= 618.1 ± 357.1 , 6 ± 2) and THERM (milk production, LF: PRE24= 774.3 ± 381.9 , 7 ± 2 ; POST24= 707.5 ± 300.3 mL, 7 ± 2). There were no differences in breastmilk lipid content between HOT (PRE24= 46.05 ± 16.90 , POST1= 35.14 ± 12.48 , POST24= 43.69 ± 9.96) and THERM (PRE24= 38.89 ± 18.56 , POST1= 33.64 ± 21.08 , POST24= 32.75 ± 19.67 ; $p=0.969$). There were no differences in breastmilk energy content ($p=0.759$). **CONCLUSION:** Despite elevated thermoregulatory strain during exercise in HOT, acute exercise in the heat did not adversely affect lactation performance in lactating women.

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LEARNING TO FUEL, BUT NOT FOLLOWING THROUGH: RESULTS FROM THE FEMALE ENERGY DEFICIENCY (FED) PROJECT

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Relative Energy Deficiency in Sport (REDs) is a syndrome of impaired physiological and/or psychological functioning caused by low energy availability (LEA), or a mismatch between energy intake (EI) and exercise energy expenditure (EEE). REDs can lead to impaired health, well-being, and performance, particularly in female athletes. Education is the primary recommendation for REDs prevention to allow for early intervention and prevent long-term consequences. **PURPOSE** The purpose of this two-arm randomized controlled trial was to assess the efficacy of the Female Energy Deficiency (FED) Project on EA status, REDs risk, and LEA knowledge in elite female athletes. **METHODS** NCAA Division I female collegiate athletes (n=28, 18-23 years) were matched for age and sport type and randomized into FED Project (FED, n=15) or waitlist control (CON, n=13). Participants completed baseline and follow-up visits, including assessment of EA components, REDs risk, and LEA knowledge. The FED group participated in a 10-week self-paced online education intervention, with five 30-minute modules. A 2x2 mixed ANOVA was conducted to determine interactions between intervention groups (FED vs. CON) and time (baseline vs. follow-up). Post hoc analyses deconstructed main effects for group and time following significant interactions. **RESULTS** There was a significant group-by-time interaction for EEE [$F(1,25)=7.57$, $p=0.01$, partial $\eta^2=0.23$]. Pairwise post hoc comparisons revealed the FED group (585 ± 131 kcal), and CON group (737 ± 407 kcal) did not differ at baseline ($p=0.198$), nor follow-up (FED: 663 ± 156 kcal, CON: 549 ± 272 kcal, $p=0.187$), but there was a significant effect of time for CON group (-189 kcal), $F(1,12)=7.347$, $p=0.012$, partial $\eta^2=0.227$. The group-by-time interaction for LEA knowledge was significant [$F(1,24)=12.729$, $p=0.002$, partial $\eta^2=0.347$]. There was no difference in LEA knowledge between groups at baseline (FED: 17.09 ± 4.66 ; CON: 17.11 ± 5.35 , $p=0.76$) or follow-up (FED: 20.76 ± 3.65 ; CON: 17.72 ± 5.52 , $p=0.11$), but there was a significant effect of time for FED group ($+3.68$), $F(1,13)=28.324$, $p<0.001$, partial $\eta^2=0.541$. No group-by-time interactions for EA, EI, or REDs risk were observed. **CONCLUSION** Findings provide preliminary evidence that REDs education improves effective in improving LEA knowledge. Additional work is needed to better understand whether education interventions meaningfully reduces REDs risk.

REPRESENTATION OF ACTIVE GIRLS, WOMEN, AND FEMALE ATHLETES IN LOW ENERGY AVAILABILITY RESEARCH: A REVIEW

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More female athletes are participating in sports today than ever before, yet they remain underrepresented in sport and exercise science (SES) research. According to a 2021 review, 34% of SES research participants are females and just 6% of studies used female-only designs. Female athletes are also at an increased risk for low energy availability (LEA), or a mismatch between energy intake and exercise energy expenditure. However, the representation of women in research related to LEA remains unclear. **PURPOSE:** This study aimed to (a) evaluate the representation of girls, women, and female athletes in LEA research, and (b) explore methodological characteristics underpinning LEA research. **METHODS:** Following Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines, peer-reviewed LEA research articles published between 2014 and 2024 were identified using PubMed, CENTRAL, and ProQuest. The number of total participants (male/female), title, topic/focus, and methodological characteristics were recorded for each publication. ANOVA, independent t-tests, and Chi-square were used to compare sex counts across studies, sex-specific studies, and proportions of study population based on methodological characteristics, respectively. **RESULTS:** A total of 296 LEA publications including 34,833 participants were reviewed. There was a significant difference between the total number of female participants ($n=28,738$; 82.5%) and male participants ($n=6,080$; 17.5%) ($F(26,935,090,106)=97.426$, $p<0.001$). Overall, 56% of studies included females-only, 22% included males-only, and 22% included both sexes, demonstrating a female bias ($t(229)=2.20$, $p<0.001$, $d=0.32$). A significant association was found between sex-specific health topics and sex of the study population ($\chi^2(2,296)=58.61$, $p<0.001$), with 91.5% of female-only studies including female-specific topics. The majority of lead and senior authors of LEA publications were female (69% lead, 55% senior), followed by male (28% lead, 43% senior), and unidentified author sex (3% lead, 2% senior), contributing to a significant difference between the sex of the lead author and study population ($\chi^2(4,296)=12.36$, $p=0.02$). **CONCLUSION:** Findings from this review demonstrate that females make up a majority of participants in LEA research, which is in contrast to the general representation of females within the broader scope of SES research. Future efforts should be made to ensure an equal understanding of both sexes in LEA research.

“MIND THE GAP”: HOW A SIMPLE COACHING CUE AFFECTS LATERAL SHUFFLING PERFORMANCE IN ATHLETES

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Lateral movement (“shuffling”) is a fundamental motion in field and court sports, often used defensively. Coaches commonly employ verbal cues intended to enhance performance, but their actual biomechanical and performance effects remain unclear.

PURPOSE: This study examined whether a common coaching cue (1) produced the intended kinematic change and (2) improved shuffling performance. **METHODS:** Twelve multidirectional athletes (7 males, 5 females; age = 21.1 ± 0.7 yrs; height = 171.3 ± 9.0 cm; mass = 66.3 ± 11.1 kg) performed reactive lateral shuffles in response to a light stimulus (three trials per direction). Baseline trials instructed participants to “shuffle as fast as possible through the finish line.” After a 5-minute rest, participants repeated trials following the cue: “Don’t let your feet come together while shuffling.” Movements were recorded using a Sony RX0 II camera system, processed with Theia3D Markerless motion capture, and analyzed in Visual3D. Response to the coaching cue was reported as minimum heel distance (cm), while shuffling performance was measured as time to 2.5 m. **RESULTS:** Heel distance increased from 16.3 ± 7.0 cm to 25.4 ± 8.4 cm (right) and 18.2 ± 6.6 cm to 27.6 ± 9.3 cm (left), representing 61.8% and 51.2% increases, respectively. However, performance decreased: time to 2.5 m rose from 1.23 ± 0.13 s to 1.30 ± 0.09 s (right) and from 1.15 ± 0.10 s to 1.21 ± 0.08 s (left), showing 5.7% and 5.2% slower times ($p < 0.001$). Of 24 total trials, only one did not result in slower performance. **CONCLUSIONS:** The coaching cue successfully altered movement mechanics by preventing the feet from converging. However, in the acute setting, this adjustment hindered rather than enhanced performance, suggesting that immediate application of such cues may not yield faster lateral movement.

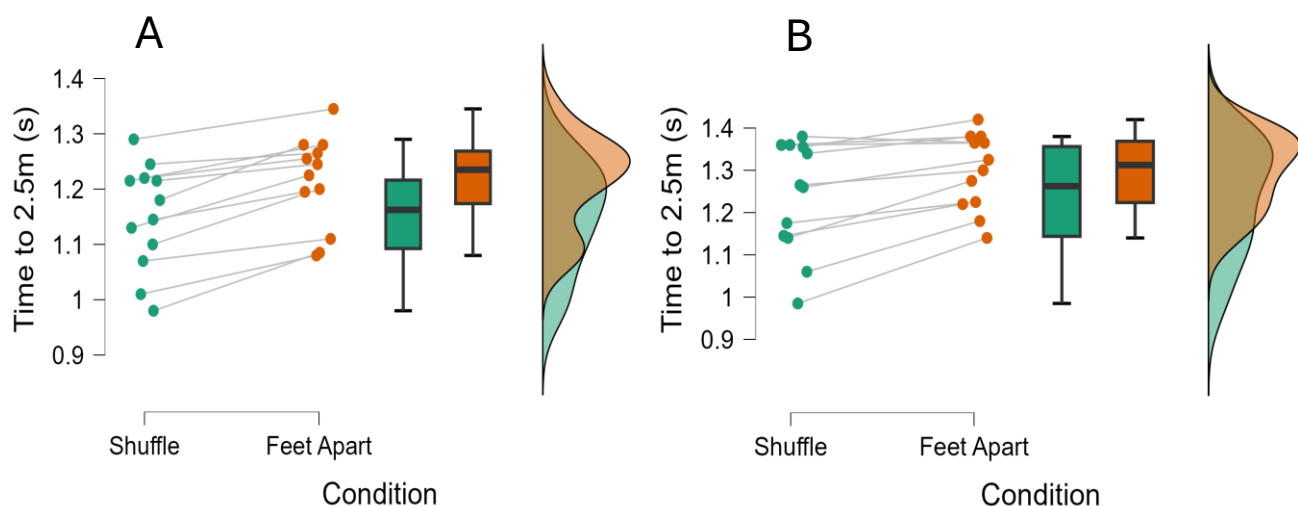


Figure 1. Raincloud plot visualizing time to 2.5m for movement to the right (A) and to the left (B) under the self-selected condition (Shuffle) compared to moving after the specific coaching cue (Feet Apart).

EFFECT OF SELF-TALK TRAINING ON PUTTING PERFORMANCE IN AMATEUR GOLFERS: A SYSTEATIC REVIEW AND META-ANALYSIS

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Mental toughness is one of the most important determining factors of a successful performance in golf. Psychological skills training is one approach commonly used to help improve both mental and physical performance in athletes. Self-talk is a common skill golfers employ to rework mental instructions constructively, leading to greater performance success. **PURPOSE:** The purpose of this systematic review and meta-analysis was to analyze the existing evidence regarding self-talk training as a psychological skill in amateur golfers and how it affects putting performance. **METHODS:** A systematic search of PubMed, SPORTDiscus, and Google Scholar was conducted in April 2025. Studies were included if they were experimental designs with a self-talk intervention that were published in English and included amateur golfers over 18 years old. A random-effects model estimated the heterogeneity and standardized mean difference across studies to observe an effect of self-talk training on putting performance. **RESULTS:** Seven studies were included in the final analysis. Self-talk training showed a statistically significant effect on improving putting performance in amateur golfers. The standardized mean difference of 1.00 indicates a relatively large intervention effect for self-talk training when compared to comparison/control groups of either a different type of self-talk than the exposure or a standard control group. **CONCLUSION:** This review suggests a high and beneficial effect of self-talk training on putting performance improvements in amateur golfers. The findings highlight the continued need for better access to psychological resources across all populations in golf to help improve performance recreationally. As the measurement for putting performance was different in each experiment included in this review, generalizability may be limited. Future studies should explore adding another psychological skill along with self-talk into their experiment to expand the possibility of effect on performance and observe how multiple skills could compound the impact on the golfer.

HYPOMETABOLISM IN ELITE JUNIOR FEMALE ATHLETES: A HIDDEN DRIVER OF METABOLIC DYSFUNCTION

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Female athletes can exhibit hypometabolism, resulting in sport performance decrements and a suppressed ovarian system. Although studies have investigated overtraining syndrome (OTS), few studies have closely examined hypometabolism as the driving agent of metabolic deficiencies. **PURPOSE:** We examined the metabolic and endocrine characteristics over a season in female athletes categorized by the measured-predicted resting energy expenditure ratio (RMR ratio). **METHODS:** Ten junior elite caliber female swimmers (15-17 yr) were evaluated across a 12-week season for the following parameters: glucose, insulin, cortisol, and β -hydroxybutyrate (β -HOB). Athletes were categorized into normal (NOR, RMR Ratio 0.95–1.05) or hypometabolic (HYP, RMR Ratio < 0.9) groups. Energy parameters have been reported in a previous publication. ANOVA and Tukey post-hoc was used ($p < 0.05$) to determine differences. **RESULTS:** HYP and NOR athletes were similar in age, body mass index, and gynecological age. In comparison to NOR athletes, HYP athletes exhibited higher cortisol concentrations at 0 (NOR=16.1+0.8; HYP=25.2+3.2 mcg/dl), 4 (NOR=16.4+1.2; HYP=23.1+2.6 mcg/dl), 6 (NOR=14.9+1.7; HYP=25.3+2.7 mcg/dl), and 12 (NOR=18.3+2.1; HYP=25.0+1.4 mcg/dl), with levels converging with NOR athletes during the mid-season intensity peak (weeks 8–10). HYP athletes had significantly lower insulin and glucose levels than NOR athletes across all time points. β -HOB concentrations in HYP athletes were elevated compared to NOR athletes at all time points ($p \leq 0.05$). **CONCLUSION:** The findings suggest that suppressed RMR ratio is associated with altered metabolic functions characterized by increased cortisol and β -HOB levels coupled with decreased insulin and glucose levels. The pattern reflects a catabolic, fasting-like state consistent with the hypometabolism literature in female athletes. The results highlight the need for early metabolic monitoring in elite female athletes to identify and address any deficiency before it negatively impacts the athlete. Future investigation is needed to understand the use of RMR ratio to identify hypometabolism in other populations.

THE RELATIONSHIP BETWEEN CORTISOL PATTERNS, PSYCHOLOGICAL MARKERS, AND PERFORMANCE IN ELITE SWIMMERS

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The hypothalamic-pituitary-adrenal (HPA) axis functions to allow athletes to prepare for competition. Researchers have described an elevated cortisol response prior to competition called the anticipatory response. Athletes who exhibit negative responses coupled with self-reported anxiety and stress can exhibit negative performance. **PURPOSE:** We examined the relationship between salivary cortisol patterns, perceived psychological status, and athletic performance. **METHODS:** Salivary cortisol was measured in 16 elite male and female swimmers at seven time points around competition (24pre, morning of [MO], 2hr pre, 20min pre, immediate post [IP], 2hr post, next morning post [MP]). Athletes self-reported fatigue, nervousness, muscle soreness, and stress at each time except IP. Based on salivary cortisol response, athletes were categorized into three groups: prolonged (PR: n=4), anticipatory (AN: n=6), and normal (NOR: n=6) groups. AN pattern exhibited substantial cortisol elevations prior to competition. NOR showed moderate elevations prior to competition, while PR maintained relatively normal pre-competition levels followed by significant elevated levels through the following morning. Swim performance was characterized by podium (1st, 2nd, or 3rd) achievement or not placing. ANOVA and post-hoc Tukey were used to determine significance ($p \leq 0.05$). **RESULTS:** Response patterns were 6 AN, 4 PR, and 6 NOR. Males made up 50% PR, 67% AN, and 50% NOR. AN reported the highest nervousness before competition. PR exhibited higher cortisol levels at MP and reported greater fatigue and muscle soreness before, and nervousness after, competition. Both PR and AN reported elevated stress compared to NOR prior to competition. Podium success percentage was 0% PR, 50% AN, and 83% in NOR. **CONCLUSION:** Athletes exhibited anticipatory, normal, and a prolonged cortisol response to competition. Perceived stress and nervousness were elevated prior to competition in AN and PR athletes. NOR athletes podium performance was better than the other groups which coupled with lower reported psychological markers. Routine evaluation of both psychological markers and cortisol may provide sport scientists information to assist athletes' performance.

PLANK TO STRIDE: EXPLORING THE LINK BETWEEN CORE ENDURANCE AND RUNNING BIOMECHANICS

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The trunk consisting of the thoracic and lumbar spine, acts as a dynamic stabilizer to maintain running efficiency and balance the body's angular momentum. Increased trunk motion has been postulated to heighten chances for running-related injury. Core endurance, specifically the lateral musculature, is often assessed using the side bridge (side plank) test. However, current literature suggests its relationship to dynamic trunk kinematics while running remains unclear. **PURPOSE:** This study aimed to examine whether side bridge performance was associated with trunk kinematics, specifically rotation and lateral flexion, during treadmill running in collegiate runners. A secondary aim was to establish normative percentile values for the side bridge within this athletic population. **METHODS:** Nineteen competitive collegiate runners (20.2 ± 1.5 yo, 1.72 ± 0.07 m, 63.6 ± 7.5 kg) were recruited. Each performed the side bridge endurance test, lying on their side with feet in tandem stance, top arm across the body, and lower arm under the shoulder. Participants maintained hip alignment off the ground until loss of alignment or voluntary termination. Video analysis (Kinovea) tracked a marker on the anterior iliac spine to detect postural deviation. Following testing, participants ran on a pressure-sensitive treadmill (Noraxon PhysTread, 100Hz) at three self-selected speeds. A nine-camera markerless system (Sony DSC RXO II; 120Hz) captured trunk kinematics and was analyzed using Theia3D and Visual3D software. Measures included bilateral trunk rotation (BTR) and lateral flexion (LF) at left and right foot contact. **RESULTS:** No significant correlations were found between side bridge duration and TR or LF (all $p > 0.05$). A moderate but non-significant trend was observed between average side bridge time and LF ($r = 0.401$, $p = 0.089$). Strong bilateral symmetry in TR ($r = 0.597$, $p = 0.007$) and total trunk motion ($r = 0.902$, $p < 0.001$). Normative data showed a median side bridge time of 74.5 seconds and median postural displacement of 4.95 px/s. **CONCLUSION:** The side bridge assessment was not significantly correlated with selected trunk kinematics during running. While the side bridge is useful for assessing lateral trunk endurance and establishing normative values, it may not adequately reflect the kinematics studied. Alternative dynamic assessments should be considered to assess core function and its relationship to running.

EFFECT OF ECCENTRIC TRAINING ON POWER AND LEG SPRING STIFFNESS IN TRACK AND FIELD ATHLETES

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Eccentric training enhances power and leg spring stiffness, but its long-term effects in trained athletes remain unclear. While some studies suggest lasting benefits, the reversibility of these gains has not been fully explored. **PURPOSE:** This study evaluated the effects of eccentric training on vertical jump performance, leg spring stiffness (reactive strength index, RSI), and 30-meter sprint speed (30m) in trained athletes. A secondary aim was to assess durability of gains 6 weeks after training. **METHODS:** 16 university athletes (18–23 years; sprinters $n=9$, jumpers $n=7$; males $n=9$, females $n=7$) volunteered. The experimental group ($n=11$) participated in a 5-week eccentric training program (2 sessions / week). Performance was assessed pre-training, 1-week post-training, and 6-weeks post-training. Vertical jump, RSI, and 30m sprint were analyzed using two-way repeated measures ANOVA. Self-reported stress-health scores monitored fatigue, and RSI asymmetry tracked potential injury risk. **RESULTS:** Eccentric training significantly improved vertical jump ($F(1,14)=6.797$, $p=.021$) and RSI ($F(1,13)=8.378$, $p=.013$). The experimental group improved vertical jump by 2.82 cm (5.3%) versus 0.6 cm (1.3%) in controls. RSI increased 14.2% in the experimental group, while controls decreased 10.3%. No significant changes occurred in 30m sprint ($F(1,14)=.567$, $p=.464$). All gains disappeared by 6 weeks post-training, consistent with the principle of reversibility. **CONCLUSIONS:** A short-term eccentric training program can enhance vertical jump and leg spring stiffness in trained athletes, translating into measurable track and field performance improvements. However, these gains were not sustained, underscoring the need for ongoing eccentric training throughout the season. Practical tools such as self-reported stress-health scores and RSI asymmetry tracking also proved valuable for monitoring training load and injury risk. Future research should examine longer interventions, sex-specific responses, and strategies to maintain performance during breaks.

A CALL TO ACTION: IDENTIFYING CONTRIBUTORS OF HEALTHY AGING IN FEMALE ATHLETES

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Understanding mechanisms of healthy aging inform us about actions we can take to better our chances of experiencing a long, healthy lifespan. Aging research considers how youth lifestyle factors facilitate healthy aging and increase healthspan within the general population. Healthspan is defined as the duration of maintained high quality of health. Inflammaging, a theory describing age-related upregulation of the inflammatory response, leads to low-grade systemic chronic inflammation (LSCI). LSCI has been used to identify contributors of unhealthy aging as it weakens the immune system and promotes the onset of non-communicable diseases (e.g. osteoarthritis) through damage of surrounding tissues and organs. As females make up half of all athletes, their increased susceptibility to early life events due to hormonal influences, sport engagement, and societal pressures may compromise their healthspan. **PURPOSE:** The purpose of this independent study was to determine what is currently known about inflammaging for female athletes and to highlight the actions necessary to improve the understanding of healthspan and longevity within this population. **METHODS:** Based on known information of healthspan and longevity in male athletes, I conducted a literature review to identify early life events that may trigger the onset of LSCI in female athletes. Databases such as Google Scholar and Embase were used with guiding key words including healthspan, inflammation, and early life events. **RESULTS:** Information detailing the impact of LSCI and early life events in female athletes were largely absent from the literature, though elite male athletes displayed higher levels of anti-inflammatory markers compared to males at lower performance levels. Healthspan and longevity have been quantified through athletic performance and career length in male athletes but not reported amongst female athletes. **CONCLUSION:** My independent study inspired my “Call to Action.” The review of the literature revealed a substantial under-representation of female athletes, highlighting gaps in understanding aging differences that are attributed to biological sex. Recognizing the mechanisms that negatively impact healthspan in female athletes is critical in counteracting risk factors that reduce healthspan. Research within female athletes is essential as a first step to discovering ways in which experts can bridge this knowledge gap.

THE BENEFICIAL EFFECTS OF PHYSICAL ACTIVITY ON ACADEMIC OUTCOMES: CONSIDERATIONS FOR ADHD

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Childhood Attention-deficit/hyperactivity disorder (ADHD) is a neurodevelopmental condition marked by inattention and hyperactivity, leading to difficulties in reading comprehension, vocabulary development, and overall academic performance. While moderate-to-vigorous physical activity (MVPA) during childhood is positively correlated with academic achievement, its role in children with varying ADHD symptom profiles remains unclear. **PURPOSE:** This study aimed to investigate the association between physical fitness and academic achievement in children with ADHD (ADHD), undiagnosed but symptomatic of ADHD (SYM), and neurotypical (NT) children. **METHODS:** Cross-sectional data were collected from 84 children aged 6-17 years (N: ADHD=35, SYM=29, NT=20). A multivariate analysis of covariance (MANCOVA) was conducted to examine group differences in academic and oral language performances. Dependent variables included standardized scores from the Woodcock-Johnson IV (WJ-IV) academic and oral language subtests. Time spent in MVPA was measured using wrist-worn Actigraph accelerometry worn continuously over 7 consecutive days, and daily average MVPA time was included as a covariate in the MANCOVA model. Tukey-adjusted post hoc comparisons were performed for significant effects. **RESULTS:** MANCOVA revealed a significant effect of ADHD category on WJ-IV outcomes (Wilks' $\Lambda = 0.54$, $F(20,96)=1.73$, $p=0.04$). Post hoc comparisons showed that NT children scored significantly higher than children with ADHD on the WJ-IV word attack (NT=114.0 $\pm$ 14.0, ADHD=101.8 $\pm$ 13.8, $t=2.52$, $p=0.04$) and passage comprehension (NT=108.1 $\pm$ 12.9, ADHD=96.2 $\pm$ 15.8, $t=2.51$, $p=0.04$) subtests. All other comparisons did not reveal statistically significant pairwise differences ($p's > 0.05$). **CONCLUSIONS:** When controlling for MVPA, NT children still performed better than children with ADHD on reading and comprehension tasks, suggesting that MVPA may be associated with language-oriented academic performance across ADHD symptom profiles. These findings underscore the potential value of promoting MVPA as a modifiable factor to support language development in children with attentional difficulties. Future analyses should also consider continuous ADHD symptoms and subtypes (e.g., inattention, hyperactivity, impulsivity) to better capture individual differences. Applying multivariate models that also include fitness and body composition could help clarify the unique contribution of critical childhood health factors to academic and oral language performance.

