

Board #1

EFFECT OF IN-SEASON STRESS ON COGNITIVE ABILITIES IN DIVISION III WOMEN'S SOCCER PLAYERS

R. Gerking, C. Reyes

Linfield University, McMinnville, Oregon

Quantifying soccer players' physical load and cognitive abilities is crucial for monitoring stress. **PURPOSE:** To examine how in-season physical and psychological demands affect collegiate soccer players' cognitive abilities. **METHODS:** NCAA Division III female soccer players ($n=22$; $20.3 \text{ years} \pm 1.5$, $163.7 \text{ cm} \pm 5.8$, $64.1 \text{ kg} \pm 8.2$) were divided by position: Goalkeepers (GK), Forwards (F), Defenders (D), Midfielders (MF), and Wingers (W). Each completed cognitive testing at three time points: beginning (P1), midpoint (P2), and end of season (P3) using a sensorimotor station to assess visual clarity, peripheral vision, near-far shift, multiple object tracking, decision-making, and reaction time. Athletes performed weekly countermovement jumps (CMJ) on a force plate to measure jump height (JH), reactive strength index-modified (mRSI), and braking rate of force development (BRFD). GPS units tracked daily practice and game data, including hard running distance (HRD), 3D load, and total distance (TD). Data were analyzed by position and season period via ANOVA, with significance being set at $p = 0.10$. **RESULTS:** GK had better near-far quickness than MF ($p=0.01$) and W ($p=0.06$) and better reaction time than F ($p=0.08$). Defenders outperformed MF in near-far quickness ($p=0.07$). Across time points, P3 showed better near-far shift than P1 ($p=0.002$) and P2 ($p=0.05$). Reaction time improved in P3 vs. P1 ($p=0.08$). No significant differences were found in CMJ performance across positions or time points. GPS data showed D covered more TD than MF ($p=0.02$), and W had greater HRD than MF ($p=0.04$) in P1. **CONCLUSION:** Cognitive abilities varied by position and season period, while physical loads differed across positions. CMJ performance remained consistent. Incorporating cognitive training may enhance performance. Further research should explore training strategies to improve cognition and examine correlations between physical load and cognitive function.

Board #2

SEDENTARY BEHAVIOR IS ASSOCIATED WITH TOTAL AND CENTRAL ADIPOSITY IN OLDER ADULTS

M.T. Antush, H. Sprague, C.A. Vella, FACSM

University of Idaho, Moscow, ID

Current evidence indicates an association between sedentary behavior (SB) and total adiposity, a key cardiometabolic disease risk factor. However, evidence using indices that better account for body shape and fat distribution than traditional indices remains limited, particularly in older adults. **PURPOSE:** To evaluate associations between SB and measures of total and central adiposity in older adults. **METHODS:** SB and physical activity data were collected via accelerometry from 38 older adults (mean $\pm$ SD: age = 67.9 ± 6.7 yrs; 66% women) who were free from injuries limiting typical physical activity. Total and central adiposity were assessed using body fat percentage (%BF) via BOD POD, waist circumference (WC), waist-to-height ratio (WHtR), and body roundness index (BRI). Multivariable linear regression analyses, expressed as standardized beta (β), were used to assess associations of SB with %BF, WC, WHtR, and BRI, controlling for accelerometer wear time, sex, moderate-to-vigorous physical activity (MVPA), and light physical activity (LPA); $\alpha = 0.05$. Effect size was calculated as Cohen's f^2 . **RESULTS:** SB ($454.5 \pm 111.6 \text{ min/d}$) was positively associated with %BF ($30.8 \pm 7.2\%$; $\beta = 0.59$, $p = 0.01$, $f^2 = 0.25$) independent of accelerometer wear time ($901.6 \pm 70.5 \text{ min/d}$) and sex; however, this association was attenuated by MVPA ($31.9 \pm 30.8 \text{ min/d}$; $\beta = 0.36$, $p = 0.11$). SB was positively associated with WC ($87.4 \pm 13.4 \text{ cm}$; $\beta = 0.44$, $p = 0.04$, $f^2 = 0.83$), WHtR (0.52 ± 0.07 ; $\beta = 0.47$, $p = 0.04$, $f^2 = 0.54$), and BRI (3.88 ± 1.52 ; $\beta = 0.47$, $p = 0.04$, $f^2 = 0.55$) independent of accelerometer wear time, sex, and MVPA. The associations between SB and all dependent variables were attenuated to non-significance by LPA ($384.7 \pm 70.1 \text{ min/d}$, $p > 0.05$). **CONCLUSION:** These preliminary data suggest that SB is independently associated with indices of central adiposity that account for body shape in older adults, with large effect sizes independent of MVPA but not LPA. While MVPA remains important for cardiometabolic health in older adults, minimizing SB and increasing LPA may be important targets for multifactorial intervention strategies for cardiometabolic disease prevention in older adults.

Supported by ACSM Northwest Student Research Award

Board #3

PAIN AND SLEEP DURATION IN PEOPLE WITH AMYOTROPHIC LATERAL SCLEROSIS: A PILOT STUDY

K. Bren¹, G. Sprint², R. Price¹, D. L. Weeks³, E. Crooks¹

¹Eastern Washington University, Spokane, WA; ²Gonzaga University, Spokane, WA; ³Washington State University, Spokane, WA

The bi-directional relationship between pain and sleep, and their time-of-day effects, have been well-established by prior literature focusing on the general population; however, these interactions have yet to be explored in individuals with amyotrophic lateral sclerosis (ALS). **PURPOSE:** This pilot study aimed to determine whether pain differed in people with ALS (pALS) across time of day, and whether sleep duration was predictive of pain. **METHODS:** Five pALS ($62.2 \pm 12.0 \text{ years}$, $33.2 \pm 24.1 \text{ months}$ since diagnosis, $n=4$ male) completed the study in their homes. Subjects completed a daily sleep diary and wore a wrist actigraph (ActiGraph GT9X Link) for 6 consecutive days. These outputs were combined to calculate daily sleep duration across a 24-h period, as published elsewhere (Bren et al., 2024). Pain was quantified via self-reported pain intensity and pain interference with activity on a 10 cm Visual Analog Scale (VAS), completed four times per day (near 8:00, 12:00, 18:30, and 20:30). Descriptive statistics, repeated measures ANOVA, and linear regression analyses were conducted with SPSS v29. **RESULTS:** Overall, the mean (SD) pain intensity was 0.86 (0.26) and pain interference was 0.77 (0.20). In the analysis of time-of-day effects, subjective ratings did not change significantly for pain intensity ($p=0.47$), or pain interference ($p=0.32$). In a linear regression model, sleep duration predicted pain intensity ($R^2=0.20$, $B=-0.45$, $p=0.02$) and pain interference ($R^2=0.24$, $B=-0.49$, $p<0.01$). **CONCLUSION:** Subjective reports of pain were low. Given that ALS is a motor neuron disease with pain occurring secondary to muscle wasting as the disease progresses, this is not a surprising finding and may reflect the relatively short time since diagnosis of pALS in our sample and/or the use of analgesic medications. Due to the low levels of pain reported by our sample, we did not identify time-of-day effects. Findings also suggest an inverse relationship between sleep duration and pain: as sleep duration increased, pain intensity and interference decreased, highlighting the importance of evaluating sleep duration to improve pain-associated outcomes for pALS. Our findings support the benefit of additional study in a larger sample of pALS with greater variability in clinical characteristics, including time since diagnosis.

Board #4

PATTERNS OF DAILY ACTIVITY, SLEEP, DIET, AND HORMONAL FLUCTUATIONS AMONG PREMENOPAUSAL WOMEN: A TWO-MONTH ANALYSIS

A.J. Aguiar Bonfim Cruz¹, A. Johnson¹, G. Irwin¹, M. Frey¹, M. Schwartz², A.F Brown¹

¹College of Education, Health & Human Sciences, University of Idaho, Moscow ID

²WWAMI Medical Education Program, University of Idaho, Moscow ID

Despite growing recognition of potential interplays among female reproductive hormones, physical activity (PA), sedentary behavior (SB), sleep, and diet; a dearth of evidence exists examining how these behaviors interact. Current evidence is primarily cross-sectional, and often includes only naturally menstruating (NM) women, and often excludes women using hormonal contraceptives (HC).

PURPOSE: To identify potential interactions between estradiol (E2), progesterone (P4), follicle stimulating hormone (FSH), luteinizing hormone (LH), and leptin on PA, SB, sleep, and diet among NM and HC women. **METHODS:** Premenopausal women (N=16, HC=9, NM=7) completed weekly testing for 8 weeks including a serum blood draw and completion of the Simple Physical Activity Questionnaire (SIMPAQ), the Automated Self-Administered Dietary Assessment Tool (ASA-24), and the Pittsburgh Sleep Quality Index (PSQI). Data was analyzed using general linear mixed models with HC/NM and cycle phase as fixed effects and participant as a random effect. **RESULTS:** Significant positive interactions were identified between FSH and carbohydrate and added sugar intake among all participants ($b=0.93$, $p=0.030$; $b=0.15$, $p=0.006$; respectively). A significant negative interaction was observed between LH and added sugar intake ($b=-1.91$, $p=0.006$). E2 and protein intake were positively associated ($b=0.10$, $p=0.013$). A significant interaction between walking and cycle phase was identified ($b=1.26$, $p=0.002$), and walking was significantly higher in the luteal phase compared to menstruation ($p=0.007$). A significant interaction between sleep and cycle phase was observed in NM participants ($b=5.21$, $p=0.004$), with sleep differing between menstruation and luteal phase ($p<0.001$). Additionally, a positive interaction between leptin and sleep was observed ($b=0.124$, $p<0.001$). No other significant interactions between lifestyle behaviors and hormones were identified.

CONCLUSION: In a relatively healthy female population, carbohydrate, added sugar, and protein intake appear to be related to infradian hormonal fluctuations. PA and sleep both appear to have cycle phase interactions among NM participants but not HC participants. Further research is needed to explore these interactions in a larger and more diverse population.

Professional Oral Presentation 1- April 4 – 11 – 11:50 AM

Presentation #1

COMPARISON OF TWO CRANIOTOMY TECHNIQUES

J. Ulbright, Whitworth University, Spokane, WA

A craniotomy is the process of removing portions of the skull on a human cadaver in an effort to remove the brain for study. A craniotomy is often completed in undergraduate gross anatomy laboratory by both graduate and undergraduate student dissectors. Generally, this involves preparing the skull by removing skin, connective tissue, and muscle. Then a bone saw is used to carefully remove bone without damaging the underlying tissue. Getting the best specimen usually requires time and the technique used can vary. Research on comparing techniques is sparse. **PURPOSE:** To qualitatively compare two different craniotomy techniques based on specimen quality, time, and student dissector feedback. **METHODS:** Four senior undergraduate students, each with roughly 30 hours of dissection experience, were paired into two teams and supervised by an instructor who has performed approximately 14 craniotomies over the past 10 years. Each team completed one to two different craniotomy techniques from the same dissection textbook. One team completed Technique 1 (T1), a circumferential dissection technique. The other completed Technique 2 (T2) that involved cutting two half-circle portions of bone, followed by removal of a third sagittal section of bone. A total of four craniotomies were performed on four separate donors. This allowed for two practice craniotomies for familiarization as well as the two craniotomies used for the qualitative analyses. The techniques were ranked using a 4-point Likert scale on 1) the quality of the brain specimen, 2) the quality of the intact meninges, 3) time required, and 4) the overall ease in following the directions as stated in the book. Student feedback was also collected. **RESULTS:** Both techniques were successful in yielding a brain specimen that could be used for teaching purposes. However, T1 ranked lower than T2 on all the 4-point scales. On brain quality, T1 averaged 3 and T2 averaged 4. On meninges quality, T1 averaged 1 and T2 averaged 3. In terms of time, T1 averaged 3 (3 hours) and T2 averaged 4 (2.5 hours). Finally, in terms of ease, T1 averaged 3 and T2 averaged 4. **CONCLUSION:** Future craniotomies should utilize Technique 2 as it yielded a higher quality brain and meningeal specimens and was both faster and easier for undergraduate dissection student to perform.

Presentation #2

EARLY AMBULATION USING A PORTABLE TREADMILL FOR PATIENTS IN INTENSIVE CARE: A PROOF-OF-CONCEPT STUDY

J. Jordan^{1,2}, **S. Hodgson-Mergel³**, **C. McGhehey³**, M. Hylton³, S. Bassett², K. Cleary³, T. LaPier³

¹Tufts University, ²Providence Sacred Heart Medical Center, ³Eastern Washington University

Early ambulation improves outcomes for patients with critical illness; however, barriers such as life-support devices, safety concerns, and staffing limitations hinder implementation in the intensive care unit (ICU). **PURPOSE:** To evaluate the feasibility of using a portable treadmill for early ambulation in patients requiring life-support devices. **METHODS:** Six participants with critical illness requiring life-support devices from a cardiac ICU ambulated on a portable treadmill with a walker attachment under the supervision of a physical therapist (PT). Distance ambulated, treadmill duration, adverse events, setup time, staffing requirements, and vital signs were recorded. Participants completed a self-report survey on their experience following the intervention. Relevant data were analyzed using median values. **RESULTS:** Participants had a median of 9 life-support devices and completed a total of 10 treadmill ambulation sessions. Each session required only a PT and had a median setup time of 6:30 minutes. The median ambulation distance was 130 feet (range: 0–300 feet), with a median intervention time of 14 minutes. Only one minor adverse event occurred. Participants reported feeling safe on the treadmill (median 5/5), perceived improvements in physical function (median 5/5), and noted benefits to mental well-being (median 4.5/5). **CONCLUSION:** Portable treadmill ambulation is feasible and safe for patients requiring extensive life-support in the ICU. This approach enables PT-led ambulation with minimal setup time and allows for enhanced bedside monitoring. Participants ambulated similar distances to prior early ambulation studies and reported positive outcomes. Future research should expand sample size and compare outcomes with overground ambulation.

Presentation #3

AGING ALTERS MACROPHAGE AND CELLULAR SENESENCE RESPONSE DURING MUSCLE RECOVERY FROM IMMOBILIZATION

C. Skiles, Z. Fennel, P. Bourrant, E. Yee, R. Castro, R. O'Connell, M. Drummond
University of Utah, Salt Lake City, UT

Hospitalization often leads to muscular disuse-induced atrophy in older adults, increasing risk of sarcopenia. Muscle regrowth requires macrophage (MAC) recruitment and timely MAC polarization for effective extracellular remodeling. Aging is associated with immune dysfunction, including altered MAC responses, potentially due to excessive cellular senescence (CS). However, the time course of MAC infiltration and CS during early recovery from immobilization remains unclear. **Purpose:** To characterize MAC infiltration and CS in skeletal muscle following 14-days of unilateral leg immobilization (ULLI) in young (YA) and older adults (OA). **Hypothesis:** OA (vs YA) will have increased CS during recovery, and this will correspond with an elevated MAC response. **Methodology:** 17 YA (9M/8F, 24±4 yrs) and 15 OA (7M/8F, 68±5 yrs) underwent 14 days of ULLI via knee brace, followed by 2- (2d-R) and 7-days of recovery (7d-R). Muscle biopsies were obtained from the immobilized vastus lateralis for immunofluorescent analyses to determine myofiber size, CS (SA-β-Gal, p21) and MACs/monocytes (CD11b). **Results:** Myofiber size remained unchanged in the YA but declined in the OA at 2d-R (-13% from PRE, $P<0.05$) before recovering by 7d-R. CD11b⁺ density increased in OA at 2d-R (PRE: $3.46 \times 10^{-5} \pm 2.32 \times 10^{-5}$ vs 2d-R: $7.37 \times 10^{-5} \pm 5.78 \times 10^{-5} / \mu\text{m}^2$, $P<0.05$) and 7d-R ($1.03 \times 10^{-4} \pm 9.31 \times 10^{-5} / \mu\text{m}^2$, $P<0.05$), while the YA enhanced CD11b⁺ cell content only at 7d-R (PRE: $1.97 \times 10^{-5} \pm 1.86 \times 10^{-5}$ vs 7d-R: $4.99 \times 10^{-5} \pm 3.31 \times 10^{-5} / \mu\text{m}^2$, $P<0.05$). SA-β-Gal⁺ content increased in OA at 2d-R (PRE: $6.76 \times 10^{-6} \pm 1.50 \times 10^{-5}$ vs 2d-R: $1.10 \times 10^{-5} \pm 1.60 \times 10^{-5} / \mu\text{m}^2$, $P<0.05$) and trended higher at 7d-R ($3.30 \times 10^{-6} \pm 5.90 \times 10^{-5} / \mu\text{m}^2$, $P=0.08$), while YA exhibited no change. A time-by-age trend was observed in CD11b⁺/p21⁺ density ($P=0.06$), driven by differences at 7d-R (OA: $3.93 \times 10^{-6} \pm 4.20 \times 10^{-6}$ vs YA: $4.92 \times 10^{-7} \pm 6.72 \times 10^{-7} / \mu\text{m}^2$). Interestingly, CD11b⁺ and SA-β-Gal⁺ were positively correlated at 7d-R ($r=0.47$, $P<0.05$), and CD11b⁺/p21⁺ and SA-β-Gal⁺ were strongly associated at 2d-R ($r=0.48$, $P<0.05$) and 7d-R ($r=0.60$, $P<0.05$). **Conclusion:** OA exhibited an increase in muscle CS during recovery perhaps characterized as MACs. An overaccumulation of CS may potentially impair MAC function and subsequently disrupt muscle recovery in aging.

