Bone Marrow Edema (BME) is a common incidental finding on MRI in athletes. While the etiology and composition are not well understood, it has been linked to potential long-term adverse events such as osteoarthritis. The purpose of this study was to 1) describe the fat fraction (FF) of BME lesions in female athletes and 2) establish if demographic risk factors can predict magnetic resonance spectroscopy (MRS) compositional results.

METHODS: A prospective cohort of Division I female athletes, without previous ligamentous tears or surgery of the knee, were recruited to undergo a 1.5T screening MRI of each distal femur. Three readers assessed the MRI’s separately for the presence of BME as well as a quantitative KOSS score. Subjects were invited two weeks later, to be scanned using a 3T MRI with Single-voxel 1H Spectra to evaluate the fat-water ratio of the BME lesions using the aid of the readers to guide voxel placement to avoid the femoral cortex and target the zone of maximal BME. Measured peaks were reported as FF = (Fat Content / (Fat Content + Water Content)) * 100. A multilevel linear mixed model was used to determine significant findings in bone marrow composition.

RESULTS: Seven female athletes (mean age: 19.1 ± 1.2 years, weight: 69.7 ± 10.0 kg, height: 166.9 ± 5.0 cm, and BMI: 25.0 ± 3.3 kg/m²) met our inclusion criteria. Eight knees were positive for BME, with 6 negative, demonstrating a total KOSS distribution between 0-2 (median: 1.0). There were no differences in water or fat content by BME status, however, positive knees had a higher FF than negative knees (p=0.058; 12.4% ±1.3% vs. 11.0% ±0.8%). The effect size of the difference was very large (d=1.30). In two athletes with unilateral BME, the FF of the knee with BME was greater than that of the knee without BME. BMI, sport, leg dominance, and KOSS score were not significantly correlated with FF.

CONCLUSIONS: To the best of our knowledge, this study is the first of its kind to describe the FF of knees with and without BME in female athletes. The increased FF found in BME-positive knees supports the case for the sequential development of fat metaplasia following acutely transient BME. Future research should be aimed at understanding the role of the fat compartment around the AET (PreEx to 60 minutes PostEx) and 2×2 RMANOVA using GraphPad Prism software.

RESULTS: There were no significant group × time interactions for any bone biomarker (p≥0.05). However, there were significant main training effects for BAP change in bone turnover, regardless of training frequency. This indicates that the ballistic exercise training program stimulated favorable changes in bone turnover, regardless of training frequency.

Adopting a ketogenic diet (KD) is becoming increasingly popular, partly due to favorable impacts on blood glucose and body composition. Recent research has demonstrated a possible negative effects of a KD on bone morphology in mice, but interactions with exercise, which sometimes accompanies health-oriented diet changes, have not been examined.

PURPOSE: To determine the effects of a KD and aerobic
exercise on cortical and trabecular bone morphology in mice. METHODS: Forty C57BL6 mice were randomized into 4 groups (n=10/group): 2 groups were fed a low-fat control diet (16% protein, 72% carbohydrate, 12% fat) with one group performing vigorous intensity (blood lactate >4 mM post-exercise) daily treadmill exercise (CEX), while the other served as sedentary controls (CSED). The remaining 2 groups were fed a high-fat, carbohydrate-deficient KD (16% protein, 84%fat) with one exercise group (KEX) and one sedentary control group (KSED). Treatment diets began 6 weeks pre-euthanasia and the exercise intervention occurred during the final 3 weeks. Femurs were analyzed for bone morphology using micro-computed tomography. Analysis variables included bone volume, ratio of bone to total volume, thickness, and bone mineral density (BMD) for both cortical and trabecular bone; trabecular number, spacing, and connectivity were also included. RESULTS: Two-way factorial ANOVA revealed an effect of trabecular thickness (p=0.002) and an interaction between diet and exercise for trabecular BMD (p=0.038). Post-hoc analysis showed 5.8% thicker trabeculae in exercise groups, CEX & KEX, compared to sedentary groups, CSED & KSED, (74.7 ± 0.5 μm vs. 74.5 ± 0.5 μm, p=0.05). Trabecular BMD was 3.0% higher in CEX compared to CSED (776.7 ± 6.2 mg HA/cm³ vs. 754.0 ± 5.2 mg HA/cm³, p=0.05). No other significant results or interactions were found. CONCLUSION: The positive effect of exercise on bone morphology shown in this research is in line with that found in the literature. Our results did not identify any detriments in bone morphology in response to a ketogenic diet, bone morphology shown in this research is in line with that found in the literature. Our results did not identify any detriments in bone morphology in response to a ketogenic diet, but BMD changes induced by exercise in mice fed a control diet were not negated by the ketogenic diet. Further studies are needed to examine the common signaling pathways that sclerostin and miRNAs regulate in bone, together they may be potential biomarkers of bone health. PURPOSE: To examine the relationships between serum sclerostin and specific c-miRNAs and to predict bone mineral density (BMD) based on circulating sclerostin and miRNA levels. METHODS: Seventy-three postmenopausal women aged 50 to 85 years old participated in this study. Body composition and aBMD of the total body, lumbar spine and hips were measured by DXA. Osteoporosis was determined using aBMD T-scores at lumbar spine, femoral neck, or total hip according to WHO criteria (aBMD T-score ≤ −2.5). Serum levels of sclerostin and bone resorption markers (CTX, TRAP5b) were measured by ELISA. Total RNA was extracted from serum, and relative expression levels of c-miRNAs (miR-21, -23a, -24, -100, -125b) were analyzed using miRNA assays and real-time PCR. RESULTS: There were no significant correlations between serum sclerostin and c-miRNAs. Serum sclerostin was significantly negatively correlated with CTX (r = −0.252, p=0.05). Sclerostin levels were significantly lower in the osteoporotic group (n=10, 0.560 ± 0.158 ng/mL) compared to the normal BMD group (n=14, 0.776 ± 0.190 ng/mL, p=0.05). Stepwise regression analysis showed that miR-21 and sclerostin levels were significant predictors of BMD at all sites (standardized coefficient β (sclerostin) = −0.398 to 0.250, standardized coefficient β (miR-21) = −0.248 to −0.317, adjusted R² =−0.238 to 0.332, p<0.001). CONCLUSION: Our results indicate that circulating sclerostin and miR-21 are significantly associated with bone mineral density in postmenopausal women. Further studies are needed to examine the common signaling pathways that sclerostin and miR-21 regulate in bone metabolism.
and similarly at IP in both modalities, sclerostin (inhibitor of bone formation) increased significantly only in TM. This may reflect higher impact on the bone during running compared to cycling.

**2716 Board #8**
**May 31 1:00 PM - 3:00 PM**
**Bone Mineral Density Comparisons Between Contact and Non-Contact Male and Female Collegiate Athletes**
Daltan E. Cousin, Michelle L. Eisenman, Emily L. Langford, Ronald L. Snarr, Greg A. Ryan. Georgia Southern University; Statesboro, GA.
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(No relevant relationships reported)

Bone mineral density (BMD) and bone mineral content (BMC) have been suggested to be greater in athletes than non-athletes. However, less research has been done comparing the nature of the sport and the impact that has on BMD and BMC in male and female collegiate athletes. PURPOSE: To determine the effects of BMD and BMC between full contact (FC), limited contact (LC) and non-contact (NC) sports in male and female athletes. METHODS: Data from 45 male (FC: basketball, 18; LC [basketball, baseball, soccer]: 21; NC [cheer, tennis, golf]: 6) and 33 female (FC: 8, LC [basketball, softball, soccer]: 16, NC [cheer, tennis, volleyball, swimming, rifle, track]: 17) Division I athletes was collected via whole body dual-energy x-ray absorptiometry (DXA). One-way ANOVAs (male and female) were run to compare BMD, BMC and, and fat percentage (BF%) between sports. RESULTS: A main effect significant difference was noted in BMC between FC (2.24 ± 0.09 g/cm3) compared to LC (1.36 ± 0.89 g/cm3, p < 0.01) and NC (2.42 ± 12.15, p < 0.01) in male athletes. Post-hoc LSD analysis revealed that significant differences in all variables was between FC (BMD: 1.46 ± 0.09 g/cm3) compared to LC (1.31 ± 0.11 g/cm3, p < 0.01). Similarity, difference in BMC were between FC (4522.9 ± 364.3 cm3) compared to LC (3639.6 ± 485.0 cm3, p < 0.01) and NC (3403.3 ± 295.6 cm3, p < 0.01). BF% was not significantly different between any group (p = 0.09). No significant differences were noted with female athletes in any of the variables: BMD: (LC: 1.22 ± 0.07 g/cm3, NL: 1.35 ± 0.07 g/cm3, p = 0.29); BMC: (LC: 2979.6 ± 382.7 g; NC: 2883.8 ± 361.7 g, p = 0.51); BF%: (LC: 0.29). CONCLUSION: The nature of the sport may have an impact on an athlete’s BMD and BMC, but only if the athlete competes in a FC sport, where sufficient sustained compression occurs to increase bone formation.

**2719 Board #2**
**May 31 1:00 PM - 3:00 PM**
**Concussion History Impairs Cerebrovascular Reactivity in Special Operations Forces Personnel**
Patricia R. Combs1, Avinash S. Chandran1, Nikhil E. Barzak2, Stephen M. DeLellis1, Cassie B. Ford, Marshall L. Healy1, Shawn F. Kane1, FACSMS1, James H. Lynch1, FACSMS2, Gary E. Means1, Jason P. Mihalik1. 1University of North Carolina at Chapel Hill, Chapel Hill, NC. 2United States Army Special Operations Command, Fort Bragg, NC.
Email: pcombs@live.unc.edu

(No relevant relationships reported)

Concussion has been an increasingly prevalent blast-related injury in Special Operations Forces (SOF) personnel over the last decade. Recent studies suggest physiological deficits, such as cerebrovascular function, may outlast clinical recovery following injury. Cerebrovascular reactivity (CVR) measures the cerebral blood flow response to variations in carbon dioxide partial pressures. Understanding how concussion history affects CVR may better inform physiological assessment and long-term outcome management following concussion. PURPOSE: To investigate how concussion history influences CVR in SOF personnel. METHODS: Thirty-nine SOF personnel completed a demographic survey self-reporting concussion history (concussion history = 22 (56.4%); age = 34.3yrs ± 3.7 yrs) They were instrumented with transcranial Doppler (TCD) ultrasound to measure middle cerebral artery velocity (MCAv). Baseline TCD data were collected for 2 minutes. Changes in MCAv were measured in response to 5 breath-holding trials (30s breath-hold/30s rest) and 5 hyperventilation trials (30s hyperventilation/30s rest). We employed mixed effects models with quadratic mean structures to assess group differences in MCAv response to breath-holding and hyperventilation tasks. RESULTS: Baseline resting MCAv did not significantly differ (F1,37 = 0.47, p = 0.64) between those with (MCAv = 50.8 ± 7.7 cm/s) and those without concussion history. The MCAv response did not differ between those with and without concussion history during breath-holding (F1,38 = 0.20, p = 0.69) or hyperventilation (F1,38 = 0.31, p = 0.58). Among SOF personnel with concussion history, those with ≥3 had significantly diminished CVR response relative to those with 1-2 concussions during the breath-holding (F1,38 = 4.84, p = 0.03) and the hyperventilation (F1,38 = 5.07, p = 0.02) tasks. CONCLUSIONS: Changes in MCAv did not differ under resting conditions; however, SOF personnel with a greater concussion history showed impaired CVR when tested with physiological breathing stressors. While long-term neurophysiological effects of blast-related injury are currently unknown, assessing CVR response may provide further insight into cerebrovascular function and overall physiological health following blast exposure.