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MOTOR CORTEX ACTIVITY INTERFERES WITH POSTURAL CONTROL WHILE SPEAKING DUE TO DUAL TASK COSTS

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In sports therapy, it is common to use “talking while walking” as a form of control for training load. However, performing multiple tasks simultaneously may negatively impact an individual’s performance in one or more of the tasks, i.e. dual task costs (DTC). In fact, speaking while balancing is shown to increase postural sway. Speaking about movement may interfere with postural control as it particularly activates the motor cortex. Motor imagery training instead is shown to improve postural control and activate fronto-parietal brain areas. **PURPOSE:** The purpose of this study was to investigate the hypothesis that postural sway and motor cortex activation increases during verbal description of a motor task when compared to motor imagery. **METHODS:** Forty-one right-handed healthy participants (25.9 ± 6.8 years; 25 women, 16 men) controlled posture while either (I) imagining or verbally describing maze navigation from an (II) egocentric or allocentric perspective in a block design (two blocks of each condition combination; four trials per block). Postural sway area (m^2/s^4) was recorded by a wearable Inertial Measurement Unit (IMU) sensor. Brain oxygenation was collected using functional Near InfraRed Spectroscopy (fNIRS) above the frontal, motor, and parietal cortices of both hemispheres. **RESULTS:** Postural sway significantly increased during verbal descriptions ($0.057 \pm 0.059 \text{ m}^2/\text{s}^4$) when compared to imagery conditions ($0.038 \pm 0.024 \text{ m}^2/\text{s}^4$; $p < 0.001$). ΔHbO_2 significantly increased within the motor cortex during verbal descriptions when compared to imagery conditions ($p < 0.01$). **CONCLUSIONS:** Increased postural sway during verbal descriptions indicates that speaking about movement interferes with the simultaneous control of posture. The increased activity within the motor cortex accompanying verbal descriptions suggests that motor-cognitive components of postural control and speaking are processed within the motor cortex, which may induce DTC. Knowing that “talking while walking” may increase the risk of falls should be taken into consideration when applying sports therapy to individuals with impaired motor functions.

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EXPLORING DIFFERENCES IN ENERGY AVAILABILITY BASED ON PRESCRIBED TRAINING INTENSITY IN FEMALE ATHLETES

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Low energy availability (LEA) is a mismatch between dietary energy intake (EI) and exercise energy expenditure (EEE) leaving the body's total energy needs unmet; therefore, there is insufficient energy to support optimum physiological function. Previous research demonstrates that athletes may be at greater risk for LEA during periods of intensified training. **PURPOSE:** The purpose of this study was to investigate difference in energy availability (EA) components (EI, EEE, EA) and macronutrient intake (carbohydrates [CHO], protein [PRO], fat [FAT]), based on prescribed training day intensity (low- vs. high-intensity). **METHODS:** A mixed sport cohort of Division I collegiate female athletes (n = 30; 18-23 years) completed prospective dietary records and accelerometer wear for two days based on subjective training intensity (e.g., high- vs. low-intensity). Gatorade Sports Science Institute (GSSI) Dietary Analysis Tool for Athletes was used to assess dietary data. EEE was calculated based on metabolic equivalent of tasks and counts per minute collected from the wrist-worn accelerometer. Dual-energy X-ray absorptiometry (DXA) assessed fat-free mass (FFM). EA was calculated as: $EA = (EI - EEE)/FFM$. Repeated measures ANOVA was conducted to examine differences in EA components (EI, EEE, EA) and macronutrient intake (CHO, PRO, FAT), between high- and low-intensity training days. **RESULTS:** Overall, average EA was 40.13 ± 13.698 kcal/kg FFM/day on a low-intensity training day and 36.37 ± 16.512 kcal/kg FFM/day on a high-intensity training day. EEE was significantly greater on a high-intensity training day (768 ± 454 kcal) compared to a low-intensity training day (552 ± 311 kcal) ($F(1,30)=5.41$, $p=0.03$, $\eta^2=0.16$). There was no significant difference in EI ($F(1,30)=0.17$, $p=0.68$, $\eta^2=0.01$) or EA ($F(1,30)=2.24$, $p=0.15$, $\eta^2=0.07$) based on training day intensity. There were no significant differences in macronutrient intake between intensity conditions (all $p > 0.05$). **CONCLUSIONS:** Overall, EI, EA, and macronutrient intake did not change based on prescribed training intensity in female collegiate athletes. Data suggests that female athletes exhibit LEA (e.g., $EA < 45$ kcal/kg FFM/day) regardless of training prescribed. This contrasts with current literature, which suggests that athletes are at greater risk for LEA during high-intensity training days or competition periods. As such, efforts should be made to promote adequate nutrition, regardless of prescribed training day.

RUNNING HOT: THERMAL STRAIN AND CARDIAC BIOMARKER ELEVATION IN MARATHON RUNNERS

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Marathon running is increasingly popular but places significant stress on the cardiovascular system. Post-race elevations in the cardiac biomarkers B-type natriuretic peptide (BNP) and cardiac troponin I (cTnI) are well-documented, yet the physiological drivers remain unclear. Core body temperature may play a key role in modulating these responses, suggesting a link between thermal strain and cardiac stress during endurance events. **PURPOSE:** This study evaluated changes in BNP and cTnI in marathon runners and investigated their relationship with estimated core body temperature. **METHODS:** A prospective cohort of 23 runners enrolled in the 2017 Hartford Marathon was recruited (11 male, 12 female; mean age 39.8 ± 10.1 years). Participants wore Zephyr BioHarness devices during the race to monitor heart rate and estimated core body temperature. Blood samples were collected 16 hours pre-race (PRE), immediately post-race (IPOST), and 16 hours post-race (POST16) and analyzed for BNP and cTnI. Twenty-one participants completed both the race and biospecimen collection and were included in the final analysis. Pearson correlations examined associations between physiological temperature features (average, total, peak, variance) and biomarker changes adjusted for sex, age, BMI, baseline temperatures, baseline biomarkers, and race time. **RESULTS:** cTnI rose from undetectable at PRE to 0.043 ± 0.04 ng/mL at IPOST, then declined to 0.012 ± 0.01 at POST16. BNP increased from 40.33 ± 31.29 pg/mL at PRE to 138.82 ± 84.91 at IPOST, remaining elevated at POST16 (124.79 ± 99.61). All runners experienced elevated core body temperature ($101.72 \pm 0.89^\circ\text{F}$), with an average rise of $3.49 \pm 1.37^\circ\text{F}$ above their baseline. Peak core temperature was positively correlated with IPOST cTnI ($r = 0.350$, $p = 0.120$), and temperature variance was positively correlated with cTnI at IPOST ($r = 0.530$, $p = 0.014$) and POST16 ($r = 0.322$, $p = 0.155$). **CONCLUSION:** Variability and peaks of core body temperature emerged as strong predictors of elevated cTnI levels, indicating that thermal variability may serve as a key biomarker of cardiac stress in endurance athletes. Implementing protocols to monitor core temperature, including variance, during endurance training could prove useful for risk mitigation.

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PHYSICAL ACTIVITY PROTECTS AGAINST DEPRESSION SYMPTOMS DURING CHILDHOOD ADHD

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Physical activity (PA) is increasingly recognized as a protective and modifiable factor against mental health difficulties. Children with Attention-Deficit/Hyperactivity Disorder (ADHD) are at elevated risk for co-morbid mental health concerns. However, little is known about how PA impacts mental health within this population. **PURPOSE:** Evaluate the extent to which PA and sedentary behavior (SB) contribute to depressive and anxiety symptoms among children with varying ADHD profiles. **METHODS:** 60 participants, ages 6-17 years (10.68 ± 2.88), completed laboratory assessments of body composition (body fat %) and fitness (VO_{2max}). Fat-free fitness ($ml/kg_{lean}/min$) was calculated. 7-day accelerometry was averaged into mins/day to capture light PA (LPA), moderate-to-vigorous PA (MVPA), and SB. Mental health (depression, anxiety) was assessed using standardized self-report questionnaires (Children's Depression Inventory; State-Trait Anxiety Inventory for Children). ADHD was assessed via self-report ADHD Rating Scale IV. Hierarchical linear regression analyses, controlling for age and sex (step 1), were conducted to examine the effects of body fat, fat-free fitness, LPA, MVPA, and SB (step 2), on depressive and anxiety symptoms. **RESULTS:** Approximately 68.33% of the sample had ADHD symptoms. Regression analyses for depression yielded significant changes in R^2 (adj. $R^2 = .61$, $F(7,52) = 14.18$, $p < .001$), with LPA ($\beta = .32$, $p < .01$) and MVPA ($\beta = .61$, $p < .001$) as significant predictors. Girls initially showed higher depressive symptoms ($\beta = 0.01$, $p < .05$), but this effect was attenuated in step 2, suggesting that PA might ameliorate this effect. No significant predictors or models were found for anxiety. **CONCLUSION:** These findings suggest that PA may protect against depressive symptoms during childhood ADHD. No predictors were associated with anxiety, suggesting specificity to depression. Furthermore, results indicate that girls report higher levels of depressive symptoms, but engagement in PA may offset this vulnerability, highlighting the importance of physical activity in supporting mental health, specifically for adolescent girls. Future work should consider this approach within a 24-hour movement framework.

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BLOOD PRESSURE VARIABILITY DURING ISOMETRIC EXERCISE OF DIFFERENT INTENSITIES IN HEALTHY YOUNG ADULTS

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Blood pressure variability (BPV) is a metric used to predict cardiovascular risk and end-organ damage. Beat-to-beat BPV has been assessed during resting conditions but has received less attention during physiological stress, such as isometric exercise. Both systolic blood pressure (SBP) and diastolic blood pressure (DBP) increase during isometric exercise. However, BPV during isometric exercise and during different isometric exercise intensities in healthy young adults is unknown. **PURPOSE:** The purpose of this study was to assess BPV during isometric exercise of different intensities in healthy young adults. **METHODS:** Ten healthy young adults (mean age 22 ± 3 years; 3 females/7 males) attended four lab visits in a randomized order. In each visit, participants rested for a 5-minute baseline period. Ten seconds before the end of baseline, a cuff around the right thigh was inflated to cause limb circulatory occlusion. Participants then performed 1.5 minutes of 30%, 50%, or 70% maximal voluntary contraction isometric right leg plantarflexion or rested for 1.5 minutes (0% control trial). SBP, DBP, and mean arterial blood pressure (MAP; photoplethysmogram) were continuously recorded. BPV was assessed using standard deviation (SD), range, coefficient of variation (COV), interquartile range (IQR), and average real variability (ARV). Two-way repeated measures ANOVAs with Šídák's post-hoc tests were used to analyze for time, intensity, and interaction effects. **RESULTS:** SD was higher during exercise of greater intensities for SBP (interaction $P < 0.0001$; range of means 6.85 ± 2.19 - 19.93 ± 5.64), DBP (interaction $P < 0.0001$; range of means 3.67 ± 1.51 - 14.49 ± 4.51), and MAP (interaction $P < 0.0001$; range of means 4.22 ± 1.78 - 15.97 ± 4.43) compared to baseline (range of means: SBP 7.22 ± 1.58 - 9.21 ± 2.81 , DBP 3.49 ± 0.85 - 4.76 ± 0.91 , and MAP 4.29 ± 0.99 - 5.69 ± 1.41). Range, COV, and IQR produced similar statistical results. ARV was lower during the rest/exercise phase for SBP (time $P = 0.0045$; range of means 2.03 ± 0.56 - 2.64 ± 1.30) and MAP (time $P = 0.0359$; range of means 1.15 ± 0.34 - 1.82 ± 0.81) compared to baseline (range of means: SBP 2.50 ± 0.64 - 3.04 ± 0.91 and MAP 1.34 ± 0.21 - 1.79 ± 0.39). **CONCLUSION:** In healthy young adults, BPV reflected as SD was higher during greater-intensity isometric exercise compared to baseline, whereas BPV reflected as ARV was lower during the rest/exercise phase compared to baseline.

MEETING SLEEP AND PHYSICAL ACTIVITY GUIDELINES: IMPLICATIONS FOR EXECUTIVE DYSFUNCTION IN CHILDHOOD

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Attention-Deficit/Hyperactivity Disorder (ADHD) affects 11.4% of school-aged children and is associated with executive function difficulties. Adherence to recommended sleep durations (e.g., 9-11 hours for children and 8-10 hours for adolescents) and daily engagement in at least 60 minutes of moderate-to-vigorous physical activity (MVPA) has been associated with improved ADHD symptoms. However, their interactive effects remain underexplored. **PURPOSE:** This study examined the interactive effects of meeting sleep and physical activity (PA) guidelines on executive dysfunction in children with varying ADHD profiles. **METHODS:** Cross-sectional data were collected from a pediatric sample (N=76, F=39, aged 10.27±2.90 years). Assessments included demographics, self-reported ADHD symptoms (ADHD Rating Scale IV), Body Mass Index (BMI), MVPA time obtained via Actigraph accelerometry, self-reported sleep duration obtained via Pittsburgh Sleep Quality Index (PSQI), and parent-reported executive dysfunction (Behavior Rating Inventory Executive Function [BRIEF] total and subdomain t-scores). Sleep and PA guideline adherence were categorized by age-specific recommendations. Multiple linear regressions examined the interactive effects of sleep and PA guideline adherence on executive dysfunction outcomes, controlling for age and BMI. **RESULTS:** Approximately 72.37% of the sample had ADHD symptoms. For executive dysfunction, significant R^2 changes were observed for self-monitoring (adj- R^2 =0.16, $p \geq .01$), shifting (adj- R^2 =0.14, $p = .01$), initiating (adj- R^2 =0.12, $p = .02$), planning/organizing (adj- R^2 =0.12, $p = .02$), and total BRIEF t-scores (adj- R^2 =0.11, $p = .03$). Sleep guideline adherence predicted fewer difficulties in self-monitoring (β =-2.51, $p \geq .01$), shifting (β =-4.58, $p \geq .01$), initiating (β =-2.66, $p \geq .01$), planning/organizing (β =-4.29, $p = .01$), and BRIEF total t-scores (β =-29.59, $p \geq .01$). MVPA guideline adherence predicted fewer difficulties in shifting (β =-4.68, $p = .04$). The interaction between sleep and MVPA guideline adherence was positively associated with difficulties in self-monitoring (β =3.64, $p = .02$), shifting (β =6.33, $p = .02$), initiating (β =3.56, $p = .04$), and BRIEF total t-scores (β =48.86, $p = .02$). **CONCLUSIONS:** Sleep adherence independently predicted lower dysfunction across these domains, as well as planning/organizing, underscoring its broad cognitive relevance, while MVPA adherence uniquely predicted fewer shifting difficulties. However, their interaction was unexpectedly associated with greater dysfunction, thus the interaction term may not be a viable methodological approach for this model. Future models should consider adding remaining movement behaviors to the model to account for this variance. Findings highlight the independent roles of sleep and PA in managing cognitive challenges.

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BMI VS. BODY COMPOSITION ANALYSIS: IMPLICATIONS FOR OBESITY CLASSIFICATION IN MIDDLE-AGED WOMEN

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Body Mass Index (BMI) is calculated based on an individual's height and weight and is commonly used to identify weight-related health risks by clinicians. However, BMI does not directly measure body composition, leading to concerns in its ability to accurately determine health status. Individuals with excessive body fat may be misclassified as normal weight based on BMI but have excess body fat (>30%) – a classification known as normal weight obesity (NWO). Individuals with NWO may be at risk for inadequate screening for chronic disease and subsequent treatment. **PURPOSE:** Examine the prevalence of obesity defined by BMI (≥ 30 kg/m²) and NWO among a sample of middle-aged women. **METHODS:** Data was collected from 106 middle-aged women (aged 53.01 $\pm$ 6.20 yrs). BMI was calculated using the standard formula: BMI = weight (kg)/height (m)². Body composition was assessed with dual-energy X-ray absorptiometry (DXA) to determine percent body fat (%BF). Conventional BMI classifications were used: normal weight (NW; 18.5–24.9 kg/m²), overweight (OW; 25.0–29.9 kg/m²), or obese (OB; ≥ 30.0 kg/m²). %BF was used to classify participants as lean (L; <30%) or obese (O; $\geq 30\%$). Participants were categorized into one of four groups based on BMI + %BF status: NWL, NWO, OWO, and OBO. Independent samples t-tests (between NWL and NWO) and Pearson's correlations were performed. **RESULTS:** Based on BMI: 45.3% of participants were normal weight, 34.9% overweight, and 19.8% obese. Based on %BF: 85.8% were classified as obese. According to BMI + %BF status, 14.2% were classified as NWL, 31.1% as NWO, 34.9% as OWO, and 19.8% as OBO. BMI and %BF were only significantly correlated in the OWO group ($r=.373$, $p=.02$). NWO participants were significantly older than NWL ($p=.04$). **CONCLUSIONS:** BMI alone underestimates obesity prevalence compared with %BF measured using DXA. The combined use of BMI and %BF identifies a group of women who are normal weight but overfat and may be at increased risk for obesity-related chronic conditions. Additional research in middle-aged women is warranted as age, a non-modifiable factor, is associated with NWO; identification of modifiable lifestyle factors is an important next step at reducing risk for chronic conditions among those with NWO.

DIFFERENCES IN ECHO INTENSITY BETWEEN YOUNG AND OLD ADULTS AND AGE-SPECIFIC RELATIONSHIPS TO MUSCLE STRENGTH

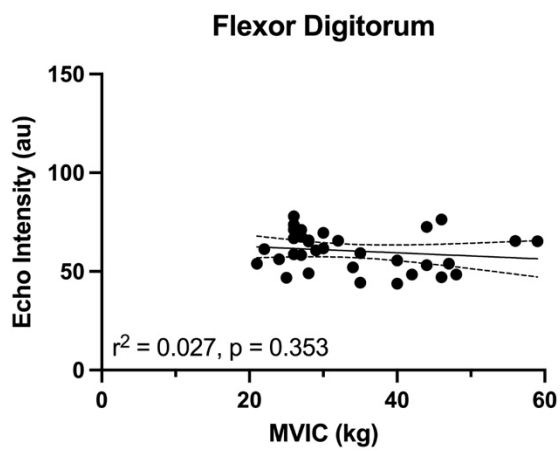
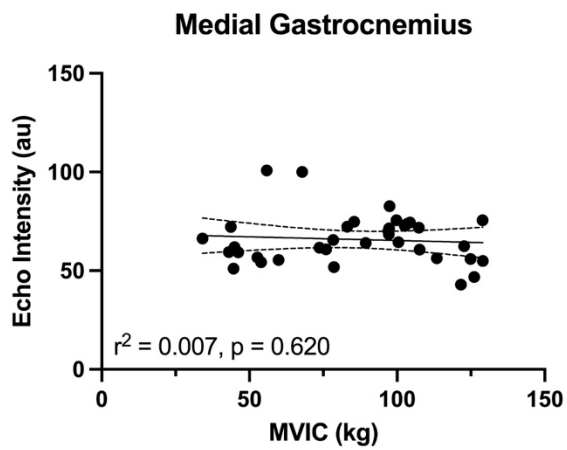
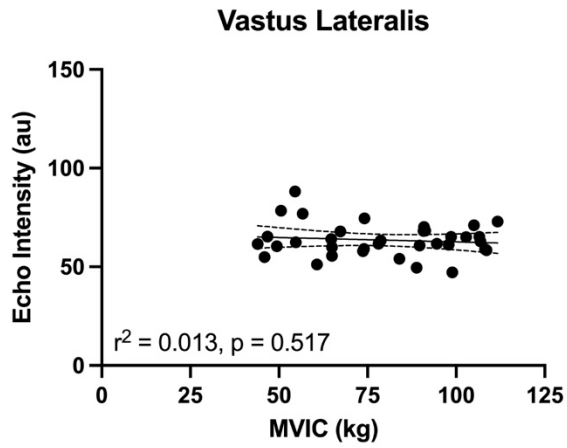
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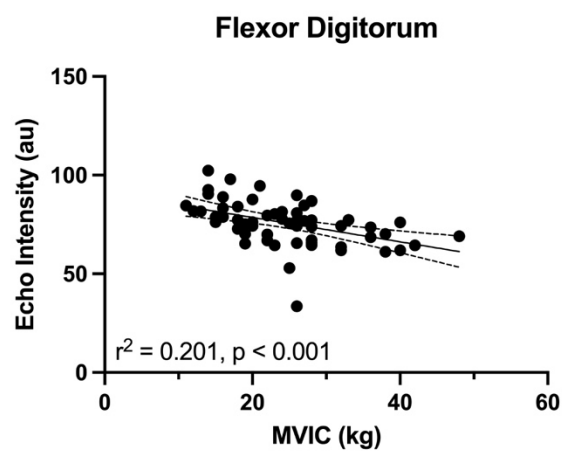
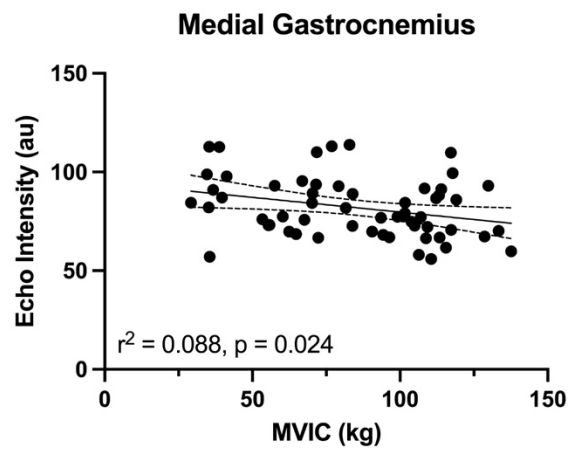
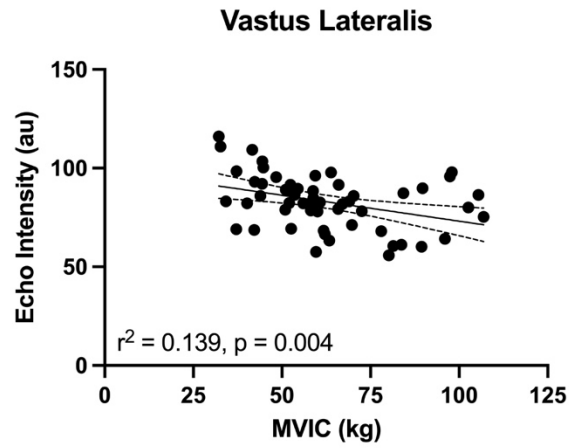
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Ultrasound echo-intensity (EI) has been proposed as a marker of muscle quality given its positive associations with muscle adiposity, fibrotic tissue, and intracellular dehydration. While previous studies have found an inverse relationship between EI and muscle strength in older adults, these studies have not compared such associations across different muscles or age groups. **PURPOSE:** To investigate age-related differences in EI of three commonly studied muscles (vastus lateralis: VL, medial gastrocnemius: MG, and flexor digitorum: FD) and their age-specific relationships with joint strength. **METHODS:** Forty-nine younger (22-44 years, n=18) and older (≥ 65 years, n=31) adults enrolled in the HVAC study had bilateral ultrasound images taken of their VL, MG, and FD from which EI was measured on a 0-255 grayscale. Afterwards, knee extension, plantarflexion, and grip strength were measured bi-laterally via maximum voluntary isometric contractions (MVIC). Age-group comparisons were made using Welch's t-tests, and muscle-specific associations between EI and MVIC were investigated via simple linear regressions. **RESULTS:** EI was significantly greater in older adults across all muscle groups: VL (Young: 63.87 ± 8.56 AU, Old: 83.17 ± 13.08 AU, $p < 0.001$), MG (Young: 65.35 ± 12.35 AU, Old: 81.93 ± 14.66 AU, $p < 0.001$), and FD (Young: 60.42 ± 9.59 AU, Old: 75.80 ± 11.12 AU, $p < 0.001$). In older adults, EI was inversely related to MVIC in all muscle groups: FD ($r^2 = 0.201$, $p < 0.001$), VL ($r^2 = 0.167$, $p < 0.001$), and MG ($r^2 = 0.108$, $p = 0.008$). However, in younger adults, EI was unrelated to MVIC across all muscle groups: FD ($r^2 = 0.017$, $p = 0.449$), MG ($r^2 = 0.002$, $p = 0.816$), and VL ($r^2 = 0.016$, $p = 0.454$). **CONCLUSION:** The inverse relationship between EI and MVIC across all muscle groups, observed only in older adults, suggests that EI may be used as a non-invasive biomarker for changes in muscle quality that accompany muscular strength decline among aging populations. These findings also highlight the utility of EI for identify older individuals at risk of strength loss or progression to frailty.

Younger Adult



Older Adult



EFFECTS OF CREATINE MONOHYDRATE SUPPLEMENTATION ON VO₂ KINETICS AND AEROBIC THRESHOLD IN FIT ADULTS

Emerson Raymond, William R. Lunn, PhD

Creatine monohydrate (CrM) is a popular dietary supplement consumed by individuals engaging in strength, power, and endurance training. Though CrM supplementation has been shown to increase the second lactate threshold, effects on the aerobic threshold (LT1) are still unknown.