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Presentation #4

MODELING METABOLIC SYNDROME SEVERITY USING ANDROID FAT PERCENTAGE

A. Campitelli; G. Bellissimo; L. Li

College of Idaho, Caldwell, ID

The disease state metabolic syndrome (MetSyn) is defined by underlying physiological dysfunction that manifests as hypertension, dyslipidemia, insulin resistance, and central adiposity. MetSyn is associated with several negative health outcomes including cardiovascular disease, diabetes, proinflammatory state, and reproductive disorders. As a constellation of metabolic conditions, MetSyn cannot be measured directly, and its diagnosis typically requires dysfunction across at least three metabolic indicators. In recent years, however, latent variable models have been employed which can quantify the *severity* of MetSyn. These models generally employ waist circumference (WC) as a manifest measure of central adiposity, but it is unknown whether a more precise and specific measure of central adiposity, such as android fat percentage (AFP), would produce a better model for MetSyn severity. **PURPOSE:** The purpose of this study was to determine if MetSyn severity could be modeled more accurately by using AFP instead of WC. **METHODS:** Data were extracted from the National Health and Nutrition Examination Study from 2003-2006 ($n = 4010$). MetSyn was measured using factor analysis with fasting blood glucose, systolic blood pressure, plasma triglycerides, plasma HDL cholesterol, plasma LDL cholesterol, and a measure of central adiposity as manifest indicators. A model was fit using WC and another using AFP measured via dual-energy x-ray absorptiometry. Data-model fit was compared between the models to determine which better approximated MetSyn severity. **RESULTS:** All measurement models were over-identified in accordance with the *t*-rule. The AFP model demonstrated adequate fit ($CFI = .941$, $TLI = .900$, $RMSEA = .067$, $SRMR = .036$). Data-model fit for the WC model, however, was poor ($CFI = .905$, $TLI = .822$, $RMSEA = .096$, $SRMR < .046$). Model information criteria comparisons also indicated that the AFP model was a better measurement model compared to the WC model ($AIC = 218464.68$ vs. 220805.00 , $BIC = 218546.54$ vs. 220886.85). **CONCLUSION:** AFP is a better manifest indicator of central adiposity compared to WC for purposes of modeling a quantifiable measure of MetSyn severity.

Undergraduate Thematic Session 1 – April 4, 2 – 2:50 PM

Board #1

EFFECT OF POST RUNNING HOT WATER IMMERSION ON WILDLAND FIREFIGHTERS WEARING PROTECTIVE CLOTHING DURING EXERCISE.

N. Marshall, A. Schooler, L. Insko, K. Pfaffenbach

Eastern Oregon University, La Grande, OR

Wildland Firefighting (WFF) is a physically demanding job that can require manual work for 8 or more consecutive hours in hot conditions while wearing personal protective equipment (PPE). Early season work and training can pose additional risk because firefighters may not be acclimatized to working in hot conditions. Previous studies have demonstrated that heat acclimatization occurs in response to post-exercise hot water immersion (HWI). However, to our knowledge, the effect of exercise + HWI on exercise efficiency in WFF wearing PPE has not been examined. **PURPOSE:** Our study aimed to measure the effect of 5 consecutive days of post exercise HWI on heart rate (HR), blood lactate, and rate of perceived exertion in WFF during graded exercise testing while wearing PPE. **METHODS:** Male WFF ($n=4$) completed a baseline graded exercise test at room temperature where each stage was 3 min and speed increased after each stage while wearing gym clothes (GC). Next, they completed the same test at room temp while wearing PPE (PPE1). Subjects then completed 40 min of moderate jogging followed by 25 minutes in a hot bath (38-40C) each day for five days. Two to three days after finishing their final exercise + HWI session subjects returned to the lab for a final graded exercise test at room temp while wearing PPE (PPE2). Heart rate, blood lactate, and rate of perceived exertion (RPE) were measured at the end of each stage during all exercise tests. **RESULTS:** For the GC condition, mean RPE was 6.25 ± 2.44 , lactate was 3.6 ± 2.50 mmol/L, and mean HR was 167.09 ± 20.59 BPM. For the PPE1 condition mean RPE was 6.17 ± 2.59 out of 10, mean lactate was 3.78 ± 2.58 mmol/L, and mean HR was 164.75 ± 21.65 BPM. For the PPE2 condition mean RPE was 6.09 ± 2.4 out of 10, mean lactate was 3.78 ± 2.50

mmol/L, and mean HR was 156.06 ± 20.59 . Comparison of blood lactate between PPE1 and PPE2 conditions showed no statistical difference. Likewise, there was no difference in RPE between PPE1 and PPE2. Mean HR was significantly lower in PPE2 compared to PPE1 ($p < 0.05$). **CONCLUSION:** This preliminary study showed that 5 days of 40 min exercise at room temp followed by 25 min of HWI lead to an average HR reduction of 8.69 BPM during a graded exercise test in PPE at room temp. This finding suggests that exercise + HWI increases exercise efficiency and may help WFF acclimatize to heat prior to fire season.

Board #2

ACUTE HEAT EXPOSURE LOWERS POSTPRANDIAL GLUCOSE & GLYCEMIC VARIABILITY OF HEALTHY MALE & FEMALE COLLEGE STUDENTS

L. Osmond, S. Zafiris, M. Hodson, A. DiCorpo, K. Cayan, A. Newton, T. Ishak, J. Crissey

Gonzaga University, Human Physiology Department, Spokane, WA

Elevated postprandial glucose (PPG) is a robust measure of glycemic control and cardiometabolic health risk. While physical activity has been shown to reduce PPG, little is known about the effects of whole-body heat. **PURPOSE:** To determine the impact of heat and immediate postprandial walking on PPG in high-heat conditions in healthy individuals. **METHODS:** Eleven healthy non-obese (24.3 ± 3.7 BMI) adults (age 20-22, 7 females and 4 males) were fitted with continuous glucose monitors (CGMs, Abbott Freestyle Libre Pro) to measure interstitial glucose every 15 minutes. Following consumption of a standardized breakfast meal (547 kcal: 25% FAT, 10% PRO and 65% CHO, GI 74), participants randomly completed three trials in 25% humidity: (1) Temp-SED: seated sedentary for 90 mins at 20°C, (2) Heat-SED: seated sedentary for 90 mins at 40°C and (3) Heat-PA: walking on a treadmill (2.5-3 mph) for 20 mins, followed by seated recovery for 70 mins at 40°C (Heat-PA). **RESULTS:** PPG area under the curve (AUC) was 13.7% lower in Heat-SED (8923 ± 1308 mg/dL/min, $p = 0.009$, $d = 0.97$) and 12.6% lower in Heat-PA (9017 ± 1516 mg/dL/min, $p = 0.04$, $d = 0.71$) compared to Temp-SED (10231 ± 1111 mg/dL/min). Mean absolute glucose (MAG) was 56.5% lower in Heat-PA (1.8 ± 0.9 mM) than Temp-SED (3.2 ± 1.2 mM, $p = 0.017$, $d = 0.87$) and 45.3% lower in Heat-PA than Heat-SED (2.9 ± 1.0 mM, $p = 0.014$, $d = 0.89$). Coefficient of variation (CV), a measure of glycemic variability, was 40.6% lower in Heat-PA than Temp-SED ($p = 0.041$, $d = 0.7$), and 28.8% lower than Heat-SED ($p = 0.02$, $d = 1.1$). **CONCLUSIONS:** A single bout of whole-body heat exposure (40°C) effectively improved glycemic control via reduced PPG and glycemic variability in normoglycemic young adults. Our findings suggest that acute heat therapy could serve as an alternative modality to improve glucose control in mobility-limited individuals and the 75% of U.S. adults who do not meet physical activity guidelines. Future research is warranted to explore the efficacy of heat therapy in populations with impaired glucose tolerance and metabolic disorders, where the therapeutic benefits may be even more pronounced.

Board #3

THE ACUTE EFFECTS OF QUADRICEP- AND HAMSTRING-ISOLATED EXERCISES ON VERTICAL JUMP PERFORMANCE

S. Ng, M. McGee, R. Blair, A. Morrison, J. Dougherty, W. M. Silvers

Whitworth University, Spokane, WA

Post-activation potentiation (PAP) is an important mechanism that can be induced to improve performances, such as the vertical jump (VJ). Many PAP-inducing exercises have been studied in the context of VJ performance. However, most of these were compound movements despite reports of higher muscle activation in quadrickep- and hamstring-isolated exercises. **PURPOSE:** The primary aim of this study was to examine the effect of quadrickep- and hamstring-isolated PAP-inducing exercises on VJ performance in strength trained. The research hypotheses were that both quadrickep-isolated and hamstring-isolated exercises would increase VJ more than compound exercises. **METHODS:** Twenty-three strength-trained ($n_{\text{females}} = 7$, $n_{\text{males}} = 16$; 23 ± 1.4 yrs old) individuals completed a back squat assessment session followed by four testing sessions in random order: control (CTRL), quadrickeps (QUAD), hamstring (HAMS), and compound (COMP). CTRL involved a VJ test performed after a standardized dynamic warm-up. QUAD involved completion of unilateral leg presses after the warm-up, but before the VJ test. HAMS involved completion of heel strikes on a stability ball after the warmup, but before the VJ test. COMP involved completion of barbell back squats before the VJ test. VJ testing included three separate countermovement jumps, separated by 1 min. The jumps for each session were averaged. A repeated measures ANOVA ($p \leq 0.05$) was utilized to determine significant differences between conditions. **RESULTS:** There was a significant difference ($p = 0.036$) found in VJ height across conditions (CTRL: 64.6 ± 12.7 cm, QUAD: 65.7 ± 13.2 cm, HAMS: 64.2 ± 13.2 cm, COMP: 64.2 ± 13.1 cm). Post-hoc analysis indicated QUAD was significantly greater than HAMS ($p = 0.033$), but there were no additional differences between conditions ($p > 0.05$). **CONCLUSION:** Isolated muscle exercises did not appear to induce a greater PAP stimulus than the compound exercise under the examined research conditions. The PAP-inducing loads (~ 80% of 1-RM utilized in this study) were consistent with previous research that demonstrated a PAP effect. The rest following PAP-inducing exercises (4 min) was near the minimum that has been documented as effective. Future studies should utilize a longer rest time (7-16 min) between the exercises and jump tests.

Board #4

KINETIC COMPARISONS ACROSS RESERVE OFFICER TRAINING CORPS BRANCHES

R. Richardson, & J.P. Bailey

University of Idaho, Moscow, ID

Limb asymmetry in muscular strength and force production may contribute to injury risk and reduced retention in military trainee populations like the Reserve Officer Training Corps (ROTC). **PURPOSE:** To examine limb asymmetry during concentric and eccentric motion among ROTC cadets. **METHODS:** Participants were recruited from ROTC units (n=44) 21 Air Force [Means: 74.67 kg, 172.1 m] 10 Army [Means: 77.25 kg, 174.86 m], 6 USMC [Means: 69.43 kg, 175.12 m] 7 Navy [Means: 77.94 kg, 176.84 m] to participate in two sessions. Session 1 was a consent and familiarization session for the isokinetic dynamometer. During session 2, participants performed isometric concentric (con) knee flexion/extension, isokinetic (60 deg/sec & 120 deg/sec) con/con knee flexion/extension, and isokinetic 90 deg/sec con/eccentric (ecc) knee flexion/extension. Participants were then instrumented for motion capture with dual embedded force platforms to measure mechanics during lunging and jumping tasks. Multiple one-way ANOVAs were used to determine potential limb and branch differences in dependent variables. **RESULTS:** No significant differences were found for any strength variables ($p>0.05$; see table). **CONCLUSION:** While our findings do not reveal statistically significant differences in strength asymmetry between branches, unexamined biomechanical variations may exist. This study focused on knee mechanics, potentially overlooking asymmetries in other joints or movement patterns. Future research incorporating a broader analysis of lower-limb biomechanics, including multiplanar movements and additional joint contributions, may better identify inter-branch differences in limb asymmetry.

Bilateral Strength differences of Knee Sagittal Plane							
Branch	60 d/s FI Pk	60 d/s Ext Pk	120 d/s FI Pk	120 d/s Ext Pk	Iso Ext Pk	90 d/s Con Pk	90 d/s Ecc Pk
Air Force	-6.9 (16.0)	-4.7 (33.1)	-1.4 (11.3)	-6.1 (23.5)	3.9 (44.4)	3.3 (35.8)	12.1 (51.9)
Army	-0.5 (12.0)	-6.6 (29.2)	-3.7 (10.7)	-6.7 (21.4)	20.6 (41.0)	-27.0 (33.0)	-24.6 (45.7)
USMC	-1.5 (20.8)	0.17 (31.9)	2.3 (13.1)	4.2 (19.7)	11.5 (44.7)	-14.2 (34.6)	-11.5 (39.3)
Navy	-3.0 (11.3)	-16.43 (26.4)	1.4 (11.2)	-8.0 (13.7)	12.7 (33.1)	-14 (29.6)	-20.1 (32.3)

Mean (SD) d/s = Degrees per Second, Ext = Extension, FI = Flexion, Pk = Peak, Iso = Isometric, Con = Concentric, Ecc = Eccentric
Note: "Difference" refers to the left-leg value subtracted from the right-leg.

Professional Oral Presentations 2 – April 4, 4 – 4:50 PM

Presentation #1

MEASURING HR_{MAX} AND VO_{2PEAK} WITH AN ON-WATER OUTRIGGER CANOEING TEST PROTOCOL: AN ACCESSMETS PROJECT

D.P. Heil, FACSM¹, S. Schmid^{2,3,4}, A. Yoshida³, L. Ching⁴, J. Funakoshi², T. Sentell²

¹ Montana State University, Bozeman, MT USA; ² University of Hawai'i, Honolulu, HI USA; ³ AccesSurf Hawai'i, Honolulu, HI USA;

⁴ Hawai'i State Department of Health, Honolulu, HI USA.

Our research group recently developed an on-water test protocol that mimicked a discontinuous graded exercise test (GXT) to exhaustion for the purpose of measuring both submaximal (i.e., METs) and maximal outcomes (i.e., maximal heart rate, HR_{MAX}; peak oxygen consumption, VO_{2PEAK}). Use of this on-water test protocol to measure maximal outcomes, however, was considered exploratory since no such protocol has ever been validated in the research literature. **PURPOSE:** To evaluate whether peak HR and VO₂ values recorded during an on-water paddling GXT could be considered true maximal outcomes representing HR_{MAX} and VO_{2PEAK}, respectively. **METHODS:** 37 adults (23 women, 14 men) were recruited to paddle in a 6-person outrigger canoe test session on the ocean while both HR and VO₂ were measured using a validated portable indirect calorimeter (without CO₂ measures). Tests included a paddling warm-up, 3 submaximal paddling stages at "light", "moderate", and "hard" intensities (5-mins each). Next were two 2-min stages at maximal paddling intensity, where all stages were separated by 2-mins of passive rest. HR_{MAX} and VO_{2PEAK} were both defined as the highest values observed over 5-sec averaging intervals during both 2-min maximal intensity stages. Two criteria were applied to peak values: 1) A peak HR within 10 BPM of age-predicted HR_{MAX} (i.e., $\geq \text{APMHR}-10$); 2) A peak VO₂ being ≥ 2.5 ml/kg/min higher than that for the previous stage value. HR_{MAX} was achieved if the first criteria was satisfied, while VO_{2PEAK} was achieved if both criteria were satisfied. All data were summarized descriptively. **RESULTS:** Of 35 paddlers with complete HR and VO₂ data, 22 (63%; 10 women, 12 men; (Mean $\pm$ SD) 179 $\pm$ 12 BPM, 38.8 $\pm$ 7.9 ml/kg/min for HR_{MAX} and VO_{2PEAK}, respectively) satisfied both HR_{MAX} and VO_{2PEAK} criteria, while 13 (37%; 13 women, 2 men; 151 $\pm$ 15 BPM, 40.3 $\pm$ 10.5 ml/kg/min) satisfied neither criteria. **CONCLUSION:** While most paddlers (63%) satisfied criteria for both HR_{MAX} and VO_{2PEAK}, the remaining paddlers all had much lower peak HR values than expected (relative to APMHR). While the cause of this observation is not immediately apparent, a future study should directly compare lab-based and on-water paddling GXT outcomes to better understand the validity of an on-water GXT protocol.