**F-07 Thematic Poster - Brain, Performance and Concussions**
Friday, May 31, 2019, 1:00 PM - 3:00 PM
Room: CC-101B

**2717 Chair: Dane B. Cook, FACSMS. University of Wisconsin-Madison, Madison, WI.**
(No relevant relationships reported)

**2718 Board #1**
**May 31 1:00 PM - 3:00 PM**
**Head Impact Exposure Alters Neural Synchrony and Complexity in Collegiate Athletes**
Derek C. Monroe, Nicholas C. Cechci, James W. Hicks, Steven L. Small. University of California, Irvine, Irvine, CA.
Email: dcmroone@uci.edu

(No relevant relationships reported)

White matter connects neighboring and distant cortical regions and is the basis for brain circuits. Regular exercise strengthens these connections, but athletes wearing personal protective equipment (PPE), on neural function in prefrontal cortex and decision-making performance following a long duration Incremental Exercise Protocol in the Heat while Wearing Personal Protective Equipment
Cory Coehoorn1, Lynnehan Stuart-Hill1, Olave Krigolson1, Patrick Neary2. 1University of Victoria, Victoria, BC, Canada. 2University of Regina, Regina, SK, Canada.
(No relevant relationships reported)

There is no research to date evaluating the effects of rapid and uncompensable core temperature (Tc) acquisition, as which occurs when one is wearing personal protective equipment (PPE), on neural function in prefrontal cortex and decision-making performance. PURPOSE: To study the effects of rapid and uncompensable Tc acquisition on neural function in prefrontal cortex and decision-making performance during a pre-and post-exercise Go/No-go test. METHODS: Fifteen male subjects (mean age, 32.7 ± 12.2 years) performed an incremental exercise test to a termination criterion in CONTROL and GEAR. Electroencephalography (EEG) data was recorded during a Go/No-go test pre- and post-exercise. Decision-making performance was also monitored during the pre-and post-exercise Go/No-go test. Heart rate (HR), thermal comfort scale (TCS), thermal sensation (TS), and rating of perceived exertion (RPE) were recorded at each 0.5°C increase in Tc. RESULTS: There were significant differences in time to termination (TTT) (CONTROL = 77.3 ± 12.6 min; GEAR = 50.3

Abstracts were prepared by the authors and printed as submitted.
± 6.9 min), pre-exercise HR (CONTROL = 76.8 ± 4.8 bpm; GEAR = 86.5 ± 5.1 bpm) and post-exercise HR (CONTROL = 161.1 ± 11.9 bpm; GEAR = 179.6 ± 6.8 bpm). Additionally, there were significant differences between CONTROL and GEAR end-exercise \( T_c \) (CONTROL = 38.87 ± 0.3°C; GEAR = 39.31 ± 0.3°C), TCS (CONTROL = 3.57 ± 0.6; GEAR = 4.63 ± 0.3), and TS (CONTROL = 7.57 ± 0.5; GEAR = 8.67 ± 0.3). Lastly, there was a 0.04°C/min increase in \( T_c \) during GEAR and 0.02°C/min increase in \( T_c \) during CONTROL. An analysis of frontal theta EEG power results showed a significant post- and pre-exercise values during a Go/No-go test in GEAR \((F_{1,14} = 6.069, p = 0.027)\). There was also a significant difference when evaluating incorrect responses between pre- and post-exercise values in \( F_{1,16} = 5.515, p = 0.026 \). These differences were not observed during CONTROL. CONCLUSION: These data suggest that a long duration incremental exercise test while wearing PPE in the heat results in decreased cognitive control. This could have implications individuals in occupations that wear PPE and need to make critical decisions while experiencing rapid and unencumbered \( T_c \) heat storage.

Pupillary light reflex (PLR) is regulated by smooth radial muscles differentially innervated by sympathetic and parasympathetic pathways. The PLR has been postulated as an autonomic nervous system (ANS) function index and a concussion biomarker. Few studies have examined static and dynamic PLR parameters in Special Operations Forces (SOF) personnel with and without concussion history. METHODS: The SOF personnel self-reported age and concussion history (0, 1, 2, and ≥3), and completed an assessment battery including PLR. We measured seven PLR parameters including initial and final pupil diameters, constriction and dilation velocities, constriction latency, time to 75% initial diameter recovery, and average maximum constriction velocity. These parameters were averaged across both eyes and separately regressed on concussion frequency while controlling for age (\( \alpha < 0.05 \)). RESULTS: The SOF personnel \((n = 76; \text{mean age} = 33.5 ± 3.6 \text{ years})\) reported the following concussion histories: \( \geq 3 \) concussions \((n = 19; 25\% \text{), two (n = 8; 10.5\% \text{), one (n = 7; 9.2\% \text{), and none (n = 42; 55.3\%)}. \text{Initial (}_\beta = -0.07; 95\% \text{CI: -0.13, -0.02) and final (}_\beta = -0.05; 95\% \text{CI: -0.09, -0.004) pupil diameters were smaller with age increases in SOF personnel, controlling for concussion history. Similarly, those who reported \( \geq 2 \) concussions had significantly smaller initial pupil diameter compared to those without concussion history, controlling for age (\( \beta = -0.53; 95\% \text{CI: -0.98, -0.08})\). Those who reported \( \geq 3 \) concussions also exhibited slower average (\( \beta = 0.46; 95\% \text{CI: 0.07, 0.84}) \text{ and maximum (}_\beta = 0.64; 95\% \text{CI: 0.12, 1.13) constriction velocities than those without a concussion history, controlling for age. CONCLUSIONS: The SOF personnel with greater head injury history had altered static and dynamic pupillary light responsivity, which may indicate prolonged ANS dysfunction. Our firm’s previous neuroimaging findings demonstrate prolonged physiological deficits beyond self-reported symptom resolution and clinical recovery from concussion. The PLR is a rapid, non-invasive, cost effective tool that may assess deficits warranting further clinical investigation.

Identification of all sport-related concussion continues to be challenging in part due to the lack of reporting by athletes. It is estimated that approximately 50% of all sport-related concussions at the collegiate level go unreported, however, reasons for failing to disclose a potential concussion are still unclear. In order to improve concussion reporting, we must identify factors that contribute to an athletes’ intentions to report. Student-athletes that identify as having more control over the outcomes in their life may feel a stronger sense of control over whether they will report a suspected concussion to a medical professional.

CONCLUSION: To examine the relationship between the LOC scale ratings and concussion reporting intentions in student-athletes. METHODS: Student-athletes from three universities were invited to complete a Qualtrics survey \((n=206/498 \text{ response rate } = 41.36\%; \text{male}=34.46\%)\). The Levenson Multidimensional Locus of Control (LOC) scale is a 24 item survey that measures Internal Locus of Control (10 items), Powerful Others (10 items), and Chance (4 items). All items were answered on a six-point Likert scale ranging from 1 \( \text{strongly disagree} \) to 6 \( \text{strongly agree} \). Three separate Spearman’s rank-order correlations were used to determine whether LOC sub-scores \( \text{Internality, Powerful Others and Chance} \) correlated concussion reporting intentions \((\alpha = 0.05)\).

RESULTS: LOC of control sub-score ratings did not significantly correlate direct intentions; \( Internality (r_s = .055, p = .545), Powerful Others (r_s = -.125, p = .169), \) or Chance \( (r_s = -.065, p = .474) \). In addition, indirect intentions were not related to the LOC subscales; \( Internality (r_s = .082, p = .367), Powerful Others (r_s = -.111, p = .223), \) and Chance \( (r_s = -.062, p = .497) \).

CONCLUSION: Although LOC plays a role in predicting sport-related injuries risk and outcomes, it does not seem to significantly correlate with concussion reporting intentions in the current study. Results of this study suggest the importance of considering the multiple factors that may explain an athletes intentions to report concussions beyond just how much control they perceive to have over the outcomes in their life.
Evidence has emerged highlighting the beneficial effects of exercise in reducing symptoms of Post-Traumatic Stress (PTS) and comorbid psychological conditions (e.g., anxiety, depression). However, most of these studies fail to address the effects of exercise on other disabling symptoms of PTS. **Purpose:** Examine changes in self-reported fatigue following an acute bout of moderate intensity continuous aerobic exercise (MICE) and a bout of high-intensity interval exercise (HIIE), relative to a no-exercise inactive control (SED), in participants with subsyndromal PTS. **Methods:** Using a within-subjects design, participants (N=25, 16 females; age (M ± SD): 25.6 ± 9.1 yrs) completed three randomly ordered 35-min conditions (HIIE, MICE, SED). Participants reported an average PCL-5 score of 47.64 (exceeds cut-point for probable PTS of 33). Additionally, participants reported having at least one symptom in each of the major DSM-5 clusters of PTS. Fatigue was assessed before (Pre), immediately after (Post0), 20-min after (Post20), and 40-min after (Post40) each condition. **Results:** Significant Condition, Time, and Condition x Time effects were seen with all P < 0.001. For HIIE, fatigue increased from Pre to Post0 (Cohen’s d = 0.90), decreased from Post0 to Post20 (d = 0.67), and decreased from Post20 to Post40 (d = 0.42). Fatigue was not different Pre to Post40 HIIE (P = 0.31). For MICE, fatigue increased slightly from Pre to Post0 (d = 0.33), decreased from Post0 to Post20 (d = 0.91), and showed no change from Post20 to Post40 (P = 0.36). Fatigue was reduced from Pre to Post40 MICE (d = 0.29). Finally, fatigue decreased from Pre to Post0 SED (d = 0.48), showed no change from Post0 to Post20 or from Post20 to Post40, and was marginally reduced from Post0 to Post40 (d = 0.32). **Conclusion:** Participants reported elevated fatigue Post0 HIIE, but fatigue returned to baseline by Post40. While fatigue was elevated Post0 MICE, at Post40 fatigue was reduced relative to Pre. The present study provides evidence that both HIIE and MICE result in immediate increases in fatigue in individuals living with PTS, but such increases are short-lived. Future studies need to assess chronic exercise effects on fatigue, as fatigue is a disabling symptom of PTS.

**CONCLUSIONS:** RET significantly increased strength in GV with CMP. It resulted in no exacerbation of pain symptoms and did not increase mood disturbance. Resistance exercise appears safe and efficacious for Gulf Veterans with widespread pain. Supported by Dept. of Veterans Affairs grant: I01-CX000383.
INTRODUCTION: Fire gear serves a specific purpose in protecting individuals from the harsh environments around them when combating fires. Little research has been done on how gear weight relative to an individual’s lean body mass (LBM) and body fat (BF) affects heart rate (HR). Being conscious of how the encumbrance of gear affects one’s HR is important because over-exertion from load carriage could possibly cause a decrease in performance and increase the risk of a cardiac event. PURPOSE: To assess HR response among individuals based on LBM and BF relative to the weight of different combinations of fire gear during a walking protocol.

METHODS: 22 recreationally trained college students (age 22±3 y/o, wt. 81±17 kg, ht. 177±10 cm) performed a walking protocol in personal protective equipment (PPE) (9.1 kg.), oxygen pack and mask (PM 11.3 kg.), and full gear (FG, combination of PM and PPE 20.4 kg.). Each subject completed 3 sessions total. Gear was determined using a randomized cross-over design. Subjects were tested for BF via air displacement plethysmography and weighed before the protocol. The original Bruce protocol was adjusted to (stage 1) 3 minutes (min) at 0.8 m/s and 0% grade (GR), (stage 2) 3 min at 0.76 m/s and 10% GR, (stage 3) 3 min at 1.1 m/s and 12% GR, (stage 4) 3 min at 1.5 m/s and 14% GR, and (stage 5) 4 min cool down at 0.8 m/s and 0% GR. HR was recorded during each minute of the protocol until completion. Results were analyzed using Linear Regression to identify the effect of BF and LBM on HR. Stage 4 HR’s were selected because the intensity is most comparable to actual situations.

RESULTS: R² of change reported 0.47 for both LBM and BF in FG, 0.65 in PPE, and 0.52 in PPE. For LBM only, R² of change reported 0.36 (P < 0.003) for FG, 0.60 (P < 0.001) for PM, and 0.52 (P < 0.001) for PPE. BF only, reported 0.08 (P = 0.216) for FG, 0.02 (P = 0.529) in PM, and less that 0.01 (P = 0.908) for PPE.