PURPOSE: to determine the effects of CrM supplementation on 1) oxygen deficit (O₂def) at the onset of exercise, 2) oxygen consumption (VO₂) at LT1, 3) heart rate (HR) at LT1, and 4) treadmill speed at LT1. **METHODS:** Analysis included 12 aerobically fit adults (8 males, 4 females, 27 ± 8 y, 75 ± 18 kg, 1.7 ± 0.1 m). Following eligibility confirmed by achieving a least 50th percentile VO₂max for sex and age via indirect calorimetry, participants consumed 0.3 g CrM•kg⁻¹ body mass (BM)•d⁻¹ plus 0.6 g maltodextrin•kg⁻¹ BM•d⁻¹ (CrM+MAL) or just 0.6 g maltodextrin•kg⁻¹ BM•d⁻¹ (MAL) for 7 d. Following a 14-d washout in a crossover design, participants consumed the other supplement for 7-d. After each supplementation period, participants were assessed for oxygen consumption at LT1 (VO₂LT1) during graded treadmill exercise and area under the curve (AUC) of VO₂ at the onset of steady-state treadmill walking. LT1 was determined by the first rise in blood lactate concentration ([bLa]), determined from finger venipuncture and subsequent electrochemical lactate oxidase analysis. Paired *t*-tests were used to compare means. Effect size was reported as Cohen's *d*. Error rate was $p \leq 0.05$.

RESULTS: VO₂LT1 (% of VO₂max) was not significantly different between CrM+MAL and MAL conditions ($63.4 \pm 8.7\%$ vs. $62.3 \pm 13.8\%$ respectively; $p = 0.648$; $d = 0.136$). HR (bpm) at LT1 did not differ significantly between CrM+MAL and MAL conditions (154 ± 10 vs. 151 ± 10 respectively; $p = 0.136$; $d = 0.464$). Treadmill running speed (mph) at LT1 did not differ significantly between CrM+MAL and MAL conditions (5.8 ± 1.6 vs. 5.8 ± 1.5 respectively; $p = 0.722$; $d = -0.106$). O₂def AUC (mL/kg/min•s) for 0-2 min after the onset of steady-state treadmill walking did not differ significantly between CrM+MAL and MAL (37.9 ± 10.1 vs. 38.5 ± 10.2 respectively; $p = 0.906$; ES = -0.35). VO₂ AUC (mL/kg/min•s) during 2-6 min of the steady state walking period was significantly greater in the CrM+MAL group compared to the MAL group (78.6 ± 13.1 vs. 71.6 ± 14.4 respectively; $p = 0.005$; ES = 1.015). **CONCLUSION:** CrM supplementation does not significantly impact oxygen consumption, heart rate, or running speed at LT1. However, CrM supplementation may impact VO₂ kinetics at the onset of steady-state aerobic exercise, increasing VO₂ following O₂def.

EFFECT OF CHRONIC ECCENTRIC CYCLING TRAINING ON BONE MINERAL DENSITY IN HEALTHY FEMALES

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Prolonged microgravity causes muscle atrophy, bone loss, and reduced function. Current countermeasures using concentric exercise may lack sufficient stimulus. Eccentric cycling, producing greater muscular tension with lower metabolic demand, enhances strength and power. Though effective in other populations, its potential to counter microgravity-induced declines remains uncertain and needs investigation. **PURPOSE:**

To evaluate changes in BMD, body composition, and muscular function, following 8 weeks of chronic eccentric cycling. **METHODS:** 10 healthy females (age=25±8 years) volunteered for this study. Participants were randomly assigned into the training (n=6) and control (n=4) groups. Participants assigned to the control group did not perform eccentric cycling training. Participants assigned to the training group performed 8-weeks of chronic eccentric cycling training preceded by a 3-week eccentric exposure-adaptation phase, implemented to avoid unnecessary muscle damage. During the eccentric-adaptation phase, eccentric cycling power was initially set to 10% of pre-training maximum cycling power ($P_{\max}$) for 5 min for 3 weeks. During the progressive eccentric work phase, workload was progressively increased from 15 to 55% of pre-training $P_{\max}$ over the 8-week training period. Bone mineral density (BMD) and body composition were determined using DEXA (iDXA, GE Healthcare, Chicago IL, USA) whole-body scans.

RESULTS: Participants in the training group significantly improved $P_{\max}$ following 8 weeks of chronic eccentric cycling training (all $P=0.034$). Interestingly, we observed a statistically significant increase in BMD in the control group ($P=0.026$) compared to the training group ($P=0.269$). **CONCLUSION:** 8 weeks of chronic eccentric cycling training was effective in improving muscular function in healthy females. While there was no observable increase in BMD, the results of this study allow us to speculate that eccentric cycling training was effective in mitigating the onset of BMD loss once healthy females have accumulated peak bone mass. Our findings have potential implications for space agency personnel responsible for developing countermeasures to combat physiological deconditioning (bone loss and muscle atrophy) due to prolonged microgravity exposure. Further, chronic eccentric cycling training may serve as a novel solution for terrestrial exercise prescription, thereby benefiting individuals predisposed to bone loss and muscular atrophy.

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DIFFERENCES BETWEEN INDWELLING AND SURFACE ELECTROMYOGRAPHY IN THE INFRASPINATUS MUSCLE DURING ACTIVE RANGE OF MOTION

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FUNDED BY: University of Rhode Island Research Innovation Grant

PURPOSE: The rotator cuff (RC) is a unique muscular structure made up of four muscles originating at the scapula and attaching at the head of the humerus. Traditionally, non-invasive surface electromyography (EMG) has been used to measure the electrical activity of RC muscles. Because only part of the RC is superficial, larger muscles such as the trapezius and deltoid interfere with clean signals from the deeper RC muscles, the subscapularis and supraspinatus, requiring fine wire intramuscular electrodes to record their activity. This project aims to investigate differences in infraspinatus activity during upper extremity movement, comparing signals recorded with indwelling fine wire and surface electrodes. **METHODS:** Four healthy participants with no history of shoulder or upper extremity injury were enrolled. The infraspinatus was palpated on both sides. A surface electrode was placed on the infraspinatus, and an indwelling fine wire electrode was inserted into the muscle belly. Muscle activity was recorded during external shoulder rotation, a primary action of the infraspinatus, from neutral and at 90 degrees of abduction. EMG signals were filtered, rectified, and enveloped in MATLAB to assess differences between indwelling and surface electrode amplitude and timing. **RESULTS:** Intramuscular EMG demonstrated greater amplitude compared to surface EMG due to the sensor penetrating muscle tissue. Activation patterns were similar between the two electrodes, with peak amplitude occurring at approximately the same timeframe. **CONCLUSION:** Indwelling fine wire EMG sensors provide more specific and localized measurement of muscle activity. These electrodes are ideal for investigating deeper rotator cuff muscles without distortion from the trapezius or deltoid often seen with surface electrodes. Further work is needed to determine if signals from surface electrodes can be reliably scaled to represent the infraspinatus activity accurately. Future research should aim to standardize data collection and safety procedures for intramuscular EMG to enhance reproducibility and promote clinical adoption.

MUSCLE-SPECIFIC ULTRASOUND-DERIVED PREDICTORS OF JOINT STRENGTH IN OLDER ADULTS

Samveda Menon¹, Carlos Rehbein¹, Oh Sung Kwon¹, George A Kuchel², Aaditya Jain¹, Richard Fortinsky², Jacob E. Earp¹

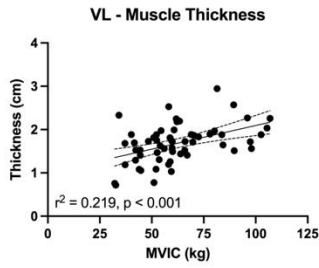
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² UConn Center of Aging, University of Connecticut Health, Farmington, CT 06032

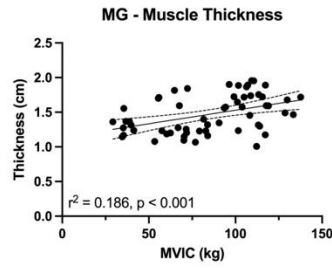
Previous studies have identified fascicle angle (FA), fascicle length (FL), and echo-intensity (EI) as markers of muscle quality in older adults in individual muscles. However, comparisons of their utility between muscles are lacking. **PURPOSE:** To compare the predictive value of ultrasound-derived measures of muscle quality and quantity (muscle thickness: MT) for joint strength between three commonly studied muscles in older adults. **METHODS:** Thirty-one older adults (74.1 ± 6.9 years) enrolled in the HVAC (Heterogeneity of Vulnerability in Aging Cohort) study underwent bilateral ultrasound imaging and strength assessment. MT and EI were measured for the Vastus lateralis (VL), medial gastrocnemius (MG), and flexor digitorum (FD), while FA and FL were measured for only the VL and MG. Joint strength was assessed via maximal voluntary isometric contractions for the knee extensors, plantar flexors, and finger flexors. Ultrasound-derived muscle-specific predictors of joint strength were determined via multiple linear regressions ($p < 0.05$). **RESULTS:** MT (VL: $r^2 = 0.174$, MG: $r^2 = 0.181$, FA $r^2 = 0.073$, $p < 0.05$) and EI (VL: $r^2 = 0.167$, MG: $r^2 = 0.108$, FA $r^2 = 0.201$, $p < 0.05$) were significant predictors of joint strength across all muscles. FA was a significant predictor of joint strength for the VL ($r^2 = 0.244$, $p < 0.001$) but not the MG ($p = 0.418$). Finally, FL was not a significant predictor of joint strength for either VL ($p = 0.657$) or MG ($p = 0.052$). **CONCLUSION:** While MT and EI were consistent predictors of joint strength in older adults, the strengths of their predictive values differed between joints up to two-fold. In contrast, muscle architecture (FA and FL) may play a muscle-specific as a non-factor in non-pennate muscles), but with differences between pennate muscles (VL vs MG). These findings support previous studies noting that ultrasound can provide valuable information regarding muscle quality in older adults. However, both the variables of interest and the predictive strength of these variables appear to differ between muscles.

Muscle Thickness

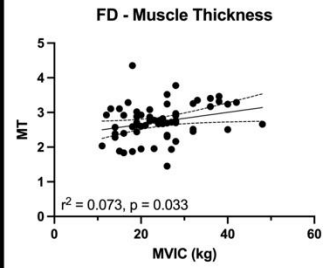
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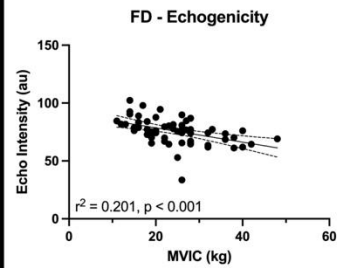
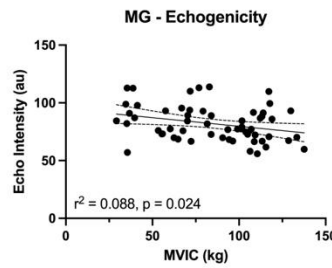
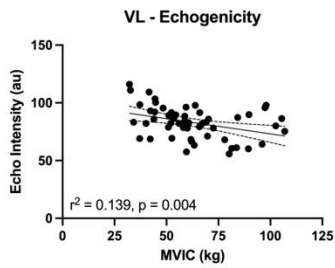
Medial Gastrocnemius



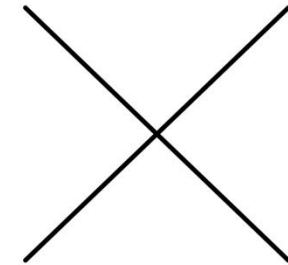
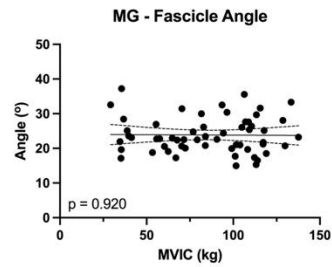
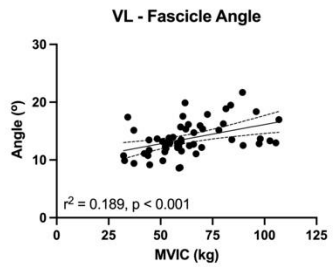
Flexor Digitorum



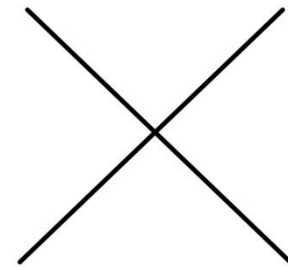
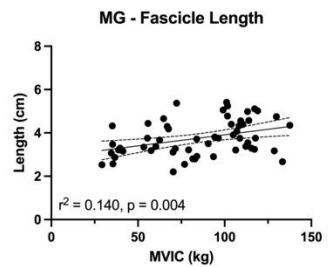
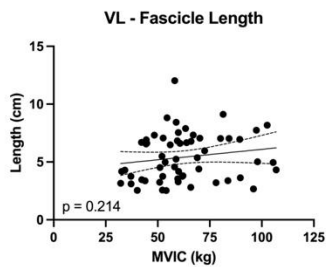
Echogenicity



Fascicle Angle



Fascicle Length



CHARACTERIZATION OF SPORTS SCIENCE PROFESSIONALS WORKING IN THE FIVE HIGHEST GROSSING U.S. SPORTS LEAGUES

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Sport science professionals play pivotal roles in athlete development, load management, recovery, technology adoption, and talent identification. In the United States (US) there are no academic, licensure, or certification requirements to provide these services, and job titles and team responsibilities can vary between sports and teams. **PURPOSE:** To characterize and compare sports science professionals working across the five highest grossing US sports leagues [National Football League (NFL), National Basketball Association (NBA), Major League Baseball (MLB), National Hockey League (NHL) and National Major League Soccer (MLS)] by job title. **METHODS:** The job title of sports science professionals were identified from official team websites for all NFL, NBA, MLB, NHL and MLS teams. Job titles were hierarchically categorized by key words as: (1) Sports Scientists, (2) Performance Directors, (3) Data Analysts, or (4) Performance Coaches. Established medically regulated (e.g. team physician) and tactical/skill coaches (e.g. position coaches) were excluded from the study. Total number of sports science professionals and number of professionals with each job title were compared between leagues. **RESULTS:** Across the five leagues, 533 sports science professionals were identified. Total number of professionals employed per team differed between leagues ($P < 0.001$), with NBA showing the highest number of professionals-per-team (6.9 ± 2.7) followed by NFL (4.8 ± 1.6), NHL (4.5 ± 2.7), MLB (3.2 ± 1.5) and MLS (3.1 ± 1.6). For job title comparison, differences between leagues were found in data analysts ($F = 32.5$) and NBA employed more sports scientists than NHL ($P < 0.05$). **CONCLUSION:** The number of sports science professionals-per-team and their job titles varied between leagues. Notably, while across all leagues, teams reported 3.1-6.9 professionals-per-team working in a sports science function, the number of professionals with a sports science job title averaged only 0.3-0.9. These results suggest that other professionals may assume responsibilities of a sport scientist and represent different sport science integration across sports.

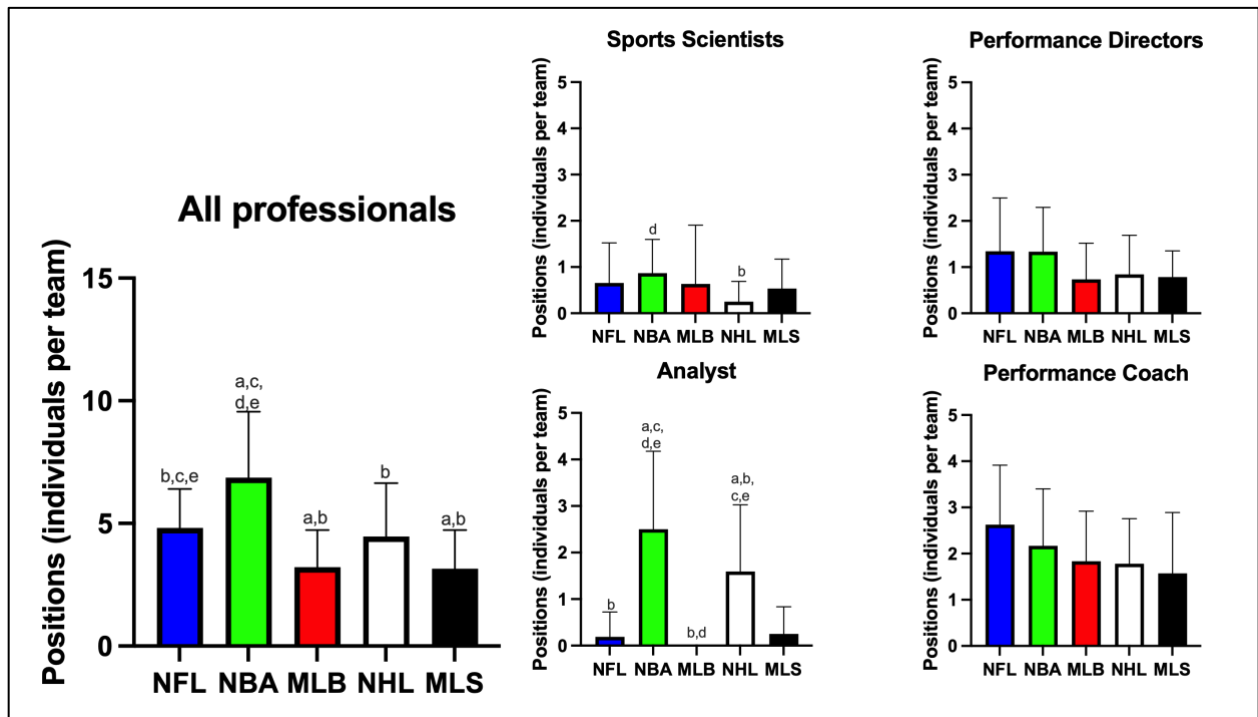


Figure 1: Total number of sports professionals across leagues and according to their job title. Differences from NFL (a), NFL (b), NBA (c), MLB (c), NHL (d) and MLS (e) are noted ($P < 0.05$).

ACUTE EFFECTS OF MODERATE EXERCISE ON COGNITIVE FLEXIBILITY AND BRAIN ACTIVITY

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3. Tufts University, MA.

Recent research suggests that acute bouts of exercise positively influence cognition, especially tasks requiring cognitive flexibility, or the ability to switch between mental processes. However, the brain mechanisms underlying this effect remain unclear. This study examined how moderate exercise impacts cognitive flexibility and task-related brain function. We hypothesized that moderate exercise would improve task-switching performance by increasing cortical activity.

Methods: Twenty-six healthy young adults (21.08 ± 4.07 years) completed two sessions (Exercise and Control) in randomized, counterbalanced order. The exercise condition involved 20 minutes of cycling at moderate intensity, determined by age-predicted heart rate and rating of perceived exertion (RPE). The control condition substituted cycling with watching self-selected television. At each session, participants completed a task-switching paradigm at three intervals: baseline (T00), immediately post-condition (T01), and 20 minutes later (T02). Functional near-infrared spectroscopy (fNIRS) measured oxyhemoglobin (HbO) and deoxyhemoglobin (HbR) concentrations in prefrontal regions during tasks. Reaction time and error rates were recorded. Data was analyzed with repeated-measures ANOVA for Condition (Exercise vs. Control) and Time (T00, T01, T02) as within-subject factors. Paired t-tests compared heart rate across conditions. Statistical significance was set at $p < 0.05$. **Results:** Heart rate was significantly higher during exercise (119.8 ± 18.0 BPM) compared to control (66.0 ± 11.16 BPM). Task-switching performance showed no significant differences in reaction time or error rate across conditions or time points ($p > 0.05$). However, reaction times were significantly faster for repeat trials (0.73 ± 0.02 ms) compared to switch trials (0.86 ± 0.03 ms). fNIRS results indicated higher prefrontal activation during the control condition than the exercise condition. **Conclusion:** Our findings did not support our initial hypothesis that moderate exercise would improve task performance and alter cortical activity. However, results showed a trend toward reduced prefrontal oxygenation following exercise while cognitive performance remained stable. Our results may be related to the neural efficiency theory, suggesting fewer metabolic resources may be required to maintain task performance after exercise. Future studies with varied protocols are needed to clarify underlying mechanisms and explore generalizability across populations.

NECK REACTION TIME FAILS TO IMPROVE FOLLOWING VISION TRAINING

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PURPOSE: The purpose of this study was to examine the effects of a three-dimensional multiple object tracking (3D-MOT) vision training program on neck reaction time.

METHODS: Forty subjects (age=20.10±0.98 yrs, height=1.70±0.10 m, mass=72.45±14.72 kg) were randomly assigned to a 3D-MOT group (n=20) (2 x per week, for 8 weeks) and a control group (n=20). Pre- and post-vision training testing consisted of dropping 1kg from a height of 13 cm onto a stanchion connected via a cable to the subject's headgear. Three monitors were positioned in front of the subject; one projected the weight drop while the others projected various sports activities serving as distractors. Three trials each were performed with the weight drop projected in the foveal view, right periphery, and left periphery. Reaction time (RT), peak EMG activity (PEMG) and time to peak EMG activity (TPEMG) of the right and left sternocleidomastoid (SCM) were assessed. 2x2 repeated measures ANOVAs compared differences between groups and pre- and post- training. **RESULTS:** There was no significant difference between groups or pre- and post- training in reaction time in the foveal view (RSCM: group: $p=0.800$, pre- vs post: $p=0.311$; LSCM: group: $p=0.916$, pre- vs. post: $p=0.410$) right periphery (RSCM: group: $p=0.837$, pre- vs post $p=0.281$; LSCM: group: $p=0.548$, pre- vs. post: $p=0.121$) and left periphery (RSCM: group: $p=0.170$, pre- vs post: $p=0.170$, LSCM: group: $p=0.528$, pre- vs. post: $p=0.051$). There was no significant difference between PEMG of the right and left SCM in the foveal view, right periphery and left periphery between the 3D-MOT trained group and the control group, or between pre- and post- trials ($p > 0.05$). There was no significant difference in TPEMG of the right and left SCM in the foveal view, right periphery and left periphery between the 3D-MOT trained group and control group, or between pre- and post- trials ($p > 0.05$). **CONCLUSION:** 3D-MOT has been shown to improve spatial awareness in broad, active visual fields, yet may not impact neck reaction time during narrow, close to the body conditions. Future studies should examine interventions to improve neck reaction time in both broad and close proximity environments.

BLOOD-FLOW RESTRICTION CUFF DESIGN AFFECTS ACUTE VASCULAR BUT NOT MUSCULAR RESPONSES IN HYPERTENSIVE INDIVIDUALS

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PURPOSE To examine acute vascular and muscular responses to different blood flow restriction (BFR) cuff designs in individuals with undiagnosed asymptomatic hypertension.

METHODS Fifteen participants (24±2 years, 8 males) completed a randomized crossover study with three visits: familiarization and two experimental sessions. Manual (SmartCuff 2.0, straight design) and automated (SmartCuff 4.0, arcuate design) BFR devices with identical width and material were tested. Participants performed repetition-fixed leg press (30-15-15-15 repetitions) at 30% one-repetition maximum and 60% arterial occlusion pressure (AOP). AOP was measured using Pulsed-Wave Doppler (Vscan Air, GE Health) at the popliteal artery for the manual cuff and via mobile application for the automated cuff. Vascular indices—aortic pulse wave velocity (PWVao), aortic augmentation index (Aixao), central systolic blood pressure (SBPao), and peripheral systolic blood pressure (SBP)—were measured using oscillometry (Arteriograph, Tensiomed) pre- and 20-minutes post-exercise. Rectus femoris cross-sectional area (CSA) and muscle thickness (MT) were assessed via ultrasound (Vscan Air, GE Health) at one-third distance from patella to anterior superior iliac spine, pre- and immediately post-exercise. Data normality was verified using Shapiro-Wilk test. Between-condition differences were analyzed using ANCOVA or Quade's non-parametric ANCOVA with baseline values as covariates.

RESULTS The arcuate cuff elevated SBP (6.5 vs. -2.1 mmHg, $p=0.046$, $\eta^2=0.14$) and SBPao (4.6 vs. -3.2 mmHg, $p=0.025$, $\eta^2=0.173$) 20-minutes post-exercise, contrasting with decreased pressures observed with the straight cuff. No significant between-condition differences were found for PWVao (0.15 vs. 0.18 m/s, $p=0.57$), Aixao (0.20 vs. -1.65%, $p=0.21$), CSA (0.50 vs. 0.48 cm², $p=0.54$), or MT (0.15 vs. 0.14 cm, $p=0.28$) changes.

CONCLUSION BFR resistance exercise with arcuate cuffs causes post-exercise blood pressure elevation, while straight cuffs demonstrate protective effects in individuals with undiagnosed asymptomatic hypertension.