This study was supported by NIMHD of NIH with award #U54MD007601.

Presentation #2

METABOLIC EQUIVALENTS FOR OUTRIGGER CANOE PADDLING FOR ADULTS WITH SPINAL CORD INJURY: AN ACCESSMETS PROJECT

S. Schmid^{1,3,4}, D.P. Heil, FACSM², A. Yoshida³, L. Ching⁴, J. Funakoshi¹, T. Sentell¹

¹University of Hawai'i, Honolulu, HI USA; ²Montana State University, Bozeman, MT USA; ³AccesSurf Hawai'i, Honolulu, HI USA;

⁴Hawai'i State Department of Health, Honolulu, HI USA.

It is well established that regular physical activity (PA) can reduce the risk for chronic disease, dementia, and all-cause mortality. This risk, however, tends to be much higher in some groups, such as people with disabilities (PWD) and Native Hawaiian and other Pacific Islanders (NHPI) who also consistently self-report lower levels of PA. The current study sought to investigate the efficacy of using outrigger canoe paddling (i.e., paddling) as a PA intervention tool because of the activity's popularity in Hawai'i, its cultural relevance as a PA to NHPs, and because paddling is practiced by those with spinal cord injuries (SCI). As such, the present study sought to determine the metabolic intensities (i.e., metabolic equivalents, or METs) that characterize on-water paddling for adults with SCI. The evaluation of METs for PA interventions targeting adults with SCI is an understudied topic. **PURPOSE:** We sought to determine whether measured MET values would exceed the 3.0 "moderate intensity" and/or 6.0 "vigorous intensity" MET PA thresholds, both of which are used to promote improved health outcomes and decreased risk for many chronic diseases. **METHODS:** Six adults with diagnosed SCI – 2 women (Mean±SD: 44±4 years age) and 4 men (53±2 years) – were recruited to paddle as part of a 6-person outrigger canoe (i.e., OC6) session on the ocean while having metabolic intensity measured using standard indirect calorimetry procedures. Sessions included a 5-minute semi-standardized paddling warm-up followed by paddling at steady-state intensities equivalent to "light", "moderate", and "hard" for 5-minutes each. **RESULTS:** Average MET values for light (4.3±1.2 METs; P=0.023), moderate (5.2±1.1 METs; P=0.003), and hard (6.0±0.9 METs; P<0.001) paddling intensities (82.5, 88.1, and 93.45% of age-predicted maximal heart rate, respectively) all exceeded the 3.0 MET PA threshold, while none of these intensities (P=0.53-0.99) exceeded the 6.0 "vigorous intensity" MET threshold. **CONCLUSION:** These results support the use of outrigger canoe paddling in adults with SCI as an intervention tool to promote lower risk for chronic disease and positive health and fitness outcomes.

This study was supported by NIMHD of NIH with award #U54MD007601.

Presentation #3

BIOMETRIC-BASED DIGITAL COACHING AND SPORT PERFORMANCE IN DIVISION I FOOTBALL ATHLETES C.

Brewer, K. Buchholz, T. Conley K. Wiegand, K. Taylor, FACSM

Eastern Washington University, Cheney, WA

Biometric data derived from wearable technology is increasingly used to guide sport performance training, with heart rate variability (HRV) being a key variable of interest. While biometric data alone may improve performance, supplementation of this data with biometric-based coaching may produce greater results. **PURPOSE:** To determine if a wearable combined with personalized biometric data-based coaching leads to greater improvements in indices of sport performance. **METHODS:** Collegiate football players (n=32) were randomized to a wearable only (W) or wearable plus coaching (W+C) group at the beginning of the 12-week off season. In addition to standardized strength and conditioning, both groups received biometric data, including day-to-day trends in HRV. The W+C group also received eight group health education sessions and daily digital health behavior coaching via a smartphone application on improving HRV. Sport performance was assessed with a 10-yd sprint (SP), vertical jump (VJ), and bench press repetitions to failure (RTF) tests pre- and post-off season. Differences in performance metrics were assessed with 2 (group) by 2 (time) ANOVAs ($\alpha=0.05$). **RESULTS:** There was no significant interaction ($p=0.16$) nor main effects of time ($p=0.37$) or group ($p=0.34$) in SP performance (W pre: 1.58 ± 0.05 s, post: 1.58 ± 0.90 s; W+C pre: 1.57 ± 0.06 s, post: 1.55 ± 0.06 s). There was also no significant interaction ($p=0.97$) nor main effects of time ($p=0.12$) or group ($p=0.96$) for VJ (W pre: 73.30 ± 9.96 cm, post: 74.20 ± 9.91 cm; W+C pre: 73.50 ± 12.98 cm, post: 74.45 ± 13.42 cm). Analyses of RTF indicated no interaction ($p=0.23$) or group effect ($p=0.39$) but a significant effect of time (pre: 13 ± 7 reps, post: 14 ± 7 reps, $p<0.001$). **CONCLUSION:** Although improvements in sport performance were greater in the W+C group, pre- to post-season changes were not significantly different from those attained in the W group. Results indicate a 12-week biometric-based digital health coaching intervention does not lead to greater improvements in the measured tests of anaerobic sports performance. These tests may lack the specificity needed to detect changes resulting from biometric-based coaching. Future research should consider longer study durations or alternative performance metrics that may be more likely to improve with biometric-based coaching.

Presentation #4

INSTRUCTIONAL SELF-TALK MEANINGFULLY IMPACTS LOWER LIMB KINEMATICS IN RUNNERS – A PILOT STUDY

J Sattgast, J Hangartner, J Roberts, J Wacker, J French, N Lazar, N Filosis

Eastern Washington University, Spokane, WA

PURPOSE: Due to elevated running injury rate associated with training volume, physical therapists often partner with runners to mitigate risk of running related injuries (RRI). This pilot study aimed to evaluate using self-talk and novel instructional cues to meaningfully impact kinematic changes, specifically step rate. **METHODS:** 7 healthy adult runners (5 male, 2 female) averaging ≥ 15 miles per week over 3 months were randomized into control (CNTRL) or experimental (EXP) groups. Following screening, participants completed a warm-up, followed by 2 repetitions of 5 minutes at self-selected pace on treadmill to establish baseline values. For EXP group, verbal and visual instruction was provided on self-talk and cue usage. Following 4-weeks, both groups returned for re-assessment with EXP participants utilizing self-talk and cueing during data collection. Kinematics were collected via 7 Noraxon inertial measurement units (IMU). Training data self-reported for both groups. **CONCLUSIONS:** Use of instructional cues, specifically targeting lower limb kinematic changes, positively impacts step-rate and pace in recreational runners

	EXP Group	CNTRL Group
Step-rate (mean)	2.99 $\pm$ 2.52 steps/min	-1.35 $\pm$ 3.19 steps/min
% change step-rate	1.812%	0.753%
p-value	0.049	0.098
Distance p/training run (mean)	6.96 $\pm$ 4.04	7.70 $\pm$ 5.1
Training runs p/participant (mean)	17.25	15
Training run pace (mean)	2.75 m/s	3.13 m/s
Pace change (pre- to post-)	0.131 $\pm$ 0.032 m/s	-0.028 $\pm$ 0.092 m/s
Cues: "short strides" (47% runs), "quick feet" (38% runs), "pump arms" (15% runs)		

Statistical analysis using an independent samples t-test comparing mean values between groups was performed utilizing SAS Enterprise Guide 8.4 (SAS Institute Inc., Cary, NC).

President's Cup Oral Presentation – April 4, 4 – 4:50 PM

Presentation #1

MENSTRUAL CYCLE PHASE EFFECTS ON EXERCISE THERMOREGULATION AND PERFORMANCE IN THE HEAT

K. J. Eustis, K. L. Pritchett, A. P. C. F. Freire, R. C. Pritchett

Central Washington University, Ellensburg, WA

The menstrual cycle (MC) is described as the natural fluctuation of hormones. It is known that the high-hormone luteal phase exhibits higher resting core temperature (T_c) compared to the low-hormone follicular phase. However, research is inconclusive and limited on whether elevated T_c impacts performance during exercise in hot conditions. **PURPOSE:** To determine if thermoregulatory measures are altered between MC phases, and whether the changes hinder running performance in the heat. **METHODS:** Recreationally trained, naturally menstruating adults completed two treadmill runs in simulated conditions during contrasting MC phases: early follicular (EF) and midluteal (ML). Subjects ran for 45min at a constant self-selected light pace, followed by a 15min performance test for distance. Environmental chamber was set to 32°C, 40% relative humidity (mean WBGT 31.8 $\pm$ 1.6°C). T_c , mean skin temperature (T_s), heart rate (HR), perceived exertion (RPE), thermal perception (THERM), and comfort perception (COMF) were assessed every 5min. Sweat perception (SP), sweat loss (SL), session ratings (sRPE, sTHERM, sCOMF), and performance test distance (DIST) were taken upon trial completion. Blood serum was analyzed for estrogen and progesterone concentrations to confirm MC phases. Two-way (phase X time) repeated measures ANOVAs were run for physiological and perceptual measures. Paired t-tests were run to assess phase differences in session ratings, SP, SL, and distance covered on the performance test. **RESULTS:** For $n=5$, T_c , T_s , HR, RPE, THERM, and COMF showed a main effect of time ($p<0.001$ for all) but no effect of phase ($p>0.05$ for all). T_c was not significantly different at baseline ([mean and SD] EF: 36.2 $\pm$ 1.0°C, ML: 35.6 $\pm$ 1.2°C, $p=0.42$). No significant phase differences were observed for SP (EF: 1094 $\pm$ 428ml, ML: 1189 $\pm$ 474ml, $p=0.45$), SL (EF: 1092 $\pm$ 310ml, ML: 1159 $\pm$ 257ml, $p=0.79$), sRPE (EF: 14.0 $\pm$ 1.4, ML: 14.0 $\pm$ 2.0, $p=1.00$), sTHERM (EF: -2.4 $\pm$ 0.5, ML: -3.4 $\pm$ 0.5, $p=0.06$), sCOMF (EF: 2.8 $\pm$ 0.4, ML: 3.4 $\pm$ 0.9, $p=0.18$), or DIST (EF: 1.71 $\pm$ 0.32mi, ML: 1.70 $\pm$ 0.45mi, $p=0.96$). **CONCLUSION:** MC phase does not appear to influence measures of thermoregulation or exercise performance in the heat. Athletes may continue to exercise per usual without concern of MC phase effects.

Supported by the ACSM Northwest Chapter and CWU School of Graduate Studies and Research.

Presentation #2

RELATIONSHIP BETWEEN PERCEIVED LIMITER AND RESPIRATORY COMPENSATION POINT IN RECREATIONAL RUNNERS

A.J. Seipel, J.M. Schuna Jr, J.T. Penry

Oregon State University, Corvallis, OR

PURPOSE: Endurance athletes report feelings of exertion related to central cardiorespiratory factors and peripheral muscular fatigue factors. Such perceptions are used in training load monitoring; yet, little work has demonstrated a link between these feelings of exertion and concrete physiological phenomena. This study investigated the relationship between primary perceived limiter and respiratory compensation point in recreational runners. **METHODS:** Twenty-eight recreationally active subjects (Males = 16; Females = 12) completed a maximal graded treadmill test that established $\dot{V}O_{2MAX}$ and respiratory compensation point (RCP). Subjects returned to the lab to complete a constant speed time to exhaustion run 1% gradient steeper than their RCP. Following each run subjects indicated whether their primary perceived limiter as "Heart and Lungs" or "Leg Fatigue." Subjects were grouped based upon their limiter during the second trial, and RCP was compared between groups using a two-sample t-test. A linear mixed-effects model assessed differences in peak $\dot{V}O_2$ between trials, and a general linear mixed model assessed differences in perceived limiter by visit. Significance for all analyses was set at $p \leq 0.05$. **RESULTS:** No between-group differences were observed for RCP (Means: $86.1 \pm 4.9\%$ vs $84.4 \pm 3.6\%$ $\dot{V}O_{2MAX}$; $p = 0.422$); the linear mixed-effects model showed no effect for visit (Difference: -1.300 ± 0.805 ; $p = 0.120$), limiter (Difference: 0.117 ± 0.905 ; $p = 0.898$), or their interaction on $\dot{V}O_2$ (Difference: 0.223 ± 0.974 ; $p = 0.821$). There was no significant effect of visit on perceived limiter, albeit with large intersubject variability (Log Odds: 0.270 ± 0.740 ; $p = 0.715$). **CONCLUSION:** These data do not provide evidence to adjust training based on perceived limiter alone, as they do not support a link between limiter and RCP relative to $\dot{V}O_{2MAX}$. Further investigation into the context wherein these perceptions could provide such utility is warranted.

Presentation #3

ASSOCIATIONS BETWEEN BODY COMPOSITION AND COGNITIVE FUNCTION AMONG FEMALE ADOLESCENTS

M. Kobylanski, R. Anderson, A.J. Aguiar Bonfim Cruz, G. MacAlevy, A. F. Brown, C. J. Brush

University of Idaho, Moscow, ID

Adolescence is a critical developmental period characterized by immense psychological and physical changes, including cognitive functioning and body composition. While research has shown that obesity impacts cognitive functioning, there is a poor understanding of which aspects of body composition impact cognitive function during adolescence. **PURPOSE:** This study aimed to assess different body composition metrics in relation to cognitive functioning in female adolescents. **METHODS:** Forty-one female participants (age = 14.59 ± 1.75 years; range = 12–17) had their height and weight assessed to compute body mass index (BMI)-for-age percentile, and percent whole-body fat mass (%BF) was measured using a Dual-Energy X-ray Absorptiometry (DXA) scan. Cognitive function was assessed using a modified go/no-go computerized task while electroencephalography (EEG) was recorded. The primary cognitive function variable of interest was the P3 event-related brain potential (ERP), a positive wave in the EEG peaking around 350 ms following stimulus presentation that reflects inhibitory control during no-go trials and target detection during go-trials. **RESULTS:** Descriptive statistics showed a %BF of 31.48 ± 6.92 and a BMI-for-age percentile of 62.20 ± 25.59 across the sample. A go/no-go EEG task manipulation check indicated that the no-go P3 amplitude was larger than the go P3 amplitude ($8.55 \pm 6.45 \mu V$ vs. $4.49 \pm 4.16 \mu V$; $t[40] = 4.23$, $p < .001$), suggesting inhibitory control required greater attentional resource allocation compared to target detection. Correlation analyses revealed that a higher %BF was associated with a smaller no-go P3 amplitude ($\rho = -.26$, $p = 0.049$; one-tailed) but not with go P3 amplitude ($\rho = -.04$, $p = .395$). BMI-for-age percentile was not associated with either no-go or go P3 amplitudes ($ps > .075$). **CONCLUSION:** These findings suggest a negative association between adiposity and cognitive function in female adolescents that was not captured by BMI metrics. Relying on BMI may obscure relationships between body composition and cognitive function. Excess adiposity could not only impair cognitive development, but deficits in inhibitory control could also contribute to behaviors that lead to increased adiposity.

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Presentation #4

AGE-RELATED DIFFERENCES IN THE ACUTE EFFECTS OF MUSCLE FATIGUE ON STABILITY

K. Hatch, K. Wiegand

Eastern Washington University, Cheney, WA

Postural stability is necessary for maintaining body position, achieving coordination, and reducing fall risk. With advancing age, fall risk increases, due in part to a decreasing ability to maintain postural stability. Muscular fatigue, which results from activities of daily life or exercise, may further intensify instability and increase risk of falls. Some research indicates older individuals develop muscular fatigue sooner than younger adults, but less is known about the differences in the time to recover stability. **PURPOSE:** To compare the acute effects of muscular fatigue on stability and time to recover stability between older and younger adults. **METHODS:** Participants from two age groups ($n = 30$; younger, 18–28 y; and older, 55–65 y) will be recruited. Four participants, two per group, have completed the study. Limits of Stability (LOS) testing and a fatiguing protocol, comprised of sit-to-stand to volitional fatigue, were performed. LOS tests were conducted at baseline and 0, 5, 10, 15, and 20 minutes after the fatiguing protocol. The variables of interest from LOS include reaction time (RT) and maximum excursion (MXE). The effects of age and recovery time on RT and MXE were analyzed with a 2 (group) by 6 (time) ANCOVA, with time to fatigue as a covariate ($\alpha = .05$). **RESULTS:** Preliminary analysis indicates that after adjusting for time to fatigue for MXE, there was no significant group by time interaction ($p = .11$), and no main effect of time ($p = .07$) or group ($p = .07$). For RT there was no significant interaction ($p = .71$) or main effect of time ($p = .34$), but there was a significant group effect ($p = .002$), with younger participants exhibiting faster reaction times (0.45 ± 0.14 s) compared to older participants (0.53 ± 0.11 s) on average. **CONCLUSION:** Based on these early results, balance measures were not significantly affected by fatigue. However, given the low sample size currently, these results may differ as additional data are collected. Between groups, there was no difference in maximum excursion based on age, which indicates that both groups were effective in reaching their limits of stability. There was a significant difference in reaction times between groups, with younger participants having faster reaction times at all testing points. This is to be expected with changes in the neuromuscular system that occur with age.