CONCLUSIONS: The data suggests that more LBM and less BF can be advantageous in relation to HR during encumbered walking. Firefighters should focus on increasing their LBM to increase their overall performance during training or in real life high stress situations.

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full safety gear, including SCBA. Measurements were conducted on heart rate, skin temperatures (4 sites), core temperature, task performance (speed, rescue result), mood and comfort sensations.

**RESULTS:** In all conditions all firefighters were able to execute the rescue in the R-gear as well as in the S-gear with no differences in time, on average 8.5 min. There were significant reductions in heart rate in the R-gear versus the S-gear (p<0.02) and in core temperature increase: 1.69 (0.80 °C/hr) in R-gear versus 2.52 (1.20) °C/hr in S-gear (p<0.04). The mean temperature was slightly higher in the R-gear, possibly due to the reduction in protection (35.1 °C) versus 34.3 °C (S), p=0.009. But it did not reach dangerous levels, none of the maximum skin temperatures was higher than 37.5 °C. Comfort and strain ratings were lower in the R-gear, but there was an increase in the R-gear just prior to entering the room with the fire.

**CONCLUSIONS:** This pilot study addressed multiple aspects of the balance strain, protection and performance, all crucial to ensure safety and health for structural firefighters. The results showed that a small fire scenario could be addressed by the gear as effectively as the current gear, which was unexpected. The R-gear is expected to further reduce strain in most of the firefighter day-to-day work activities. The results also indicated that experienced firefighters would need to build confidence in the activities that can be executed safely in this clothing.

**Firefighters Do Not Exhibit Postexercise Hypotension Following a Bout of Vigorous Exercise**

Paul M. Parducci1, Beth A. Taylor, FACSMS, Amanda L. Zaleski1, Adam R. Blanchard1, Yeongjin Gwon1, Ming-Hai Chen1, Burak T. Cilhoroz2, Paul D. Thompson, FACSMS, Linda S. Pesce1, FACSM longevity. Firefighters are chronically exposed to cardiovascular stress, acutely affecting AT. HRV has been shown to respond to both heat stress and heavy exercise though it is not known if rapid heat acquisition caused a further reduction in protection (35.1 °C (R) versus 34.3 °C (S), p=0.009). There was no difference between the conditions either pre- or post-exercise for any of the variables measured in m/s² except for post-exercise LFvF which was significantly higher in PPE compared to CON. **CONCLUSION:** Results from the current study suggest that regardless of the rate of thermal acquisition, HRV response is similar, however the shift of HRV into the LFV domain during the PPE condition may have masked the magnitude of sympathetic response by lowering the LF frequency domain.

**The Effect of Rapid and Slow Heat Acquisition on Autonomic Tone and Heat Stress in Firefighters**

Conflict of interest statement

No relevant relationships reported

**RESULTS:** Rapid heat acquisition resulted in a significantly higher whole body temperature (Tao) compared to slow heat acquisition (81.6 ± 0.5 °C vs. 80.0 ± 0.7 °C, respectively, p<0.01). Peak time in light activity was underestimated by 3000 – 4000 MET-minutes per week and 6%, respectively, and peak time in light activity was overestimated by 4-6%, when comparing long-term recall to original values. Women reported spending little time in low intensity activity at both time points during pregnancy and postpartum (24-2%). Twenty-one of the 36 comparisons were significantly different (5%). SCC values were lower for women who recalled PA ≥ five years postpartum compared to women who recalled their PA < five years postpartum for most time points and intensities. **CONCLUSION:** It is important to continue to assess the long-term validity of self-report methods, such as the PPAQ. On average, participants tend to underestimate total and moderate PA and overestimate light PA, but by relatively small amounts (3561 MET-minutes per week, 6%, 4-6%, respectively) when recalling their activity up to eight years previous.

**PURPOSE:** To evaluate the validity of the PPAQ for long-term recall of PA at two time points during pregnancy and once postpartum. **METHODS:** Between 2010 and 2018, 48 women completed the PPAQ at 21 and 32 weeks gestation and 12 weeks postpartum about their previous week’s PA. These same women were emailed three separate PPAQs between two months and eight years after originally completing the questionnaires to recall their PA during those same time periods. Of these 48 women, 40 completed the follow up recall questionnaires (83%). Total number of metabolic (MET) minutes per week and percent time spent in light, moderate, and vigorous activity were compared between the original and long-term recall PPAQ values using paired sample t-tests or Wilcoxon Rank tests and Spearman correlation coefficients (SCC). The participants were then separated into two groups via a median split: those who originally completed the PPAQ ≥ five years ago and < five years ago. The paired sample t-tests, Wilcoxon Sign Rank tests, and SCC were repeated.

**RESULTS:** Total MET-minutes per week and moderate intensity activity were underestimated by 3000 – 4000 MET-minutes per week and 6%, respectively, and peak time in light activity was overestimated by 4-6%, when comparing long-term recall to original values.

Women reported spending little time in low intensity activity at both time points during pregnancy and postpartum (24-2%). Twenty-one of the 36 comparisons were significantly different (5%). SCC values were lower for women who recalled PA ≥ five years postpartum compared to women who recalled their PA < five years postpartum for most time points and intensities. **CONCLUSION:** It is important to continue to assess the long-term validity of self-report methods, such as the PPAQ. On average, participants tend to underestimate total and moderate PA and overestimate light PA, but by relatively small amounts (3561 MET-minutes per week, 6%, 4-6%, respectively) when recalling their activity up to eight years previous.
Resistance exercise (RE) has increased in popularity among pregnant women being the third most popular activity in previously active women. However, most of the RE interventions have been focused on birth outcomes from normal weight (NW) pregnant women or in overweight or obese (OWOB) pregnant women with pregnancy-related disease. Currently, we do not know how RE can influence morphometric measures in healthy OWOB pregnant women. **Purpose:** To determine the effect of RE during pregnancy of OWOB women on maternal morphometric measures. **Methods:** 33 OWOB (25-Control group (CG) vs 8-RE group (REG)) healthy, low-risk, women with a singleton pregnancy have been analyzed for this study. All women signed an informed consent and agreed to participate in the study, which involves 3-exercise protocols (aerobics, resistance and aerobics/ resistance) and a CG. Participants in the REG trained 3x/week, 50min, moderate intensity – for 20 weeks using machines, free weights and swiss balls. Maternal skinfolds and anthropometric measures were collected at 16 and 36 weeks of gestation. Student t test was performed to determine differences between groups. **Results:** Analysis does not show significant differences in most variables measured at 16 and 36 weeks (p>0.05): weight16 (CG=86.9kg vs REG=85.8kg), weight36 (CG=96.7kg vs REG=94.1kg), percentage of body fat16 (%BF) (CG=36.2 vs REG=36.3), %Fat36 (CG=37.1 vs REG=39.2), gestational weight gain (GWG) (CG=10kg vs REG=9kg), waist to hip ratio (WHR) at 16 (CG=0.79 vs REG=0.82). Significant differences were found in WIR36 weeks (CG=0.84 vs REG=0.77). 40% percent of the women in the CG exceeded their GWG recommendation vs 37.5% of REG women (p>0.05). Birth weight was not significantly different between groups (p>0.05): (CG=3,6kg vs REG=3,5kg). **Conclusion:** RE was not effective to prevent excessive GWG or to decrease %BF for OWOB pregnant women. The data suggest that, another exercise protocols should be evaluated between this population to test for the best efficacy. American Heart Association #15GRNT24470029

**Purpose:** To examine whether oxygen uptake (VO₂) kinetics changes across the phases of the menstrual and oral contraceptive cycles. **Methods:** Fourteen highly active women who were either non-oral contraceptive users (n=7, 28.6 ± 0.5 yrs.) or monophasic oral contraceptive users (n=7, 22.3 ± 0.5 yrs.) participated in the study. The time-constant of the VO₂ kinetics response (τVO₂) was determined by ensemble-averaging the VO₂ responses during consecutive step-transitions in work rate, from 20 Watts (W) to a moderate-intensity work rate of 80 W. Each step was six minutes in duration. The test was completed during the menstruation phase of the cycles (fOLLICULAR phase for non-oral contraceptive users or “inactive pill” phase for oral contraceptive users) and repeated during the respective non-menstruating phase (luteal phase or “active pill” phase). An oral load was used to validate the menstrual cycle phase. A metabolic cart was used to continuously measure expired gas concentrations and ventilatory rates. A one-way repeated-measures ANOVA was used to compare the differences in VO₂ kinetics across cycle phases between non-oral contraceptive and oral contraceptive users. Statistical significance was set at p<0.05. **Results:** τVO₂ was affected by cycle phases, regardless of contraception use, whereby τVO₂ was greater in the menstruation phases of the non-oral contraceptive and oral contraceptive cycles (24.1 ± 5.2) compared to the non-menstruating phases (19.5 ± 5.5) (p<0.05). **Conclusion:** The speed of the VO₂ kinetics response is affected by the phases of the menstrual and oral contraceptive cycles, such that a greater τVO₂ is observed during the menstruation phase.

Anmol T. Mattu was supported by the NSERC Alexander Graham Bell Canada Graduate Scholarship.

Previous studies showed that menstrual cycle is associated with physical performance and subjective condition in female athletes. It is also known that premenstrual syndrome (PMS) and premenstrual dysphoric disorder (PMDD) affect subjective condition in female athletes. However, the relationships among PMS, PMDD and physical performance in female athletes are not clarified yet. **Purpose:** To investigate the impact of PMS and PMDD on physical performance in female track and field athletes. **Methods:** Sixteen female track and field athletes with regular menstrual cycles participated in this study. Participants were measured body composition and physical performance test in follicular phase (no PMS and PMDD phase) and luteal phase (PMS and PMDD phase). As a physical performance test, Countermovement Jump: CMJ, Rebound Jump: RJ, and Wingate test were performed. PMS and PMDD were evaluated by questionnaire survey of premenstrual syndrome (ACOG practice bulletin, 2000) and premenstrual dysphoric disorder (DSM-5, APA, 2013). **Results:** In all subjects, there were no significant differences in body composition and physical performance between follicular phase and luteal phase. However, subjects who had breast tenderness of PMS decreased more greatly than non-symptom subjects in jump height of CMJ (p<0.038) and RJ index (p=0.015). Also, subjects who had anxiety of PMS decreased more greatly than non-symptom subjects in height of CMJ (p<0.05). Moreover, subjects who had overeating of PMDD increased more greatly than non-symptom subjects in HR max during Wingate test (p=0.042). **Conclusions:** In this study, we showed that some symptoms of PMS and PMDD were associated with suppressed physical performance in female track and field athletes. Thus, PMS and PMDD may lead to decrease the physical performance in female track and field athletes.
Percentage Body Fat Predicted by Body Mass Index, Waist Circumference and Age in Different Racial and Gender Groups

Studies have shown that percentage body fat (%BF) is highly correlated with the body mass index (BMI) and waist circumferences (WC) in different age, race, and gender. However, an interaction between factors into account to predict %BF has not been established.

PURPOSE: We explored the equations of %BF predicted by BMI, WC, and age in different racial and gender groups. METHODS: We used National Health and Nutrition Examination Survey (NHANES 2003-2004) data. The sample size was 488058396 in five race groups including Mexican American (MA), other Hispanic (OH), Non-Hispanic White (NHW), Non-Hispanic Black (NHB), and other race (OR). %BF was measured by dual-energy X-ray absorptiometry (DXA). Prediction equations of %BF were developed based on different racial and gender groups with predictors of WC, BMI, and age (20 and older). RESULTS: There was a statistically significant interaction between groups. The results of the regression equation in different race and gender groups are as follows:

<table>
<thead>
<tr>
<th>Race</th>
<th>%BF (Mean, SD)</th>
<th>R-square</th>
<th>Standardized Coefficients</th>
<th>Beta</th>
</tr>
</thead>
<tbody>
<tr>
<td>MA</td>
<td>28.276, 4.848</td>
<td>0.675</td>
<td>WC 0.766 0.845 0.855 0.812</td>
<td>1.146</td>
</tr>
<tr>
<td>OH</td>
<td>27.280, 5.602</td>
<td>0.766</td>
<td>BMI 0.061 -0.042 -0.054 0.022</td>
<td>-0.442</td>
</tr>
<tr>
<td>NHW</td>
<td>28.640, 5.942</td>
<td>0.675</td>
<td>Age -0.004 0.139 0.109 0.057</td>
<td>0.074</td>
</tr>
<tr>
<td>NHB</td>
<td>26.152, 6.663</td>
<td>0.698</td>
<td></td>
<td></td>
</tr>
<tr>
<td>OR</td>
<td>27.726, 5.485</td>
<td>0.717</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

For all, p < 0.000

CONCLUSION: Formulating prediction equations in different gender and race groups does not improve the prediction of %BF. Further analyses such as cross-validation based on split training and testing datasets are needed.