Funding Source: NASA Connecticut Space Grant

SEX DIFFERENCES IN LOAD AND STRUCTURE DEPENDENT ARTERIAL STIFFENING AFTER ISOMETRIC HANDGRIP EXERCISE

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Acute isometric handgrip (IHG) exercise elicits a greater pressor response in males than in females, which potentially leads to sex differences in arterial stiffening via pressure-load dependent mechanisms. Regardless of blood pressure (BP), arterial structural changes also contribute to stiffening, yet their role in IHG-induced stiffening and potential sex-specific effects remains unclear. This is important given that localized stress with IHG may differentially stiffen vascular beds, with hypothetically greater effects in conduit (i.e. brachial) vs. central arteries (i.e., carotid), which would suggest preservation of the normal stiffness gradient protecting against pulsatile organ damage. **PURPOSE:** To determine how load-dependent and structural components contribute to common carotid and brachial artery stiffness responses following IHG in young females and males. **METHODS:** Twenty-nine healthy adults (18–32 years; 15 females, 14 males) performed a fatiguing IHG at 30% maximum voluntary contraction. Beat-to-beat BP was measured via finger photoplethysmography. Distensibility of the common carotid and brachial arteries was obtained from ultrasonic echo-tracking to estimate pulse wave velocity (PWV), a marker of arterial stiffness. Structural (using fixed pressures, carotid: 112/80 mmHg; brachial: 120/80 mmHg) and load-dependent PWVs were estimated from the Bramwell-Hill equation with Peterson's modulus, using a participant-specific exponential model with a non-linear stiffness parameter. Measurements were taken before, and at 5, 30, and 60 min post-exercise. **RESULTS:** After IHG, load-dependent carotid PWV remained elevated in males (mean difference (Δ)_{60-pre} = 0.50 m/s, 95% confidence interval (CI): 0.26 to 0.74 m/s, $p < 0.001$) but not in females (Δ _{60-pre} = 0.22 m/s, 95% CI: -0.46 to 0.10 m/s, $p = 0.08$), whereas structural carotid PWV was unchanged in both sexes (time-effect $p = 0.491$). Conversely, structural brachial PWV remained elevated in both sexes (Δ _{60-pre} = 1.86 m/s, 95% CI: 0.25 to 3.47 m/s, $p = 0.001$), while only males exhibited load-dependent elevations (interaction: $p = 0.036$). **CONCLUSION:** IHG induced a male-specific load-dependent stiffening of the common carotid and brachial arteries, while structure-dependent stiffening was limited to the brachial artery, independent of sex. The stiffness gradient was maintained after acute IHG, suggesting such exercise does not increase risk of pulsatile energy-mediated organ damage or adverse events, even in young males with load-dependent stiffening.

SEX DIFFERENCES OF NECK REACTION TIME FOLLOWING AN 8-WEEK NECK STRENGTHENING PROGRAM

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Department of Exercise and Sport Performance, University of New England

PURPOSE: The purpose of this study was to assess sex differences in neck reaction time following an 8-week neck strengthening or no strengthening program. **METHODS:** College-aged male ($n=15$) and female ($n=25$) subjects were randomly placed into neck strengthening (S, $n=20$, age= 19.8 ± 0.89 yrs, height= 1.74 ± 0.09 m, mass= 70.38 ± 14.25 kg) or no strengthening group (NS, $n=20$, age= 20.3 ± 1.08 yrs, height= 1.69 ± 0.09 m, mass= 71.46 ± 13.52 kg). The neck strengthening group completed a cervical resistance strengthening program twice a week for 8-weeks, the no strengthening group served as controls. Isometric force (IF), time to peak force (TPF), peak EMG activity (PEMG), and time to peak EMG activity (TPEMG) of the sternocleidomastoid (SCM) were measured. Foveal view (FV), right peripheral (RP), and left peripheral (LP) views were tested for reaction time (RT), PEMG, and TPEMG of the SCM. Reaction time was tested via a weight dropped from a height of 13 cm onto a stanchion connected to headgear via a cable. Monitors were used to display the weight drop and distraction activities. Three trials were performed in the foveal view, right, and left peripheral views. 2x2x2 repeated measures ANOVAs were used to analyze differences between sex (male/female), group (S/NS), and time (pre/post). **RESULTS:** For isometric measures, males had significantly greater IF ($p<0.001$) versus females and post-strengthening had significantly greater IF ($p=0.048$) versus pre-. For right SCM, post-strengthening had significantly more PEMG ($p=0.003$) and TPEMG ($p=0.004$) versus pre-. Males had significantly less PEMG in FV (RSCM, $p<0.001$) (LSCM, $p=0.012$) and RP (RSCM, $p=0.002$) (LSCM, $p=0.030$) versus females. For RT measures, males right SCM had significantly increased RT ($m=0.185\pm0.055$ s; $f=0.176\pm0.012$ s) ($p=0.014$) in FV, and post-strengthening had significantly more PEMG ($p=0.014$) in LP. For left SCM, post-strengthening had significantly more PEMG ($p=0.027$) in FV versus pre- and males had significantly decreased TPEMG ($p=0.010$) in FV and less PEMG ($p=0.007$) in LP versus females. **CONCLUSIONS:** Males had greater neck strength, muscle activity, and force production versus females. Further research is needed to examine ways to improve neck strength in females and reduce head-neck angular displacement and acceleration to aid in decreasing frequency of sports related concussions.

BAROREFLEX, NOT VASCULAR FUNCTION, APPEARS TO DRIVE MALE-SPECIFIC ANTIHYPERTENSIVE EFFECTS OF ISOMETRIC HANDGRIP TRAINING

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Isometric handgrip training (IHG) is gaining attention over traditional modalities as a time-efficient, low-cost, home-based method that apparently elicits greater blood pressure (BP)-lowering effects in normotensive individuals. Although these benefits are relevant for hypertension prevention, the mechanisms behind IHG-induced antihypertensive effects and if the mechanisms are sex-dependent, remain uncertain. **PURPOSE:** To examine the effects of IHG on BP and regulatory mechanisms, including baroreflex sensitivity (BRS) and vascular function in young normotensive females and males. **METHODS:** Twelve normotensive females and twelve males (age: 18-29 yrs) completed a baseline visit, followed by a 4-week home-based IHG training (3 d/wk, 4x2-min sets, at 30% maximum voluntary contraction, ~89% adherence), and a 4-wk non-exercise period in a randomized crossover design. BP was measured via beat-to-beat finger plethysmography, and heart rate via a single ECG-lead. BRS was estimated by the spontaneous sequence method. Brachial flow-mediated dilation (FMD), reflecting endothelial function, was assessed using high-resolution ultrasound, with video signals analyzed using automated edge-detection/wall-tracking software. Central pulse wave velocity (cPWV), reflecting aortic stiffness, was estimated via ECG-gated applanation tonometry. Training-induced changes in outcomes were tested using linear mixed models. **RESULTS:** IHG reduced mean arterial pressure (Figure) and systolic BP in males (mean difference (Δ)_{IHG-BAS} = -8 mmHg, 95% CI: -11 to -5 mmHg, $p < 0.001$), but not females (Δ _{IHG-BAS} = -2 mmHg, 95% CI: -1 to 6 mmHg, $p = 0.456$). After IHG, BRS increased only in males (Δ _{IHG-BAS} = 6.2 ms/mmHg, 95% CI: 3.4 to 8.9 ms/mmHg, $p < 0.001$), while FMD increased only in females (Δ _{IHG-BAS} = 2.7%, 95% CI: 1.3 to 3.9%, $p < 0.001$). cPWV was unchanged by IHG (Figure). **CONCLUSIONS:** The antihypertensive effects observed only in normotensive males suggest sex-specific adaptation to IHG, likely reflecting baroreflex rather than vascular adjustments. IHG thus emerges as a promising first-line strategy for hypertension prevention in young males, who face a higher risk at younger ages than females.

● Female ▲ Male

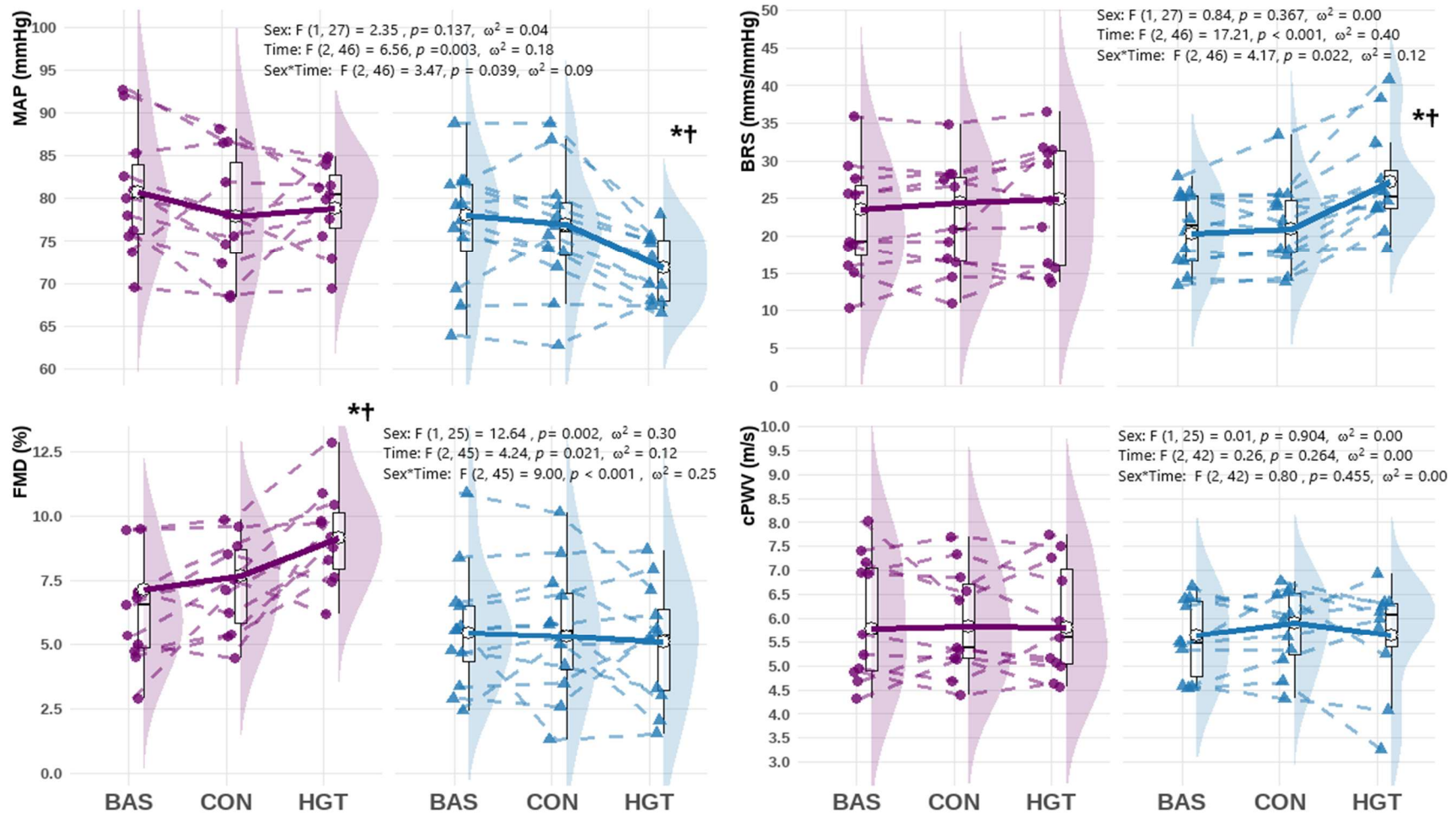


Figure. Mean arterial pressure (MAP), baroreflex sensitivity (BRS), flow-mediated dilation (FMD), and central pulse wave velocity (cPWV) responses to 4 weeks of isometric handgrip training (HGT). Individual responses are represented by dashed lines, and open circles denote the mean values at each time point. Kernel density distributions are included for each time point. *Different from baseline ($p < 0.05$); †Different from control ($p < 0.05$). Abbreviations: BAS, baseline; CON, control.

EFFECTS OF DIFFERENT CARDIOVASCULAR EXERCISE INTENSITIES ON HEART RATE RECOVERY

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Heart Rate Recovery (HRR) is a fast and cost-efficient way to assess the ability of the heart to manage applied stress. Previous research has examined HRR in both clinical populations and athletes alike, identifying relationships between HRR, cardiovascular (CV) health, and fitness performance. In healthy, active populations, a high-intensity (HI) CV training protocol appears particularly effective at improving a key measure in VO_{2max} (Hov et al., 2022). What is not yet known is the impact of various training protocols on HRR. **PURPOSE:** The purpose of the present study was to examine the impact of four weeks of HI and low-intensity (LI) training on HRR. The researchers hypothesized that while both groups will show improvement in HRR, the HI group will show greater improvements than the LI group. **METHODS:** Fifteen healthy, active male and female subjects (20.8 ± 1.8 yrs) were randomized into three groups: HI, LI, and control. The training groups completed two sessions per week for four weeks. The HI group completed an individualized Maximal Aerobic Sprinting (MAS) interval training program based on their initial scores from the Yo-Yo Level 1 Recovery Test (YYL1R), consisting of four sets of eight HI sprints. The LI group completed a 20-minute steady-state running protocol at 40-59% of their maximal HR. All groups completed pre- and post-testing to document estimated VO_{2max} and post-exercise HRR. **RESULTS:** After 4 weeks of intervention, there was significant improvement with the LI group in HRR (55.5 ± 11.09 to 64.67 ± 5.98 , $p < .04$) and VO^2 (42.5 ± 2.42 to 44.79 ± 3.82 , $p < .04$). While the HI group did not report significant changes, HRR increased (55 ± 9.6 to 66.8 ± 6.09 , $p > .05$) and VO^2 (43.58 ± 1.67 to 45.74 ± 1.75 , $p > .05$). **CONCLUSION:** The main findings of my study uncovered the effectiveness of LI CV exercise in a 4-week period to positively affect HRR and VO^2 . CV health is a primary indicator of performance in aerobic sports, and HRR scores indicate an athlete's ability to recover after exercise. Coaches and athletes can utilize these training modalities to improve players' CV health and enhance their performance.

EVALUATING THE ACCURACY OF WEARABLE TECHNOLOGY FOR SP02 AND HEART RATE AT VARIOUS ALTITUDES

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Roughly 30% of Americans have a smart wearable device such as a watch, ring or band. Furthermore, roughly 20% of Americans use fitness wearables to monitor health and fitness metrics. We are interested in how accurate these trackers are at monitoring variables such as heart rate (HR) and oxygen saturation (SpO₂), as well as how feasible these devices are for the use of high-altitude tracking of these vitals. **PURPOSE:** The goal of this study was to determine the accuracy of the COROS Apex 2 Pro watch SpO₂ sensor at both sea level and at altitude, as well as the accuracy of the watch and the armband when compared to a pulse oximeter's detected HR. **METHODS:** We evaluated the COROS Apex 2 Pro watch combined with the COROS bicep HR monitor, and compared both HR and SpO₂ to a finger pulse oximeter during activity at sea level and high altitude. The COROS Apex 2 Pro was chosen due to its long battery life and its reported SpO₂ sensing capabilities. This pilot study included a single participant. **RESULTS:** The overall correlation between the watch and oximeter's SpO₂ was strong and significant ($r=0.64823$, $p<0.00001$). The correlation between the watch and oximeter's SpO₂ during aerobic exercise ($r=0.6972$, $p<0.00001$) was stronger than during resistance exercise ($r=0.4437$, $p<0.00001$). The average difference between the oximeter and watch was $\pm 2/6\%$. Interestingly, the correlation was tighter at higher elevations than at lower elevations ($r=0.42788$ for altitude vs $r=0.20316$ at low altitude). However, both correlations are weak so caution should be exercised, and the average difference should be considered when measuring SpO₂. Additionally, the altimeter in the watch works exceptionally well ($r=0.99948$, $p<0.00001$), showcasing the accuracy of the altimeter and GPS in this watch. The armband and watch HR ($r=0.76747$ and $r=0.93970$ simultaneously) showed a strong correlation with the finger pulse oximeter, indicating that the heart rate detection via both methods is accurate. **CONCLUSIONS:** From these results, it can be concluded that the COROS Apex Pro 2 provides good location/elevation data and HR data, however, the accuracy of the SpO₂ values is limited. These findings will be important in considering the use of the COROS Apex 2 Pro for field-based physiological data collection.

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PHYSIOLOGIC RESPONSES TO BOUTS OF ROWING AT VARIOUS INTENSITIES IN RESISTANCE TRAINED MALES

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Rowing is well studied in endurance-trained athletes, yet little is known about its acute demands in resistance-trained individuals who increasingly use rowing for conditioning. **PURPOSE:** This study examined cardiovascular and metabolic responses to short-duration rowing bouts in resistance-trained males, with the goal of identifying performance outcomes relative to strength-training capacity. **METHODS:** Six resistance-trained males (20 ± 1 y; 78.9 ± 3.5 kg) completed two randomized rowing ergometer trials (250 m and 500 m) following baseline assessments of squat and bench press strength and whole-body composition via DXA. Each bout was separated by 10 minutes of passive rest. Physiological and performance metrics included heart rate, blood lactate (BL), oxygen uptake (VO_2), carbon dioxide production (VCO_2), respiratory exchange ratio (RER), blood pressure, and peak power output. **RESULTS:** Peak power was higher during the 250 m trial (528.2 ± 107.4 W) compared to the 500 m trial (423.0 ± 84.9 W; $p = 0.045$), consistent with power decline during sustained effort. The 500 m bout elicited a greater increase in BL ($7.63 \pm 2.63 \rightarrow 13.57 \pm 2.86$ mmol/L; $p < 0.05$) than the 250 m bout ($4.20 \pm 4.06 \rightarrow 11.78 \pm 4.07$ mmol/L; $p < 0.05$). Heart rate rose progressively during the 500 m bout ($p = 0.0016$), and systolic blood pressure increased 30–52 mmHg post-exercise. RER exceeded 1.0 across both trials, indicating predominant carbohydrate utilization. **CONCLUSIONS:** Short-duration rowing induced rapid and substantial cardiovascular and metabolic stress in resistance-trained males, characterized by high lactate accumulation, progressive cardiovascular strain, and power degradation. These results fill a gap in the literature by showing that rowing, though traditionally linked to endurance sports, is also a potent anaerobic stimulus in resistance-trained populations. Findings support rowing as an effective modality for anaerobic conditioning, HIIT application, and diagnostic assessment in non-rowing athletes. Future work should expand to larger, more diverse samples, including females and athletes from other sport backgrounds.

SLOW BREATHING RATE ALTERS HEART RATE VARIABILITY IN FEMALES GIVING FALSE INDICATION OF INCREASED STRESS

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The variability in beat-by-beat heart function (heart rate variability: HRV) is commonly used clinically and in sports science to manage stress and training volume. HRV monitors are being incorporated into wearable devices (smart watches) and used by many individuals including athletes to monitor training and recovery. A small study on male athletes suggests that HRV may be influenced by breathing frequency, but this has not been explored in females. **PURPOSE:** The purpose of this study is to examine the effects of breathing frequency (bf) on HRV in females. **METHODS:** This study compared HRV metrics in nine females (5 sedentary; SED, 4 athletes; ATH) at normal bf (~12 breaths per min) as well as increased and slower bf (15 and 6 breaths per minute, respectively). Differences between SED and ATH were compared using Student T-Tests and changes in HRV across bf was analyzed using a 2-way repeated measures ANOVA. **RESULTS:** The groups were not different in age (SED: 21 ± 2 y vs ATH 19 ± 1 y, $p=0.248$), body mass index (SED 22.1 ± 1.9 vs ATH 21.0 ± 2.2 $\text{kg} \cdot \text{m}^{-2}$, $p=0.440$), lean mass (SED 38.0 ± 5.1 vs ATH 43.0 ± 4.0 kg, $p=0.162$) but SED had lower $\text{VO}_{2\text{peak}}$ (SED 42.1 ± 7.1 vs ATH 50.8 ± 2.7 $\text{ml} \cdot \text{kg}^{-1} \cdot \text{min}^{-1}$, $p=0.049$). Resting heart rate during normal breathing was higher in SED (65 ± 7) compared to ATH (49 ± 10 BPM; $p=0.025$) but the root mean square of the standard deviation of the R-to-R interval (RMSSD) (SED 86 ± 41 vs 101 ± 39 ms; $p=0.570$) was similar. Breathing at a slower rate increased the ratio of low frequency (LF) to high frequency (HF) band HRV ($p=0.001$) primarily by increasing the LF band measures ($p=0.010$). Additionally, there is a trend for this increase to be higher in ATH than SED females ($p=0.144$). **CONCLUSION:** The LF/HF ratio has been identified as a reliable measure of stress/autonomic balance and over-training with elevated values positively correlated with increased stress. Therefore, this examination suggests that a slow breathing frequency may falsely indicate a high level of stress. This may be an important consideration as endurance trained athletes typically have slower breathing frequencies than non-athletes and some HRV applications control breathing frequency.

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PHYSICAL ACTIVITY AND ENERGY EXPENDITURE IN CBD AND NON-CBD USERS ACROSS AGE GROUPS

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Cannabidiol (CBD) is increasingly used for wellness and recovery, yet its relationship with energy and physical activity remains unclear. **PURPOSE:** This study investigates whether CBD use is associated with differences in daily energy expenditure and activity levels across age groups. **METHODS:** Participants were categorized as CBD users or non-users and stratified into three age groups: Young (n=5), Adult (n=10), and Mature (n=21). Variables were collected using the International Physical Activity Questionnaire, and data were analyzed using Metabolic Equivalent (MET) total, minutes of activity, age, and sex. Outliers were identified and removed using both the Interquartile Range (IQR) and Grubbs' test, applied separately to each group and variable. Statistical analyses included independent-samples t-tests, Mann–Whitney U tests, and Pearson correlations. **RESULTS:** No significant differences were found between CBD users and non-users in average MET, 1364 ± 570 and 659 ± 107 respectively, or minutes of activity, 578 ± 243 and 401 ± 75 , respectively, regardless of outlier inclusion ($P > 0.39$ in both cases). When outliers were excluded, CBD users showed lower mean values, but the differences remained non-significant due to high variability in the samples. Within age groups, no significant differences in MET or activity were observed among CBD users. Among non-CBD users, Mature participants exhibited significantly higher activity levels than Adults ($p=0.03$), with values of 572 ± 117 and 163 ± 50 on average, respectively, though MET differences were not significant ($p=0.80$). Due to the limited number of valid cases among Young and Adult CBD users, statistical comparisons within these subgroups were not considered reliable. Correlations between age, sex, MET, and activity were weak and non-significant across all groups. **CONCLUSIONS:** The absence of significant differences suggests that CBD use does not substantially influence physical activity or energy expenditure across age groups. The observed trend of higher activity among Mature CBD users compared to Adults, though not statistically significant, may reflect lifestyle factors such as increased free time and a proactive approach to maintaining physical health in later adulthood. These findings warrant further investigation with larger and more balanced samples, particularly among younger CBD users.

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ANXIETY SYMPTOMS, DEPRESSION SYMPTOMS, AND RESILIENCE IN COLLEGIATE ATHLETES ACROSS AN ATHLETIC SEASON BY SEX

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Anxiety (AS) and depression (DS) symptoms are more common in female student-athletes. Greater resilience (RES) may help mitigate AS/DS. Peer-reviewed research examining these characteristics in Division III student-athletes is limited. **PURPOSE:** To examine changes in AS, DS, and resilience over the course of one competitive season. **METHODS:** During preseason, 181 student-athletes (age: 19.67 ± 1.35 yrs; male=97 [53.6%]) completed the Generalized Anxiety Disorder-7 (GAD-7), Center for Epidemiologic Studies Depression (CES-D), and Connor-Davidson Resilience Scale (CD). Surveys were readministered mid-season and post-season. Normality and sphericity were assessed using Shapiro-Wilk and Mauchly's Tests, respectively. Mixed-effects ANOVAs were used to examine the effect of sex and time on AS, DS, and RES. Statistical significance was set at $p < 0.05$, *a priori*. **RESULTS:** Means and standard deviations are presented in Table 1. There was no significant interaction between sex and time for the GAD-7 ($F(2, 91) = 0.199$, $p = 0.820$, partial $\eta^2 = 0.004$), CES-D ($F(2, 92) = 0.469$, $p = 0.627$, partial $\eta^2 = 0.010$), or CD ($F(2, 82) = 1.830$, $p = 0.167$, partial $\eta^2 = 0.043$). There was a significant main effect for time for the CES-D ($F(2, 93) = 4.336$, $p = 0.014$, partial $\eta^2 = 0.045$), but not GAD-7 ($F(2, 92) = 2.961$, $p = 0.054$, partial $\eta^2 = 0.031$) or CD ($F(2, 83) = 2.437$, $p = 0.091$, partial $\eta^2 = 0.029$). Post-hoc analysis using Tukey HSD indicated a significant increase in CES-D from preseason to post-season (16.63 ± 1.14 vs. 14.04 ± 0.94 , $p = 0.038$). There was a significant main effect for sex for the GAD-7 ($F(1, 92) = 12.688$, $p < 0.001$, partial $\eta^2 = 0.121$) and CES-D ($F(1, 93) = 5.315$, $p = 0.023$, partial $\eta^2 = 0.054$), but not CD ($F(1, 83) = 0.530$, $p = 0.469$, partial $\eta^2 = 0.006$). On average, males scored significantly lower than females on the GAD-7 (4.48 ± 0.59 vs. 7.25 ± 0.51 , $p < 0.001$) and CES-D (13.69 ± 1.32 vs. 17.72 ± 1.15 , $p = 0.023$). **CONCLUSION:** Both AS and RES remained consistent across the competitive season; however, there was a significant increase in frequency of DS experienced by student-athletes from preseason to post-season. On average, male student-athletes experience AS and DS less often than female student-athletes.