Presentation #5

IMPACT OF AGING ON DIAPHRAGM THICKNESS AND RESPIRATORY FUNCTION: COMPARISON WITH PERIPHERAL SKELETAL MUSCLE

C.B. Hart, K.R. Roozan, B.A. Warner, A.P. Freire, R.C. Pritchett, L.J. D'Acquisto, J.M. Dickinson, FACSM.
Central Washington University, Ellensburg, WA.

Aging is associated with a general loss of muscle size and strength, termed sarcopenia. However, less understood is the impact of advancing age specific to the size and structure of the diaphragm, the primary muscle regulating breathing. **PURPOSE:** Determine the impact of aging on the size and function of the diaphragm and identify how any impact compares to that of peripheral skeletal muscle. **METHODS:** Nine young (4M, 5F; 22±1yr) and seven older (3M, 4F; 69±4yr) healthy individuals volunteered for this study. While lying supine, ultrasound images of the right hemidiaphragm were obtained to determine diaphragm thickness (end expiration, maximal inspiration). Images of the thigh were obtained to determine thickness of the vastus lateralis. Inspiratory muscle strength was evaluated using maximal inspiratory pressure (MIP) and thigh muscle strength was assessed using peak isometric force. **RESULTS:** Vastus lateralis thickness was 35% lower in older (1.68±0.34cm) compared to younger adults (2.58±0.60cm) ($P<0.05$), and peak isometric force during leg extension was 39% lower in older (119±20Nm) compared to younger adults (196±59Nm) ($P<0.05$). Diaphragm thickness after exhalation was not statistically different ($P>0.05$) between older (0.181±0.057cm) and younger adults (0.176±0.033cm), nor was maximal inspiratory diaphragm thickness (older = 0.316±0.100; younger = 0.361±0.088cm) ($P>0.05$). However, MIP tended ($P=0.1$) to be lower in older (78±35cmH₂O) compared to younger adults (100±20cmH₂O). **CONCLUSION:** These preliminary data suggest that age-related changes to the structure and function of the diaphragm may differ from those in peripheral skeletal muscle. It is interesting to speculate about a potential role for exercise in preserving diaphragm size and function during aging as the older adults in the current study were considered to be relatively active.

Undergraduate Thematic Session 2 – April 5, 9 – 9:50 AM

Board #1

INFLUENCE OF EXECUTIVE FUNCTION ON MOVEMENT FUNCTION IN PEOPLE WITH PARKINSON'S DISEASE AND UNIMPAIRED ADULTS

N. Hutchison, M. Edwards, L. Wehrman, C. Garbuz, C. Wutzke, Gonzaga University, Spokane WA

Parkinson's Disease (PD) affects approximately one million people in the United States and is increasing. Decline in motor function including impairments in gait and balance is commonly a symptom of PD. Additionally, the influence of non-motor symptoms such as impaired executive function (planning, short-term memory) on movement function, are not well understood. An increased understanding of the association between motor and non-motor symptoms in people with PD is crucial for maintaining movement function and quality of life for people with PD. **PURPOSE:** To determine the influence of executive function on movement function in people with PD and unimpaired adults. **METHODS:** 37 participants (10 young adults (5F, 5M), 13 older adults (6F, 7M), 14 people with PD (7F, 7M)) completed movement and cognitive tasks. Cognitive tasks included the MoCA and MMSE questionnaires, as well as trail making tests (TMT). Movement tasks included the 10m walk, and two novel movements tasks (walking trail making test (WTMT#, WTMTL) replicating the sequence of the TMT). Time to complete tasks (TMT, WTMT) as well as time to walk between targets (WTMT) were recorded. Correlational analysis was conducted to determine associations between motor and non-motor tasks while an ANOVA was conducted to determine differences between groups ($p<0.05$). **RESULTS:** Although time to complete WTMTs did not differ between OA and PD groups, time between targets during WTMT did differ between OA and PD. In the WTMT#, PD had reduced velocity compared to OA at target intervals 5 (OA: 0.72 ± 0.04m/s, PD: 0.56 ± 0.02m/s, $p<0.001$), 7 (OA: 0.78 ± 0.02m/s, PD: 0.67 ± 0.04m/s, $p=0.016$), 9 (OA: 0.70 ± 0.1m/s, PD: 0.56 ± 0.03m/s, $p=0.032$), and 11 (OA: 0.93 ± 0.06m/s, PD: 0.79 ± 0.09m/s, $p=0.033$). **CONCLUSION:** Although time to complete the WTMT tasks did not differ between OA and PD participants, targets that required greater executive function led to reduced velocities in people with PD. These findings suggest that people with PD may have increased attentional demands when completing tasks that involve greater executive function. Rehabilitation programs that emphasize executive function may be beneficial for people with PD to maintain movement function and quality of life.

Board #2

THE EFFECT OF LOCOMOTOR-RESPIRATORY COUPLING ON HANDGRIP MUSCLE STRENGTH AND ENDURANCE

A. Sorensen, S. Henry

Pacific University, Forest Grove, OR

Locomotor-Respiratory Coupling (LRC) is the synchronization of rhythmic locomotion and breathing. Although the phenomenon has been historically associated with activities such as running, it is unclear if LRC plays a role in other types of repetitive muscular contractions. **PURPOSE:** Determine effects of LRC on handgrip muscle strength and endurance. **METHODS:** Using randomized and repeated measures design, participants ($n = 25$; 14 male, 11 female; 23 ± 3 yrs age) completed multiple trials of handgrip strength and endurance testing on two days (counterbalancing left and right handgrip trials). Instrumentation included digital handgrip dynamometer and chest-mounted pressure transducer (to verify breathing cadence) interfaced with data acquisition system (sampling 1000 Hz). To assess the effect of LRC on maximal force production, each testing day included multiple 30 s trials of repetitive maximum handgrip (frequency = 30 bpm) utilizing a LRC strategy of either two squeezes to one breath ratio (2:1) or three squeezes to one breath ratio (3:1). Trials were completed with each hand and rest periods were incorporated to minimize fatigue. To assess effect of LRC on muscular endurance, participants completed 120 s trials of maximal repetitive squeezes (57 bpm) for each hand, either inspiring during each contraction (Inspiration-Motor Coupling, IMC) or expiring during contraction (Expiration-Motor Coupling, EMC). To quantify level of resultant fatigue (i.e. muscular endurance), % change of peak force from initial to final represented degradation of handgrip muscle force over time. **RESULTS:** Paired t-tests revealed 2:1 breathing ratio increased maximal handgrip force as compared to 3:1 breathing ratio (158 ± 63 N, 146 ± 55 N, respectively; $p < 0.01$). Although the endurance protocol was deemed valid, as shown by decrement of peak force from initial to ending point in both breathing conditions (IMC = 35 ± 12 % decline, $p < 0.01$; EMC = 37 ± 12 % decline, $p < 0.01$), there was no difference in level of fatigue between IMC and EMC. **CONCLUSION:** Although our study showed no effect of LRC on muscular endurance, our findings did indicate a 2:1 breathing ratio is more effective than 3:1 for enhancing muscle strength during short duration, repetitive activities. Future research should investigate the efficacy of additional LRC breathing ratios.

Approved by Institutional Research Board and supported by Pacific University School of Natural Sciences Grant.

Board #3

BILATERAL DIFFERENCES IN SHOULDER ROTATION WITH UNILATERAL STATICS STRETCHING DUE TO CROSS-EDUCATION

B. Meric, T. Wiker, B. Beckwith, K. Taylor FACSM
Eastern Washington University, Cheney, WA

Research has shown that unilateral resistance training can lead to strength increases in the untrained contralateral limb due to cross education. However, less is known about the effects of cross education with unilateral stretching to increase range of motion, which may have implications for sport performance and injury rehabilitation. **PURPOSE:** To determine the effects of unilateral static stretching on contralateral shoulder external rotation in resistance trained males. **METHODS:** Resistance-trained, young adult males ($n = 15$; 18 - 25 y) completed a 7-day unilateral static stretching intervention of the right shoulder. Stretching was conducted for 5-10 minutes, twice daily. Shoulder external rotation was measured at baseline and following the intervention using a manual goniometer and an average of three measures were taken for the right (trained) and left shoulder (untrained). Data were analyzed using a 2 (shoulder) $\times$ 2 (time) repeated measures ANOVA with Bonferroni comparisons and an alpha level set at 0.05. Data are presented as mean $\pm$ SD. **RESULTS:** There was a significant main effect of time on shoulder external rotation ($p = .008$; $\eta^2 = .41$) with increases from pre ($91.8 \pm 7.6^\circ$) to post ($95.3 \pm 6.6^\circ$). However, there was no difference between the trained ($94.1 \pm 6.8^\circ$) and untrained shoulder ($93.0 \pm 7.0^\circ$; $p = .15$; $\eta^2 = .14$). Finally, there was no interaction between shoulder side and time on external rotation ($p = .61$; $\eta^2 = .02$). **CONCLUSIONS:** Our findings suggest that shoulder external rotation increased with a static stretching intervention in both the trained and untrained shoulder. This suggests that cross education may play a role in improving contralateral shoulder external rotation following a static stretching intervention. However, the findings of this study are limited to investigating the effects on shoulder external rotation in resistance trained males, impacting the generalizability of our findings. Future research would be beneficial to determine the effects of cross education on range of motion across major joints for injury rehabilitation and in more diverse groups.

Board #4

KINEMATIC EVALUATION OF TWO 3D-PRINTED PNEUMATIC SOFT ROBOT PROTOTYPES FOR FINGER EXTENSION REHABILITATION

M. Anderson, M. Deal, B. Heintz Walters, Y. L. Han
Seattle University, Seattle, WA

Impaired hand function is one of the most common motor deficits after a stroke, often manifesting as decreased finger extension range of motion. However, there remains a need for an affordable and accessible hand rehabilitation device. Soft robots have the potential to be lightweight, easily fabricated, and cost-effective, increasing patient accessibility. However, most existing soft robots facilitate finger flexion versus extension. **PURPOSE:** We compared the kinematics of two 3D-printed pneumatic soft robot prototypes (Prototype A and Prototype B) in assisting finger extension in healthy adults. **METHODS:** Eight participants (19–28 years, avg 21.88 ± 3.36 : 4 male, 4 female) were tested using motion analysis software to assess range of motion (ROM) at the metacarpophalangeal (MCP), proximal interphalangeal (PIP), and distal interphalangeal (DIP) joints with soft robot actuation. Electromyography (EMG) was used to record muscle activity of the extrinsic finger extensors. **RESULTS:** Prototype A generated 94.25 ± 8.13 percent passive ROM (%) at the MCP, 79.75 ± 5.42 % at the PIP, and 88.10 ± 3.68 % at the DIP joints. Prototype B generated 95.35 ± 6.87 % at the MCP, 73.32 ± 4.14 % at the PIP, and 84.83 ± 2.56 % at the DIP joints. All trials had no significant EMG activity during device actuation, demonstrating that ROM occurred from soft robot actuation, not voluntary muscle activation. Prototype A reached maximum actuation in 56.38 ± 7.73 s, consistent with that needed for effective hand rehabilitation exercises (i.e., < 60 s). Prototype B reached maximum actuation in 68.63 ± 5.10 s. **CONCLUSIONS:** Results demonstrate the efficacy of the soft robot prototypes regarding finger extension range of motion, and greater performance of Prototype A compared to Prototype B. Future research will seek continued development of soft robot extensors for hand rehabilitation through testing of additional prototypes similar to Prototype A.

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Poster/Free Communication – April 4, 6 – 8 PM

Board #1 – Graduate

PRELIMINARY STUDY: INTRA-RATER RELIABILITY OF BIERING-SORENSEN TEST WHEN USING GONIOMETER

J. Albert, A. Holsapple, D. Mars, J. Nash, F. Mehryar
Eastern Washington University, Cheney, WA

The Biering-Sorenson test has been used in the field of athletics and rehabilitation for decades. The test measures back extensor endurance and can be used to predict the risk for low back pain. The reliability of the test was found to be variable (low-high reliability) in previous studies. Several studies suggested that the reliability of the test can be improved by using instruments that can help the rater to determine the end of the test. **PURPOSE:** To investigate the reliability of Biering-Sorenson test when a goniometer is used to determine the end of the test. **METHODS:** 5 healthy subjects were recruited. Subjects completed three sessions of the Biering-Sorenson test. The first session was used as a practice session, the two subsequent sessions were used for data collection. Exclusion criteria included recent low back pain or injuries to lower extremities. The Biering-Sorenson test was performed using a goniometer fixed to a tripod with additional bubble level attachment placed one foot from the treatment table. The axis of the goniometer was at the level of the iliac crest, the stationary arm was parallel to ground, and the movable arm was fixed at 170 degrees mark. Stopwatch was used to record the time. The test ended when the upper trunk dropped below 10 degrees horizontal as measured by the goniometer. One rater (PT student) determined the end of the test. Using the Biering-Sorenson test results from the 2nd and 3rd sessions, Intraclass correlation coefficient (ICC) estimate and its 95% confidence interval were calculated using SPSS statistical software. **RESULTS:** There were 6-9 days between the data collection sessions. All participants were young (age= 23.4 ± 1.5) and 80% of participants were females. Participants had moderate-high activity level (80% moderate and 20% high) and healthy weight (BMI= 23.4 ± 2.6). The reliability estimate was found to be high; ICC= 0.94 (lower bound=0.57, upper bound=0.99). **CONCLUSION:** The results indicate high intra-rater reliability of Biering-Sorenson test when a goniometer is used to determine the end of the test in healthy individuals. However, the sample size of the study is small, and the findings cannot be generalized to people with pathological conditions.

Board #2 – Undergraduate

ASSOCIATIONS OF DAILY STEP COUNT AND STEP RATE WITH QUALITY OF LIFE IN OLDER ADULTS

H. Sprague, M.T. Antush, and C.A. Vella, FACSM

University of Idaho, Moscow, ID

Associations between daily step count and quality of life are well established in older adults. There is less evidence about the impact of average step rate, a marker of intensity, on quality of life, and the role of body composition, a key cardiometabolic disease risk factor, as a potential mediator. **PURPOSE:** To determine associations of daily step count and average step rate with physical quality of life (PQL) and mental quality of life (MQL) in older adults. **METHODS:** Daily step count and average step rate data were recorded via accelerometry worn over 7 days from 37 older adults (mean $\pm$ SD: age = 67.9 ± 6.7 yrs; 64.9% women) who were free from injury preventing typical physical activity levels. PQL and MQL data were collected via survey and scored on a 0 to 100 scale. Body fat percentage (%BF) was assessed via BOD POD. Multivariable linear regression analyses were used to evaluate associations of step count and step rate with PQL and MQL, controlling for accelerometer wear time, age, and %BF. **RESULTS:** Daily step count (8603 ± 3186 steps/d) and average step rate (9.6 ± 3.5 steps/min) were associated with PQL (82.2 ± 10.4 ; $\beta = 0.37$, $p = 0.03$ and $\beta = 0.35$, $p = 0.05$, respectively) independent of accelerometer wear time (903.1 ± 70.9 min/d) and age. The associations of daily step count and average step rate with PQL were attenuated by %BF ($30.6 \pm 7.2\%$; $\beta = 0.17$, $p = 0.45$ and $\beta = 0.12$, $p = 0.59$, respectively). There were no significant associations between daily step count or average step rate and MQL (80.0 ± 13.2 , $p > 0.05$). **CONCLUSION:** These data suggest that daily step count and average step rate are positively associated with PQL but not MQL in older adults, with the associations attenuated by %BF. Increasing daily step count and average step rate while maintaining healthy body composition may be meaningful objectives for multifaceted intervention strategies for improving PQL in older adults.