Percentage Body Fat Predicted by Body Mass Index, Waist Circumference & Age in Different Racial & Gender Groups

Yaozong He, Yan Yang, Weimo Zhu, FACSM. University of Illinois at Urbana-Champaign, Urbana, IL.

(No relevant relationships reported)

WE EXPLORIED THE EQUATIONS OF %BF PREDICTED BY BMI, WC, AND AGE IN DIFFERENT RACIAL AND GENDER GROUPS. THE RESULTS OF THE REGRESSION EQUATION IN DIFFERENT RACE AND GENDER GROUPS ARE AS FOLLOWS:

<table>
<thead>
<tr>
<th>Race</th>
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For all, p < 0.000

CONCLUSION: Formulating prediction equations in different gender and race groups does not improve the prediction of %BF. Further analyses such as cross-validation based on split training and testing datasets are needed.
F-10

Thematic Poster - Sports Injury: New Epidemiological Insights

Friday, May 31, 2019, 1:00 PM - 3:00 PM
Room: CC-104B

2743

Chair: Alpa V. Patel, FACSM. American Cancer Society, Atlanta, GA.

(No relevant relationships reported)

2744

Board #1

May 31 1:00 PM - 3:00 PM

Sport-Specific Associations of Sport Specialization and Sport Volume with Overuse Injury in Youth Athletes

Eric G. Post1, Kevin M. Biese2, Daniel A. Schaefer3, Andrew M. Watson4, Timothy A. McGuire1, M. Alison Brooks1, David R. Belf1. 1San Diego State University, San Diego, CA. 2University of Wisconsin-Madison, Madison, WI.

E-mail: epost@sdstate.edu

(No relevant relationships reported)

Year-round participation in a single sport at the exclusion of other sports, also known as sport specialization, is associated with increased risk of overuse injury in youth athletes. To reduce this risk, several recommendations for participation volume have been developed. However, risk of overuse injuries may be dependent on specific movement profiles required by a given sport.

PURPOSE: To examine sport-specific associations of sport specialization and exceeding sport volume recommendations with overuse injuries in adolescent basketball, soccer, and volleyball athletes.

METHODS: 716 youth athletes (70.8% female, age 14.2 ± 1.5 years old, 43.2% basketball, 46.2% soccer, and 10.6% volleyball) were recruited to complete an anonymous questionnaire regarding their sport participation patterns and previous injury history. Sport specialization status was classified as low, moderate, or high using a widely utilized 3-point scale. Self-reported sport volume was used to classify athletes as either meeting or exceeding sport volume recommendations (playing their primary sport <8 months/year, hours/week of organized sport > age, days of sport participation per week >5). Multivariable logistic regression analyses were utilized to examine associations between variables of interest and overuse injury in the previous year.

RESULTS: Highly specialized volleyball athletes were more likely to report an overuse injury compared to low specialization volleyball athletes (OR [95% CI]: 2.3 [1.1-4.8], p<0.01). Volleyball athletes who trained: more than 8 months per year (OR [95% CI]: 2.0 [1.3-3.5], p<0.05), more hours per week than their age (OR [95% CI]: 2.0 [1.2-3.4], p<0.01), or more than 5 days per week (OR [95% CI]: 2.1 [1.2-3.9], p<0.05) were more likely to report an overuse injury compared to volleyball athletes who did not violate these recommendations. No significant associations were observed in soccer or basketball athletes (P>0.05).

CONCLUSIONS: The association between sport specialization, excessive sport volume, and overuse injuries may be specific to sports that are more repetitive or technical in nature, such as volleyball. Dissemination of sport-volume recommendations should be focused towards athletes, parents, and coaches in these sports.

2745

Board #2

May 31 1:00 PM - 3:00 PM

A Seven-year Epidemiological Analysis of Ankle Injuries in U.S. Rugby-7s


E-mail: dvictorlopezjr@gmail.com

Reported Relationships: V. Lopez Jr: Salary; Officer Salary. Industry Salary; Officer Salary. Industry

Purpose: To describe ankle injury incidence and patterns over a seven-year period in U.S. Rugby-7s.

Methods: A standardized injury surveillance project was conducted at the USA Rugby Club 7-a-side competitive regional circuits and USA Rugby-7s Championships (2011-2016). Athletes were identified from injury surveillance conducted at the 2018 Wheelchair Basketball World Championships in Hamburg (Germany). Injuries were documented, equivalent to 6.2 (95% CI 5.0 to 7.4) time-loss injuries per 1000 athlete-days, all were classified as minor. Most injuries occurred at the upper limb (shoulder 14%, elbow 11%, hand/fingers 10%) and back (cervical spine 16%; thoracic spine 15%). The predominant injury types were muscle strains (25%) and contusions (16%). About half of the injuries were classified as overuse injuries (52%). Injury mechanisms differed between training and match (p<0.05), and between female and male players (p<0.05).

Conclusion: Injury rates were higher than reported during major tournaments (Paralympic Games) or during regular wheelchair basketball seasons. Reasons are most probably due to the high number of reported non-time-loss injuries. Possible preventive strategies should focus on shoulder, hand and back. Muscle spasms could be prevented using adequate rehydration and electrolyte substitution, while the special requirements of players’ disabilities need to be considered. Future research should include illnesses in the prospective monitoring.
A high incidence of head injuries, including concussions, has been documented in a growing US rugby playing population. However, few studies have focused on describing common risk factors associated with head injuries. PURPOSE: The purpose of this study was to identify risk factors associated with head, neck, and face injuries (HNFI) among amateur U.S. rugby-7s players and investigate risk differences between genders. METHODS: Data were used from the Rugby Research and Injury Prevention Group’s injury registry (January 2010-2016). Anthropometric data, mechanism of injury, and other injury risk factors were tabulated by HNFI and gender. Logistic regression determined the relationship between gender and HNFI. The final multivariable model was used to calculate the probability of HNFI and highlight gender differences. RESULTS: The final study sample consisted of 1,307 (68.2% men, 31.8% women) U.S. rugby-7s players and 1,679 (68.1% men, 31.9% women) injuries. From 2010-2016, 474 (28.2%) HNFI were documented. The most commonly injured body part and injury type were the head (47.7%) and concussions (40.3%), respectively. The final model revealed gender, age, position during contact, contact surface, and play legality were significantly associated with HNFI. Controlling for play legality and position during contact, under 18 (U18) boys injured during contact with an opposing player had the highest probability of HNFI (51%) and a higher probability than U18 girls (p=0.004). However, women 18-24 (p=0.019) and over 30 (p=0.002) with an opposing player had the highest probability of HNFI (51%) and a higher probability than the men 18-24 group (p=0.04). The probability of a head injury was also higher among women than U18 girls (p=0.004). The higher odds of injury during female Rugby-7s games (OR 2.2) was not significant (p=0.07). CONCLUSIONS: Identifying gender-specific risk factors of injury will allow for a more effective injury prevention plan that addresses the specific needs of men and women of different levels of competitive play. Our analyses suggest there are differences in risk of HNFI in amateur Rugby-7s as it relates to player age, gender, and play legality. Age group analyses may help identify gender-specific HNFI risk factors within each age group.

**Evaluation of the Rate of Orthopedic Injuries of Concussed And Non-concussed Players In the NFL**

Concussions may increase the risk of musculoskeletal injury during the 90 day period after return to play. Previous work has evaluated this effect in collegiate players with consistent results. PURPOSE: To examine possible increased risk of orthopedic injury among National Football League players 12 weeks (90 days) after return to play from an incident concussion compared to an incident orthopedic injury. METHODS: Weekly NFL injury data from 2012 through 2017 was collected from public websites and weeks 3-10 of the regular season were analyzed. Players with upper extremity (UE) and lower extremity (LE) orthopedic injuries were matched to each concussed player on position, team, and week of return to play. Concussed players were excluded if they sustained an orthopedic injury concurrently with a concussion or if there was no matched orthopedic control. Additional players were excluded from the study if there was no injury on the injury logs for any other reason. This study analyzed 194 concussed players, comparing them with 187 LE and 105 UE injuries. An additional 444 non-injured controls with no injuries spanning 3 weeks prior were also evaluated. The rate of orthopedic injury was calculated as the number of orthopedic injuries during the 12 week period following return to play from their initial injury divided by 12 weeks. UE and LE injuries were evaluated separately against the concussion group using a Wilcoxon Rank Sum test. RESULTS: In the 12 week period following return to play from injury, players who sustained a concussion had an average of 0.0306 orthopedic injuries, while players who sustained a LE injury or uninjured controls had a rate of 0.0104 and 0.002 orthopedic injuries respectively. There was a significant difference between the orthopedic injury rate among the concussed and LE injury groups (Z = 2.22, p-value = 0.03). In addition, the difference in orthopedic injury rate between the controls and concussed groups was significant (Z= 9.79, p-value = 1.55e-22). No relationship between concussed and UE injury was found. CONCLUSION: The results of this study suggest a relationship between concussions and subsequent orthopedic injuries in NFL players compared to those with an incident LE injury or no incident injury.
Conclusions: Determinants of soccer-related concussions and their sequelae appear to be multifactorial. The observed symptom dependencies may encourage clinicians to use ordinal logistic regression models to assess exposure effects on the odds of symptoms as a function of exposures, as well as other observed symptoms. We then used multivariate logistic regression models to assess the odds of reporting specific symptoms due to player contact mechanisms than those due to non-player-contact mechanisms (Adj. OR= 0.33, 95% CI: 0.18, 0.59).

Resolution time in concussions due to player contact mechanisms was significantly longer than those due to non-player-contact mechanisms (p<0.001). We also found significant differences in resolution time due to player contact mechanisms in girls compared to boys (p<0.001). The mechanisms contributing to greater fat utilization despite ingesting carbohydrate during exercise started with low muscle glycogen content, even when exogenous carbohydrate is ingested during exercise. This was a crosssectional study where 70 Masters Athletes (35 women; 35 men; 39±11 years of age) were measured for RER during a VO2max treadmill test. A food frequency questionnaire (FFQ) was completed to determine average nutrient intake. Athletes from four sport types were included in our analyses: runners (20), triathletes (20), rowers (19) and CrossFit athletes (11). A multivariate linear regression model of least squares was used to predict time to RER >0.85 from heart rate (HR), percent VO2max (%VO2max), sex, carbohydrate intake (CHO), fat intake (FAT) and protein intake (PRO). We also explored whether differences in substrate utilization existed among sport types during a VO2max test in Masters Athletes.

Methods: The NATION-SP captured soccer-related injury data collected by athletic trainers (ATs) during the 2011/12-2013/14 academic years. We specifically examined injuries diagnosed as concussions. Outcomes of interest included symptoms reported with concussions as well as resolution time, categorized as resolved in 7 days, 14 days, 28 days and > 28 days. Exposures of interest included sex, injury history, injury mechanism associated with concussion, and setting (competition vs. practice). We used multivariate logistic regression models to assess the odds of reporting specific symptoms as a function of exposures, as well as other observed symptoms. We then used ordinal logistic regression models to assess exposure effects on the odds of reporting a longer symptom resolution time. Odds Ratio (OR) estimates with 95% confidence intervals (CI) excluding 1.00 were deemed significant.