TABLE 1. Inventory scores by sex during preseason, mid-season, and post-season

		GAD-7 (n=94)	CES-D (n=95)	CD (n=85)
		Mean (SD)	Mean (SD)	Mean (SD)
Males	Preseason	3.80 (3.00)	11.93 (8.30)	73.09 (12.56)
	Mid-season	4.78 (4.14)	14.05 (8.65)	74.83 (14.46)
	Post-season	4.85 (4.68)	15.10 (10.68)	69.89 (15.91)
Females	Preseason	6.54 (4.59)	16.15 (9.65)	74.83 (14.46)
	Mid-season	7.85 (5.00)	18.85 (10.86)	70.40 (16.04)
	Post-season	7.35 (5.57)	18.15 (11.23)	70.16 (16.62)

BLOOD PRESSURE REGULATION FOLLOWING AEROBIC EXERCISE, PASSIVE HEATING, OR COMBINED EXERCISE AND HEAT TREATMENTS

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Both aerobic exercise and passive heat exposure result in transient decreases in blood pressure (BP), but the impact of post-exercise passive heat exposure is relatively unexplored. It is unknown whether the mechanisms of BP reduction are shared or unique, and whether the combination of treatments results in a larger decrease in blood pressure. **PURPOSE:** This study examined the impact of aerobic exercise, passive heat exposure, or post-exercise passive heat exposure on nocturnal blood pressure, endothelial function, and heart rate variability (HRV) in men and women with elevated blood pressure ($>120/80$ mmHg). **METHODS:** Sixteen participants (13F, 3M) underwent four trials: Exercise alone (EX; 30 min treadmill walking at 55-60% heart rate reserve), Heat alone (HT; 45 min leg immersion in 42°C water), post-exercise heating (EXHT; 30 min treadmill + 45 min leg immersion at 42°C), or control (CON; no exercise or leg immersion). Following each treatment, endothelial function was assessed using flow-mediated dilation (FMD) of the popliteal artery, HRV was examined using a 3-lead electrocardiogram with paced breathing, and participants were instrumented with an ambulatory BP cuff to wear overnight. Trials were compared using repeated measures ANOVA, and significance was accepted at $p<0.05$. **RESULTS:** Daytime pre-trial BP was classified as elevated ($126\pm3/73\pm2$ mmHg) and did not differ between trials. Nocturnal systolic and diastolic BP decreased following all trials (Mean nighttime BP= $108\pm3/63\pm2$) but was not significantly different between treatments. Post-treatment FMD was higher following EXHT ($6.3\pm0.6\%$) and HT ($6.6\pm0.7\%$) compared with EX ($4.8\pm0.5\%$) and CON ($4.5\pm0.6\%$). SDNN (a measure of HRV) was higher after EXHT (SDNN: 93 ± 18 ms) compared to all other treatments (CON: 69 ± 11 ms; EX: 76 ± 8 ms; HT: 71 ± 9 ms). **CONCLUSIONS:** Post-exercise hot water leg immersion results in increased endothelial function and improved heart rate variability, indicating that heating impacts both vascular function and autonomic balance post-exercise. Despite these differences, nocturnal blood pressure was not significantly lower following EXHT compared with either control conditions or standalone exercise or heat treatments.

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HEMISPHERICAL SPECIALIZATION OF GESTURE PRODUCTION INFLUENCES DUAL TASK COSTS DURING POSTURAL CONTROL

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Evidence suggests that gestural functions are grounded in left or right hemispheric functions depending on the gesturer's perspective. When a person gestures from an egocentric perspective (e.g., when pantomiming actions) left hemispheric functions may apply whereas gestures from an allocentric perspective may be grounded in right hemispherically lateralized functions. **PURPOSE:** Because the processes of dual task costs (DTC) have been linked to the left hemispheric Inferior Frontal Gyrus (IFG), the purpose of this study was to test the hypothesis that gestures from an egocentric perspective may increase DTC more than allocentric gestures would. **METHODS:** 41 healthy individuals (25.9 ± 6.8 years; right-handed (mean DHQ score: 9.5 ± 1.4 ; mean EHI score: 87.2 ± 16.4); 25 female, 16 male) controlled their posture (recorded with a wearable Inertial Measurement Unit (IMU) sensor) during *egocentric direction* and *motion quality presentation (allocentric)* gestural executions with the *right (rh)* and *left (lh)* hands. Brain oxygenation was measured using functional Near InfraRed Spectroscopy (fNIRS) above frontal, motor, and parietal cortices of the right and left hemispheres. **RESULTS:** Increased postural sway was found during *allocentric* gestures with the *right hand* as when compared to *allocentric* gestures with the *left hand* ($p < 0.001$). *Left hand egocentric* gestures increased postural sway when compared to *lh allocentric* gestures ($p < 0.01$). ΔHbO_2 was significantly increased within the frontal cortex during *egocentric* versus *allocentric* gestures ($p = 0.068$). **CONCLUSIONS:** The fact that postural control was impacted during *allocentric* gestures with the *right hand* could be attributed to hemispherically specialized functions. Postural sway is reduced during allocentric gestures with the left hand indicating that right hemispheric functions of gesture production do not interfere with left hemispheric control of DTC. We therefore conclude that the transfer process between hemispheres for hemispherically specialized motor tasks may influence postural control due to DTC.

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PHYSICAL ACTIVITY WEARABLE DEVICE: APPROPRIATENESS, ACCEPTABILITY, AND FEASIBILITY AMONG PEOPLE WITH HIV

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Wearable devices are effective at objectively measuring physical activity, and necessary to increase the rigor of health behavior and clinical research. Meeting physical activity guidelines is associated with positive health outcomes among people with HIV (PWH), but the high prevalence of unhealthy substance use among this population may limit adherence to physical activity programs. No studies to date have investigated the differences in wearable device acceptability by unhealthy substance use behaviors among PWH. **PURPOSE:** The purpose of this study is to inform future interventions by examining how the appropriateness, acceptability, and feasibility (AAF) of wearable devices among PWH differs by demographic characteristics, physical activity levels, and unhealthy substance use. **METHODS:** A purposive sample of 100 PWH will be recruited from the Yale Center for Infectious Diseases (YCID) in New Haven, CT. Inclusion criteria of participants will be HIV seropositivity; receiving care at YCID; and age ≥ 18 years. Participants will be excluded if they are unable or unwilling to provide consent. We will distribute a web-based, self-administered survey to eligible participants in person, or via text message, email, or QR code. The survey will take approximately 25 minutes to complete. The survey will include infographics of two wearable devices (a wrist-watch and a chest patch), and ask participants to rate the AAF of each device. Recruitment will begin on 09/10/25 and data collection is anticipated to be completed by 12/31/25. AAF scores will each be totaled and averaged (mean and standard deviation). Using SPSS, we will describe the sample in terms of baseline characteristics overall and conduct Chi-square/t-test analysis to compare AAF scores by 1) demographic characteristics; 2) physical activity levels; and 3) unhealthy substance use. If significant differences in AAF scores are present (defined by $p < 0.05$), we will conduct logistic regression models to calculate odds ratios and 95% confidence intervals. **RESULTS:** This work is currently ongoing. We hypothesize that there will be no significant differences in wearable device AAF by demographic characteristics, physical activity levels, or unhealthy substance use. **CONCLUSIONS:** Results will inform future implementation of wearable devices to measure physical activity among PWH with unhealthy substance use.

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DETERMINE THE ROLE OF DYNAMIN-RELATED PROTEIN 1 IN EXERCISE CAPACITY IN MICE

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Mitochondrial dynamics plays a crucial role in the body's ability to adapt to exercise. Dynamin-related protein 1 (Drp1) is the key regulator of mitochondrial fission and helps regulate the overall efficiency of mitochondria. Recent research has promising findings indicating Drp1 as a new treatment method for individuals with obesity and insulin resistance. **PURPOSE:** The purpose of this study was to determine the role of Drp1 in exercise capacity after exercise training via tamoxifen-inducible skeletal-muscle specific Drp1 knockout mice. We hypothesize that exercise training would increase their exercise capacity, and skeletal muscle Drp1 ablation would blunt this adaptation to exercise training. **METHODS:** C57/BL6 male skeletal muscle Drp1 knockout (KO) and wildtype (WT) mice were assigned to either 6 weeks of exercise via voluntary wheel running (EX) or remained sedentary (SED). After exercise training, all mice completed a graded exercise capacity test at a constant 5-degree incline and began with a 5-minute long 8m/min warm up, then progressed to 10m/min and 3-minute stages with an increase of 1m/min per stage. Exercise capacity was determined by an odometer reading once failure was reached. **RESULTS:** We found that KO mice had a significantly lower exercise capacity when compared to WT groups (main effect of genotype, $p < 0.001$). In addition, there was an interaction between genotype and exercise ($p = 0.036$). WT/EX group had a 50% higher total running distance compared to WT/SED (mean 682m vs 417m). In contrast, KO/EX group was only 15% higher when compared to KO/SED (mean 124m vs 105m). **CONCLUSION:** Our data demonstrate that skeletal muscle Drp1 is crucial in exercise training-induced improvements to exercise capacity.

EFFECTS OF POST-ACTIVATION PERFORMANCE ENHANCEMENT ON 3KM RUNNING PERFORMANCE IN COLLEGIATE AND POST-COLLEGIATE RUNNERS

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Post-Activation performance enhancement (PAPE) is the acute improvement in voluntary performance following a plyometric or strength-based conditioning activity. While observed in power sports, the potential of PAPE to enhance running performance in high-level endurance runners remains to be determined. **PURPOSE:** This study examined whether a plyometric-based PAPE protocol could improve 3km running performance in collegiate and post-collegiate runners. **METHODS:** Six collegiate and post-collegiate runners (5 males and 1 female; 21.3 ± 1.2 yrs; 68.2 ± 9.6 kg; 1.77 ± 0.09 m; $\dot{V}O_{2\max} 60.6 \pm 3.0$ ml·kg⁻¹·min⁻¹) completed two 3-km time trials under PAPE and control (NoPAPE) conditions. The PAPE condition consisted of two sets of 10 ankle hops and 5 squat jumps following a standardized warm-up, whereas the NoPAPE condition included the warm-up alone. An 8-min rest interval after the PAPE protocol and an 11-min rest interval after the NoPAPE condition were provided prior to beginning the 3-km run. Split times were recorded at each kilometer, and total performance time served as the primary outcome. Secondary measures included blood lactate concentration, heart rate, and rating of perceived exertion (RPE, Borg 6–20), assessed immediately before and after each trial. Repeated measures analysis of variance and dependent t-tests were used to analyze the data. **RESULTS:** Cumulative time trial did not differ between PAPE and NoPAPE ($10:26 \pm 47$ s vs $10:25 \pm 37$ s; $p=0.45$; $d=0.054$, respectively). There were no differences in blood lactate ($p=0.27$; $\eta^2=0.24$), HR ($p=0.13$; $\eta^2=0.4$), RPE ($p=0.56$; $\eta^2=0.07$) between the two conditions. **CONCLUSION:** A plyometric-based PAPE protocol was not effective in improving 3-km running performance in collegiate and post-collegiate runners. Future research should explore whether manipulating the intensity of the conditioning activity or adjusting rest interval length could produce different PAPE responses in endurance running. Clarifying the role of PAPE in endurance running may help guide the design of future warm-up strategies for competitive distance runners.

LOWER MUSCLE SPECIFIC POWER MAY LESSEN METABOLITE ACCUMULATION DURING DYNAMIC CONTRACTIONS IN MOBILITY-IMPAIRED OLDER ADULTS

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Knee extensor power declines with older age and may fall below the thresholds necessary for daily tasks, contributing to mobility impairments. Both smaller muscle size and lower specific power (power/size) may be factors in this power deficit. Muscle fatigue (decline in peak power with contractions) compounds the problem of low power. The question of whether lower specific power reduces energy demand, and thus the accumulation of fatigue-inducing metabolites, has not been addressed. **PURPOSE:** To test the hypotheses that: older adults with mobility impairments (OI) will have smaller muscles, lower peak and specific power, and less metabolite accumulation and fatigue during muscular work than healthy older adults (OH).

METHODS: Eight OH (73±3yr, 50% female, Advanced Short Physical Performance Battery (SPPB-A) score: 2.62±0.12) and 7 OI (75±3yr, 86% female, SPPB-A score: 2.12±0.22) participated in magnetic resonance measurements to quantify maximal fat-free muscle cross-sectional area (mCSA, cm²), and the mechanical (W) and energetic (intramyocellular pH, inorganic phosphate [Pi]) responses to incremental knee extensor contractions. Maximal contractions (120°·s⁻¹) of increasing frequency (0.1-0.5Hz, every 2min) were performed for 10min in a 3-Tesla MR system. Peak concentric power was normalized to mCSA to calculate specific power (W·cm⁻²). [Pi] and pH were collected continuously during rest and contractions, and fatigue was calculated as

final/greatest power. Statistics: Wilcoxon test. **RESULTS:** mCSA was 52±13cm² in OH and 42±10cm² (n=6) in OI (p=0.108). Peak power was greater in OH than OI (116±37W, 59±18W; p=0.006), as was specific power (2.2±0.5W·cm⁻², 1.5±0.5W·cm⁻²; p=0.043). OH accumulated more [Pi] (24±5mM) than OI (19±4mM, p=0.040) in response to low-to-moderate frequency contractions (0.1-0.25Hz), while pH was not different (OH:6.88±0.11, OI:6.97±0.08, p=0.072). There were no group differences in [Pi] (OH: 28±4mM, OI: 25±4mM, p=0.281), pH (OH: 6.76±0.10, OI: 6.82±0.13, p=0.336), specific power (OH:1.0±0.4W·cm⁻², OI:0.8±0.4W·cm⁻², p=0.228), or fatigue (OH:49±13%, OI:50±12%, p=0.955) following the final 2min of contractions at 0.5Hz. **CONCLUSION:** These results suggest that lower specific power in OI compared with OH dampened metabolite accumulation during low-to-moderate frequency contractions, potentially due to a lower energy demand. The mechanisms and consequences of lower specific power in mobility-impaired older adults require further investigation.

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DIFFERENTIAL EFFECTS OF CAFFEINE ON PEAK MAINTENANCE AND REPETITION VOLUME IN RESISTANCE TRAINING

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Caffeine is widely studied for its ergogenic properties, including enhanced neuromuscular activation and reduced perception of fatigue, but caffeine's impact on sustaining power output during resistance training still needs investigation. **PURPOSE:** The purpose of this study was to investigate the effects of acute caffeine supplementation on maintaining power during resistance exercise. **METHODS:** Twenty-three healthy, recreationally trained college-aged males (22.1 ± 2.2 years; BMI 25.5 ± 3.0 kg/m²; body fat $15.8 \pm 6.4\%$) participated in a randomized, double-blind, placebo-controlled crossover trial. Participants completed two experimental sessions separated by 48 hours, participants ingested either caffeine (7 mg/kg body weight) or placebo 60 minutes before testing. Performance was assessed through repetitions to failure in the bench press (BP) and Smith machine squat (SMS) at 60% of 1RM. Peak power for the first, middle, and last repetitions was measured via Tendo unit and analyzed to assess power maintenance. **RESULTS:** Peak power declined significantly across BP and SMS repetitions ($p < 0.001$), however caffeine had no impact on peak power for BP ($p = 0.570$) and SMS ($p = 0.570$) or fatigue patterns across repetitions (BP $p = 0.0226$; SMS $p = 0.226$) compared to placebo. However, participants performed more total repetitions to failure in the bench press (95% CI = [0.31, 2.35]; $t(20) = 2.72$; $p = 0.01$) and squat (95% CI = [0.14, 2.81]; $t(22) = 2.30$; $p = 0.03$) with caffeine compared to placebo. **CONCLUSION:** Peak power declined significantly from the first to last repetition in both conditions, but there were no differences between caffeine and placebo on peak power maintenance. While caffeine did not improve the maintenance of peak power, it significantly increased the number of repetitions to failure. Caffeine's impact on the number of repetitions suggests that caffeine may not be ideal for sustaining power output but can be an aid for endurance-based resistance exercise.

IMPACT OF SPORTS DIETITIAN ACCESS ON NCAA ATHLETES' KNOWLEDGE OF DIETARY SUPPLEMENTATION SAFETY AND EFFICACY

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Dietary supplement consumption by collegiate athletes has risen in popularity, but many athletes are not aware of the safety regulations put in place by the U.S. Government. Additionally, many NCAA teams have access to a sports registered dietitian (RD) but may not utilize their services or engage in their education. **PURPOSE:** The purpose of this study was to assess the knowledge of dietary supplement safety and efficacy regulations for collegiate athletes who have access to a sports dietitian compared to athletes who do not, as well as the relationship between academic year and NCAA division on dietary supplement regulation knowledge. **METHODS:** A cross-sectional survey on dietary supplement usage was completed by 309 NCAA college athletes (male=139, female=170). Participants were asked to complete the Dietary Supplement Survey (DSS), and answer questions regarding their knowledge and understanding of U.S. dietary supplement regulations. Chi-square analyses were used to determine if there were any associations between having access to an RD, academic year, and NCAA division on the correctness of their responses. **RESULTS:** Access to an RD (safety: $\chi^2=0.554$; efficacy: $\chi^2=0.888$), school NCAA division (safety: $\chi^2=0.554$; efficacy: $\chi^2=0.888$), and academic year (safety: $\chi^2=0.508$; efficacy: $\chi^2=0.396$) did not significantly impact correctness for either safety and efficacy knowledge and understanding questions. **CONCLUSION:** Access to an RD, NCAA division, and academic year did not impact the knowledge of dietary supplement safety and efficacy of collegiate athletes. Division I athletes had access to an RD, while Division III did not, which may have impacted the results of the analysis. However, many Division I athletes still answered the knowledge questions incorrectly, which indicates there may be unequal education between athletes, or perhaps between different athletic teams. Academic year also did not contribute to athlete's knowledge, showing that over time athletes may not have received or engaged in education on supplement usage from a RD. Educating athletes on safe and effective dietary supplement consumption is crucial to health and performance. RDs and coaches can use this information to make informed decisions regarding nutrition education.

Key Words: dietary supplements, dietary supplement knowledge

Funding: The Rhode Island Foundation Clean Competition Grant

COMPARATIVE ANALYSIS OF RATE OF TORQUE DEVELOPMENT ALGORITHMS BETWEEN INDIVIDUALS WITH AND WITHOUT PATELLOFEMORAL PAIN

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PURPOSE: To compare lower extremity rate of torque development (RTD) between individuals with and without patellofemoral pain (PFP) using three common algorithms. **METHODS:** Twenty individuals with PFP (8 males and 12 females, 21.5 ± 1.7 years, 1.68 ± 0.11 m, 69.5 ± 16.4 kg, symptom duration: 36.8 ± 39.7 months) and twenty pain-free individuals (10 males and 10 females, 20.4 ± 2.7 years, 1.69 ± 0.1 m, 65.1 ± 13.2 kg) participated in this cross-sectional study. Hand-held dynamometry was used to assess RTD during hip abduction, hip extension, and knee extension. Data was converted to torque and normalized to body mass. RTD was calculated using three methods: (1) 0-100ms and 0-200ms windows; (2) early phase of 0-50ms and a late phase of 100-200ms; and (3) start of the contraction to 30%, 60%, and 90% of peak torque. Mean differences between groups with their corresponding 95% confidence intervals were calculated across the three muscles of interest and the three algorithms, $p < .05$. **RESULTS:** There were no differences in age, height, or mass between the groups, $p < .05$. The PFP group produced lower RTD across all 30%, 60%, and 90% calculations compared to the pain-free group for all three muscles of interest, $p < .05$ (Figure 1). When using the 0-100ms and 0-200ms method, the only statistical difference between groups was in hip extension, $p < .05$. The early (0-50ms) and late (100-200ms) phase method showed statistically significant differences between groups in hip extension and hip abduction during the late phase; however, only hip extension was significantly different during the early phase, $p < .05$. **CONCLUSION:** The 30%, 60%, and 90% calculations demonstrated lower torque development in the PFP cohort across all three muscles of interest. Since there were inconsistencies across the three approaches, clinicians and researchers should exercise caution when interpreting RTD findings and avoid direct comparisons between algorithms.

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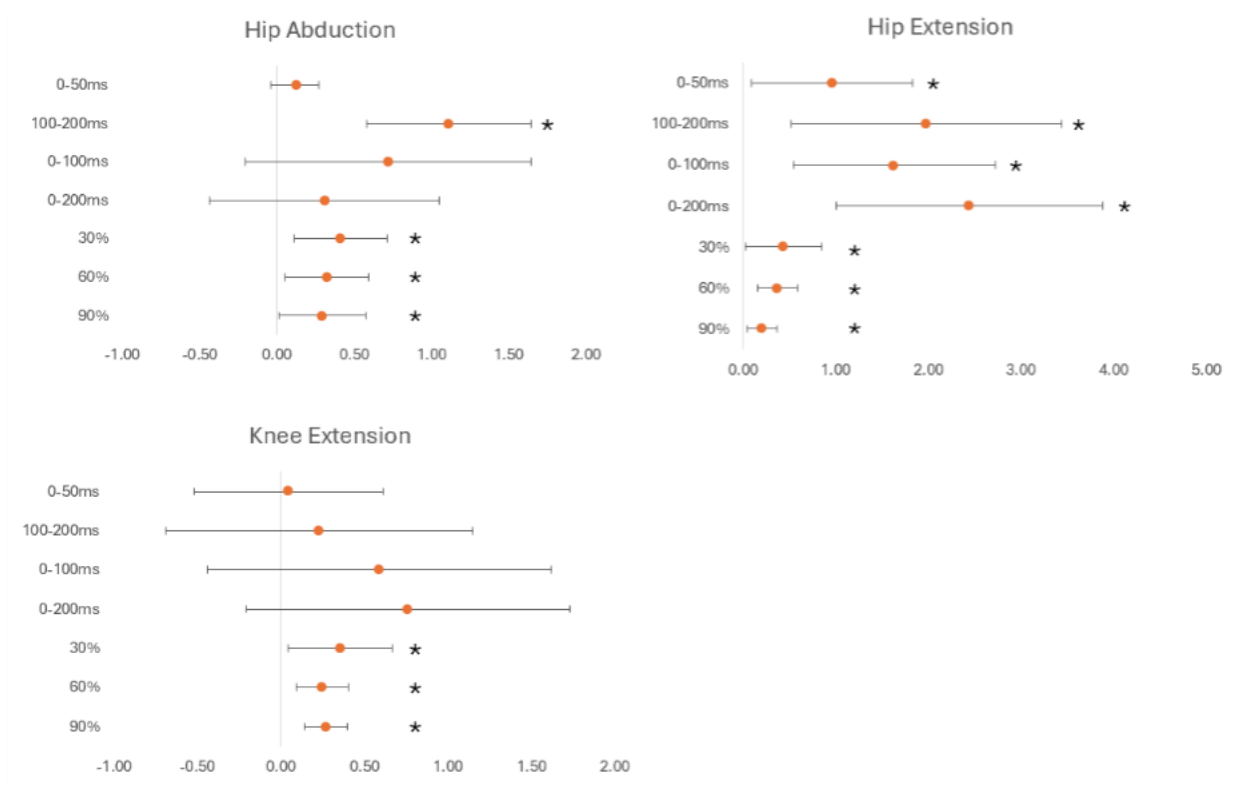


Figure 1. Mean differences (with 95% confidence intervals) in lower extremity rate of torque development (RTD) between individuals with and without patellofemoral pain (PFP). * Denotes statistically significant differences ($p < .05$). Positive values indicate the pain-free cohort had greater RTD, while negative values indicate the PFP cohort had greater RTD.