Supported by ACSM Northwest Student Research Award

Board #3 – Graduate

ACHILLES TENDINOPATHY PREVENTION: AN EVIDENCE-BASED APPROACH

J. Sargeant¹, V. Romano²

¹Rocky Mountain University, USA; ²Multnomah Athletic Club, USA

PURPOSE: Achilles tendinopathy is a prevalent musculoskeletal condition affecting physically active individuals, particularly athletes engaged in high-impact activities such as running and jumping. The condition is influenced by intrinsic factors (e.g., flexibility, tendon stiffness, muscle strength) and extrinsic factors (e.g., training loads, footwear). This study aims to develop an integrated prevention framework incorporating biomechanical, physiological, and contextual risk factors to mitigate Achilles tendinopathy risk. **METHODS:** A systematic literature review was conducted using databases including PubMed, Scopus, Google Scholar, and Consensus AI. Out of 250 studies identified, 34 high-quality studies were selected for inclusion. The review focused on key prevention strategies, including eccentric training, load management, stretching protocols, and footwear modifications. The included studies were evaluated using PRISMA guidelines to ensure methodological rigor and reliability. **RESULTS:** The findings highlight that an effective Achilles tendinopathy prevention strategy must integrate multiple risk factors. Key preventive measures include eccentric calf exercises (shown to significantly enhance tendon resilience), dynamic and static stretching (improving flexibility and reducing strain), targeted strength training (enhancing muscle support for the tendon), and load management (balancing stress and recovery to prevent overuse injuries). Additionally, biomechanical interventions, such as selecting appropriate footwear to optimize ankle dorsiflexion, play a crucial role in reducing strain on the Achilles tendon.

CONCLUSION: This study presents a comprehensive, evidence-based framework for Achilles tendinopathy prevention. The findings emphasize the necessity of a multidimensional approach that integrates biomechanical, physiological, and training-related strategies rather than relying on isolated interventions. Future research should focus on experimental validation and longitudinal studies to assess the long-term effectiveness of this framework across diverse athletic populations.

Supported by: Rocky Mountain University of Health Sciences and Multnomah Athletic Club.

Board #4 – Undergraduate

EFFECT OF COLLAGEN SUPPLEMENTS ON HAMSTRING FLEXIBILITY IN YOUNG ADULTS

H. Luu, K. Flann

University of Portland, Portland, OR

Collagen, a structural protein in connective tissues, has gained popularity as a dietary supplement for its potential benefits on skin, joint, and muscle health. This study looks at the impact of 30-day collagen supplementation on flexibility on subjects aged 19- 24. This was a randomized, blind study that was conducted over 30 days and involved 23 subjects divided amongst 4 experimental groups: 4 subjects in the control, 6 subjects only consuming collagen for 30 days, 7 subjects consuming collagen and performing stretching exercises for 30 days, and 6 subjects only performing stretching exercises for 30 days. Participants taking collagen supplements consumed 20g of a commercial, bioactive bovine collagen supplement daily. Weekly measurements for flexibility were taken by conducting clinical techniques for sit and reach tests, passive knee extension tests, and passive leg raise tests. Additional data on participants' perceived flexibility, joint mobility, and pain were also collected using a VAS index. While no significant changes were seen in the flexibility of the control or collagen group, results showed increases in flexibility in both the stretching group as well as with the stretching + collagen group ($p < 0.05$). When comparing those changes, there was a significantly greater change in flexibility with the stretching + collagen group ($p < 0.05$). The data from this study suggests that collagen may be a beneficial supplement but only when used in conjunction with a stimulus like stretching. Furthermore, consuming collagen supplements without the addition of physical activity may increase the risk of injury due to minimal stimulation of collagen remodeling. This area shows potential, and thus future research should aim for similar short-term collagen use and changes in other parameters like muscle strength or injury prevention.

Supported by University of Portland Honors Program

Board #5 – Undergraduate

ASSOCIATION OF CALF CIRCUMFERENCE WITH BLOOD PRESSURE AND HEART RATE

K. Craft, K. Ecker

Pacific University, Forest Grove, OR

Calf circumference (CC) is an easy, attainable measurement that has been found to be a good tool for predicting a multitude of factors among older individuals. **PURPOSE:** To determine if there is an association of calf circumference, heart rate (HR), and blood pressure (BP) among a variety of fitness and health levels in men aged 35-75. **METHODS:** Participants were recruited from both the Forest Grove community (n=10) and PeaceHealth's cardiac rehabilitation program in Springfield, OR (n=10). All participants were seated while CC was recorded with a tape measure and BP and HR were recorded with a cuff. Data were analyzed using JMP version 4 and a Pearson Product Moment correlation was used to analyze the sample sizes. **RESULTS:** CC showed a moderate positive correlation with diastolic BP and no significant difference, $r = 0.340$, $p = .142$. No significant difference was found between CC and systolic BP as well as a negative weak correlation, $r = -0.208$, $p = 0.377$. No correlation was found between CC and HR, $r = 0.088$, $p = 0.714$. CC showed a weak positive correlation with cardiac events and no significant difference, $r = 0.191$, $p = 0.421$. All other data showed no significance and a weak correlation. **CONCLUSION:** These results indicate CC has little to no association with HR and BP in men aged 35-75 years of age who are healthy, as well as those who have a history of heart disease. CC has the most significant correlation with diastolic blood pressure. A moderate, positive correlation could indicate that CC may be a way to predict elevated diastolic BP and/or hypertension. The findings provide a starting point for further analysis. Additional factors and more advanced statistical models are needed to gain deeper insights.

Board #6 – Graduate

PORTABLE LEG PRESS FOR CLOSED KINETIC CHAIN EXERCISES: ENHANCING STRENGTH FOR PATIENTS IN INTENSIVE CARE

K. Suen¹, J. Jordan², K. Ratcliff¹, S. Wood¹, K. Cleary¹

¹Eastern Washington University, Cheney, WA; ²Tufts University, Seattle, WA

Patients in the intensive care unit (ICU) often experience severe muscle weakness and atrophy due to prolonged immobility, necessitating effective and unique rehabilitation strategies. **PURPOSE:** To evaluate the effectiveness of resisted closed kinetic chain (CKC) exercises compared to existing interventions in improving functional outcomes for patients with critical illness. **METHODS:** A comprehensive literature review was conducted using databases such as EBSCOhost, CINAHL, PubMed, TRIP, and MEDLINE. Key terms included "intensive care unit," "closed kinetic chain vs. open kinetic chain exercises," "leg press machine," "acute care," "portable leg press," "modalities," and "functional outcomes." Studies were selected based on their relevance to interventions focused on combatting the effects of immobility and their impact on functional outcomes for patients in ICU. **RESULTS:** CKC exercises, which involve multiple joints and mimic functional activities, have shown superior functional outcomes compared to open kinetic chain (OKC) exercises. Implementing CKC exercises via a portable leg press can be done at bedside, making it feasible for patients in the ICU where out-of-bed mobility may be contraindicated. The studies reviewed indicate that CKC exercises improve balance, lower extremity muscle activation, and gait quality. A prototype portable leg press has been developed to facilitate these exercises, addressing the limitations of existing interventions like neuromuscular electrical stimulation (NMES), cycle ergometry, and tilt-tables. **CONCLUSION:** Resisted CKC exercises using a portable leg press offer a promising alternative to traditional strengthening modalities in the ICU. These exercises can enhance muscle strength, balance, and functional mobility, improving patient outcomes. Further research is needed to validate these findings and optimize the implementation of CKC exercises in critical care settings.

Board #7 – Undergraduate

EFFECTS OF HYDRATION ON EXERCISE-INDUCED BRONCHOCONSTRICTION IN THE COLD IN HIGH-VENTILATION COLLEGIATE ATHLETES

G. Fink, J. Campbell, T. Divergilio, K. Lipp, O. Medal, L. Pham, K. Sierhuis, and D.B. Thorp

Gonzaga University, Spokane, WA

Exercise-induced bronchoconstriction (EIB) occurs due to drying and irritation of the airways and is characterized by reduced forced expiratory volume (FEV₁) and forced vital capacity (FVC). EIB is more prevalent in high-ventilation athletes, exacerbated by cold air, and evidence suggests it is diminished through increased hydration in warm conditions. **PURPOSE:** To determine whether increased hydration would diminish EIB following high-intensity exercise in the cold. **METHODS:** 7 male and 3 female D1 collegiate rowers (20.3 ± 1.4 yrs.) performed a graded treadmill test to exhaustion to determine maximal ventilation and to set intensity for experimental trials. Subjects recorded fluid intake for 7 days prior to the first experimental trial. Two trials were performed in a counterbalanced order. The baseline (BL) trial was performed without manipulating the subjects' normal fluid intake, while the hydration (HYD) trial was performed following 7 days of consuming an additional 1.1 L of water/day and 1.2 L of saltwater (0.003% w/v NaCl) 120 minutes prior to the trial. Plasma osmolality (POsm) was assessed and pre-exercise spirometry was performed prior to each trial. The exercise protocol consisted of a 10-min. warm-up, followed by 8 min. of running at the final speed achieved in the graded test in an environmental chamber set to at -16°C and 40% humidity. The spirometry test was repeated 3 min. post-exercise in ambient conditions and compared to pre-exercise values to assess EIB. Data was analyzed using repeated measures ANOVA and paired sample t-tests (α set at ≤ 0.05). **RESULTS:** There was no difference in POsm between BL (296.3 ± 3.8 mOsm) and HYD (294.0 ± 5.2 mOsm, $p = 0.285$). Subjects consumed an additional 0.81 ± 0.99 L/day of fluid prior to HYD ($p = 0.04$). Exercise in the cold led to a 4.88% decrease in FEV₁ (4.1 ± 0.34 vs. 3.9 ± 0.33 L, $p = 0.027$) and a 4.73% decrease in FVC (4.44 ± 0.35 vs. 4.23 ± 0.32 L, $p = 0.017$). Hydration status did not impact pre- vs. post-exercise FEV₁ ($p = 0.337$) or FVC ($p = 0.534$). **CONCLUSION:** High-ventilation exercise in the cold did induce bronchoconstriction, thereby demonstrating modest EIB. Hydration status did not appear to impact prevalence or magnitude of EIB following exercise in the cold as had been previously reported in warm conditions. These findings reinforce that cold air is a strong stimulus for EIB.

Board #8 – Graduate

SLEEP QUALITY AND CARDIOPULMONARY FUNCTIONAL CAPACITY IN OUTPATIENT CARDIAC REHABILITATION

C. Pavlenco¹, E. Crooks², L. Miller³, L. Wambold⁴, S. Shroeder⁴, D. L. Weeks⁵

¹University of Washington, Seattle, WA; ²Eastern Washington University, Spokane, WA; ³Lincoln Memorial University, Knoxville, TN; ⁴Providence St. Luke's Rehabilitation Medical Center, Spokane, WA; ⁵Washington State University, Spokane, WA

PURPOSE: Impaired sleep is common among people with cardiovascular disease and has been linked to adverse clinical outcomes, yet its relationship with functional capacity during cardiac rehabilitation (CR) remains understudied. The purpose of this study was to evaluate whether sleep quality predicted cardiopulmonary functional capacity in patients attending outpatient cardiac rehabilitation (OCR). **METHODS:** One hundred patients (67.3 ± 9.8 years, 68% male) participating in OCR following a recent cardiac event or diagnosis completed the study. Sleep quality was assessed by the Pittsburgh Sleep Quality Index (PSQI) near OCR admission, with poor sleepers defined by a PSQI score >5 . Cardiopulmonary functional capacity was determined by the 6-Minute Walk Test (6MWT), administered near OCR admission and again near OCR discharge (mean 11 weeks). Descriptive statistics and linear regression analyses were conducted with SPSS v29. **RESULTS:** The mean ($\pm$ SD) total PSQI score was $8.81 (\pm 4.57)$, and 68% of the sample were categorized as poor sleepers. Patients categorized as poor sleepers trended towards lower 6MWT scores (327.00 ± 100.48 meters) than those categorized as good sleepers (366.26 ± 84.14 meters; $p=0.059$) at OCR admission, but not at discharge ($p=0.55$). Additionally, total PSQI scores predicted 6MWT performance at OCR admission ($R^2=0.07$, $B=-18.61$, $p=0.007$), but not at discharge ($p=0.61$). **CONCLUSIONS:** Poor sleep was highly prevalent and associated with lower cardiopulmonary functional capacity at OCR admission. This association diminished at OCR discharge. While sleep quality predicted admission 6MWT scores, the proportion of variance explained by the independent variable was small (7%). It should be noted that several predictors of functional capacity were not examined, and the large majority of variance is unaccounted for. Future research should address limitations of this work, evaluate and intervene on sleep health in CR, and identify key factors to accelerate and enhance functional outcomes after a cardiac event.

Board #9 – Undergraduate

THE EFFECTS OF RAPID AND SLOW STRETCH-SHORTENING CYCLE MOVEMENTS ON PERCEIVED SORENESS AND PERFORMANCE

B. Hurajt, C. Schneider, M. Blazzard, R. Brandon, B. Root, K. Taylor FACSM
Eastern Washington University, Cheney, WA

Research has indicated that neuromuscular fatigue and recovery levels do not differ with changes in the speed of the stretch-shortening cycle. Previous studies have shown no differences between a rapid speed stretch-shortening cycle activity (e.g., countermovement jump [CMJ]) and a slow speed stretch-shortening cycle activity (e.g., squat jump [SJ]) during maximal exercise. However, less is known about the effects on perceived soreness, which may impact adherence and, ultimately, performance. **PURPOSE:** To determine the differences in repetitions to fatigue and perceived muscle soreness between CMJ and SJ in active young adults. **METHODS:** Resistance-trained young adults ($n = 8$; 21.8 ± 2.2 y; 5 females and 3 males) completed two sessions in a randomized and counterbalanced order, separated by at least 72 hours. Participants were asked to perform as many jumps as possible until fatigue using a CMJ or SJ. The number of jumps was recorded, and participants reported muscle soreness levels using a Likert scale from 1 (no soreness) to 10 (worst soreness) at 24, 48, and 72 hours following the exercise. Data were analyzed using a paired samples *t*-test for repetitions to fatigue (mean $\pm$ SD; $\alpha = .05$) and the Wilcoxon signed rank tests for differences in soreness [median (IQR)] at each time point ($\alpha = .017$ after Bonferroni adjustment). **RESULTS:** Repetitions to fatigue were higher with the CMJ (45 ± 14 jumps) than the SJ (32 ± 11 jumps; $p < .001$). There were no differences in perceived muscle soreness between jump conditions at 24- (CMJ: 3.0 (1.0, 5.0) vs. SJ: 2.5 (1.0, 4.0); $p = .26$), 48- (CMJ: 2.0 (1.0, 4.5) vs. SJ: 1.0 (1.0, 3.5); $p = .18$), or 72-hours (CMJ: 1.0 (1.0, 3.8) vs. SJ: 1.0 (1.0, 3.5); $p = .18$). **CONCLUSIONS:** Our results suggest that there may be no differences in muscle soreness between a CMJ and SJ up to 72 hours after exercise. However, participants performed more repetitions to fatigue with the CMJ than the SJ, suggesting that the speed of the stretch-shortening cycle may play a role in endurance performance. These findings are limited by a small sample size, impacting statistical power and the ability to generalize findings. Future research should explore differences in other jump exercises using a more sensitive measure of perceived muscle soreness.

Board #10 – Graduate

BIDIRECTIONAL RELATIONSHIPS BETWEEN PHYSICAL ACTIVITY AND AFFECT: EVIDENCE FROM ACCELEROMETRY AND ECOLOGICAL MOMENTARY ASSESSMENT

G. MacAlevy, K. Knudson, C.J. Brush¹
University of Idaho, Moscow, ID

Affective flexibility, defined as the ability to modulate subjective feelings, is a critical component of psychological well-being and has been linked to physical activity participation. Research has examined affect as both a determinant and consequence of physical activity; however, most studies have relied on lab-based assessments or between-person analyses (i.e., average relationships between affect and physical activity). As a result, there is a poor understanding of how daily affect and physical activity levels fluctuate within individuals in real-world settings, limiting efforts to promote physical activity or develop more personalized interventions. **PURPOSE:** This study aimed to better understand the role of affect in relation to physical activity over the course of one week, assessing positive and negative affect both as predictors and outcomes of moderate-to-vigorous physical activity (MVPA). **METHODS:** Twenty-one adults (18-38 years old) wore a wrist-worn accelerometer for one week to measure time spent in MVPA and reported their affect four times daily in accordance with an ecological momentary assessment (EMA) protocol. Multilevel modeling (MLM) was used to assess bidirectional between- and within-person associations between MVPA and affect. **RESULTS:** When testing affect as a predictor of MVPA, neither positive ($ps > .136$) nor negative affect ($ps > .401$) were associated with changes in MVPA at the within- or between-person levels. However, when testing affect as a consequence of MVPA, there was a significant within-person effect, such that on days when participants engaged in more MVPA than usual, they reported greater positive affect ($b = 0.01$; 95% CI [0.001, 0.02]; $p = .033$). No between-person effects of MVPA were observed ($p = .143$). There were also no associations between MVPA and negative affect ($ps > .358$). **CONCLUSION:** Findings indicate that positive affect is better conceptualized as a consequence rather than a predictor of MVPA. This information highlights the potential efficacy of activity-based interventions for increasing daily positive affect and overall affective flexibility. Future work should focus on understanding physical activity determinants in efforts to improve affective flexibility.