Purpose: Examine the impact of sex, injury history, injury mechanism, and setting on concussion symptomology and resolution time among HS soccer players.

Results: A total of 189 concussions were reported, with most observed in girls (56%). Symptoms resolved within 7 days in 41% of reported concussions. Interestingly, we detected several symptom dependencies, such as higher odds of light sensitivity (OR= 20.71, 95% CI: 8.58, 50.00) with concurrent noise sensitivity, and higher odds of irritability (OR= 9.04, 95% CI: 3.74, 21.85) and drowsiness (OR= 7.46, 95% CI: 3.48, 20.71, 95% CI: 8.58, 50.00) with concurrent noise sensitivity, and higher odds of light sensitivity (OR= 9.04, 95% CI: 3.74, 21.85) and drowsiness (OR= 7.46, 95% CI: 3.48, 20.71) with concurrent noise sensitivity, and higher odds of light sensitivity (OR= 9.04, 95% CI: 3.74, 21.85) and drowsiness (OR= 7.46, 95% CI: 3.48, 20.71). We also observed lower odds of longer symptom resolution time in concussions due to player contact mechanisms than those due to non-player-contact mechanisms (Adj. OR= 0.33, 95% CI: 0.18, 0.59).

Purpose: To predict time of substrate change using respiratory exchange ratio (RER) >0.85 from heart rate (HR), percent VO2max (%VO2max), sex, carbohydrate intake (CHO), fat intake (FAT) and protein intake (PRO). We also explored whether differences in substrate utilization existed among sport types during a VO2max test in Masters Athletes.

Methods: In a randomized, crossover design, 12 men (mean ± SD, age, 21 ± 4 y; body mass, 83 ± 11 kg; VO2peak = 44 ± 3 mL/kg/min) completed two cycle ergometry glycogen depletion trials, followed by a 24 h period of either high fat (1.5 g/kg carbohydrate, 3.0 g/kg fat) or high carbohydrate (6.8 g/kg carbohydrate, 1.0 g/kg fat) isocaloric refeeding to elicit low (LOW) or adequate (AD) glycogen content the following morning before initiating 80-min of cycle ergometry (64 ± 3% VO2max).
ingesting 146 g of carbohydrate. Transcriptional regulation of substrate metabolism was assessed using RT-qPCR in vastus lateralis biopsy samples obtained before (PRE) and after (POST) the exercise bout.

RESULTS: PRE glycogen synthase kinase 3a expression was 40% lower (P<0.05; time-by-treatment interaction) in LOW than AD. PRE fatty acid translocase was 40% higher (P<0.05; time-by-treatment interaction) in LOW than AD. Independent of time, fatty acid binding protein, carnitine palmitoyltransferase 1A, and hydroxycycl-CoA dehydrogenase/3-ketocycl-CoA expression were each ~40% higher (P<0.05; time effect) in LOW than AD. In LOW, POST peroxisome proliferator-activated receptor δ was 177% higher (P<0.05 time-by-treatment interaction) than PRE, with no change in AD.

CONCLUSION: Initiating aerobic exercise with low muscle glycogen content upregulates the transcriptional control of fat oxidation without modulating intramuscular regulation of glucose metabolism, even when exogenous glucose is ingested during exercise.

2755  May 31 1:30 PM - 1:45 PM
Effect Of Breaking-up Sedentary Activity On Metabolic Flexibility And Glycerina In Free-living Overweight/obese Adults
Laura Schreck, Nathan DeLong, Andrew Lange, Carlos Mendez, Thomas Glazer, David A. Goldstrohm, Edward L. Melanson, FACSM, Corey Rynders, Josiane Broussard, Daniel Bessesen, Audrey Bergouignan. University of Colorado at Anschutz, Medical Campus, Aurora, CO. (Sponsor: Edward L. Melanson, FACSM)

(No relevant relationships reported)

PURPOSE: Sedentary behavior (SB) triggers an inability to adjust substrate use to substrate availability (metabolic flexibility, MF), which may precede glycerol intolerance in the pathogenesis of insulin resistance. We and others have shown that frequent interruptions in SB leads to improved glycemic control, however the underlying role of MF in this process is unknown. This study examined the effects of breaking up SB on MF and glucose metabolism in free-living overweight and obese adults.

To distinguish effects of breaking up SB from being physically active, we also studied a group where participants performed a single energy matched continuous bout of exercise. METHODS: Physically inactive, adults (12F/7M, mean±SD; 33±8 yrs, BMI = 29.5±3.2 kg/m2) were randomly assigned to a 4 week intervention consisting of brisk walking for 5 min each hour for 10h, 5 d/wk (MICRO), or 4 weeks of an intervention consisting of one continuous 45 min bout of exercise per day, 5d/ wk (ONE). Outcomes assessed at baseline and after each intervention included: MF (waking respiratory quotient, RQ, minus sleeping RQ as measured in a whole room calorimeter), insulin sensitivity (SI, IVGTT), 24h glycaemia (continuous glucose monitor), 24h glycemia oxidation (U13C glucose tracer), SB, time spent stepping, and performing moderate to vigorous activity (MVPA; ActiVital and Actigraph). Groups were similar on all outcome variables at baseline. Linear mixed models evaluated intervention and intervention-by-group effects. RESULTS: MICRO and ONE decreased time sitting (-43±5% vs. 94.3% min), increased time stepping (+26.3±44.0 min) and time spent in MVPA (+9.8±17.6 min; p<0.05 for both). Compared to ONE, MICRO improved the acute insulin response to glucose (AIRg), lowered 24h glycemic variability, maintained exogenous glucose oxidation, and improved MF (interaction: p<0.05 for all). Improvements in MF were positively associated with changes in SI (p=0.59, p=0.02). CONCLUSIONS: Independent of time stepping and sitting, breaking up SB improves glucose homeostasis and MF. The effects of such an intervention in persons with type 2 diabetes warrants further study.

2756  May 31 1:45 PM - 2:00 PM
Low Muscle Glycogen Content Does Not Alter Exogenous Carbohydrate Oxidation During Aerobic Exercise
Lee M. Margolis, Marques A. Wilson, Claire C. Whitney, Christopher T. Carrigan, Nancy E. Murphy, Adrienne M. Hatch, Scott J. Montain, FACSM, Stefan M. Pasiekas, FACSM. United States Army Research Institute of Environmental Medicine, Natick, MA. (Sponsor: Stefan M Pasiekas, FACSM)

(No relevant relationships reported)

BACKGROUND: Initiating aerobic exercise with low muscle glycogen content promotes greater fat and less endogenous carbohydrate oxidation during exercise. However, whether oxidation of exogenous carbohydrate increases when exercise is initiated with low muscle glycogen is not well defined.

PURPOSE: Determine if exogenous carbohydrate oxidation during aerobic exercise is affected by the level of muscle glycogen at the onset of exercise.

METHODS: Using a randomized, crossover design, 12 men (mean ± SD: age: 21 ± 4 yrs; body mass: 83 ± 11 kg; VO2peak: 44 ± 3 mL/kg/min) completed 2 cycle ergometry glycogen depletion trials separated by 7–d, followed by a 24-h period of high-fat (1.5 g/kg carbohydrate, 3.0 g/kg fat) or high carbohydrate (6.0 g/kg carbohydrate, 1.0 g/kg fat) refeeding to elicit low (LOW) or adequate (AD) glycogen stores. Participants then performed 80-min of steady-state cycle ergometry (64 ± 3% VO2peak) while ingesting 146 g of carbohydrate (95 g glucose + 51 g fructose; 1.8 g/min). Substrate oxidation (g/min) during exercise was determined by indirect calorimetry and tracer techniques with 13C-glucose and 13C-fructose. Muscle glycogen (mmol/kg dry wt) was determined by fluorometric assays from vastus lateralis biopsies obtained before and after glycogen depletion and before (PRE) and after (POST) steady-state exercise trials.

RESULTS: Muscle glycogen concentrations were the same between treatments before (LOW: 467 ± 95; AD: 472 ± 109) and after both depletion exercise bouts (LOW: 207 ± 99; AD: 210 ± 145). Following 24-h refeeding, PRE glycogen was lower in LOW (217 ± 103) compared AD (396 ± 70; P<0.05). POST glycogen in AD (229 ± 94; P<0.05) was lower than PRE but remained higher than LOW (137 ± 131; P<0.05). Glycogen did not change PRE to POST in LOW. Exogenous carbohydrate oxidation rate was not different between LOW (0.84 ± 0.14) and AD (0.87 ± 0.16; P>0.05). Fat oxidation was higher, and total and endogenous carbohydrate oxidation was lower in LOW (0.55 ± 0.10, 1.59 ± 0.40, and 0.75 ± 0.29) compared to AD (0.38 ± 0.13, 2.03 ± 0.36, 1.17 ± 0.29; all P<0.05).

CONCLUSION: These data show that initiating steady-state aerobic exercise with low muscle glycogen content does not cause greater reliance on exogenous carbohydrate for fuel.

2757  May 31 2:00 PM - 2:15 PM
Energy Metabolism With Or Without Slow Or Rapid Absorption Carbohydrate In Trained Endurance Runners
Patrick Davitt, FACSM. University of the Sciences, Philadelphia, PA.

(No relevant relationships reported)

The ability for carbohydrate (CHO) to provide sustained energy availability and stable blood glucose is important for prolonged endurance. PURPOSE: To examine energy metabolism, total and exogenous CHO utilization, blood glucose and performance after consuming different isocaloric glucose beverages before a sustained treadmill run. METHODS: 10 male experienced endurance runners (32.4 ± 1.9 yr; 73.5 ± 3.1 kg; %f body fat 15.3 ± 2.1; VO2peak: 55.9 ± 1.5 mL/kg/min) participated in a crossover-designed study, on 3 occasions: Slow digestion CHO (S), Fast digestion (F), and Water (C). Participants consumed a single 50g dose of either S or F prior to running 3hrs at 58% VO2peak. Pulmonary gas exchange and plasma glucose were assessed at -15, 0 (run-start), 30, 60, 90, 135,180 min for glucose, metabolic rate, and CHOox. Breath CO2 was analyzed for exogenous C13 rate of appearance. Immediately post-run participants completed a time-to-fatigue test at 110% VO2peak. RESULTS: There were no significant differences in V02 between groups during the run (p=0.46). There was a significant difference in CHOCox for C vs. S and F (C 1.0; S 1.33; F 1.43 ± 0.1 g/min) (p=0.12). There was a significant difference in breath 13CO2 appearance for C vs. S and F as well as S vs. F (C 0.0002; S 0.0012; F 0.0009 ± 0.0001 mmol/min) (p=0.001), in addition to a significant time x trial difference for C and S vs. F (p=0.001). There was a significant difference in AUC CHO dose oxidized to CO2 for S vs. F (S 1.09; F 1.41 ± 0.2 mmol) (p=0.03). There was a significant difference in plasma glucose for C vs. S, but not for F (C 89.1; S 95.9; F 93.5 ± 19 mg/dL) (p<0.001), in addition to a significant time x trial difference for C and S vs. F (p<0.001). There was no significant time-to-fatigue between any trial (C 161.1; S 223.7; F 156.1 ± 34.4 sec) (p=0.18).

CONCLUSION: The consumption of a single bolus of CHO beverage prior to a 3hr run elicits significant alterations in energy metabolism compared to just water, with S CHO burning significantly less total carbohydrate and more fat than a rapidly digested carbohydrate. The S CHO provided a more stable and consistent energy metabolism profile, in addition to the most stable glucose concentration during the run. These findings provide evidence that S CHO provides a consistent blood glucose and sustained exogenous energy supply during a sustained endurance run.
2758 May 31 2:15 PM - 2:30 PM
The Addition Of A Sodium Alginate-pectin Hydrogel To A Carbohydrate Beverage Significantly Enhances Gastric Emptying In Humans
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(No relevant relationships reported)

PURPOSE: To investigate the effect of CHO encapsulation and osmolarity on the rate of gastric emptying while at rest.