EXAMINING WORK-FAMILY CONFLICT AND FAMILY-WORK CONFLICT AMONG COLLEGIATE COACHES AT THE NCAA DIVISION III LEVEL

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Athletic coaching within the National Collegiate Athletic Association (NCAA) setting is known to be a stressful profession. Time commitments for coaches can extend beyond normal hours, limiting time for coaches to be at home supporting family and household chores. This imbalance between work and home can lead to increased stress and create role conflict. Work-family conflict (WFC) and family-work conflict (FWC), the result of the imbalance, can impact overall satisfaction among work and family domains. **PURPOSE:** Investigate WFC and FWC among NCAA Division III full-time collegiate coaches by using the validated 10-item WFC scale. **METHODS:** This cross-sectional survey study examined 746 responses using the WFC scale ($\alpha=0.911$) and used descriptive statistics and Mann Whitney U tests to identify differences between gender, marital status, parental status, and years of experience. **RESULTS:** Coaches were middle-aged (41 ± 12 years) with an average of 16 ± 11 years of experience. Majority of the sample were men (61.5%), married (61.1%), and just over half (52.8%) had children. Married coaches reported significantly higher levels of WFC ($U=56837.0$, $p=0.001$) and FWC ($U=54737.5$, $p<0.001$) compared to unmarried coaches. Coaches with children reported significantly higher levels of WFC ($U=61080.5$, $p=0.007$) and FWC ($U=51543.5$, $p<0.001$) compared to their counterparts without children. Coaches with less than three years of experience reported significantly lower levels of WFC ($U=13220.5$, $p=0.027$) compared to those with more than three years of experience. **CONCLUSIONS:** Gender alone may not be a strong predictor of WFC and FWC in coaching. Marriage adds to the complexity of balancing coaching demands, and parenting responsibilities are a major source of conflict. As coaches gain experience, their responsibilities and expectations grow, increasing conflict. WFC appears to be influenced by life circumstances (i.e., marriage, children) more than gender. Sport organizations may want to have targeted support, especially for those coaches with families, and who are in the mid-to-late career stages. Coaches may need to be proactive in their planning but also take advantage of organizational policies that could help them manage coaching and family responsibilities.

Key Words: work-life balance, family strain, job issues

SODIUM–GLUCOSE COTRANSPORTER-2 INHIBITOR THERAPY IMPROVES MARKERS OF MAFLD IN A RAT MODEL OF T2DM

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Type 2 diabetes mellitus (T2DM) and metabolic-associated fatty liver disease (MAFLD) are interrelated conditions characterized by dysregulated metabolism. Excessive hepatic lipid accumulation and mitochondrial dysfunction promote lipotoxicity, and hepatocellular injury drives profibrotic pathways leading to disease progression in MAFLD. Sirtuins can play important roles in regulating hepatic fatty acid metabolism and mitochondrial function. Since exercise training (EX) and sodium–glucose cotransporter-2 inhibitors (SGLT2i) are recommended for T2DM management, they may also benefit MAFLD by restoring metabolism, reducing hepatic injury. **PURPOSE:** To assess the effects of SGLT2i, exercise, and their combination on lipid metabolism–related regulatory proteins, profibrotic markers, and the expression of Sirtuin 1/3 in the liver of a rat model of T2DM. **HYPOTHESIS:** SGLT2i, EX, and their combination will significantly lower lipid storage and profibrotic proteins, will and alter Sirtuin 1/3 compared with untreated sedentary animals. **METHODS:** Hyperglycemia was induced in male Sprague-Dawley rats with low-dose streptozotocin (30 mg/kg) and a high-fat diet (45% kcal fat). Rats were assigned to vehicle sedentary (VEH SED), vehicle exercise (VEH EX), SGLT2i sedentary (SGLT2i SED), or SGLT2i exercise (SGLT2i EX) groups for 12 weeks. SGLT2i groups received canagliflozin (3 mg/kg/day in 0.5% methylcellulose), while VEH groups received 0.5% methylcellulose. Exercise groups underwent treadmill running (60 min/day, 5 days/week, 10% incline, ~50–55% VO₂ max). **RESULTS:** Neither EX nor SGLT2i influenced lipid storage–related proteins PPAR γ or SCD1. SGLT2i had significantly higher protein expression of the sphingolipid biosynthesis regulator, SPTLC1 (p=0.003). There were no effects of EX or SGLT2i on pro-fibrotic α -SMA expression, but SGLT2i had ~35% lower COL1A1 protein expression (p=0.10). Neither EX nor SGLT2i had effects on mitochondrial biogenesis protein PGC-1 α or SIRT1, but SGLT2i therapy had significantly higher SIRT3 protein expression (p=0.04). **CONCLUSION:** Compared to the VEH SED group, SGLT2i had higher SPTLC1 and SIRT3 and slightly lower expression COL1A1. Taken together, these results highlight the potential of SGLT2i therapy as a promising strategy to mitigate MAFLD.

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COMPARATIVE ANALYSIS OF THE IMPACT OF ORGANIZED SPORTS ON MENTAL HEALTH IN RURAL COLLEGE STUDENTS

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Mental health is a vital yet often overlooked aspect of human well-being. Mental health is strongly linked to physical health which in turn is greatly affected by the level of physical activity a person engages in. People who engage in higher levels of physical, particularly athletes, tend to be healthier both physically and mentally. Recent evidence indicates that college students are experiencing declining mental health, with rising rates of stress, anxiety, and depression posing challenges to academic success and overall well-being. **PURPOSE:** The purpose of this study was to assess a population of rural college freshman to assess factors relating to mental and physical health. **METHODS:** A survey consisting of several validated tools (BRS scale, CDR scale, UCLA loneliness scale, Kessler distress scale, Weight concerns scale, PSQI, Diener flourishing, IPAQ) was sent out to all college freshmen on two Vermont State University campuses. 98 full responses were recorded and analyzed by athlete status. **RESULTS:** Significant correlations were found in athlete groups with significant differences among the various athlete statuses. For both scales, there was significantly higher resilience reported in club and varsity athletes compared to non-athletes ($p < 0.05$). All athlete groups recorded higher flourishing scores compared to non-athletes ($48.7-51.5$ vs 40 ± 1.3). Kessler distress scores also showed a significant difference between groups, with all athlete groups reporting lower distress than non-athletes ($4.4-6.6$ vs 11.1 ± 0.8 , $p < 0.05$). Sleep quality index scores showed a difference only between varsity and club sport athletes compared to non-athletes ($5.7-7.0$ vs 9.3 ± 6.0 , $p < 0.05$). **CONCLUSION:** Our results indicate that increased physical activity in the form of organized sports including varsity, club sports and intramural sports, tend to result in students who are more resilient, flourishing more, have better sleep and feel less lonely. These all contribute to an improved state of mental health.

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THE EFFECT OF MAX-AIR® SWIRLZZ® NASAL DILATORS ON EXERCISE PERFORMANCE IN DIVISION III VARSITY ATHLETES

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New Max-Air SwirlZZ internal nasal dilators are specifically designed to dilate the anterior nasal airways, facilitate nasal breathing, and relieve nasal airway obstruction. **PURPOSE:** The purpose of this study was to determine the effect of wearing Max-Air SwirlZZ internal nasal dilators on the aerobic performance of male NCAA Division III varsity athletes who reported no complaint of nasal airway obstruction. **METHODS:** Participants ($n = 15$; $ht = 1.79 \pm 0.07$ m, $wt = 83.48 \pm 9.67$ kg) completed two sessions and were randomly assigned to either the experimental (SwirlZZ) or control condition first. Participants completed a $\dot{V}O_{2peak}$ treadmill test. Ventilatory data including $\dot{V}O_{2peak}$, ventilatory threshold (T_{vent}), tidal volume (TV), breathing rate, and time to completion were gathered using the Parvo Medics TrueOne 2400 metabolic system (Parvo Medics, Salt Lake City, UT). Lactate values were also collected at the end of each exercise stage to determine lactate threshold. All procedures were carried out after a three hour fast. **RESULTS:** Paired samples T-Tests revealed significant increases in the SwirlZZ condition compared to the control for $\dot{V}O_{2peak}$ ($M_{SwirlZZ} = 49.86$, $SD_{SwirlZZ} = 4.27$; $M_{con} = 49.02$, $SD_{con} = 4.23$); $t(14) = 2.21$, $p = 0.022$, $d = 0.57$, T_{vent} ($M_{SwirlZZ} = 39.8667$, $SD_{SwirlZZ} = 4.94$; $M_{con} = 30.13$, $SD_{con} = 12.18$); $t(14) = 3.127$, $p = 0.004$, $d = 0.81$, T_{vent} as a % of $\dot{V}O_{2peak}$ ($M_{SwirlZZ} = 0.80$, $SD_{SwirlZZ} = 0.07$; $M_{con} = 0.61$, $SD_{con} = 0.24$); $t(14) = 3.126$, $p = 0.004$, $d = 0.807$, and in TV ($M_{SwirlZZ} = 2.96$, $SD_{SwirlZZ} = 0.46$; $M_{con} = 2.89$, $SD_{con} = 0.45$); $t(14) = 1.92$, $p = 0.037$, $d = 0.50$. **CONCLUSION:** These findings suggest wearing Max-Air SwirlZZ internal nasal dilators during a maximal effort incremental treadmill test leads to a 1.7% increase in $\dot{V}O_{2peak}$, a 32.3% increase in T_{vent} , and a 2.4% improvement in TV, which may improve performance in endurance-type activities.

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THE VASOMOTOR TONE RESPONSE TO CAFFEINE

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Caffeine is a common pharmacological substance that contributes to a variety of physiological responses. Previous research has in large part identified a large portion of cardiovascular responses to caffeine through various measured variables such as cerebral blood flow, arterial stiffness, heart rate, and blood pressure. However, researchers have yet to investigate the extent of vasoconstriction or dilation of the blood vessel wall that occurs with caffeine consumption.

PURPOSE: The purpose of this randomized, double-blind, crossover study was to investigate vasomotor tone responses to caffeine in college-aged, resistance-trained females using hormonal contraceptives. **METHODS:** Participants ($n = 9$, age = 22.67 ± 3.04 yrs, height = 1.65 ± 0.84 m, weight = 65.99 ± 11.25 kg) were randomly assigned to receive either a 200 mg caffeine tablet or a placebo. Five ultrasound measurements of the brachial artery were taken at baseline, 30-, 45-, 60-, 75-, and 90-minutes post-ingestion of the assigned treatment. The same procedure was repeated for session three with the alternate treatment. A 2x6 repeated measures analysis of variance was performed to assess possible main and interaction effects of within-subject factors condition (caffeine, placebo) and time (baseline, 30, 45, 60, 75, 90 minutes post) on vasomotor response. **RESULTS:** There was a significant interaction effect of time and condition ($p = 0.049$). There was a significant decrease in mean vasomotor tone from baseline to 75 minutes post-ingestion of caffeine ($p = 0.045$). There were no significant differences across the remaining time comparisons of the caffeine condition, no significant time comparisons in the placebo condition, and no significant differences between conditions at each time point.

CONCLUSIONS: Based on the results, within this population, caffeine begins to affect the vasculature after 75 minutes. As all testing was performed in females using hormonal contraceptives, it is possible that the observed vasoconstriction could be altered by changes in hormone levels due to menstrual cycle phase or status of hormonal contraceptive use. Further research is needed regarding the specific interaction of caffeine, the menstrual cycle, and hormonal contraceptives on vasomotor tone in this population.

ASSOCIATIONS BETWEEN MENSTRUAL CYCLE SYMPTOM BURDEN AND ANAEROBIC PERFORMANCE

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In research exploring the menstrual cycle and athletic performance, most studies rarely consider symptom burden alongside objective outcomes. This leaves a gap in understanding how menstrual cycle symptoms influence exercise performance. **PURPOSE:** This analysis examines whether menstrual cycle symptom burden is associated with high intensity anaerobic performance in collegiate students. We hypothesize that higher symptom burden would be associated with lower measures of anaerobic performance. **METHODS:** The study protocol was approved by the Smith College IRB (#24-037). Collegiate students (mean age = 20.3 ± 1.6 years; 40% varsity athletes) tracked their cycles using apps, calendar counting, and ovulation testing. Participants completed a 30-second Wingate test during the early follicular, ovulatory, and late luteal phases. Outcomes included peak power output (PPO; $\text{Force (kg)} \times \text{Total Distance (m)} / \text{Time (min)}$), mean anaerobic power (MAP; $[\text{Total Revolutions} \times \text{Distance per Revolution} \times \text{Resistance} \times 60] / 30$), relative MAP (RMAP, MAP normalized to body weight), and fatigue index (FI, $[(\text{Peak Power} - \text{Minimum Power}) / \text{Peak Power}] \times 100\%$). Symptom burden was assessed subjectively using the Premenstrual Assessment Form–Short Form (PAF-SF). Symptom burden (%) was calculated by totalling physiological and psychological burden category scores, then converting the scores to a percentage based on the highest possible total score. Correlations between performance outcomes and symptom burden were analyzed within and across all phases. **RESULTS:** Preliminary results ($N = 10$) show a trend of a significant correlation between symptom burden and RMAP ($r = -0.35$, $p = 0.057$) when all menstrual phases were considered together. The strongest effect was observed during ovulation ($r = -0.52$, $p = 0.12$) compared with other cycle phases. For PPO, the strongest correlation with symptom burden was found during the ovulation phase but the correlation was not significant ($r = -0.30$, $p = .39$). **CONCLUSION:** These findings suggest that menstrual cycle symptom burden may be related to anaerobic performance. Further data collection and in-depth analysis will help refine these preliminary outcomes. Incorporating symptom assessment should be employed when examining menstrual cycle effects on performance.

5-YEAR DECLINE IN DAILY PHYSICAL ACTIVITY IS TWOFOLD THAT OF PULMONARY FUNCTION IN OLDER SMOKERS

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Chronic obstructive pulmonary disease (COPD), affecting 11 millions of adults in US, is a chronic lung condition characterized by poorly reversible airflow limitation. People with COPD have a low physical activity (PA) that associates with mortality. The longitudinal rate of decline in daily PA, either its duration or intensity, is unknown. **PURPOSE:** To determine 5-year changes in daily PA in older smokers with COPD, compared to smokers with normal spirometry (controls, CON). **METHODS:** 245 individuals enrolled in the *Muscle Health Study*, an ancillary study of COPDGene, were recalled for a 5-year follow-up testing. Daily PA (vector magnitude units, VMU/min; steps/day) was monitored by triaxial accelerometry over 7 days, where ≥ 4 days and ≥ 8 h/day (8AM-11PM) was required for data validation. Participants were characterized by: anthropometrics, pulmonary function (FEV₁), exercise performance (6-minute walk distance, 6MWD), dyspnea symptoms (mMRC), and smoking history (ATS pack-years). T test inferred about differences between follow-up and baseline study phases. **RESULTS:** 225/245(93%) participants met PA measurement inclusion criteria, of those 111(49%) were COPD. Mean follow-up was 4.6 $\pm$ 0.6 years. At time to follow up, 57/225(25%) were deceased, of these 28/57(49%) were COPD. There was no difference in smoking history (ATS pack-years: COPD 37 $\pm$ 15; CON 38 $\pm$ 19; p=0.41), or age (follow up age: COPD 71 $\pm$ 10; CON 72 $\pm$ 11; p=0.51) between COPD and CON. Our ongoing preliminary analysis reported that annualized rates of decline in PA were rapid but did not differ between groups (**Table**). Across our cohort, the relative 5-years decline in VMU/min (-31 $\pm$ 23%) and steps/day (-32 $\pm$ 30%) were double that of FEV₁ (-16 $\pm$ 11%) (N.S.). **CONCLUSION:** 5-year follow-up in former smokers with and without COPD revealed rapid decline in PA than pulmonary function, with no significant difference among COPD and CON. Next step of our analysis is to determine 5-year changes in intensity (METs) and duration of the daily activities.

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Table. Five-year decline in pulmonary function and physical activity in older smokers with and without COPD

		Age years	FEV ₁ L/min	Vector Magnitude Unit VMU/min	Step/day count
CON	Baseline	68(11)	2.43(0.45)	384.5(192.1)	6844(3249)
	Follow-up	72(11)	2.09(0.37) *	251.4(143.0)	4126(2300) \$
	Rate of decline/year	-	-0.07(0.04)	-29.3(34.0)	-587(575)
COPD	Baseline	65(10)	1.76(0.59)	362.9(206.8)	4400(3345)
	Follow-up	71(10)	1.46(0.41) *	213.3(107.1) *	3115(1908)
	Rate of decline/year	-	-0.07(0.05)	-32.5(21.7)	-279(312)

Data are mean(SD). CON, smokers with normal spirometry. FEV₁, forced expiratory volume in the first second. * p<.05 and \$ p=.06 vs. Baseline.

RETROSPECTIVE EVALUATION OF NCAA DIVISION III ATHLETE RECOVERY FROM COVID-19 USING INSTITUTIONAL PROTOCOLS

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The novel coronavirus, first discovered in 2019 (COVID-19) in China, set off a global pandemic. COVID-19 has been shown to cause lasting physiological effects even in young, healthy individuals, such as athletes. Studies focused on elite and professional athletes have shown cardiac abnormalities resulting from COVID-19 infection. Consequently, return to play protocols (RTP) were developed, yet there is limited research on examining these RTP protocols in NCAA Division III athletes. **PURPOSE:** The purpose of this study was to examine the changes in cardiovascular parameters (HR, BP, PP, RPP, SpO₂) during recovery from COVID-19 in NCAA DIII athletes and whether the response to acute exercise mediated time in protocol. **METHODS:** A retrospective analysis was conducted on forty-six included athletes undergoing institutional RTP protocol from Spring 2021. Acute exercise responses and baseline cardiovascular values were analyzed using repeated measures ANOVA, linear regression, and Kaplan-Meier survival analysis. **RESULTS:** HR and RPP increased significantly with exercise ($p < 0.001$), while SpO₂ decreased ($p < 0.001$). Post-exercise HR and baseline SpO₂ were predictive of prolonged RTP duration (HR: $\beta = -0.060$, $p = 0.009$; SpO₂: $\beta = -0.949$, $p = 0.024$). BP classification (normal vs elevated) did not significantly influence RTP time ($p = 0.35$). **CONCLUSION:** These findings suggest that elevated post-exercise HR and reduced baseline SpO₂ may identify athletes at risk for delayed convalescence following COVID-19. Cost-effective and non-invasive measurements, like HR and SpO₂, could be useful tools for RTP planning and implementation by athletic trainers and coaches.

Inter Agreement of Brachial and Central Blood Pressure between Two Blood Pressure Devices

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Accurate and reproducible blood pressure (BP) measurement is essential for cardiovascular disease management and prevention. The Mobil-O-Graph and SphygmoCor XCEL are automated, non-invasive devices used to assess brachial and central BP. While the SphygmoCor XCEL is extensively validated, direct comparison between these devices across body positions is limited. **PURPOSE:** The purpose of this study was to evaluate the agreement between the Mobil-O-Graph and SphygmoCor XCEL for brachial and central BP in both seated and supine positions. **METHODS:** Thirty healthy, recreationally active, normotensive nonsmokers adults (age=23±4 yrs; BMI=26±6 kg/m²) participated in the study. BP was measured in a quiet, dimly lit room after a 10-minute seated rest using both devices. Participants then rested supine for 5 minutes before repeat measurements. Pearson's correlations were utilized to assess relationships between devices, and Bland-Altman plots were used to determine inter-device agreement. **RESULTS:** In the seated position, correlations between devices for brachial systolic, brachial diastolic, central systolic, and central diastolic BP were $r=0.643$, $r=0.545$, $r=0.546$, and $r=0.531$ ($p<0.05$ for all). In the supine position, the corresponding correlations were $r=0.545$, $r=0.726$, $r=0.509$, and $r=0.722$ (all $p<0.05$). Bland-Altman analyses showed mean differences (95% limits of agreement) for seated brachial systolic, diastolic, central systolic, and central diastolic BP of 1.18 (-11.66 to 14.02), 2.69 (-10.74 to 16.12), 2.74 (-12.10 to 17.59), and 3.29 (-10.35 to 16.94) mmHg, respectively. In the supine position, the corresponding mean differences were -0.68 (-17.10 to 15.73), -1.89 (-13.45 to 9.66), 4.45 (-12.68 to 21.59), and -2.38 (-9.32 to 14.09) mmHg. **CONCLUSIONS:** The Mobil-O-Graph demonstrated strong comparability to the validated SphygmoCor XCEL, with mean differences consistently <5 mmHg. These findings indicate that the Mobil-O-Graph provides reliable brachial and central BP assessment in both seated and supine positions, supporting its use in clinical and research applications.

EXERCISE ENHANCES SKELETAL MUSCLE FUNCTION AND GLUCOSE HOMEOSTASIS IN HUMANS WITH TYPE 1 DIABETES

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PURPOSE: Type 1 Diabetes (T1D) is an autoimmune disease that leads to destruction of insulin-producing β cells in pancreas, resulting in lifelong insulin dependence and increased risk of complications such as cardiovascular disease, neuropathy, and muscle weakness. While exercise is well established to improve glucose regulation and metabolic health in conditions such as type 2 diabetes and obesity, its effects on glucose homeostasis and musculoskeletal health in T1D remain less defined. We aim to investigate the influence of exercise on individuals with T1D and hypothesize that exercise enhances glycemic control and improves muscle function in this population. **METHODS:** All procedures are approved by the IRB Committee at University of Hartford and comply with the ACSM statement regarding the use of human subjects and informed consent. Human participants complete eight laboratory visits across an eight-week period (one visit per week). At baseline (Visit 1), assessments include muscular strength (handgrip and isometric quadriceps extension), body composition (DEXA), maximal oxygen consumption (VO_2max), blood glucose and lactate concentration, and functional performance (30-second sit-to-stand). Beginning with Visit 2 until Visit 7, participants are randomly assigned to either a sedentary control group or an exercise intervention group. The intervention group performs a 45-minute brisk walk at 50–60% heart rate reserve, while the control group remains seated for an equivalent duration. Blood glucose and lactate concentrations are monitored during each session, with additional pre- and post-intervention assessments. Final assessments (Visit 8) include blood glucose and lactate concentrations, maximal oxygen consumption, body composition, maximal lower-limb strength, lower-extremity functional fitness, handgrip strength, and Diabetes Quality of Life questionnaire responses. Statistical analyses are conducted using Two-Way ANOVA and/or Student's *t*-tests and reported as means $\pm$ SD. **RESULTS:** We expect that regular physical activity in individuals with type 1 diabetes will attenuate hyperglycemia and enhance muscle performance, thereby demonstrating a beneficial role of exercise in modulating T1D progression. **CONCLUSION:** Our study provides critical insights into how exercise-based interventions could improve metabolic and musculoskeletal health in T1D population.

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EFFECTIVENESS OF NEUROMOTOR EXERCISE AS ANTIHYPERTENSIVE LIFESTYLE THERAPY: A META-REVIEW AND META-ANALYSIS

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Aerobic (AET) and resistance (RT) training alone or combined are universally recommended as antihypertensive lifestyle therapy. However, the blood pressure (BP) benefits of neuromotor exercise (NEURO) among adults with hypertension are inconclusive due to the low quality of this literature. **PURPOSE:** We performed a meta-review and meta-analysis (MA) to assess the effectiveness of NEURO as antihypertensive lifestyle therapy. **METHODS:** We systematically searched 7 databases to November 2024 for peer-reviewed, systematic reviews (SR)/MAs of randomized control trials published in English. Qualifying SR/MAs included: NEURO interventions >4wk with a no-exercise/no-diet control group; healthy adults >18yr with resting BP $\geq$ 130 and/or 80 mmHg without (w/o) chronic disease; and reported pre- and post-intervention BP. We evaluated methodological quality (AMSTAR-2), risk of bias (ROB), Evidence Grading (GRADE), and degree of overlap (Corrected Covered Area), and calculated the pooled weighted mean difference. Subgroup analysis included NEURO type and antihypertensive medication use (MEDS). **RESULTS:** Qualifying MAs (k=8; n=13,920 sample; n=8531 hypertension) included 16 interventions: Tai Chi (k=3 with MEDS; k=5 w/o MEDS), Qigong (k=4 with MEDS; k=3 w/o MEDS), and Yoga (k=1 with MEDS) lasting 6-52wk. Control groups included health education and routine care with MEDS (k=10) and w/o MEDS (k=6). Among adults with hypertension with and w/o MEDS, NEURO reduced systolic BP (SBP) 9.7mmHg (95% CI, -12.6,-6.8; k=14) and diastolic BP (DBP) 5.6mmHg (95% CI, -7.7,-3.4; k=15) vs control. NEURO w/o MEDS reduced SBP 14.3mmHg (95% CI, -19.3,-9.3; k=5) and DBP 8.1mmHg (95% CI, -12.6,-3.6; k=6) vs control; NEURO with MEDS reduced SBP 8.8mmHg (95% CI, -10.6,-7.0; k=7) and DBP 4.6mmHg (95% CI, -5.5,-3.7; k=7) vs MEDS. Four MAs had high methodological quality and 4 low, ROB was low, degree of overlap was slight, while the strength of the evidence was very low. **CONCLUSIONS:** Overall, NEURO reduced BP 6-10 mmHg among adults with hypertension, antihypertensive benefits that appear $\geq$ AE and/or RT. The magnitude of the BP reductions were greater w/o MEDS (8-14mmHg) than with MEDS (5-9mmHg). Despite improvements in the quality of the literature, the strength of evidence remains low to recommend NEURO as standalone antihypertensive therapy.