Board #11 – Undergraduate

THE EFFECT OF PEA AND RICE PROTEIN SUPPLEMENTATION ON MUSCLE RECOVERY

S. Dombrowik, E. Beach, B. Bennett, B. Jones, L. Ledesma, K. Reilly, S. Squires, D. Kim

Gonzaga University, Spokane, WA

PURPOSE: This study compares the effectiveness of pea and rice protein supplementation on muscle recovery following muscle-damaging exercise. **METHODS:** This cross-sectional, repeated-measures study involved seven healthy adults (5 female, 1 males; mean age: 22.2 ± 1.0 years) who completed three trials in a randomized order. Each trial consisted of a 3-day preloading phase, during which participants consumed their assigned supplement (0.4 g/kg body weight) daily. The supplements tested were pea protein (PS), rice protein (RS), or maltodextrin as a control (CN). Following the preloading phase, participants performed a muscle-damaging exercise, consisting of 30 minutes of downhill walking on a treadmill (AMT1, Watertown, MA) at a 20% decline and 1.36 m/s. Immediately after completing the exercise, capillary blood samples were collected to assess creatine kinase (CK) levels using a Piccolo Xpress analyzer (Abbott, Abbott Park, IL). Subsequent to blood collection, participants performed the knee extension strength tests on an isokinetic dynamometer (Human Norm, Stoughton, MA) to assess peak quadriceps muscle isometric torque. Neuromuscular activation of the vastus medialis was measured using an EMG sensor (Delsys, Natick, MA). The strength test was repeated after 1 hour of recovery to assess post-exercise recovery. Data were analyzed using repeated-measures ANOVA with Bonferroni-corrected post-hoc comparisons ($p < 0.05$). **RESULTS:** There were no significant differences in CK levels between groups (RS: 114.7 ± 70.0 U/L, PS: 89.2 ± 48.3 U/L, CN: 90.3 ± 44.7 U/L, $F(2,12) = 1.571$, $p = 0.247$), nor in peak muscle extension torque (RS: 29.5 ± 27.9 nm, PS: 26.8 ± 29.5 nm, CN: 1.3 ± 24.23 nm, $F(2,10) = 2.01$, $p = 0.184$) or neuromuscular activation (RS: 36.8 ± 27.7 nm, PS: 32.3 ± 33.0 nm, CN: 13.8 ± 12.4 nm, $F(2,8) = 1.47$, $p = 0.284$). **CONCLUSION:** Pea and rice protein supplementation had no significant effect on muscle damage, peak force recovery, or neuromuscular activation following exercise under the conditions tested.

Board #12 – Graduate

CARDIAC INDICATORS DURING HALF AND FULL IRONMAN COMPETITION: A COMPARATIVE ANALYSIS

D. Smith¹, R. Edwards¹, N. Dooley¹, E. Griffin², A. Lamp², C.P. Connolly, FACSM¹

¹Washington State University, Pullman, WA; ²Washington State University Elson S. Floyd College of Medicine, Spokane, WA

Ultra-endurance triathlon competitions and participants have increased in number worldwide over recent years with little research focused on cardiac performance or risk during competition. Though relatively rare, anecdotal reports of athlete death during triathlon competition continue to emerge, most commonly a result of sudden adverse cardiac events. **PURPOSE:** To investigate how relative time in heart rate zones (HRZ) differs among half and full Ironman (IM) athletes, as well as maximal heart rate variability (HRV) and pre-competition somatic anxiety. **METHODS:** Participants ($n=15$) were recruited from ultra-endurance triathlon races including the Tri-Cities, WA (half IM) and Kona, HI Ironman World Championships (full IM). Participants were equipped with a portable two-lead electrocardiogram to monitor cardiac performance throughout both races. Pre-competition somatic anxiety (day prior to race) was assessed via survey using the Competitive State Anxiety Inventory-2 (CSAI-2). Independent samples T-tests were used to compare study variables of interest between half and full IM participants. **RESULTS:** Half IM athletes spent more time in HRZ 5 (55.0% of race) compared to full IM athletes (26.5% of race). In contrast, full IM athletes spent more time in HRZ 4 (41.0% of race) compared to half IM athletes (34.5% of race). Pre-competition somatic anxiety scores were higher for half IM athletes (18.8 ± 4.3) compared to full IM athletes (15.6 ± 0.7). For half IM athletes, significant correlations were found for pre-competition somatic anxiety and time spent in HRZ 4 ($r=0.671$, $p=0.048$) and HRZ 5 ($r=-0.724$, $p=0.027$) during the race. However, this trend was not found with full IM athletes. Max HRV (Mv) during the race was higher for full IM (95.5 ± 34.6) compared to half IM athletes (80.4 ± 35.6). **CONCLUSION:** Half IM athletes appear to spend more time at higher intensities compared to full IM athletes, as indicated by several cardiac indicators. Preliminary data infers that high pre-competition somatic anxiety may be a product of anticipated higher intensity, rather than volume. These findings provide a basis for future examinations of competition intensity and anxiety seeking to understand mechanisms of adverse cardiac events in triathlons.

Board #13 – Undergraduate

RACE SEGMENT VARIABILITY IN PHYSIOLOGICAL RESPONSES DURING HALF IRONMAN TRIATHLON

N. Dooley¹, D. Smith¹, R. Edwards¹, E. Griffin², A. Lamp², C.P. Connolly, FACSM¹

¹Washington State University, Pullman, WA; ²Washington State University Elson S. Floyd College of Medicine, Spokane, WA

Ultra-endurance triathlon is a physiologically challenging and potentially hazardous sport, with limited research on the acute cardiac and pulmonary responses throughout competition. **PURPOSE:** To compare specific physiologic responses—heart rate (HR), breathing rate (BR), relative time in heart rate zones (HRZ), and cardiac strain (CS)—across Half IM swim, bike, and run race segments. **METHODS:** Participants ($n=9$) from the TriCities, WA Half IM were equipped with a two-lead electrocardiogram (ECG) and instructed to wear the device throughout competition. Friedman's test was performed to determine mean rank of each physiologic response for race segments, including occurrences of CS (ST segment deviation ± 0.2 Mv), as well as min, max, mean HR, BR, and relative time in HRZs. Post hoc Hedges G was calculated to determine effect size by segment when insignificant results were found with Friedman's test. **RESULTS:** Mean BR during the swim (35.7 ± 4.1), bike (39.3 ± 6.5), and run (43.0 ± 4.0) varied significantly, $\chi^2(2, N=9) 12.667$, $p=.002$. Additionally, max BR during the swim (43.0 ± 5.8), bike (51.9 ± 3.8), and run (51.7 ± 4.6), $\chi^2(2, N=9) 8.400$, $p=.015$, and min BR during the swim (26.6 ± 4.6), bike (27.7 ± 6.0), and run (32.7 ± 4.0), $\chi^2(2, N=9) 8.971$, $p=.011$, also varied. When comparing max HR during the bike segment (171.1 ± 6.7) to the swim (164.7 ± 7.0), a large effect size was seen ($d=0.81$ 95% CI [-1.77 – .15]). Likewise, a large effect size for min HR was found between the bike segment (114.6 ± 16.5) and the run (134.3 ± 14.4) ($d=1.17$ 95% CI [-2.17 – .17]). No significant differences for CS and relative time in HRZs by race segments were observed. **CONCLUSION:** Findings indicate that BRs (min, max, mean) all differ significantly by race segment, suggesting variable pulmonary workloads throughout triathlon competition. Race segment comparisons also show max HR differences between the swim and bike, and min HR differences between the bike and run, indicating exertion levels to be highest during the run.

Board #14 – Graduate

AFFECTIVE RESPONSES TO SELF-SELECTED AND MODERATE-INTENSITY AEROBIC EXERCISE IN ADULTS WITH DEPRESSIVE SYMPTOMS

R. Anderson, K. Knudson, M. Kobylanski, C.A. Vella, FACSM, C.A. Egan, C.J. Brush
University of Idaho, Moscow, ID

Despite the known antidepressant effects of exercise, participation rates remain low among depressed individuals. One potential barrier is the affective experience of exercise, which is particularly relevant for individuals with depression, as they often avoid physical activity and experience reduced motivation. Research assessing affective responses to exercise may help inform more targeted strategies for exercise prescription. **PURPOSE:** This study examines affective responses to self-selected versus prescribed moderate-intensity exercise in adults with mild-to-severe depressive symptoms. **METHODS:** Using a within-subjects crossover design, 26 participants (age=23.6±5.6 years; 62% female) completed two counterbalanced laboratory sessions, each involving 30 min of cycling at a self-selected or prescribed moderate intensity (64-76% of maximal heart rate [HR]). Exercise intensity was monitored via HR and ratings of perceived exertion (RPE), while affective responses—pleasure and perceived activation—were assessed before, during, and after exercise using the Feeling Scale and Felt Arousal Scale. **RESULTS:** Prescribed exercise resulted in a higher HR (136 vs. 133 bpm; $t(275)=2.3$, $p=.022$) and RPE (11.7 vs. 11.2; $t(275) = 3.0$, $p = .003$) during exercise than self-selected exercise. Pleasure did not differ overall but showed a depressive symptom severity x condition interaction, with greater pleasure during the self-selected bout for those with high depressive symptoms ($b=-0.4$; $F(1,264)=4.4$, $p=.037$). Perceived activation followed an inverted-U trend and also showed a depressive symptom severity x condition interaction. That is, perceived activation was higher during the prescribed exercise for those with low depressive symptoms ($b=0.6$; $F(1,264)=20.1$, $p<.001$). **CONCLUSION:** Our findings indicate that exercise intensity and autonomy influence affective responses among individuals with depressive symptoms. Considering individual differences in depressive symptoms may optimize exercise prescription effectiveness. Future research should explore tailoring exercise prescriptions to individual preferences for improved engagement and adherence.

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Board #15 – Undergraduate

TO PLAY OR NOT TO PLAY: INVESTIGATING THE EFFECTS OF AUDITORY STIMULI DURING RUNNING

A. Tamblyn, J. Brandt, C. Schmidt, G. Barnett, D. Kern, K. Taylor FACSM
Eastern Washington University, Cheney, WA

Research has shown that listening to music during physical activity can have a positive effect on emotional state, ratings of perceived exertion, and overall performance. However, limited research has investigated the differences between tempo-matched music and metronome pacing on running performance. Many runners utilize metronome pacing to pace a run, improve efficiency, and enhance form. To date, research on the efficacy of metronome pacing compared to music on one mile run time to completion is limited. **PURPOSE:** To determine the effects of different auditory stimuli (e.g., music, metronome, and silence) on one mile run time in young adults. **METHODS:** Young adults ($n = 11$; 21.3 ± 4.1 y) who were free from any previous or existing hearing impairments volunteered for the study. Participants ran one mile under each of the three conditions (music, metronome pacing, and silence), in a randomized and counterbalanced order, and separated by at least 48 hours. The music and metronome-pacing conditions were tempo-matched at 150 bpm. Time to completion was recorded for the one mile run and is reported as mean $\pm$ SD. Data were analyzed using a one-way repeated measures ANOVA with an alpha level set at 0.05. **RESULTS:** There was a significant difference in time to completion for one mile across the three conditions ($p = .008$; $h^2 = .38$). Time to completion was shorter with music (8.89 ± 1.36 minutes) than silence (9.29 ± 1.41 minutes; $p = .002$). However, there was no difference between music and metronome pacing (9.15 ± 1.65 minutes; $p = .13$) or between metronome pacing and silence ($p > .99$). **CONCLUSIONS:** Our findings indicate that running while listening to music at 150 bpm results in shorter time to completion compared to tempo-matched metronome pacing and silence. This suggests that factors other than the tempo may contribute to performance improvements. The current study was limited to young, healthy adults, limiting the generalizability to other groups such as older adults and runners aiming to rehabilitate gait patterns. Therefore, future research should investigate whether music or tempo-matched metronome pacing is superior for improving efficiency and enhancing form.

Board #16 – Graduate

RELATIONSHIP BETWEEN MINDFULNESS, PAIN, AND EXERCISE PERFORMANCE

A.L. Lassiter, S. Ulrich-French

Washington State University, Pullman, WA

A person's pain tolerance during exercise, allows for longer hold times during isometric contractions. Mindfulness is a psychological construct that can be used to manage pain. Mindfulness can be global, referred to as trait mindfulness (TM), or situational, referred to as state mindfulness (SM). The maximum hold time of each isometric exercise indicates exercise pain tolerance; therefore, hold time (time) was used to measure pain tolerance and muscular endurance (exercise performance). Detaching from negative thoughts or feelings related to pain (affective experience) is a product of mindful pain reappraisal (MPR), mindful shifts in the appraisal of painful interoceptive cues. Shifting a negative emotional response to an interoceptive cue, can change the perception and severity of painful stimuli. This ability to detach may allow people to withstand painful sensations and hold an exercise position longer (time). Daily levels of pain that may interfere with people's normal work (pain interference/pain_interf) could also impact a person's exercise pain tolerance. **PURPOSE:** To examine the relationship of trait and state mindfulness, how they relate to daily pain interference and the affective experience during isometric exercises, and whether TM, SM, and MPR predict exercise performance. **METHODS:** Data were collected at baseline as part of a larger study to test the effects of mindfulness during isometric contraction exercises on affective responses and pain tolerance. Participants were healthy, trained adults, from a university fitness class ($N = 73$, age 18-43). Gender and race were self-reported: 32 female, 35 male, two did not report, two identified as non-binary and one identified as a trans-man, 50.9% white, 27.4% did not report, 22.1% non-white. **RESULTS:** TM and pain interference were negatively correlated ($r = -.381$, $p \leq .001$). SM and pain interference were not correlated (plank $r = -.182$, $p = .139$; wall-sit $r = -.23$, $p = .059$). TM and SM were positively correlated (plank $r = .384$, $p \leq .001$; wall-sit $r = .343$, $p \leq .001$). MPR was positively correlated with the time individuals held each exercise (exercise performance) (plank $r = .281$, $p = .009$; wall-sit $r = .299$, $p = .006$). SM was positively correlated with MPR (plank $r = .578$, $p \leq .001$; wall-sit $r = .602$, $p \leq .001$). SM was positively correlated with plank time ($r = .417$, $p \leq .001$); however, was not significantly correlated with wall-sit time ($r = .156$, $p = .204$). MPR was positively correlated with time (plank $r = .281$, $p = .018$; wall-sit $r = .299$, $p = .012$). Predicting plank time in the regression model, TM, SM, MPR accounted for 20% of the variance in time ($R^2 = .196$, $p = .04$). Only SM was a significant predictor ($B = .43$, $p = .005$) of plank time with a one unit increase of SM predicting a 30 second increase in time. The wall-sit time regression model was not significant ($R^2 = .112$, $p = .06$). **CONCLUSION:** The results suggest SM may support MPR and exercise performance, allowing more mindful individuals to alter pain appraisals and hold an isometric contraction longer. People may experience plank and wall-sit differently—with SM more easily utilized to hold plank. Those with higher trait mindfulness report less pain interfering with daily activities; however, pain interference was not associated with SM, MPR, or time. While TM and SM are related, they are distinct constructs, and SM does not fully depend on TM. These findings support previous research indicating that mindfulness can influence the experience of exercise and pain severity/tolerance. Future research should examine the impact of a mindful intervention during an isometric contraction. Understanding how to moderate the experience of pain during exercise could improve exercise performance.

Board #17 – Undergraduate

EFFECT OF A STUDENT-LED EXERCISE CLINIC ON CARDIOVASCULAR HEALTH AND FITNESS AMONG COMMUNITY VOLUNTEERS

Liam Quinn, Macauley M. Devin, Eric Pitman, Julie Larsen, Jaysa Ramos, Catherine L. Jarrett

Department of Nutrition and Exercise Physiology, Washington State University, Spokane, WA

According to the CDC, more than 75% of US adults do not meet physical activity guidelines. Physical inactivity increases cardiovascular disease risk, while engaging in exercise substantially lowers that risk. Experiential learning projects, like Washington State University's Health and Fitness Clinic, allow undergraduates to apply exercise training skills in a real-world setting to promote health in the community. **PURPOSE:** The goal of this study was to assess cardiovascular health and fitness outcomes after a 2-month student-led nutrition and exercise clinic. **METHODS:** Students led clients through a bi-weekly personalized fitness program for 8 weeks based on the clients' individual needs and goals. Eligible participants were consented to take part in the research study and had their fitness and vascular health assessed before and after the 8-week program. Vascular function was assessed by Doppler ultrasound-measured femoral artery blood flow during a passive leg movement (PLM) test. Vascular stiffness and blood pressure (BP) were measured with SphygmoCor XCEL, including large artery pulse wave velocity (PWV) and both brachial and central BP. General fitness was assessed using a stationary bike test for aerobic fitness, a push-up test for muscular endurance, and a single-leg balance test. Clinic attendance was tracked, and a clinic satisfaction survey was completed at the end of the study. **RESULTS:** Eleven clients (7 women, 4 men) were consented and completed the 8-week study, with an average clinic attendance rate of 81%. The participants' rated clinic satisfaction positively, with a score of 4.6 out of 5. There were significant improvements in both aerobic fitness and push-up test score ($p < .05$). No significant changes were observed for BP, PLM and PWV tests of vascular health. Despite non-significant changes in blood pressure measurements, 9 participants had clinically meaningful improvements. This included lowering BP categories from high to elevated BP or elevated to normal BP. Similarly, for the balance test, 5 participants raised their scores from below average to above average. **CONCLUSION:** Taken together, these results demonstrate the health benefits of a student-led clinic. This is the first year of a 3-year annual study in which we hope to see continued expansion and improvement.