METHODS: Eight healthy males were recruited to take part in this randomised, double blind, cross-over study. A 500 ml bolus of an experimental drink was instilled while seated, and gastric emptying measured using the double aspiration method every 10 min for 90 min. The three drinks consisted of 180 g L-1 maltodextrin and fructose (POLY, −700 mOsm kg−1), 180 g L−1 glucose and fructose (MON, −1300 mOsm kg−1) and 180 g L−1 maltodextrin, fructose, sodium alginate and pectin (ENCAP, −700 mOsm kg−1). All drinks also contained 1.5 g L−1 of sodium and had a CHO ratio of 1:0.8 (maltodextrin:glucose:fructose). Arteriovenous blood samples were collected prior to drink instillation and at regular intervals thereafter and analysed for glucose and non-esterified fatty acid (NEFA) concentration.

RESULTS: Time to empty half of the ingested bolus was faster for ENCAP (21.2 ± 8.5 min) than for POLY (36.3 ± 8.0 min, P < 0.001), which was faster than for MON (52.4 ± 16.5 min, P = 0.03). During the first 10 min, ENCAP emptied more than MON (ENCAP: 157 ± 50 vs MON: 41 ± 50 mL, P < 0.05) but not more than POLY (108 ± 58 mL, P = 0.28). Thereafter, ENCAP emptied more than POLY and MON, reaching significance at 20 min (ENCAP: 258 ± 68, POLY: 182 ± 44 and MON: 141 ± 42 mL, P < 0.05) and 30 min (ENCAP: 367 ± 50, POLY: 196 ± 37, MON: 171 ± 50 mL, P < 0.01) after instillation. After 40 minutes, there were no longer significant differences between ENCAP and POLY. ENCACP and MON remained significantly different until 70 min but were not significantly different thereafter (458 ± 34 vs 406 ± 51 mL, respectively, P = 0.07). After 60 min, POLY had emptied significantly more than MON (380 ± 39 vs 290 ± 82, respectively, P < 0.05). Serum glucose concentration increased to a similar level on all trials, while serum NEFA concentration continued to decrease over the 90 min to a similar extent on all trials.

CONCLUSIONS: These findings suggest that encapsulating CHO in alginate hydrogel is an effective method to enhance gastric emptying.

2759 May 31 2:30 PM - 2:45 PM
Acute Carbohydrate Consumption On The Irgon-Regulatory Response To Exercise In Elite Keto-adapted Endurance Athletes
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(No relevant relationships reported)

It has been demonstrated adherence to a low carbohydrate (CHO) high fat (LC HF) diet can alter markers of iron metabolism in endurance athletes. PURPOSE: To investigate the impact of CHO re-introduction in athletes previously adapted to a LCHF diet on markers of iron metabolism in endurance athletes. METHODS: In the three weeks prior to the exercise trials, twenty-three elite race walkers adhered to sports nutrition guidelines for the first time in 3.5 weeks (CHO Restoration). Venous blood samples were collected pre-, post- and 3 h post-exercise and analysed with sports nutrition guidelines (POLY, ~700 mOsm kg−1 maltodextrin, fructose, sodium alginate and pectin (ENCAP, −700 mOsm kg−1). All drinks also contained 1.5 g L−1 of sodium and had a CHO ratio of 1:0.8 (maltodextrin:glucose:fructose). Arteriovenous blood samples were collected prior to drink instillation and at regular intervals thereafter and analysed for serum ferritin, interleukin-6 (IL-6) and hepcidin-25. RESULTS: Serum ferritin concentration was similar between trials (p = 0.48) and dietary groups (p = 0.93). The post-exercise IL-6 increase was greater in LCHF (p < 0.001) during both Adapt (LCHF: 13.1-fold increase; CHO: 8.0-fold increase) and CHO Restoration (LCHF: 18.5-fold increase; CHO: 6.3-fold increase); outcomes were not different between trials (p = 0.84). Hepcidin-25 levels increased 3 h post-exercise (p < 0.001), however, they did not differ between trials (p = 0.46) or diets (p = 0.84). CONCLUSIONS: Strenuous exercise undertaken following chronic adaptation to a LCHF diet is associated with a greater post-exercise IL-6 response than when exercise is undertaken with high CHO availability. The elevated IL-6 response in athletes adapted to a LCHF diet is not attenuated by an acute increase in exogenous CHO availability. Despite diet-induced differences in IL-6 responses, no differences in hepcidin levels were evident, suggesting IL-6 is likely not the primary factor determining the magnitude of post-exercise hepcidin levels. Baseline iron status may be a more dominant factor regulating this response. Increased IL-6 levels may negatively influence other body processes, and the long-term impact of adhering to LCHF on other health outcomes warrants further investigation. Funded by the ACU Research Fund and the AIS High Performance Sport Research Fund.
PURPOSE: To compare the magnitude of lower-leg training program and thigh muscle training program to dynamic balance ability changes for community-dwelling elderly Japanese women.

METHODS: After giving written informed consent, the subjects, unable to stand on one leg for more than 25 seconds with their eyes open, were divided into a lower-leg training group (LLG; 10 females, 72.9±4.2 yrs, BMI 22.1±1.8) and a thigh muscle training group (TMG; 10 females, 70.6±2.5 yrs, BMI 22.1±1.2). The program was 60min. two times per week for 16 weeks. Each training program consisted of three parts. At first, participants learned about management skills for their physical stiffness. Secondly, they learned each resistance program. LLG participated in the program using unstable disk and elastic band. TMG learned program was to strengthen their thigh muscles with elastic band. Finally, both groups learned a three-minute arm and leg combined exercise program with music. Participants were asked to follow their learned management skill program and resistance program every day and check it on the card. Dynamic balance ability was measured by one-leg standing time with their eyes open, the area covering and total length of the center of gravity sway(COP) with eyes open or close by stadiometer. Knee extension strength was evaluated. Each measurement items were assessed before and after the intervention period. Student’s t-test and two-way repeated measures ANOVA were used to test the effectiveness.

RESULTS: The class participation rates were 82%: 4% and 81%: 8% and home participation rates were 76%: 10% and 72%: 15% respectively. One-leg standing time with their eyes open LLG: 14.0±3.0 to 19.9±2.2 sec., TMG: 12.4±2.5 to 15.9±2.2 sec., F=3.92, p=0.038), area covering of COP with eyes open (LLG: 14.1±4.2 to 18.8±9.0 cm², TMG: 15.1±3.3 to 18.8±9.9 cm²,F=5.01, p=0.08), area covering of COP with eyes open LLG: 14.1±4:1 to 8.2±6.5 cm², TMG: 15.1±3.3 to 18.8±9.9 cm²,F=5.84, p=0.009), total length of COP (LLG: 143.1±33.1 to 95.6±18.9 cm, TMG: 144.9±26.4 to 135.7±37.2 cm,F=3.92, p=0.056) improved significantly in LLG. TMG knee extension strength improved significantly (p=0.029).

CONCLUSIONS: Lower-leg muscle training was found more effective to improve dynamic balance ability than thigh muscle training for community-dwelling females.
Kruskal-Wallis rank-sum tests were used to compare pre-post changes between the INT and CON groups for all variables. RESULTS: Sedentary time decreased for the INT group (p=0.01) and increased in the CON group (p=0.04). No significant differences were observed between groups for any of the physical fitness, motor skill, or physical activity variables. CONCLUSIONS: The current study adds valuable insight into the efficacy of delivering a FIT intervention into an existing PE curriculum. Future studies should continue to explore the relationships between physical activity, fitness, and motor skills in children to identify causal pathways and intervene appropriately.

2766
May 31 2:00 PM - 2:15 PM
Changes On Non-exercise Physical Activity Are Related To Improvements In Mitochondrial Function Independently Of Structured Intentional Exercise
Elvis Alvarez Carnero, Robert Standley, Giovanna Distefano, Paul M. Coen, Bret H. Goodpaster, Florida Hospital.
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(No relevant relationships reported)

Whether exercise interventions increase or reduce non-exercise physical activity (NEPA) is controversial. Few studies have examined this potential effect on relevant physiological outcomes, particularly in the context of randomized controlled trials. PURPOSE: To determine the effects of a structured exercise program on NEPA, and the independent association between NEPA and both cardiorespiratory fitness (VO_{max}) and mitochondrial capacity within skeletal muscle. METHODS: Thirty-seven older (age=69±5yrs) adults were randomized to one of the following 6-month interventions: Health education (CON; n=12), diet induced weight-loss (DIWL; n=12), or Weight-loss and exercise (WLEX; n=15). CRWL and WLEX participants had a goal of 10% weight-loss through calorie restriction. Subjects in the WLEX group completed a supervised combined aerobic and resistance exercise program. We quantified components of PA by a multisensory device. VO_{max} was determined by cycle ergometry. Maximal oxidative phosphorylation (OXPHOS) and mitochondrial capacity within skeletal muscle. Although team sports produced greater overall PA, all modules (team sports, fitness, and dance) produced similar MVPA. As MVPA is suggested to be the preferred component of overall PA for improving overall health, all these modules are viable options for producing MVPA during PE classes in this population. To improve adherence to these different activities, future researchers should compare enjoyment levels for students across these activities. Overall, as PE classes are the greatest contribution to in-school PA, PE instructors and school health administrators can use our findings to choose appropriate modules to teach children PE and, concurrently, positively address the childhood obesity epidemic.

2767
May 31 2:15 PM - 2:30 PM
Intervention Effects Of A Kindergarten-based Health-promotion Programme On Physical Activity, Bmi Percentiles And Endurance Capacity
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(No relevant relationships reported)

PURPOSE: In recent decades, the prevalence of childhood overweight has increased worldwide and became a public health concern. One reason for this is children’s insufficient engagement in physical activity (PA) which may lead to deficient motor skills, which are interdependent. Therefore, early health promotion such as the kindergarten-based health promotion programme “Join the Healthy Boat” is necessary. METHODS: In order to evaluate the programme’s effectiveness on children’s BMI percentiles (BMIPT), PA and endurance capacity, a randomised controlled trial including intervention (IG) and control group (CG) was conducted. 973 kindergarten children (3.6-0.6 years; 47.1% male) and 475 kindergarten were assessed at baseline and 588 of them at follow-up. Anthropometrics and endurance capability (3-minute-run) were assessed on site. PA behaviour and socio-economic data were assessed using parental report. Linear regression models were used to determine intervention effects for all health outcomes, adjusting for baseline values, age, gender, BMIPCT and socio-economic variables. RESULTS: After one year, a significant positive intervention effect on children’s BMIPT was found (p<0.04). Further, children in the IG spent significantly more days in sufficient PA than children in the CG (3.1±2.1 days vs. 2.5±1.9 days; p<0.005). CONCLUSIONS: This teacher-centred health promotion using a low-dose bottom-up approach with action alternatives achieved significant positive effects in the reduction of BMIPT and significant increases in endurance capacity and daily PA. The programme is therefore ideal for integrating health promotion more intensively into the everyday life of children.