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University of Connecticut Health Fitness Research Laboratory

SEX DIFFERENCES IN NON-LOCAL MUSCLE FATIGUE FOLLOWING UNILATERAL LOWER BODY EXERCISE

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Muscle fatigue following repeated unilateral contractions on one limb can also be evident in non-exercised muscles on the contralateral limb. This is known as non-local muscle fatigue (NLMF). While males and females often display different patterns of fatigue in which females may be more fatigue-resistant, NLMF has not been evaluated. **PURPOSE:** To determine if NLMF occurs in the knee extensors (KE) and flexors (KF) after a fatigue protocol and if the response differs between males and females. **METHODS:** Twelve participants (7 males (21 $\pm$ 1 years, 177 $\pm$ 6cm, 77 $\pm$ 9kg, body fat percentage=12.4 $\pm$ 4.7) and 5 females (20 $\pm$ 1 years, 165 $\pm$ 9cm, 64 $\pm$ 12kg, body fat percentage=26.4 $\pm$ 7.3)) participated in a fatigue protocol consisting of five sets of 30 maximal isokinetic (180 $^{\circ}$ •s $^{-1}$) KE and KF repetitions with 30s of rest between sets. Maximum voluntary isometric contractions (MVICs) were completed on the KE and KF for both legs and blood lactate were assessed before and after the fatigue protocol. Data was analyzed using a 2x2x2 repeated measures analysis of variance comparing pre and post force production in each leg between males and females and t-tests with Bonferroni corrections were used for post hoc tests. **RESULTS:** There was not a significant interaction in KE force ($p=0.11$, $\eta_p^2=0.10$) but there was for KF ($p=0.02$, $\eta_p^2=0.21$). While KE force in the exercised leg decreased 29 $\pm$ 13% ($p=0.001$, $d=1.28$), force did not decrease in the non-exercised leg (-1 $\pm$ 19%, $p=0.47$, $d=0.10$) and this response was similar between males and females. Males experienced significant KF force decrements in the exercised leg (32.9 $\pm$ 16%, $p<0.001$, $d=1.67$) and non-exercised leg (10.5 $\pm$ 10.6%, $p=0.002$, $d=0.92$). Females experienced similar KF impairments in the exercised leg (27.5 $\pm$ 16.8%, $p<0.001$, $d=0.1.4$) and non-exercised leg (12.1 $\pm$ 11%, $p<0.001$, $d=1.2$). Males had significantly higher blood lactate concentrations post protocol than females (8.2 $\pm$ 2.0 vs. 6.0 $\pm$ 1.7, $p=0.004$). **CONCLUSION:** NLMF was only evident in the KF suggesting factors like neural drive, fiber type, and muscle mass may make the KF more susceptible to NLMF. Despite the occurrence of NLMF only in the KF, females and males experienced similar local and non-local decrements in fatigue.

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EXERCISE INTENSITY THRESHOLDS AS PREDICTORS OF MAJOR ADVERSE CARDIOVASCULAR EVENTS: A SYSTEMATIC REVIEW

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Introduction: The energy needed to exercise at lower relative intensities is entirely supplied by aerobic metabolism. However, when energy requirements increase to a certain point, this triggers anaerobic energetic contribution. This physiological event is known as the exercise intensity threshold (EIT). The oxygen uptake (VO_2) at the first exercise intensity threshold ($\text{VO}_2\text{@EIT1}$) has been used to assess surgical risk; however, its association with mortality outside this setting has not been systematically investigated. **Purpose:** This systematic review aimed to evaluate whether $\text{VO}_2\text{@EIT1}$ is able to predict all-cause and cardiovascular mortality. **Methods:** Three databases (PubMed, ScienceDirect, and Web of Science) were searched for eligible studies. After removal of duplicates, 1,245 articles were assessed, and 2 were included. **Results:** Risk-related data were reported in 13 studies. Additionally, 4 provided prognostic statistics, and 7 compared survivors and non-survivors. $\text{VO}_2\text{@EIT1}$ was significantly associated with lower mortality in 12 of 13 studies, with reductions in cardiovascular-related and all-cause mortality ranging from 23% to 52% and 10% to 63%, respectively. In 6 out of 11 studies that used multivariate models, EIT ceased to be a significant predictor of mortality. In 55% of studies where $\text{VO}_{2\text{peak}}$ was included in a multivariate analysis, $\text{VO}_2\text{@EIT1}$ was not a significant independent predictor of mortality. In four studies evaluating EIT's prognostic value using the area under the curve of the receiver operating characteristic analysis, point estimates ranged from 0.504-0.750. **Conclusion:** $\text{VO}_2\text{@EIT1}$ showed a strong association with mortality despite apparently being dependent to one's peak VO_2 . EITs have potential for risk stratification use, given that they are derived from noninvasive submaximal tests. $\text{VO}_2\text{@EIT1}$'s prognostic ability varied considerably depending on the metric used (L/min vs mL/kg/min). Further research is needed to optimize the use of EITs and improve the understanding of their predictive value.

MARKERS OF HYDRATION AND KIDNEY HEALTH IN INDIVIDUALS COMPLETING THE 160K WESTERN STATES ENDURANCE RUN

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Participation in ultramarathon (>42.2 kilometer) running events has increased over the past decade, and emerging research indicates that these events create significant physiological stress evident in markers of kidney function. The Western States Endurance Run (160 kilometer trail race) is typically run in hot, dry conditions which further increases risk of dehydration and impaired renal blood flow. **PURPOSE:** The purpose of this study was to examine urinary markers of hydration and kidney health in individuals before and after completing a 160k race in hot conditions. **METHODS:** Twenty-one athletes (14M, 7F; Mean [range] age: 43 [24-72] years) completed the 160k race. Semi-nude body mass and urine samples were collected pre-race and within 30 minutes post-race. Urine was analyzed for osmolality (Uosm), specific gravity (USG), and presence of protein, blood, and ketones. **RESULTS:** Body mass decreased by $2.1 \pm 0.7\%$, and both Uosm (Pre: 572 ± 66 ; Post: 962 ± 77 mOsm/L; $p < 0.01$) and USG (Pre: 1.016 ± 0.007 , Post: 1.022 ± 0.010 ; $p = 0.01$) increased significantly from pre- to post-race. Urine samples taken post-race exhibited high rates of proteinuria (18/21 finishers), hematuria (16/21 finishers), and urinary ketones (15/21 finishers). Evidence of urinary abnormalities was not associated with percent body mass loss. **CONCLUSIONS:** These findings indicate that, even when changes in hydration status are moderate, a 160k race presents significant challenges to the urinary system and elevates risk of acute kidney injury. Future research can examine predictors of acute kidney injury, urinary abnormalities, and strategies to reduce risk.

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EXAMINING THE INFLUENCE OF AN OBESOGENIC MODEL ON INSULIN RESISTANCE DEVELOPMENT & GLUCOSE CONTROL

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High added sugar consumption and increased sedentary behavior are associated with the development of insulin resistance. It remains unknown how the development of insulin resistance shifts 24h mean glucose and variability when young adults transition to an obesogenic lifestyle (LowPA+CHO; <5,000 steps/day & ~170g added sugar consumption). **PURPOSE:** The purpose of this study was to determine the relationship between insulin resistance and 24-hour glucose control in young adults exposed to an obesogenic lifestyle. **METHODS:** Twenty-six recreationally active young adults completed a 10-day randomized intervention protocol comprising three subgroups: active control (Active, maintain normal active lifestyle), low physical activity (LowPA; <5,000 steps/day), and LowPA+CHO. All participants were encouraged to meet their daily step goals. All participants (20 male, 6 female; age= 21 ± 2 yrs) wore 24h continuous glucose monitors and physical activity monitors over the 10-day intervention. Added sugar beverages were provided to participants in the LowPA+CHO to consume as part of their normal diet. Insulin resistance was measured using HOMA-IR before and after the 10-day intervention. 24h mean glucose and continuous overall net glycemic action (24h CONGA) were assessed as measures of glucose control. **RESULTS:** By design, both LowPA ($5,413 \pm 1,439$ steps/day) and LowPA+CHO ($5,905 \pm 2,053$ steps/day) groups averaged fewer steps compared to the Active group ($10,502 \pm 3,363$ steps/day), $p < 0.05$. The 10-day obesogenic lifestyle (LowPA+CHO) increased 24h mean glucose (24h mean= 7.2 ± 0.7 mmol/L) and CONGA (24h CONGA= 6.5 ± 0.6 mmol/L) compared to LowPA (24h mean= 6.5 ± 0.6 mmol/L; 24h CONGA= 5.9 ± 0.6 mmol/L) and Active (24h mean= 6.6 ± 1.0 mmol/L; 24h CONGA= 6.0 ± 1.0 mmol/L) groups, $p < 0.05$ vs. LowPA+CHO. There was no significant difference in HOMA-IR between groups ($p > 0.05$). However, there was a significant correlation ($r = 0.783$, $p = 0.022$) between the change in 24h mean glucose and the change in insulin resistance in the LowPA+CHO group over the 10-day intervention. There was no correlation in the LowPA ($r = 0.478$) or Active ($r = 0.558$) groups, $p > 0.05$. **CONCLUSION:** The findings of this study suggest that young adults with greater increases in insulin resistance will have greater induced changes in 24 mean glucose when transitioning to an obesogenic lifestyle. LowPa conditions over 10-days do not induce increases in 24h mean glucose or glucose variability.

DELAYED ONSET MUSCLE SORENESS AND THE POTENTIAL IMPACT OF SELECTIVE SEROTONIN REUPTAKE INHIBITORS

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Selective Serotonin Reuptake Inhibitors (SSRIs) are widely prescribed for mood disorders but have been associated with musculoskeletal side effects, including rare cases of rhabdomyolysis. However, it is unclear if SSRIs have an effect on exercise-induced muscle damage and recovery. **PURPOSE:** The purpose of this study was to determine if SSRI use influences delayed onset of muscle soreness (DOMS) following an excessive bout of eccentric exercise in the quadriceps muscles. **METHODS:** Thirty-six healthy subjects (weight 160.4 ± 36.3 lbs., height 65.3 ± 3.0 inches, and age 19.7 ± 1.7 years old) were divided into two groups, SSRI users ($n=18$) who were on an SSRI for three or more months, and control subjects ($n=18$) not on SSRIs. Participants were asked to complete a DOMS protocol consisting of 300 eccentric repetitions of the quadriceps on the BIODEX machine. Dependent variables assessed included muscle soreness, thigh circumference, quadriceps flexibility, and isometric quadriceps strength that were measured at baseline, 24-, 48-, 72-, and 96-hours post-DOMS protocol. **RESULTS:** In comparison to baseline when subjects were collapsed across both groups, the DOMS protocol induced muscle soreness, with increases at all time points compared to baseline measurement (3.8 ± 4.3 , 37.1 ± 23.1 ; $p < .001$, 47.8 ± 26.9 ; $p < .001$, 35.8 ± 25.9 ; $p < .001$, 21.4 ± 20.6 ; $p < .001$ for baseline, 24-, 48-, 72- and 96h post DOMS, respectively). Quadricep flexibility decreased at 72h compared to baseline (136.4 ± 11.4 , 126.6 ± 15.9 ; $p < .05$, respectively). Thigh circumference increased at the 24-, 48-, and 72h post DOMs compared to baseline (53.4 ± 6.8 , 54.5 ± 6.5 ; $p < .001$, 54.5 ± 6.5 ; $p < .05$, 54.3 ± 6.3 ; $p < .01$, respectively). Isometric quadricep strength decreased at the 24- and 48h post DOMs compared to baseline (146.1 ± 11.4 , 117.9 ± 47.9 ; $p < .001$, 124.1 ± 51.6 ; $p < .05$, respectively). No significant differences were observed between SSRI users and non-SSRI users for any of the dependent variables across all time points. **CONCLUSION:** In this healthy young adult population, SSRI use did not have an effect on muscle soreness, circumference, strength, or flexibility of the quadriceps muscle following eccentric exercise that led to DOMS. These findings suggest that SSRIs do not impair short-term recovery from exercise-induced muscle damage. Further research should be done with competitive athletes with higher-intensity protocols to determine if SSRI use poses unique risks to those populations regarding muscle damage and recovery.

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MACRONUTRIENTS ASSOCIATED WITH BODY COMPOSITION IN DIVISION III MALE AND FEMALE ATHLETES

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Body composition in athletes plays a crucial role in performance by influencing endurance, balance, coordination, and movement capacity. Consuming the recommended dietary allowance (RDA) of macronutrients – protein intake of 0.8-2g/kg, carbohydrate intake of 5-12g/kg, and fat intake of 0.5-1.5g/kg – can improve body composition by increasing muscle mass and reducing fat mass. Macronutrients also impact cardiometabolic markers, liver function, and inflammation. **PURPOSE:** The study examined whether Division III male and female athletes met the RDA and the difference in their absolute and relative macronutrient intake. **METHODS:** 47 Division III athletes (25 females and 22 males) from Skidmore College were recruited via email and word-of-mouth to complete a three-day dietary log, analyzed by ESHA Food Processor software. Body composition was determined using dual-energy x-ray absorptiometry for females and BodPod for males. The t-test assessed the difference in absolute and relative macronutrients between male and female athletes, and the correlation determined the relationship between relative macronutrients and body composition for both sexes. **RESULTS:** Forty-seven athletes (mean $\pm$ SD; age 20.1 ± 1.5 ; height 173.0 ± 9.86 ; body mass 73.6 ± 11.9) were in the study. Male and female athletes had a significant difference in absolute protein and fat intake, unlike carbohydrate ($p < 0.001$, Cohen's $d = -1.57$; $p < 0.001$, Cohen's $d = -1.24$; $p = 0.242$, Cohen's $d = -0.35$; respectively). There was no significant difference between sexes for relative protein, fat, and carbohydrate ($p = 0.007$, Cohen's $d = -0.86$; $p = 0.052$, Cohen's $d = -0.61$; $p = 0.394$, Cohen's $d = 0.26$). All athletes met the minimum RDA for fat. For protein, all females met the minimum requirement, while only 89.47% of males did. The minimum RDA for carbohydrate was met by 15.79% of male and 24.00% of female athletes. Male athletes' relative protein intake was significantly associated with lower body fat percentage and higher fat-free mass percentage, while no significant relationships were observed in female athletes. **CONCLUSION:** All Division III athletes demonstrated adequate protein and fat intake but failed to meet the RDA for carbohydrate. Relative protein intake was associated with improved body composition in male athletes. This study offers new insights into the dietary intake and body composition of Division III athletes, who are underrepresented in research.

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COMPARING PHYSICAL THERAPY WITH -VS- WITHOUT HYDRODILATATION FOR ADHESIVE CAPSULITIS TREATMENT

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Hydrodilatation and physical therapy are established interventions for adhesive capsulitis, but whether their combined use yields superior outcomes compared to therapy alone remains uncertain. **PURPOSE:** This study evaluated hydrodilatation plus physical therapy versus physical therapy alone, assessing for differences in their effect on pain, range of motion, and function. **METHODS:** This was a systematic review and meta-analysis conducted in outpatient clinic settings, including 455 patients (182 males and 273 females, mean age 53.4). Interventions compared were hydrodilatation with physical therapy (or exercise program) versus physical therapy alone. Main outcome measures included the visual analogue scale (VAS), range of motion (flexion, abduction, and external rotation), and the shoulder pain and disability index (SPADI). **RESULTS:** A total of 679 studies were identified through searching PubMed, Embase, and Web of Science databases. After screening and removing duplicates, a total of 6 randomized controlled trials (RCTs) were included with high risk of bias for 5 RCTs and some concerns for the other RCT. Meta-analyses revealed that hydrodilatation with physical therapy (or exercise program) resulted in better pain scores (4 RCTs, SMD 0.288, 95% CI 0.01 to 0.57, I² 20.7%) and SPADI scores (3 RCTs, SMD 0.52, 95% CI 0.08 to 0.96, I² 52.3%) at 12 weeks. However, there were no additional benefits in abduction (4 RCTs, SMD 0.23, 95% CI -0.55 to 1.018, I² 89.1%), external rotation (SMD 0.40, 95% CI -0.31 to 1.10, I² 86.5%), and forward flexion (SMD 0.22, 95% CI -0.56 to 1.00, I² 89%). **CONCLUSIONS:** For patients with adhesive capsulitis, adding hydrodilatation to physical therapy may enhance short-term outcomes, particularly pain reduction and functional improvement as measured by SPADI, compared with physical therapy alone.

EXERCISE AS A PROTECTIVE FACTOR AGAINST TYPE 1 DIABETES IN NON-OBESE DIABETIC MICE

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PURPOSE: Type 1 diabetes (T1D) is an autoimmune condition characterized by the destruction of pancreatic β -cells, leading to insulin deficiency and chronic hyperglycemia. This study investigates the impact of voluntary exercise on the disease progression of T1D in non-obese diabetic (NOD) mice. By comparing metabolic and survival outcomes between sedentary and exercise-trained groups over a 10-week period, we aim to determine whether physical activity can mitigate hyperglycemia and reduce disease incidence in a genetically susceptible mouse model. **METHODS:** All procedures are approved by the IACUC Committee at University of Hartford and comply with the NIH guidelines regarding the use of animals. Female NOD/LtJ mice of 6 - 7 weeks old were randomly assigned into sedentary or exercise ($n = 8$ per group). All mice were housed individually and provided with food and water. Exercise mice were allowed open access to their running wheels 24 h/day. Sedentary mice remained in their individual cages without wheels throughout the 10-week study. Food intake, water consumption, body mass, and blood glucose measurements were taken weekly. All data were analyzed using Two-Way ANOVA or paired Student *t*-tests and are reported as means $\pm$ SD. **RESULTS:** Exercise mice ran 12.8 ± 6.6 km/day. At the end of 10 weeks training, all 8 runners were alive, compared with 5 of 8 sedentary mice ($p=0.002$). Sedentary mice have higher blood glucose levels as compared to runners (194.5 ± 166.1 vs 127.5 ± 35.2 mg/dL, $p=0.008$), also consumed more water than exercise mice (61.4 ± 22.9 vs 40.7 ± 5.0 ml/week, $p=0.012$). There is no difference in food intake (30.9 ± 13.8 vs 31.9 ± 1.8 g/week, $p=0.82$) and body mass (22.4 ± 1.6 vs 23.3 ± 1.3 g, $p=0.21$) between sedentary and exercise mice. **CONCLUSION:** Ten weeks of voluntary exercise demonstrated a significant reduction in T1D onset by lowering disease incidence and attenuating hyperglycemia, suggesting that physical activity may offer a preventive effect against T1D progression.

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Exercise Intensity Thresholds as Predictors of All-Cause and Cardiovascular Mortality: A Systematic Review

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The body's highest rate of absorbing, transporting, and utilizing oxygen to produce maximal energy, known as VO₂peak, is strongly associated with cardiovascular (CV) health. Having a high VO₂peak indicates efficient functioning and coordination of the heart, lungs, and muscles and an overall robust CV system. However, for many with impaired CV health, peak measurements are hard to obtain because of limiting symptoms such as dyspnea and angina. Therefore, the predictive value of the VO₂ at submaximal exercise intensity thresholds (EIT), which characterize metabolic changes, needs further investigation. **Purpose:** To evaluate the relations between EIT and major adverse cardiac events (MACE) or CV disease (CVD).

Methods: We conducted a systematic review of peer-reviewed literature on three databases: PubMed, ScienceDirect, and Web of Science. After removing duplicates and unpublished studies, 3,820 articles were screened with 37 studies meeting eligibility criteria. Data on EIT, Peak VO₂, risk statistics associated with EIT and comparisons between healthy and clinical populations were extracted by two independent reviewers. Risk of bias was evaluated using the Newcastle-Ottawa quality assessment scale and all data were tabulated using Excel. **Results:** Out of the 37 studies analyzed, 6 reported risk statistics analyzing the first EIT and its association with MACE and CVD. For every 1.0-3.5 ml/kg/min increase in the VO₂ at the first EIT, MACE/CVD risk was reduced by 12-25%. VO₂ at the EIT1 was significantly lower in individuals with MACE or more severe CVD in 90% of studies (26 out of 29 studies; range: 1-20 mL/kg/min). Regarding EIT's prognostic use, the area under the curve of the receiver operating characteristic was investigated in four studies (range: 0.313-0.744). **Conclusion:** Data indicates that having a lower VO₂ at the EIT1 is associated with a higher risk for MACE/CVD. Additionally, patients with CVD have significantly lower VO₂ at EIT1 when compared to healthy or event-free individuals. More studies are needed to optimize EITs use and to better understand EITs prognostic ability for MACE and CVD.

AGE-RELATED TRENDS IN MUSCLE STRENGTH AND DEPRESSIVE SYMPTOMS: A SECONDARY ANALYSIS OF NHANES DATA (2011–2018)

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Muscle strength is an important indicator of health and independence across the lifespan. Grip strength, measured in the National Health and Nutrition Examination Survey (NHANES), provides a validated marker of physical function, while depressive symptoms, measured by the Patient Health Questionnaire-9 (PHQ-9), reflect mental wellness. Exploring the relationship between muscular and mental health offers insight into “wellness from the inside out.”

PURPOSE: The purpose of this study was to evaluate age-related trends in grip strength among U.S. adults and its associations with depressive symptoms. **METHODS:** A cross-sectional secondary analysis was performed using NHANES cycles 2011–2018. Healthy adults aged 18 years and older with valid grip strength and PHQ-9 measures were included. Grip strength was assessed by hand dynamometer and expressed as combined maximal strength (kg). Depressive symptoms were measured with the PHQ-9 and scored from 0–27. Survey-weighted regression models were used to assess associations between grip strength, age, sex, protein intake, physical activity, and depression score. **RESULTS:** The analytic sample included 11,940 adults (weighted to represent >200 million U.S. adults). Mean grip strength peaked in the 20–29 age group (men: 50–55 kg; women: 30–35 kg) and declined steadily with advancing age. Regression models showed that higher depressive symptom scores were independently associated with lower grip strength ($\beta = -0.45$ kg per 1-point increase in PHQ-9, $p < 0.01$), even after adjusting for age, sex, activity, and protein intake. **CONCLUSIONS:** Grip strength negatively correlates with higher PHQ-9 scores. These findings are consistent with other studies about the interconnection between muscular and mental health and emphasize the role of physical wellbeing in maintaining psychological wellness.

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UPDATED OBESITY DEFINITION BETTER CAPTURES MORTALITY RISK IN OLDER ADULTS: THE HEALTH AND RETIREMENT STUDY

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Traditionally defined obesity (TraDef), body mass index (BMI) ≥ 30 kg/m², may misclassify overly muscular people as obese. The Lancet Diabetes and Endocrinology Commission on Obesity recently proposed a new definition (UpdDef) that classifies individuals as having obesity with BMI ≥ 40 kg/m² or BMI = 30-40 with elevated adiposity measured by waist circumference (WC) (women > 88 cm; men > 102 cm) and at least one obesity-related chronic condition.

PURPOSE: (1) to compare obesity prevalence between TraDef and UpdDef of obesity; (2) to compare mortality outcomes using TraDef versus UpdDef in older adults (≥ 50 years).

METHODS: A national representative sample of 13,054 adults from the Health and Retirement Study was analyzed. Participants were classified as having obesity using both the TraDef and the UpdDef. Self-reported chronic conditions were additionally used to classify obesity.

Multivariable logistic regression was conducted to estimate odds ratios (OR) of mortality.

Obesity groups were compared using chi-square test for categorical variables and t-test for continuous variables. Covariates included age, gender, race/ethnicity, education, marital status, self-rated physical activity (PA), self-rated health status, smoking status, and socioeconomic status measured by federal poverty level. **RESULTS:** Obesity prevalence was higher using TraDef (39.0%) compared with UpdDef (34.4%). There were 602 people classified as having obesity by TraDef but not by UpdDef; these people, compared to those obese by UpdDef, were younger (62.1 years vs. 66.7 years), had smaller WC (103.5 cm vs. 113.2 cm), fewer chronic conditions (0.56 vs. 2.44), and a higher proportion performing moderate (90.2% vs. 75.1%) or vigorous (50.3% vs. 32.6%) PA. Moreover, they had significantly lower mortality risk (OR = 0.69, 95% CI: 0.51–0.92, $p = 0.01$). **CONCLUSIONS:** UpdDef identified fewer individuals as obese compared with TraDef. Those reclassified as non-obese under UpdDef were healthier at baseline, characterized by smaller WC, fewer chronic conditions, greater engagement in PA and exhibited significantly lower 10-year mortality rate. These findings suggest that incorporating WC and comorbidity criteria into obesity classification may provide a more accurate assessment of obesity-related risk in older adults, thereby improving clinical and epidemiological relevance.