Board #18 – Graduate

RELATIONSHIP BETWEEN COUNTERMOVEMENT JUMP METRICS AND CONCENTRIC DEADLIFT VELOCITY IN COLLEGIATE ATHLETES

A. Norling, C. Reyes

Linfield University, McMinnville, Oregon

Velocity Based Training (VBT) is technology that measures concentric velocity and is used to create force-velocity profiles, calculate 1-repetition maximum (1RM), which can then prescribe the appropriate load based on neuromuscular readiness and specific neuromuscular goals. **PURPOSE:** To correlate an individual's concentric velocity on the trapbar deadlift (TDL) at specific load increments, with countermovement jump (CMJ) performance. **METHODS:** NCAA Division III athletes ($n=21$, 20.6 years $\pm$ 2.29, 173.77 cm $\pm$ 7.6, 80.2 kg $\pm$ 16.64) participated in a single testing session. After a standardized warm-up, each athlete performed 3 CMJ on a force plate. Their highest jump height (JH) and its corresponding 6 kinetic metrics were used in the analyses. Participants then performed TDL with a standardized set of loads, which was based on relative percentages of the individual's body weight: 50%, 75%, 100%, 125%, 150%, 175%, and 200%. Two repetitions were performed at each load and concentric velocity was measured using a barbell sensor. Their average velocity (AV) from the 2 reps at each load was used in the analyses. The trend in incremental load and corresponding AV was also used to calculate 1RM. Correlation coefficients were calculated to examine the relationship between CMJ metrics and TDL performance. Linear regressions were used to calculate significant trends with moderate to high correlations. **RESULTS:** High correlations were displayed between JH and AV at loads 75%, 100%, 125%, and 150% (0.6 to 0.74). Linear regressions displayed significant trends in JH and AV at those loads, with 125% having the highest R^2 value (0.55, $p < 0.005$). The 125% load also was a significant predictor of reactive strength index-modified (mRSI) with an R^2 value of 0.29 ($p = 0.01$). Finally, 1RM displayed significant predictive qualities to JH (R^2 of 0.43, $p = 0.001$) and jump momentum (JM; R^2 of 0.59, $p < 0.0001$). **CONCLUSION:** AV in the TDL at a semi-intense load could be used to predict CMJ performance, specifically JH. Using these relationships allows for more in-depth creation of athletic profiles and the crossover of information when using various technology.

Board #19 – Undergraduate

DOES ACUTE KETOSIS IMPROVE FINGER DEXTERITY OR COGNITION IN HYPOXIC AND COLD CONDITIONS?

A. Alfaro, O. Hinklin, T. Moussa, A. Murayama, B. Neal, J. Ogren, E. Powers, and M. Lewis

Gonzaga University, WA

People live and work in mountainous environments, which consist of cold and hypoxic conditions. These conditions can induce a decline in dexterity and cognition. Ketone bodies have been shown to increase oxygen saturation in peripheral tissues, which protect against declines in dexterity and cognitive function. **PURPOSE:** This study aimed to explore how acute ketosis affects cognition, dexterity, and physiological elements in cold and moderate-altitude conditions. **SUBJECTS:** Ten students from Gonzaga University were recruited ages 20-21. Male and Female genders were included, and lifestyle factors were controlled. **METHODS:** Participants were placed into two groups: our control ate a normal western diet before testing, the other group fasted overnight to induce ketosis and consumed medium chain triglyceride oil prior to testing. Diets were switched and subjects underwent both dietary conditions on different testing days. Prior to the start of the test, hand-grip strength and cognition were measured. During the test, participants walked at 5.5 km/hr in -10°C at 1219m for 30 mins; grip and pinch strength were tested twice during the testing protocol. Muscle and peripheral oxygen saturation along with volumes of inspired and expired air was measured continuously throughout the test. At the end of the test, all measurements were recorded again. **RESULTS:** There was not a significant change in the metabolic activity between the participants in ketosis and the western diet ($p>0.05$). Acute ketosis did not change the time that it took participants to complete the trail making test ($p>0.05$), or the accuracy of the stroop test ($p>0.05$). When dexterity was analyzed over the entire 30-minutes, there was not a significant change. When looking at the results over the entire 10 minutes there was a significant decrease in hand force for the first 20-minutes in both diets, however, in ketosis participants continued to have a significant decrease in force production. In the lateral pinch test when participants were in the western diet there was not a significant decrease in finger force, but in ketosis there was a significant decrease from the start to 30-minutes ($p=0.027$).

Board #20 – Graduate

RELATIONSHIP OF COLLEGIATE SOFTBALL HITTING PERFORMANCE WITH SENSORIMOTOR ABILITIES

H. Hubbard, C. Reyes

Linfield University, McMinnville, OR

Achieving high levels of softball batting success requires the precise coordination of sensorimotor skills and biomechanical movements. **PURPOSE:** To determine the relationships between sensorimotor abilities, bat swing mechanics, and on-field hitting performance. **METHODS:** NCAA Division III softball hitters ($n=26$; 19.9 years $\pm$ 1.2, 83.3 kg $\pm$ 15.5, 1.69 meters $\pm$ 0.07) participated in this study. All participants reported to the lab for a testing session. Each participant completed tests on the sensorimotor station to assess 7 different perceptual abilities. The participants then completed a hitting session where 6 swing metrics were collected using an attached bat sensor across 20 hits. Hitting statistics from the previous competitive season were used to assess their on-field performance including walks (BB), batting average (BAVG), strikeouts (K) on-base percentage (OB%), slugging percentage (SLG%), and hits (H). Correlations were calculated to find relationships between the sensorimotor skills, swing metrics, and on-field performance. Linear regressions were then used to follow-up on moderate to strong correlations for predictive values. **RESULTS:** A strong correlation between BB and eye-hand coordination was shown (0.679). A Linear Regression analysis revealed that this pair demonstrated a significant predictive trend ($R^2 = 0.461$; $p = 0.02$). Moderate correlations were calculated between BAVG with eye-hand coordination (0.475), near-far shift (0.457), and with dynamic vision (0.484), but no statistical significance with a linear regression. Another moderate correlation existed between OB% and eye-hand coordination (0.546) but no statistical significance with linear regression. Weak correlations were displayed between bat swing metrics and sensorimotor abilities and on-field performance. **CONCLUSION:** Specific metrics in sensorimotor abilities have correlations with on-field performance. While future research is recommended to continue to find the relationships between sensorimotor skills and on-field performance, it would be recommended that sports vision training be included to increase on-field performance.

Board #21 – Graduate

PROFILING KINETICS AND KINEMATICS OF COLLEGIATE VOLLEYBALL PLAYERS BASED ON POSITION GROUP AND DIVISION

P. Richards¹, R. Handy², C. Reyes¹

¹Linfield University, McMinnville, OR; ²University of Portland, Portland, OR

The countermovement jump (CMJ) is an athletic test that can be used to derive meaningful metrics to assess player performance, especially in volleyball. This data can be used to inform player differences in relation to position, divisions, and overall movement strategies. **PURPOSE:** To profile CMJ kinetics and kinematics of NCAA volleyball players based on position, as well as to compare D3 CMJ metrics to D1. **METHODS:** NCAA D3 and D1 women's volleyball players ($n = 99$, 23 ± 2.3 years, 175.4 ± 8.4 cm, 71.3 kg ± 11.7) completed 3 maximal effort CMJs on force plates during their preseason testing. The participants' highest jump height (JH) of their 3 trials, and its corresponding 6 kinetic metrics, were used in the analyses. ANOVAs were conducted to compare jump metrics across positions and level of play with the alpha being set to $p < 0.05$. A Bonferroni post-hoc analysis was used to identify specific statistical differences between jump metrics, positions, and level of play. **RESULTS:** Significant differences resulted in Right Side Hitters creating higher braking rate of force development (BRFD) than Defensive Specialists ($p < 0.005$), and both Right Side Hitters and Middle Blockers displayed greater peak propulsive force (PPF) than Defensive Specialists ($p < 0.005$). Between divisions, D1 athletes exhibited significantly higher jump height (JH) compared to D3 athletes ($p < 0.005$). D1 athletes achieved higher JH due to deeper countermovement depth (CMD), higher reactive strength index-modified (mRSI), higher peak PPF, and greater relative propulsive impulse (RPI) ($p < 0.005$). **CONCLUSION:** Significant positional differences in jump strategy were presented, particularly for defensive specialists. When compared level of play, D1 volleyball players displayed greater values across multiple CMJ metrics, meaning they have enhanced neuromuscular abilities than D3. The jump data has implications for profiling, recruiting, and training adaptations. Future research should expand participant age, gender, include other divisions of play, and compare volleyball athletes to other sports.

Board #22 – Undergraduate

THE INFLUENCE OF ANKLE TORQUE PRODUCTION ON THE TIMED UP & GO IN PEOPLE WITH PARKINSON'S DISEASE

¹G. Urvater, ¹K. Barnett, ²M. Haas, ¹Clinton Wutzke

¹Gonzaga University, Spokane WA, ²University of Washington School of Medicine, Spokane WA

Parkinson's disease (PD) is a chronic progressive neurodegenerative disorder that is characterized by both motor and non-motor symptoms. Motor symptoms including bradykinesia, resting tremor, and rigidity, impair gait and balance; whereas non-motor symptoms include impaired short-term memory and planning. Improved understanding of the influence of PD on movement function is crucial for management strategies and physical therapy treatments. **PURPOSE:** To determine the association between the Timed Up and Go (TUG) and ankle torque production in people with Parkinson's disease and similarly-aged unimpaired adults. **METHODS:** 15 participants: 7 people with mild-to-moderate PD (5M, 2F) and 8 unimpaired older adults (6M, 2F) wore a seven-inertial sensor system to track lower extremity movement during TUG tasks. Each participant completed three trials of the TUG, with the fastest attempt used for analysis. Ankle torque was collected with an isokinetic dynamometer at two speeds (60°/s and 120°/s), with 10 repetitions per test. Pearson's product coefficients were calculated to assess associations between the TUG and torque production. Independent t-tests were conducted to determine differences between groups ($p < 0.05$). **RESULTS:** No differences were found between the PD and unimpaired groups regarding age or time to complete the TUG (PD: 9.99 ± 3.52 s, OA: 7.67 ± 1.12 s, $p = 0.124$). As part of the TUG, unimpaired older adults demonstrated faster time to complete the turn (OA: 1.57 ± 0.25 s, PD: 2.09 ± 0.52 s, $p = 0.036$). A negative correlation was found between peak torque (PT) and TUG time for both groups (PD: $r = -0.778$, OA: $r = -0.764$ ($p < 0.05$)). There was no difference in turn velocity between groups. **CONCLUSION:** People with PD and unimpaired older adults suggest people with PD on anti-PD medication perform similarly to OA. Peak plantarflexor torque was positively associated with TUG performance for all participants, indicating greater torque production correlates with faster TUG times. It may be beneficial for people with more severe PD motor symptoms to prioritize strength at the ankle to maintain movement function. Further studies are warranted to explore muscle activation patterns at the ankle and the importance of coordination in movement function in people with PD.

Board #23 – Graduate

ASSESSING THE EFFECT OF ANKLE TAPING IN AMATEUR FIGURE SKATERS PERFORMING A DIP R.

Driskell¹, L. Coleman¹, T. Lee¹, N. Martonick²

¹University of Washington School of Medicine, Seattle, WA; ²University of Idaho, Moscow, ID

Ankle range of motion (ROM) restriction through boot taping has emerged as a prevalent practice among competitive figure skaters and is thought to enhance stability. However, the biomechanical implications of this technique on both ankle mechanics and more proximal kinetic chain effects are unstudied. The Dip, a fundamental figure skating element requiring substantial ROM, presents an ideal standardized movement for evaluating the impact of these modifications on performance. **Purpose:** To assess the impact of circumferential ankle taping on a figure skater's lower extremity kinematics during a Dip on synthetic ice. **Methods:** A crossover design was used to assess the effect of a circumferential tape (CT) on Dip kinematics. Figure skaters with at least one year of experience and ownership of their own figure skating boots participated ($n=10$, height: 154.3 ± 12.5 , mass: 52.5 ± 19.8 , age: 15.9 ± 6.3). Participants were gathered from a convenience sample of figure skaters with a minimum age of 7 and at least one year of figure skating experience. After a standardized warmup, and a familiarization period with the synthetic ice, each skater performed 7 Dips on the synthetic ice under two conditions: CT and non-taped (NT). Condition order alternated between participants. Duct tape was applied by the same figure skating coach for each participant. Trunk and lower extremity kinematic data were collected using nine inertial measurement unit sensors. Comparisons between conditions were analyzed via group and single subject Statistical Parametric Mapping (SPM) t-tests ($\alpha = 0.05$). Kinematic variables for the SPM t-tests were analyzed from 30° before to 30° after peak knee flexion and interpolated to 101 data points. **Results:** There were no significant group differences between conditions for any sagittal or frontal plane kinematics. The single subjects analyses support a lack of differences between the two conditions as no variable demonstrated more than 30% of participants with a difference. **Conclusion:** The lack of significant findings indicate that a CT does not impact lower extremity and trunk kinematics during a Dip. These findings should be substantiated during other skating maneuvers that may place more stress on frontal plane kinematics. It should also be noted that these results are preliminary with further data pending.

Board #24 – Undergraduate

EVALUATING THE RELIABILITY AND ACCURACY OF THREE SENSOR PROTOTYPES FOR ENHANCING STAIR MOBILITY

C. Schmidt, O. Buchholz, M. Jain, K. Wiegand
Eastern Washington University, Cheney, WA

Peripheral neuropathy causes sensory deficits, impaired motor control, and instability. One challenge for individuals with neuropathy is stair navigation due to reduced sensory feedback and altered mechanics, increasing fall risk. Few commercial products mitigate sensory issues, creating a need for an affordable and easy to use product for individuals with neuropathy safely navigate stairs. **PURPOSE:** To evaluate the reliability and accuracy of three sensor prototypes designed to provide assistive feedback through tactile and visual cues during stair navigation. **METHODS:** Five of 15 healthy adults (20 ± 2.8 y) completed the study, consisting of stair ascent and descent with the prototypes placed in their own shoes. Each prototype involves a switch pad on the proximal heel, triggering feedback upon activation: Prototype A provides a vibration at the ankle, Prototype B emits a light cue at the ankle and wrist, and Prototype C emits a light cue on the shoelaces. For each prototype, participants completed 3 ascents and 3 descents onto a 17.8 cm stair with the dominant leg. High speed video (120 Hz) was used to visually identify sensor activation, which was compared with kinetic data from a force platform (1200 Hz). Activation delay (ΔT) between sensor and force platform data was calculated to assess timing accuracy, and miss rates were analyzed to assess reliability. A 3 (device) x 2 (direction) ANOVA compared ΔT between devices and ascent/descent and a one-way ANOVA examined differences in miss rates across devices ($\alpha = .05$). **RESULTS:** Based on preliminary results, ΔT was 0.34 ± 0.54 s for A, 0.18 ± 0.36 s for B, and 0.31 ± 0.43 s for C. The two-way ANOVA indicated no interaction ($p = .49$) or main effects of device ($p = .57$) or direction ($p = .26$). Miss rates were not significantly different among devices (A: 23.3%, B: 29.9%, and C: 16.7%, $p = .68$). **CONCLUSION:** Early results indicate all three prototypes exhibit notable activation delays (0.18–0.34 s) and miss rates (16.7%–29.9%) without significant differences in accuracy or reliability. The observed delays exceed typical reaction time thresholds for real time gait adjustments, which may limit the feedback effectiveness for immediate correction. However, more data collection is needed to determine if these trends persist and to assess the potential benefits of these prototypes.