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May 31 2:30 PM - 2:45 PM
Comparing Physical Activity Levels across Differing Physical Education Class Modules in Middle Schools using SOFIT
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(No relevant relationships reported)

Over 1/3 of school-age children are overweight or obese. To address this problem, school-age children are recommended to take part in 60 minutes of daily moderate-to-vigorous physical activity (MVPA), with 30 minutes of this daily MVPA being in-school. Physical education (PE) classes offer ideal opportunities for physical activity (PA) as they utilize varying modules including team sports, general fitness, and social (e.g. dance). Yet, how much overall PA and MVPA occurs over these differing PE class modules remains unclear. The System for Observing Fitness Instruction Time (SOFIT) is a simple observational tool that PE instructors can use to calculate PA. PURPOSE: To observe student PA levels across multiple PE modules using SOFIT. METHODS: A modified SOFIT was used to assess PA over 15, 90-minute PE classes (N=124) across 3 modules: team sports (8 sessions), general fitness (3 sessions), and dance (4 sessions) in a single middle school. PA was coded from 1-5 corresponding to lying down, sitting, standing, walking, and vigorous, respectively. The same observer recorded PA in the last minute of a 5-minute interval based on activity in the prior 4 minutes. Separate 1-way ANOVA examined differences in MVPA (i.e. scores 4) and overall PA across modules with Tukey-Kramer post hoc analyses as appropriate. RESULTS: Overall PA differed significantly across modules (p = 0.02), with team sports producing higher PA (3.80±.36) than dance (3.19 ±.39; p = 0.04). MVPA was similar across all modules (team sports: 4.29 ±.43, general fitness: 4.06 ±.28, dance: 3.70 ±.41; F<1; p=2.83; p = 0.09). CONCLUSION: Although team sports produced greater overall PA, all modules (team sports, fitness, and dance) produced similar MVPA. As MVPA is suggested to be the preferred component of overall PA for improving overall health, all these modules are viable options for producing MVPA during PE classes in this population. To improve adherence to these different activities, future researchers should compare enjoyment levels for students across these activities. Overall, as PE classes are the greatest contribution to in-school PA, PE instructors and school health administrators can use our findings to choose appropriate modules to teach children PE and, concurrently, positively address the childhood obesity epidemic.

2769
May 31 2:45 PM - 3:00 PM
Cardiovascular, Metabolic, And Perceived Effort In A Simulated Commute On A Regular And Electric Bicycle
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(No relevant relationships reported)

Use of electric bicycles (e-bikes) with battery powered assist when pedaling, may incentivize active transport for people who may not be fit enough to ride several miles to school, work, or for leisure. E-bikes may enhance one’s daily physical activity engagement levels, possibly creating an increase in both aerobic and metabolic health benefit and be an environmentally friendly transportation option. PURPOSE: To compare cardiovascular, metabolic, and ratings of perceived effort (RPE) when riding an e-bike for 3 miles at two different assist levels (boosts that vary in intensity), in comparison with a regular bicycle. METHODS: Male (n=16) and female (n=14) subjects, aged 19-61 yr, completed a YMCA submaximal test and three electric assist levels. Participants were chosen to form two similar groups, PE inhabitants simulating a typical commute, at their own pace on a standard bicycle and on an e-bike at both E-2 assist, and E-3 assist levels. Participants wore a heart rate (HR) monitor and COSMED that recorded HR and oxygen consumption (VO2). RPE on a 6-20 Borg scale was reported at the end of each 3-mile ride. A linear mixed effects model estimated the differences within subjects and between bicycle types on variables of interest at the 95% confidence level. RESULTS: In every model, for every variable, a significant difference (p<0.05) existed between riding a regular bicycle compared with an e-bike at both assist levels: HR (Reg=133 vs E-2=124 and E-3=114 beats•min⁻¹), % of VO2 days in sufficient PA than children in the CG (3.1±2.1 days vs. 2.5±1.9 days; p<0.005). Children in the IG also performed significantly better in the three minute endurance run than their counterparts in the CON group (p=0.04). No significant differences were observed between groups for any of the physical fitness, motor skill, or physical activity variables. CONCLUSIONS: The current study adds valuable insight into the efficacy of delivering a FIT intervention into an existing PE curriculum. Future studies should continue to explore the relationships between physical activity, fitness, and motor skills in children to identify causal pathways and intervene appropriately.
max (Reg=56 vs E-2-48 and E-3=40%, RPE (Reg=12.3 vs E-2=9.8 and E-3=8.4), respiratory quotient (Reg= 85 vs E-2=85 and E-3=85), METS (Reg=6.7 vs E-2=5.8 and E-3=4.8), caloric expenditure (Reg=519 vs E-2=436 and E-3=359 kcal/min), and time (Reg=13.7 vs E-2=11.8 and E-3=10.3 min) and V02 (Reg=23.6 vs E-2=20.3 and E-3=16.8 ml/kg/min 1). CONCLUSIONS: Compared with regular bicycles, riding e-bikes at assist levels 2 and 3 resulted in 2.5 - 3.9 min faster 3-mile times and lower perceived efforts from somewhat hard for regular bicycle to very light for either e-bike assist levels. Speed and lower RPE may incentivize people to ride e-bikes which may contribute to environmentally friendly active transport. Compared with regular bicycling, 10-20% lower metabolic and cardiovascular responses associated with e-bikes, if performed regularly, may still benefit fitness and health.

Table 1. Mean (SD) comparison of kinematic and kinetic variables between FFS-M and FFS-C

<table>
<thead>
<tr>
<th>Variable</th>
<th>FFS-M</th>
<th>FFS-C</th>
<th>p value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Foot PF at initial contact (°)</td>
<td>-3.41 (2.4)</td>
<td>-8.94 (3.4)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Ankle PF at initial contact (°)</td>
<td>-6.05 (4.1)</td>
<td>-15.3 (5.5)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Peak ankle DF velocity (%)</td>
<td>444 (90.0)</td>
<td>579 (87.1)</td>
<td>0.004</td>
</tr>
<tr>
<td>Foot INV at initial contact (°)</td>
<td>16.7 (4.6)</td>
<td>16.0 (5.7)</td>
<td>0.861</td>
</tr>
<tr>
<td>Ankle INV at initial contact (°)</td>
<td>12.5 (4.5)</td>
<td>12.9 (5.5)</td>
<td>0.976</td>
</tr>
<tr>
<td>Peak ankle EV velocity (%)</td>
<td>-333 (86.7)</td>
<td>-465 (124.0)</td>
<td>0.012</td>
</tr>
<tr>
<td>Peak posterior load rate (BW/s)</td>
<td>15.5 (5.7)</td>
<td>26.5 (10.8)</td>
<td>0.022</td>
</tr>
<tr>
<td>Peak medial load rate (BW/s)</td>
<td>7.12 (2.5)</td>
<td>9.51 (2.7)</td>
<td>0.055</td>
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<tr>
<td>Peak resultant load rate (BW/s)</td>
<td>55.7 (12.0)</td>
<td>66.4 (17.8)</td>
<td>0.114</td>
</tr>
</tbody>
</table>

Foot Contact Identification Using A Tibial Mounted Accelerometer During Running

Kevin Aubol, Jillian L. Hawkins, Clare E. Milner, FACSM, Drexel University, Philadelphia, PA. (Sponsor: Clare Milner, FACSM) Email: kga43@drexel.edu
(No relevant relationships reported)

It is often necessary to identify foot contact when analyzing running biomechanics data, but most techniques are restricted to use in the laboratory. The accurate identification of foot contact from a single triaxial accelerometer mounted on the tibia may be useful for in-field measurements of gait. PURPOSE: To determine criterion-related validity of a new technique for determining foot contact from the resultant acceleration of the distal tibia compared to foot contact determined from vertical ground reaction force. METHODS: As part of a larger study, 19 runners (10 female, 9 male; 31 ± 6 years; 1.70 ± 0.08 m; 68.6 ± 11.6 kg) participated. Synchronous tibial acceleration and ground reaction force data were recorded at 1000 Hz using a triaxial accelerometer mounted to the skin over the distal antero-medial tibia and a force plate embedded in the floor. Participants completed 10 running trials at 3.0 m/s. Resultant acceleration was calculated and foot contact was determined using a custom algorithm that identified a minimum prior to peak resultant acceleration. Foot contact was also determined as the time at which vertical ground reaction force exceeded a threshold of 20 N. 95% limits of agreement between the two methods were calculated. RESULTS: On average the resultant acceleration determined from the accelerometer identified foot contact 2.1 ± 5.4 ms earlier than ground reaction force. The 95% limits of agreement were -8.5 to 12.8 ms. With this approach 95% of foot contacts identified from resultant acceleration were within 10 ms of foot contact identified from ground reaction force. CONCLUSION: Identifying foot strike from resultant tibial acceleration measured using a single triaxial accelerometer is a valid technique for foot contact identification in the field. Study funded by College of Nursing and Health Professions Research Award
2775 May 31 2:00 PM - 2:15 PM
Effects of Shock Pad and Synthetic Turf on Ankle Biomechanics in a 90º Cutting Movement
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(No relevant relationships reported)

Shock pad (PAD) is a popular choice underlayer installed under a synthetic turf (TURF) field. The effects of PAD on impact attenuation and injury risks of human movements are still relatively unknown.

PURPOSE: To examine impact attenuation related ankle biomechanical characteristics of a 90º cutting movement on synthetic turf with shock pad compared to synthetic turf only.

METHODS: Twelve recreational football and soccer players performed five successful trials of 90º cutting movement in each of two approaching speed conditions: 3.0±0.3 (SLOW) and 4.0±0.4 (FAST) m/s on each of TURF and PAD surface conditions. Three-dimensional kinematic and ground reaction force (GRF) data were collected simultaneously. A 2º monofilament synthetic turf with 1.2º stitch gauge was used in TURF and PAD conditions. A foam-based shock pad was used in PAD condition.

RESULTS: No significant surface main effect or surface by speed interactions were found for any ankle kinematic and kinetic variables and peak GRFs (p > 0.05). Increased peak ankle eversion moment (0.65 vs. 0.84 Nm/kg, p<0.001) and inversion loading range of motion (ROM, 13.7 vs. 18.6 deg, p<0.001) were seen in FAST compared to SLOW. Increases for peak ankle sagittal-plane concentric power, and frontal-plane eccentric and concentric power were also observed in FAST compared to SLOW. Peak vertical (2.04 vs. 2.31 BW, p<0.023) and medial loading (0.79 vs. 1.11 BW, p<0.002) GRFs were higher in FAST than SLOW. Additionally, peak pushoff medial GRFs were increased from SLOW to FAST (0.91 vs. 1.20 BW, p<0.025), but pushoff vertical GRFs were decreased slightly (2.24 vs. 2.11 BW, p=0.011).

CONCLUSIONS: The lack of significant differences between TURF and PAD and their interactions for examined ankle and GRF variables suggest that adding a form-based shock pad does not impede cutting performance. These results also seem to indicate there is a neuromuscular accommodation in cutting mechanics on PAD surface, which cannot be reflected loading variables using inverse dynamics. As cutting speed increased, greater increases in medial peak GRFs, and frontal-plane peak ankle moment and ROM were observed compared to those in sagittal-plane, suggesting increased mediolateral loading to ankle complex in fast cut movement. Supported in part by Brock International.

2776 May 31 2:15 PM - 2:30 PM
Gluteus Medius Activation During Gait Is Altered With Chronic Ankle Instability: An Ultrasound Imaging Study
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(No relevant relationships reported)

Altered gait mechanics are frequently reported in individuals with chronic ankle instability (CAI), and increasing information suggests proximal muscle adaptations occur in this population. Ultrasound imaging (USI) offers a visual means to evaluate muscle activation during movement, and overcomes limitations of electromyography to detect hip muscle activity.

PURPOSE: To identify gluteus maximum (GMAX) and medius (GMD) muscle activation using USI throughout walking gait in individuals with and without CAI.

METHODS: A descriptive laboratory study was conducted to evaluate gluteal muscle activation throughout walking on 40 total participants during a single session. Twenty young adults with CAI (21.6±2.4 years, 10 males) and 20 healthy participants (21.2±2.8 years, 10 males) walked on a treadmill at 1.35 m/s while researchers obtained 10-second clips of bilateral USI of the GMAX and GMD. USI clips were reduced to 55 frames consisting of 11-points over five full gait cycles. Muscle thickness values during walking were normalized to quiet bipedal standing USI images to obtain functional activation ratios (FARs). FARs with 90% confidence intervals (CI) were plotted at 10% interludes from 0-100% of the gait cycle to compare groups and limbs. Group mean differences and Cohen’s d effect sizes were used to assess the extent of differences.

RESULTS: The CAI group had decreased GMED activation bilaterally from 0-40% of walking gait compared to healthy counterparts with large effect sizes (d: 0.62-0.95). CAI group FARs were below quiet stance levels (FAR<1.0) throughout the entire gait cycle. There were no differences noted between groups or limbs for GMAX measures.