IN-SEASON VERSUS OFF-SEASON ACADEMIC PERFORMANCE IN DIVISION III COLLEGIATE STUDENT-ATHLETES

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Academic performance is a crucial component of the collegiate student-athlete experience. Balancing the dual demands of academics and athletics may present challenges that impact academic outcomes. However, existing research offers limited and conflicting findings, particularly at the Division III level, on the relationship between athletic participation and academic outcomes during athletic seasons. **PURPOSE:** The purpose of this study was to examine the impact of athletic season (in-season vs. off-season) on the academic performance of Division III student-athletes at Fitchburg State University. **METHODS:** Historical semester grade point average (GPA) and completed credit hour data from the 2023-2024 academic year was provided by Fitchburg State University's Office of Institutional Research and Planning. Eligible fall and spring sport Division III student-athletes ($N = 207$) were categorized as in-season or off-season based on sport-specific competition terms, with winter and multi-sport athletes excluded due to inconsistent seasonal alignment. **RESULTS:** Across the entire sample, there was no significant difference in semester GPA between the in-season (2.91 ± 0.78) and off-season (2.92 ± 0.78) periods, $t(206) = -0.15$, $p = 0.88$. Similarly, there was no significant difference in completed credit hours between the in-season (13.04 ± 3.11) and off-season (12.94 ± 4.06) periods, $t(206) = 0.38$, $p = 0.71$. Comparisons by sex and fall vs. spring sports will be explored. **CONCLUSION:** To the best of our knowledge, this is one of the first studies to directly compare in-season and off-season academic performance of Division III student-athletes. The results of this study suggest that the athletic season may not significantly impact the academic performance of Division III student-athletes, as measured by semester GPA and completed credit hours. However, this study did not account for individual differences in motivation, time management, or other such factors that could influence how one manages the stress of the in-season, and ultimately academic performance. Future research should examine these factors as well as sport-specific differences, including a comparison of team and individual sports. Furthermore, longitudinal studies may illuminate the academic demands of collegiate athletics throughout an athlete's career.

CHANGES IN SALIVARY STRESS BIOMARKER RESPONSES TO 10-WEEK OFFICER CANDIDATE SCHOOL TRAINING

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Military training exposes trainees to multi-stressor environments influencing physiological function; however, few studies have examined sex-specific serial stress biomarker responses across training and their relationship with resilience, stress, and attrition. **PURPOSE:** Examine the acute and chronic sex-specific salivary biomarker concentration responses to Marine Corps Officer Candidates School (OCS), and how an acute response to training is associated with resilience, stress, and attrition. **METHODS:** Twenty-three male (26.3 ± 3.2 y, 26.2 ± 2.2 kg/m²) and fifteen female (26.0 ± 3.4 y, 24.1 ± 2.4 kg/m²) candidates provided post-awakening saliva samples to measure cortisol, testosterone, and α -amylase concentrations via ELISAs at training onset (acute; Days (D)1–3) and bi-weekly during physical training (chronic; Weeks (W)2–10). Resilience (Connor-Davidson Resilience Scale, CD-RISC) and perceived stress (PSS) were assessed at training onset while attrition was ascertained from OCS staff. Acute response was calculated as Δ concentration from D1 to D3. Statistical analyses were stratified by sex; changes in biomarker concentrations were assessed via Friedman's test. Spearman's correlation assessed the relationship between acute response, CD-RISC, and PSS. Mann-Whitney U test assessed group differences in Δ biomarker between attrition groups ($\alpha=0.05$). **RESULTS:** In females, cortisol concentrations decreased acutely ($X^2(2)=7.54$, $p=0.023$) from D1 (0.93 ± 0.26 μ g/dL) to D3 (0.61 ± 0.22 μ g/dL, $p=0.005$). Chronic reductions in α -amylase ($X^2(4)=10.74$, $p=0.030$) were seen from W2 (79.94 ± 72.12) and W4 (83.50 ± 59.88 U/mL) to W8 (48.22 ± 34.14 U/mL, $p=0.043$; ($p=0.011$)). No other significant changes in biomarkers or correlations with resilience or stress were observed ($p=0.089$ – 0.957). In females that attrited, testosterone decreased acutely ($\Delta=-26.92 \pm 36.40$) compared to an increase in completers ($\Delta=38.35 \pm 84.56$, $p=0.021$). No other Δ biomarkers differed between attrition groups ($p=0.53$ – 0.643). In males, no acute changes were observed ($p=0.115$ – 0.953); but, chronically, testosterone ($X^2(4)=12.57$, $p=0.014$) increased from W2 (117.56 ± 64.31 pg/mL) to W4–8 (167.13 ± 109.43 pg/mL, 168.38 ± 109.98 , 205.28 ± 121.85 pg/mL, all $p \leq 0.011$). α -amylase and cortisol did not change ($p=0.067$ – 0.099). In males, PSS correlated positively with acute Δ testosterone ($\rho=0.567$, $p=0.022$) and negatively with $\Delta\alpha$ -amylase ($\rho=-0.525$, $p=0.044$); CD-RISC was negatively correlated with Δ testosterone ($\rho=-0.505$, $p=0.027$). In males there were no differences between attrition groups ($p=0.529$ – 0.801). **CONCLUSION:** Acute changes in stress biomarkers did not align with subjective perceptions of stress and resilience. However, chronic changes in stress biomarkers suggest positive adaptation to military training in both sexes.

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EFFECTS OF POST-ACTIVATION PERFORMANCE ENHANCEMENT ON GAIT AND 3K PERFORMANCE IN COLLEGIATE RUNNERS

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Post-activation performance enhancement (PAPE) is the acute improvement in performance following a high-intensity conditioning activity. PAPE heightens neuromuscular recruitment and force production which could lead to improvements in gait, specifically, step rate (SR) and contact time (CT), which are two key variables in running performance. **PURPOSE:** To determine how SR and CT change throughout 3k time trials and how those variables are impacted by a PAPE intervention. **METHODS:** Six collegiate and post-collegiate runners (N=6, 5 males, 1 female; 21 ± 1 years, 177 ± 9 cm, 67.3 ± 10.6 kg; $12.0 \pm 3.6\%$ body fat) completed two, 3k treadmill time trials under randomized conditions, PAPE and NoPAPE. The PAPE protocol consisted of 2 sets of 10 ankle hops and squat jumps following a standardized warmup versus NoPAPE which was just the standardized warmup. They were instructed to complete the time trial as fast as possible. RunScribe 500Hz IMU footpods were attached to the shoes and SR and CT were recorded in 30-s epochs, reported on the right leg each kilometer. Data was analyzed using a 3x2 ANOVA with post hoc t-tests when necessary. **RESULTS:** 3k time in PAPE and NoPAPE conditions were not different ($10:26 \pm 47$ s vs $10:25 \pm 37$ s; $p=0.45$; respectively) and when the conditions were averaged together there were differences in time to completion each kilometer: 1k: $3:18 \pm 14.8$ s, 2k: $3:30 \pm 16.5$, 3k: $3:38 \pm 15.7$ s ($p < .05$). There were no condition x time interactions for SR ($p=0.16$) and CT ($p=0.96$) and the main effects of condition were not significant for either variable ($p > 0.05$). There was a significant main effect of time for SR ($p=.011$) as it decreased from 180.7 ± 7.0 spm at 1k to 178.3 ± 7.2 spm at 2k and 176.4 ± 6.3 spm at 3k. CT did not change throughout the time trial ($p=0.29$). **CONCLUSION:** The PAPE protocol had no effect on 3k performance and gait variables. SR was lower with each kilometer run paralleling slower times, but this was not due to the PAPE protocol. Further research should be done to evaluate other PAPE protocols to determine if gait variables would be affected.

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ASSESSMENT-GUIDED AND DATA-DRIVEN RETURN-TO-PLAY IN A COLLEGIATE ATHLETE AFTER BILATERAL ACL RECONSTRUCTIONS: A CASE REPORT

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Athletes with bilateral ACL reconstructions (ACLRs) face elevated reinjury risk, as deficits often persist beyond standard rehabilitation. Comprehensive assessment approaches may better identify risk factors to guide return-to-play programming and improve rehabilitation outcomes.

PURPOSE: To present a case report evaluating a multifaceted assessment using quantitative data to guide individualized rehabilitation in an athlete with bilateral ACLRs. **METHODS:** A 21-year-old female collegiate lacrosse athlete was assessed 6 months post left ACLR (quadriceps tendon autograft) with prior contralateral ACLR (hamstring tendon autograft). A 5-week return-to-play program tailored to baseline findings was implemented, followed by post-intervention assessment. Plyometric performance was measured with single-leg hop tests (single, triple, 6-m timed, crossover). Isometric strength of the gluteus maximus, gluteus medius, quadriceps, hamstrings (90°/45°), and adductors was assessed via hand-held dynamometry. Single-leg squats were analyzed via markerless motion capture for peak knee flexion and valgus angles. Force plate testing assessed neuromuscular function during countermovement jumps (CMJ: peak landing force asymmetry, reactive strength index (RSI)) and single-leg jumps (SLJ: jump height, landing impulse, concentric mean power). **RESULTS:** Values are presented as left, right, and % deficit, respectively. Strength improved in the gluteus maximus (141→237 N; 119→239.5 N; -18.5%→1.0%), hamstrings at 90° (91.25→142.5 N; 67→114.5 N; -36.2%→-24.5%), hamstrings at 45° (142.5→230.5 N; 129→200 N), gluteus medius (73.5→117 N; 81.5→107 N), quadriceps (165.5→278 N; 221.5→312.5 N; 25.3%→11.0%), and adductors (91→120.5 N; 61→107.5 N; -49.2%→-12.1%). Hop tests improved in the single-hop (0.825→1.215 m; 1.255→1.45 m; 34.3%→16.2%), triple-hop (3.16→3.935 m; 4.355→4.675 m; 27.4%→15.8%), 6-m timed-hop (2.92→1.975 s; 2.30→2.00 s; 27.0%→-1.3%), and crossover-hop (2.435→3.33 m; 3.445→4.06 m; 29.3%→18.0%). Single-leg squat motion analysis showed peak knee flexion increased (61.9°→86.2°; 71.6°→90.0°) and peak knee valgus varied (5.5°→0.9°; 3.0°→8.8°). CMJ showed peak landing force asymmetry improved (36.6%→24.0%) and RSI increased (0.21→0.25). SLJ showed improvements in jump height (1.9→3.0 in; 3.5→4.4 in; 47.2%→31.4%), landing impulse (81→97 N·s; 86→93 N·s), and concentric mean power (597→703 W; 743→832 W). **CONCLUSION:** A comprehensive assessment using quantitative data identified modifiable risk factors, including functional deficits and graft-related weaknesses, guiding a 5-week individualized return-to-play program that improved strength, function, and reduced asymmetry. Findings support optimizing ACL rehabilitation through data-driven, assessment-guided interventions.

DAILY MOVEMENT PATTERNS AND MENTAL HEALTH IN COLLEGE STUDENTS USING SMARTPHONE-BASED TRACKING

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Mental health in college students is a growing public health concern, with high rates of stress, anxiety, and depression reported worldwide. While smartphone technology supports many aspects of student life, constant access to social media, gaming, and entertainment can promote excessive screen time, sedentary behavior, and poorer mental health outcomes. Although movement behavior (e.g., steps per day) has been linked to mental health, little is known about how fluctuations across the day relate to mental health outcomes in this population. **PURPOSE:** To determine whether physical activity averaged across time-of-day intervals, daily, or weekly is associated with mental health in college students. **METHODS:** Sixteen participants (20.7 ± 0.87 yrs; 69% male, 31% female) completed the study. Participants completed pre- and post-assessment (14 days later) surveys (Depression, Anxiety, and Stress Scale (DASS); Perceived Stress Scale (PSS)). Over 14 days, the WeClock app passively tracked steps, and Ecological Momentary Assessments assessing positive and negative affect (PANAS) were delivered six times daily via text messages. Participants were instructed to answer the EMAs whenever they could. Step counts were analyzed at multiple time-of-day intervals, as well as daily and weekly averages. Spearman's rank correlations assessed associations with affect scores and mental health scales. **RESULTS:** Compliance with EMAs varied by time of day: participants completed 39.1% of morning surveys, 48.0% of afternoon, 80.4% of evening, and 62.2% of night assessments, resulting in an overall compliance rate of 52.2%. Analyses indicated that time-of-day step counts demonstrated stronger associations with affect and mental health measures compared to daily or weekly totals. Specifically, higher early-morning step counts were significantly correlated with lower negative affect ($r = -0.54$, $p = .021$), lower depression scores on the baseline DASS ($r = -0.54$, $p = .020$), and lower post-assessment anxiety ($r = 0.72$, $p = .003$). **CONCLUSION:** Early-morning physical activity demonstrated stronger associations with mental health compared to aggregated daily or weekly steps. These findings highlight the importance of evaluating movement behavior in time-specific intervals and suggest opportunities for targeted interventions to optimize mental health in college students.

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MICRORNA-206 ALTERATIONS IN C2C12 MUSCLE CELLS AFTER SCRATCH-INDUCED INJURY

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Skeletal muscle has remarkable regenerative capacity requiring coordinated communication between satellite cells, myocytes, and immune cells. MicroRNAs (miRNAs) are small, non-coding RNAs that regulate gene expression via post-transcriptional mechanisms and serve as critical molecular messengers during muscle repair. miR-206, one of the most abundant muscle-specific miRNAs (myomiRs), is known to promote muscle regeneration. Current muscle damage assessment relies on creatine kinase (CK) activity, but CK exhibits high inter-subject variability, limiting its clinical usage. **PURPOSE:** The purpose of this study was to examine changes in miR-206 expression following scratch-induced injury in C2C12 myocytes to evaluate its potential as an alternative biomarker for muscle damage assessment. **METHODS:** C2C12 mouse myoblasts were cultured in 6-well plates using growth medium (DMEM + 10% fetal bovine serum) until 95% confluent, then switched to differentiation medium (DMEM + 2% horse serum) to promote myotube formation. Differentiated myotubes were subjected to scratch-induced injury using pipette tips to create standardized scratch. Cells were harvested at control (pre-scratch), 3.5h, 22h, and 96h post-injury timepoints. Total RNA was extracted and miR-206 expression quantified using RT-qPCR with TaqMan assays (mmu-miR-206-5p, Assay ID: mmu482924_mir) normalized to miR-16 housekeeping control (mmu-miR-16-5p, Assay ID: mmu482960_mir). Data were analyzed using the $2^{(-\Delta\Delta Ct)}$ method and statistical comparisons performed via Student's t-test with significance set at $P < 0.05$. **RESULTS:** Visual assessment confirmed progressive wound closure with active cell migration into scratch areas by 22h post-injury. miR-206 expression showed time-dependent changes following injury. Expression remained near baseline at 3.5h (close to 1.0 fold change) but increased at 22h post-injury (1.6 fold change, $P = 0.08$ vs. pre-scratch). By 96h, expression returned toward baseline levels (1.2 fold change). Although the 22h timepoint did not reach statistical significance, the P-value of 0.08 approached the significance threshold, suggesting biological relevance. **CONCLUSIONS:** These results demonstrate a trend toward elevated miR-206 expression during the early phase of muscle cell regeneration, with peak expression occurring around 22h post-injury. The pattern supports miR-206's role in coordinating muscle repair responses and suggests its potential use as a biomarker for muscle damage assessment. Future studies with increased sample size to improve statistical power and adding intermediate timepoints between 3.5- 22h to better capture peak MiR-206 expression and establish its utility as a more reliable alternative to CK for muscle damage evaluation.

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EFFECTS OF PROPRIOCEPTIVE NEUROMUSCULAR FACILITATION ON HIP AND KNEE RANGE OF MOTION

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Proprioceptive neuromuscular facilitation (PNF) uses muscle contractions and stretching to result in acute increases in range of motion (ROM). These improvements may differ between males and females due to female's having greater flexibility than males. **PURPOSE:** This study determined the effects of acute PNF stretching of the hamstrings on ROM in the hip and knee joints in females and males. **METHODS:** Fifteen healthy, college-age individuals (8 females and 7 males, 20.8 ± 1.5 yrs, 170.0 ± 12.6 cm, 71.7 ± 16.5 kg, % body fat $23.1 \pm 8.4\%$) that had not done PNF stretching in the last 6 months, had their ROM measured before, immediately after, and 30-minutes after 4 repetitions of 30 seconds of PNF stretching on the hamstrings on their dominant leg. ROM measurements included knee extension, knee flexion, hip extension, and hip flexion. This was compared to a control (CON) session where participants sat for 2 minutes and had their ROM measurements taken at the same timepoints. A 3x2 analysis of variance was used to compare ROM between males and females at the measured timepoints. Significant interactions and main effects were followed up with post hoc t-tests. **RESULTS:** While females had significantly higher resting hip flexion ($p=0.012$) and knee flexion ($p=0.041$) ROM than males, there were no differences in how males and females responded to PNF stretching across the time points ($p>0.05$). There were no changes to knee flexion and hip extension following PNF stretching on the hamstrings (all $p>0.05$), but hip flexion and knee extension did change in males and females. On average, hip flexion improved immediately after stretching from $85 \pm 17^\circ$ to $95 \pm 17^\circ$ ($p=0.016$, $d=0.7$) but then decreased to $88 \pm 16.8^\circ$ 30-minutes post stretching ($p=0.009$, $d=0.78$). Knee extension ROM increased immediately after stretching from $1.3 \pm 1.0^\circ$ to $2.1 \pm 1.1^\circ$ ($p=0.017$, $d=0.7$) and decreased to $1.6 \pm 1.2^\circ$ 30-minutes post stretching ($p=0.283$, $d=0.3$). **CONCLUSION:** PNF stretching does not result in sex differences in ROM as males and females both experience immediate improvements in hip flexion and knee extension. However, this effect is temporary as ROM returns to baseline values within 30-minutes. Future studies should evaluate ROM adaptations following regular PNF training in males and females.

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EFFECTS OF PROPRIOCEPTIVE NEUROMUSCULAR FACILITATION ON MUSCULAR FORCE PRODUCTION IN COLLEGE-AGED MALES AND FEMALES

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ABSTRACT

Proprioceptive Neuromuscular Facilitation (PNF) combines stretching and muscle contraction to increase range of motion but is purported to force production and power. Although, Males and females have distinct levels of strength and flexibility, the effect of these on force production after a bout of PNF are unknown. **PURPOSE:** This study evaluated the effects of one bout of PNF stretching knee extensor (KE) and knee flexor (KF) force between males and females. **METHODS:** Fifteen healthy individuals with no orthopedic injuries, (8 females, 20.3 ± 1.2 yrs, 61.9 ± 12.5 kg, 162.2 ± 10.8 cm, $27.7 \pm 7.7\%$ body fat; and 7 males, 21.4 ± 1.7 yrs, 84.0 ± 10.9 kg, 180.8 ± 4.5 cm, $16.5 \pm 4.5\%$ body fat) completed a control (CON) condition and a stretching condition in a random order with 24-72 hours between conditions. During PNF, four repetitions of the contract-relax technique was performed on the hamstrings of the dominant leg. The participant sat for 2 minutes in CON. Isometric and isokinetic strength of the KE and KF were assessed at $0^\circ \cdot s^{-1}$, $60^\circ \cdot s^{-1}$, $180^\circ \cdot s^{-1}$, and $300^\circ \cdot s^{-1}$ pre, immediately post, and 30 minutes post intervention. 3x2x2 analysis of variance was performed to compare the conditions over time between males and females and followed with t-tests when appropriate. **RESULTS:** Males had a higher KE and KF force production than females in each condition at each speed ($p < 0.001$). However, there were no differences in the trend of force production between PNF and CON at any time point between males and females at any speed ($p > 0.05$). Males had a mean percent different of $4.58 \pm 6.14\%$ from pre to immediately post when all speeds were averaged in CON and $3.00 \pm 1.60\%$ in PNF ($p > 0.05$) and this was similar at 30 minutes post ($p > 0.05$). Females had a mean percent difference of $6.25 \pm 4.33\%$ from pre to immediately post when all speeds were averaged in CON and $4.58 \pm 6.14\%$ in PNF ($p > 0.05$) and this was similar at 30 minutes post ($p > 0.05$). **CONCLUSION:** An acute bout of PNF stretching does not result in force decrements immediately after and 30 minutes after preforming, despite males being stronger at all speeds and time points ($p < 0.001$).

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NO SECOND WIND: CAFFEINE BOOSTS MUSCLE ENDURANCE INITIALLY, WITH FEWER RESPONDERS BY THE THIRD SET.

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Purpose: This study investigated the effect of caffeine supplementation and its expectancy (placebo effect) on muscle endurance (ME) using a balanced placebo design. **Methods:** Resistance-trained men (18-30 years, n=16) participated in six sessions: two assessments and familiarization sessions (e.g. demographics, one-repetition maximum test (1RM) followed by 4 experimental sessions in a randomized order: C/C: participants were informed they were given a caffeine supplement (5 mg/kg body weight) and received caffeine; C/P: participants were informed they were given caffeine, but received placebo; P/C: participants were informed they were given placebo, but received caffeine; P/P: participants were informed they were given placebo and received placebo. We assessed ME by performing 3 sets of maximal Smith machine parallel squats at 60%1RM with a 3-minute interval between sets. Caffeine's effect (EFF) on the number of repetitions was calculated for each set as the number of repetitions performed using caffeine (sessions C/C+P/C) minus the number of repetitions performed when not using caffeine (sessions C/P+P/P) divided by two. We considered caffeine responders those whose EFF was ≥ 1.0 . **Results:** Neither caffeine ($p=0.584$; $\eta_p^2 = 0.02$) nor its expectancy ($p=0.184$; $\eta_p^2 = 0.11$) had a significant main effect when analyzing the number of repetitions per set. However, there was one significant interaction, between using caffeine and the repetitions at a given set ($p=0.017$; $\eta_p^2 = 0.24$). On average, caffeine significantly increased the number of repetitions by 0.8 (95% confidence interval [CI]: 0.1-1.4) in the first set ($p=0.031$; $d=0.25$) without a significant difference in the second ($p=1.000$) and third set ($p=0.354$). Despite not achieving significance, using caffeine seemed to decrease the number of repetitions in the third set (mean difference: -0.3 [95% CI: -1.0–0.4]). Analyzing individual data, we observed that 56% of the participants were caffeine responders during the first set; however, this number dropped to 25% ($p=0.025$) and 19% ($p=0.014$) in the second and third sets, respectively. **Conclusion:** Caffeine expectancy had no influence on ME. Caffeine use increased the number of repetitions only during the first set, with a substantial reduction in the number of responders in the subsequent sets. Further research is warranted to investigate the differences between responders and non-responders.

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EXPLORING THE VALIDITY OF WRIST-WORN WEARABLES FOR ESTIMATING CARDIORESPIRATORY FITNESS IN YOUNG ADULTS

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Wearable devices non-invasively track health and fitness metrics, indicating potential utility of these devices in remote settings. Newer devices have fitness tests to estimate VO_2 max; however, there are limited studies on the validity of these devices for estimating VO_2 max. Therefore, the purpose of this study was to: 1) determine the validity of three wrist-worn devices (Polar Ignite 3, Garmin VivoActive 5, Garmin VivoSmart 5) for estimating VO_2 max; 2) Determine validity of the devices for estimating VO_2 max based on fitness level. **METHODS:** Twenty-nine participants (21.9 ± 2.1 years; male: 16, female: 13) completed resting (Polar Ignite 3) and walking (Garmin VivoActive 5, and Garmin VivoSmart 5) assessments to estimate VO_2 max based on watch protocols and algorithms. The COSMED Quark CPET metabolic cart was used to measure VO_2 max. Paired t-tests were used to compare measured VO_2 max and device-generated estimates. Significance was accepted at $p < .05$. **RESULTS:** Mean VO_2 max was 40.5 ± 8.3 mL/kg/min. Measured VO_2 max was significantly lower than Polar Ignite 3 (mean difference: 10.6 ± 8.4 ; $p < .001$), VivoActive 5 (mean difference: 4.7 ± 6.6 ; $p = .003$), and VivoSmart 5 (mean difference: 4.5 ± 6.8 ; $p < .001$) estimates. The watches better estimated VO_2 max in more fit (VO_2 max $\geq$ sample mean of 40 mL/kg/min) compared to less fit (VO_2 max < 40 mL/kg/min) individuals, with no significant differences between measured VO_2 max and estimates from the VivoActive 5 (mean difference: 0.06 mL/kg/min) and VivoSmart 5 (mean difference: 1.00 mL/kg/min) in fit participants. **CONCLUSION:** All three devices overestimated VO_2 max compared to the measured value. The Garmin devices showed higher validity in fit compared to unfit participants, suggesting that the VO_2 max feature may be more accurate and appropriate for healthy active individuals or athletes, but not for sedentary populations or those with low fitness and/or functional limitations. A larger more diverse sample size is needed to confirm these results.