Board #25 – Graduate

WALKING WITH ADDED MASS POTENTIALLY INCREASED CENTER OF MASS VERTICAL DISPLACEMENT IN NON-PREGNANT WOMEN

L.H. Tan¹, G. Watson², K. Knaus³, N. Danos⁴, J.H. Zhang-Lea^{5,6}

¹ Information Systems, Whitworth University, Spokane WA

² College of Arts and Sciences, Gonzaga University, Spokane, WA

³ Mechanical Engineering, University of Colorado of Mines, Golden, CO

⁴ Department of Biology, University of San Diego, San Diego, CA

⁵ School of Health Sciences, Gonzaga University, Spokane WA

⁶ Department of Human Physiology, University of Oregon, Eugene, OR

Pregnant women walk with added mass distributed anteriorly around their pelvis. This added mass, which can range between 15-35 lbs for singleton pregnancies, shifts their center of mass (CoM) forward and can affect walking biomechanics. While previous studies have assessed musculoskeletal adaptations in response to hormonal variation during pregnancy, less is known about the adaptations in walking kinetics due to added mass. **PURPOSE:** This study aimed to assess how walking kinetics and CoM vertical displacement changes in response to added mass in non-pregnant women. **METHODS:** Five non-pregnant women walked under 4 conditions: without added mass and with added mass of 10, 20, and 30 lbs to simulate pregnancy weight gain. Sixty percent of the added mass was distributed anteriorly to the pelvis, while 40% was distributed in posteriorly. Participants walked at their preferred speed, with two speed gates ensuring speed variation within 10%. We recorded ground reaction forces in the vertical direction (vGRF) and calculated the first (Fz1) and the second peaks (Fz2) of vGRF, and vertical loading rates (VLR). Force data were normalized to the participants' total body weight (BW), including the added mass for each condition. We used double integration method to obtain CoM vertical displacement within a gait cycle, and calculated the CoM vertical displacement during the first double stance phase (CoMz_{initial}) and the total CoM vertical displacement during a gait cycle (CoMz_{total}). Linear mixed-effect models were used to assess the effect of added mass on all variables. **RESULTS:** The added mass used in this study simulated a weight gain ranged between 7.3% to 21.8% on average. Fz1, Fz2, and VLR changes were proportional to the added mass and remained unchanged when normalized by BW ($p = 0.71$ -0.95). Linear mixed effect model showed that for every 1% increase in BW, CoMz_{total} increased by 0.28% ($p = 0.036$), and CoMz_{initial} increased by 2.8% ($p < 0.001$). **CONCLUSION:** We found that added mass increased CoM vertical displacement during the first double-stance phase in non-pregnant women. The effect of added mass combined with the effect of hormonal changes should both be taken into consideration when analyzing walking biomechanics in pregnant women.

Board #26 – Undergraduate

EFFECTS OF ACUTE LOW-INTENSITY WALKING ON ATTENTIVENESS IN THE Classroom

M. Bell, E. Ayresman, A. Hylton, Q. Winder, W. M. Silvers

Whitworth University, Spokane, WA

There is evidence to support the notion that moderate to high-intensity exercise facilitates blood flow to the brain. Blood flow increases oxygen to the prefrontal cortex, which plays a significant role in cognitive function. Also, the prefrontal cortex is responsible for attentiveness, which is crucial for learning. However, the benefits of low-intensity exercise on acute and lasting attentiveness have yet to be studied in depth. College students often perform low-intensity walking between classes, which may have a potential benefit for in-class learning. **PURPOSE:** The purpose of this study was to investigate the effects of low-intensity walking on attentiveness for college-aged students. It was hypothesized that a low-intensity treadmill walk would improve: 1) immediate post-exercise attentiveness, 2) lasting attentiveness in class, more than sitting. **METHODS:** Fifty students (age = 20 ± 2 yrs, $n_{\text{male}} = 22$, $n_{\text{female}} = 28$, $n_{\text{undergrad}} = 41$, $n_{\text{grad}} = 9$) participated in two conditions: 1) low-intensity walking on a treadmill at 40% heart rate reserve while watching a 22 min show, and 2) sitting and watching another episode of the same show. Following each condition, attentiveness was measured with two Trail Making Tests (TMT). Lasting attentiveness in a lecture-based class was measured with the Attentional Control Scale (ACS). At the end of the lecture, the ACS was emailed to participants for immediate completion. Dependent t-tests ($p \leq 0.05$) were used to determine significant differences between each condition. **RESULTS:** There were no differences in acute attentiveness as measured with the TMT (sitting: 39.82 ± 11.78 , walking: 38.58 ± 15.04 ; $p > 0.05$). The ACS demonstrated improvement in lasting attentiveness for class (sitting: 24.14 ± 7.58 , walking: 20.82 ± 8.31 ; $p = 0.006$). **CONCLUSION:** As measured under these conditions, low-intensity exercise improved lasting, but not acute, attentiveness. The primary explanation for the observed results was that walking may have increased blood flow, which increased lasting attentiveness. The TMT may have elicited a learning effect, which may have reduced acute attentiveness accuracy. Future research is needed to investigate the immediate effects of post-exercise attentiveness, methods of resting heart rate measurement, and expand self-report measurements.

Board #27 – Graduate

ASSESSING THE EFFECTS OF ANKLE TAPING ON DORSIFLEXION AND STABILITY IN FIGURE SKATERS

L. Coleman¹, R. Driskell¹, T. Lee¹, N. Martonick²

¹University of Washington School of Medicine, Seattle, WA; ²University of Idaho, Moscow, ID

Competitive figure skating has seen an increase in taping the ankles of skates to better stabilize the boot. This method may also prolong the duration of the boot as it loses stability with time. However, the effect of circumferential ankle tape on ankle kinematics has not been substantiated. **PURPOSE:** To evaluate the effect of circumferential ankle taping (CT) compared to a boot with no tape (NT) on lower extremity kinematics during a single leg glide (SLG) and maximum ankle dorsiflexion (ADF). **METHODS:** A convenience sample of figure skaters with their own skates and at least 1 year of experience ($n=9$, age: $16.33 \text{ yrs} \pm 6.519$, height: $154.4 \text{ cm} \pm 13.28$, mass: $53.02 \text{ kg} \pm 20.92$) were recruited. Nine inertial measurement sensors were placed on the lower extremities to analyze maximum ADF and lower extremity kinematics. Maximum ADF was evaluated using a weight bearing lunge test (WBLT). The WBLT was performed in a 90/90 kneeling position and participants were asked to shift their weight as far forward as they could over their lead skate, keeping the blade on the ground. Lower extremity kinematics were evaluated during a single leg glide (SLG) on synthetic ice. Participants took 4 pushes for speed before bending their non weight bearing knee and gliding as far as possible, maintaining stability. Joint kinematics during the glide were assessed at peak knee flexion of the non-weight bearing leg. CT intervention included a primary layer of plastic wrap to protect the boot material, followed by duct tape circumferentially wrapped three times with ankle compression. Differences between NT and CT conditions were assessed with paired t-tests with critical threshold for significance set at $p < 0.05$. **RESULTS:** Taping of skates demonstrated no statistical significance on the maximum degree of ADF between CT and NT (CT: $34.3 \pm 7.8^\circ$, NT: $36.0 \pm 10.1^\circ$, $p=0.25$) during the WBLT. Assessment of the SLG reached but did not exceed a significant reduction in hip adduction (CT: $0.2 \pm 3.9^\circ$, NT: $2.8 \pm 4.7^\circ$, $p = 0.05$) and had a large effect size ($d=0.75$). **CONCLUSION:** Our findings indicated there was a moderate improvement in stability through the hip joint with CT rather than NT in the SLG. However, the CT did not restrict maximum ADF. Figure skaters and coaches should be cautious about expecting improved stability or limited ROM by applying a CT application.

Board #28 – Undergraduate**BILATERAL ASYMMETRY IN STABILITY AND MOBILITY MEASURES OF RECREATIONAL ENDURANCE RUNNERS****N. Jones, S. Schlittler, & J.P. Bailey**

University of Idaho, Moscow, ID

Mobility and stability have been assessed through functional movement tests (LQ-YBT, FMS) to identify potential injury risk factors among athletic populations. However, the potential bilateral asymmetries in recreational runner's mobility, stability, and run performance is unknown. **PURPOSE:** The purpose is to investigate bilateral asymmetries in mobility and stability characteristics of recreational endurance runners. **METHODS:** Seventeen participants [34.8(12)yrs, 1.7(0.1)m, 68.4(8.5)kg, 21.9(6.1)BF%] with a weekly mileage of 30.6(19.5) participated in three sessions. In session one, each participant was assessed with body composition testing, an LQ-YBT test (Anterior, posterior-medial, Posterior-lateral, and Composite score), and FMS testing (Overhead Squat, In-line lunge, Hurdle step-over). The Graded exercise test was performed to identify the peak aerobic capacity and speed at Ventilatory Threshold (VT2). Participants performed a submaximal treadmill run until volitional exhaustion at 90% speed at VT2. Metabolic data were collected throughout the run, with motion capture data collected every minute of the run to assess changes in mechanics throughout the run. Multiple paired *t*-tests were conducted to assess the differences between limbs for the LQ-YBT and FMS (individual and composite data) ($p < 0.05$). **RESULTS:** Bilateral asymmetries were found for LQ-YBT posterior-lateral and composite analyses (see table). **CONCLUSION:** The YBT posterior-lateral differences may indicate an imbalance of transverse and frontal plane loading of the hip during running. Future research should assess the relationship between injury history and these multiplanar bilateral asymmetries.

<i>COMPARISON</i>	<i>MEAN (SD)</i>	<i>MEAN DIFF (SD)</i>	<i>t-STAT</i>	<i>p-VALUE</i>
YBT_RT_ANT - YBT_LT_ANT	65.4(7) – 65.3(8.4)	0.11 (2.34)	0.20	0.842
YBT_RT_PM - YBT_LT_PM	102.2(9.9) – 102.6(9.5)	-0.42 (2.33)	-0.76	0.458
YBT_RT_PL - YBT_LT_PL	99.5(7.4) - 96.3(8.6)	3.97 (4.69)	3.48	0.003
YBT_RT_COMP - YBT_LT_COMP	97.7(7.3) – 96.6(7.7)	1.16 (2.17)	2.20	0.043

Board #29 – Graduate**EXPLORING THE COGNITIVE BENEFITS OF PHYSICAL ACTIVITY IN A NATURAL ENVIRONMENT****K. Knudson, E. Luvaas, C.J. Brush**

University of Idaho, Moscow, ID

Research has shown that acute physical activity results in small-to-moderate improvements in cognitive function. Specifically, acute exercise seems to benefit higher-order cognitive functions, such as executive function, which has been reported to play a critical role in numerous aspects of life including physical and mental health. Recent research on the acute physical activity and executive function relationship has started to assess moderators, such as the setting or environmental context of the physical activity, to determine whether laboratory-based findings generalize to more naturalistic environments. **PURPOSE:** This study assessed the moderating effects of environment on executive function by comparing the effects of a single, 15-min bout of light physical activity on executive function performed indoors and outdoors. **METHODS:** Using a within-subjects crossover posttest design, 28 individuals (57% female; age range=18-32 years) completed two study visits in a counterbalanced order: a 15-min bout of walking indoors and a 15-min bout of walking outdoors. Following each bout, executive function was measured during a modified go/no-go experimental paradigm while an electroencephalogram (EEG) was recorded. Executive function was assessed using behavioral performance (response accuracy and reaction time [RT]) and the P3 event-related potential (ERP) indicators. Repeated-measures ANOVAs were used to test differences in these measures by condition. **RESULTS:** There were no effects of condition on task performance (i.e., response accuracy or RT; p s > .405). For the P3 ERP, there was a condition main effect, $F(1, 27) = 4.67$, $p = .040$, partial- $\eta^2 = .15$, such that there was an increased P3 amplitude following the outdoor compared to indoor walk. **CONCLUSION:** These findings suggest that while a brief bout of light physical activity does not differentially impact behavioral measures of executive function based on environmental context, walking outdoors may enhance neural markers of executive function processing, as indicated by an increased P3 amplitude. This effect may reflect greater attentional resource allocation following outdoor physical activity. Future work should determine the time-course of these effects and whether they vary by intensity, duration, or population.

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Board #30 – Undergraduate

THE INFLUENCE OF AN(AEROBIC) TRAINING ON ANKLE PROPRIOCEPTION, ANKLE LAXITY, BALANCE

B. Gee, N. Hutchison, S. Yamanaka, A. Belcher, G. Urvater, C. Swider, M. Giusti, G. Meyers, C.J. Wutzke

Gonzaga University, Spokane, WA

Athletic training modalities isolate specific physiological processes to enhance performance. Aerobic training emphasizes endurance, sustained performance over extended periods of time whereas anaerobic training emphasizes high-magnitude, low-repetition output. Training modality may lead to increased likelihood of injury, dependent upon athlete specialization and demands of a task. The comparison of aerobic (AE) and anaerobically (AN) trained athletes may provide insight into training-related injury predisposition. **PURPOSE:** To determine the influence of training on lower extremity sensation, balance, and strength in college-aged athletes trained aerobically or anaerobically. **METHODS:** 37 unimpaired young adults (21 AE, 16 AN) completed sensory assessments including plantar cutaneous sensation, proprioception (ankle), and peak torque (PT) production at the ankle with an isokinetic dynamometer. Static balance was assessed before and after exercise under four conditions standing on a force plate. Differences between groups were determined using a mixed-model ANOVA ($p < 0.05$). **RESULTS:** AE trained participants had greater proprioception (59.5 ± 15.8 vs. $68.9 \pm 10.5\%$, $p < 0.05$) compared to AN participants. AN participants produced greater PT (95.1 ± 30.3 vs. 69.0 ± 23.9 Nm, $p < 0.05$) than AE. AE males had greater positive active range of motion (AROM) (59.0 ± 9.4 vs. $50.0 \pm 7.6^\circ$, $p < 0.05$), PF PT (108.3 ± 23.9 vs. 74.6 ± 22.1 Nm, $p > 0.05$), and PF work (1356.8 ± 428.6 vs. 868.9 ± 377.1 J, $p > 0.05$) than AN males. Center of pressure (COP) displacement differed due to base of support (two feet compared to one ($p < 0.001$), with or without visual feedback ($p < 0.001$), and following exercise ($p = 0.019$). COP displacement did not differ between groups ($p = 0.632$). **CONCLUSION:** Training modality influences ankle neuromuscular function (sensation and force production). These findings suggest aerobic training may enhance sensory feedback and joint stability, whereas anaerobic training improves strength and power output. Optimization of training programs should include activities to limit development of deficits related to training modality to mitigate injury risk. Future research should explore potential benefits of hybrid training to enhance both neuromuscular control and strength.

Board #31 – Graduate

EFFECT OF FIGURE SKATES ON SQUAT KINEMATICS IN AMATEUR FIGURE SKATERS

T. Lee¹, L. Coleman¹, R. Driskell¹, N. Martonick²

¹University of Washington School of Medicine, Seattle, WA; ²University of Idaho, Moscow, ID

Figure skaters regularly execute variations of a squat while performing routines. Squats are also used clinically to evaluate functional mobility and stability. However, it remains unclear whether a clinical assessment of the squat represents the same movement pattern as a squat with figure skates. **PURPOSE:** To evaluate the effect of figure skates on the squat kinematics of amateur figure skaters. **METHODS:** Participants ($n=10$, height: $154.3 \text{ cm} \pm 12.5$, mass: $52.5 \text{ kg} \pm 19.8$, age: $15.9 \text{ years} \pm 6.3$) were collected from a convenience sample of amateur skaters with their own figure skates and at least one year of skating experience. After a standardized 5-minute warmup, seven unshod squats were performed. Unshod squats were performed with a heel lift equal to that of the participant's skates to maintain consistency between kinematic models. Both squats were performed to maximal depth with the feet shoulder width apart, the toes pointed forward and arms flexed to shoulder height. Joint kinematics in the frontal and sagittal planes were analyzed via 9 inertial measurement units (IMUs) attached to the lower extremities and trunk. Comparisons between conditions were analyzed via group and single subject Statistical Parametric Mapping (SPM) t-tests ($\alpha = 0.05$). Kinematic variables for the SPM t-tests were analyzed from 30° before to 30° after peak knee flexion and interpolated to 101 data points. **RESULTS:** Sagittal plane kinematics were greater in the unshod condition for the ankle ($p = 0.03$), and knee ($p = 0.02$), while squats with figure skates resulted in increased trunk flexion ($p < 0.01$) and anterior pelvic tilt ($p = 0.02$). No significant group findings were found in the frontal plane. However, single subject analyses indicated that 100% of participants differed between conditions for ankle inversion, 80% for knee abduction, and 70% for hip adduction. In the unshod condition, 70% of subjects with differences increased ankle inversion, 66% increased knee abduction, and 57% increased hip abduction. **CONCLUSION:** Our preliminary findings suggest that squat pattern in the shod condition significantly increases trunk and pelvic flexion, which may place more torque on lower extremity joints. Additionally, clinical examinations of the squat performed without skates may not be representative of athlete movements performed in practice.