CONCLUSIONS: Proximal stabilizing musculature was altered bilaterally in CAI individuals compared to healthy counterparts, which may contribute to movement...
Chronicle Ankle Instability (CAI) is a condition characterized by neuromuscular, range of motion, and postural control deficits that predispose subjects to reinjury. Different kinematic landing strategies have been identified in people with CAI when compared to healthy controls. Whether these adaptations result in similar loading patterns than those without CAI, has not been documented. This knowledge would be of much use for programing physical rehabilitation protocols to prevent the progression of CAI.

**METHODS:** To compare ground reaction force (GRF) parameters between subjects with and without CAI, after a drop jump (DJ) and a drop landing (DL). The order of all 10 jumps for each subject was determined by an online random generator. The signal corresponding to the vertical GRF was low pass filtered (4th order Butterworth, 20 Hz), normalized to body weight, and then processed to calculate the maximal GRF (FMax) and the loading rate (LR) from the time of initial contact to when FMax was achieved. Comparisons among groups were performed using unpaired t test with normal distributed data; otherwise Mann-Whitney test was used. A p value <0.05 was considered as significant.

**RESULTS:** FMax was larger for CAI after DJ (CAI: 3.35 ± 0.57 N*N-1 vs CON: 3.03 ± 0.29 N*N-1; p<0.01), but was not different from CON after DL (CAI: 3.50 ± 2777

May 31 2:30 PM - 2:45 PM

**The Effect Of Persistent Pain Following Ankle Sprain On Lower Extremity Kinematics During Walking**

Kazandra M. Rodriguez1, Stephen C. Cobb2. 1University of Michigan, Ann Arbor, MI. 2University of Wisconsin-Milwaukee, Milwaukee, WI. Email: kazandra@umich.edu

(No relevant relationships reported)

Persistent pain is the most common complaint reported by those with chronic symptoms following ankle sprain with its prevalence peaking in middle-aged adults. Despite the high prevalence rate and associated adverse effects on mobility, quality of life, and physical activity, the influence of persistent ankle pain on lower extremity function during gait in middle-aged adults has not been examined. PURPOSE: To identify the modifiable lower extremity kinematic dysfunction during walking gait associated with persistent ankle pain in middle-aged adults. METHODS: Ten individuals with persistent ankle pain (9F, 1M; 55.4 ± 6.52 years; 166.8 ± 6.73 cm; 78.24 ± 25.05 kg) and nine matched uninjured controls (8F, 1M; 53.0 ± 5.79 years; 168.2 ± 6.06 cm; 75.81 ± 24.46 kg) volunteered for the study. The three-dimensional lower extremity kinematics and kinetics were collected during five barefoot walking trials at a self-selected speed. Lower extremity sagittal and frontal joint positions were used to calculate joint ROM and maximum joint position during 1st limb support, single-limb support, and 2nd double-limb support. Position at initial contact in the sagittal and frontal plane was also calculated. MANOVA tests assessed group differences with an alpha level of p<0.05. Significant tests were followed by independent t-tests with Bonferroni corrections. RESULTS: Rearfoot ankle inversion significantly increased in those with persistent ankle pain compared to controls during overground walking (p<0.05). Persistent ankle pain subjects were in an inverted position at initial contact (2.91 ± 4.32°), while controls were in an everted position at initial contact (-3.75 ± 3.25°). No other group differences were noted. CONCLUSIONS: Persistent ankle pain subjects demonstrate significant increases in rearfoot inversion at initial contact compared to controls. This altered movement pattern may result in further stress of the ankle joint structures, which may contribute to their persistent ankle pain. Additional research with a larger sample size and greater male representation is needed to further explore the effects of ankle pain on gait. This project was supported by the College of Health Sciences Student Research Grant Award at University of Wisconsin-Milwaukee.

50.59 N*N-1 v/s CON: 3.39 ± 0.39 N*N-1; p=0.57). LR was larger for CAI after both DJ (CAI: 35.74 ± 13.26 N*N-1 vs CON: 24.54 ± 10.01 N*N-1; p<0.01) and DL (CAI: 41.33 ± 10.43 N*N-1 vs CON: 35.03 ± 5.94 N*N-1; p<0.01)

CONCLUSION: According to our preliminary results, subjects with CAI exhibit less GRF absorption after dropping from a medium altitude, which might contribute as a risk factor for ankle reinjury. Patients with CAI might benefit from including loading absorption strategies in their rehabilitation protocols.

5.09 N*N-1 v/s CON: 3.59 ± 0.39 N*N-1; p<0.01). The signal corresponding to the vertical GRF was low pass filtered (4th order Butterworth, 20 Hz), normalized to body weight, and then processed to calculate the maximal GRF (FMax) and the loading rate (LR) from the time of initial contact to when FMax was achieved. Comparison among groups were performed using unpaired t test with normal distributed data; otherwise Mann-Whitney test was used. A p value <0.05 was considered as significant.

**RESULTS:** FMax was larger for CAI after DJ (CAI: 3.35 ± 0.57 N*N-1 v/s CON: 3.03 ± 0.29 N*N-1; p<0.01), but was not different from CON after DL (CAI: 3.50 ± 0.59 N*N-1 v/s CON: 3.39 ± 0.39 N*N-1; p=0.57). LR was larger for CAI after both DJ (CAI: 35.74 ± 13.26 N*N-1 vs CON: 24.54 ± 10.01 N*N-1; p<0.01) and DL (CAI: 41.33 ± 10.43 N*N-1 vs CON: 35.03 ± 5.94 N*N-1; p<0.01)

CONCLUSION: According to our preliminary results, subjects with CAI exhibit less GRF absorption after dropping from a medium altitude, which might contribute as a risk factor for ankle reinjury. Patients with CAI might benefit from including loading absorption strategies in their rehabilitation protocols.

8.09 N*N-1 v/s CON: 3.39 ± 0.39 N*N-1; p<0.01). The signal corresponding to the vertical GRF was low pass filtered (4th order Butterworth, 20 Hz), normalized to body weight, and then processed to calculate the maximal GRF (FMax) and the loading rate (LR) from the time of initial contact to when FMax was achieved. Comparison among groups were performed using unpaired t test with normal distributed data; otherwise Mann-Whitney test was used. A p value <0.05 was considered as significant.

**RESULTS:** FMax was larger for CAI after DJ (CAI: 3.35 ± 0.57 N*N-1 v/s CON: 3.03 ± 0.29 N*N-1; p<0.01), but was not different from CON after DL (CAI: 3.50 ± 2779

May 31 2:45 PM - 3:00 PM

**Subjects with Chronic Ankle Instability Exhibit Less Loading Absorption After Drop Jump and Drop Landing**

Oscar Achiardi, Tomás Castillo, Jaime Hernández, Josefa Robert, Catalina Sepúlveda. Pontificia Universidad Católica de Valparaíso, Valparaíso, Chile. Email: oscar.achiardi@gmail.com

(No relevant relationships reported)

Screening for mental health disorders common in collegiate athletes can be challenging due to time constraints and concerns about the willingness of athletes to report given the need for multiple screening tools to cover the broad spectrum and concerning stigma surrounding mental health. PURPOSE: This study evaluates the Brief Resilience Scale (BRS) as a tool to identify mental health conditions in collegiate athletes. The BRS is a 6-question screening tool assessing one’s ability to recover from stress. METHODS: Collegiate athletes were anonymously surveyed completing BRS and mental health screening tools including the Patient Health Questionnaire-2 (PHQ-2) for depression, Generalized Anxiety Disorder Assessment (GAD-7), Adult ADHD Self-Report Scale (ASRS), SCOFF questionnaire and Pittsburgh Sleep Quality Index (PSQI). Correlations between BRS and the screening tools were determined using Pearson’s correlation. Mean BRS scores among athletes screening positive or negative with the screening tools were compared by t-test. RESULTS: 468 athletes (67.1% male, 34.6% division I, 37.4% division II, 39.3% division III) participated in the survey with 392 (84%) completing all 6 screening tools. Significant differences in the mean BRS were seen among athletes screening positive vs. on 4/5 mental health screening instruments (PHQ-2: -0.43 ± 0.70 v
CONCLUSIONS: Resilience (BRS) shows significant correlation with mental health screening instruments in athletes. As a short survey that avoids the stigma of many mental health questions, BRS may provide an efficient and effective alternative screening instrument to identify those athletes most at risk and in need of further specific screening.

Purpose: To examine the prevalence of anger in collegiate NCAA Division I athletes; and to investigate differences between sex, academic status (i.e., freshman, senior) and sport type. Men's and women's collegiate athletes (N=616; age: 19.5±1.3 years; males: n=234, height: 183.5±14.3 cm, weight: 91.2±19.5 kg; females: n=382, height: 168.6±7.4 cm, weight: 63.4±9.8 kg) were recruited over a 3-year period from a NCAA Division I Institution. Descriptive demographic information (e.g., age, self-reported height and weight, sex, academic status, sport type) and the Anger Index Self-Test were collected from a NCAA Division I football program. Cross-tabulations were used to analyze the proportion of participants classified as “at risk” and injury status, multiple injuries and injury type. Cross-tabulations were used to analyze the proportion of participants classified as “at risk” and injury status, multiple injuries and injury type.

Results: The proportion of participants classified as “at risk” was significantly higher in male athletes (males: 26.5%, n=97; females: 41.7%, n=29). Overall, significant differences were found between sex (males: 26.5%, n=97; females: 41.7%, n=29) and injury type (males: 26.5%, n=97; females: 41.7%, n=29). Significant differences were found between sex (males: 26.5%, n=97; females: 41.7%, n=29) and injury type (males: 26.5%, n=97; females: 41.7%, n=29). Conclusions: Male collegiate athletes demonstrated a higher risk for anger than female collegiate athletes; however, most athletes displayed moderate risk for anger across different sports. Anger across academic status was not significant, therefore, this may imply anger management and/or coping skills were not learned or taught throughout college. Further examination is necessary to investigate the prevalence of risky behaviors in combination with anger among this population. Considering the high prevalence of anger among collegiate athletes; institutions should work to establish a screening for all student-athletes and direct those at risk to a qualified mental health professional for intervention.

Revised anger index: A revised anger index was developed to improve the screening tool. The Revised Anger Index (RAI) has been shown to be a more sensitive and specific measure of anger compared to the original Anger Index. The RAI includes additional items that assess the intensity and duration of anger, providing a more comprehensive assessment of an athlete's anger-related experiences. The RAI also incorporates a self-report rating scale to help athletes rate their level of anger on a scale from 1 (not at all) to 5 (very much). This revised scale allows for a more nuanced understanding of anger, enabling athletic professionals to better identify and address anger-related issues in student-athletes.

The National Collegiate Athletic Association (NCAA) has recently identified mental health as a priority for student-athletes. Each sport contains its own unique stressors, which may require sport-specific stress reduction and resiliency-building techniques. The Revised Anger Index provides a useful tool for athletic professionals to screen for anger-related concerns and develop targeted interventions to support the mental health and well-being of student-athletes.
Participating in sports helps to promote a healthy lifestyle. However, as competition level increases so do physical, emotional, and mental demands placed on the athletes. These increased demands could also increase susceptibility to depression, anxiety, and stress. PURPOSE: To investigate differences in self-reported in-season levels of stress, anxiety, and depression among college men's and women's basketball players from collegiate levels of NCAA Division I, II, III, and the NAIA. METHODS: 100 collegiate basketball players completed the Depression Anxiety Stress Scale-21 (DASS-21) and demographic information questionnaire including variables measuring hours of sleep, credit hours enrolled and history of injury. RESULTS: There was not a statistically significant difference in stress, anxiety and depression scores by division levels (DI, DII, DIII and NAIA) (p = .965, r = .383, r = .729, respectively). However, differences were found between males and females, with females reporting higher levels of stress compared to males (median score 4.0 and 13.0, respectively; p < .001), anxiety (median score 3.0 and 6.0, respectively; p < .001) and depression (2.0 and 5.0, respectively; p < .003). A comparison of hours of sleep by gender revealed males were more likely to get more sleep, however the difference was not statistically significant (p = .182). Similarly there was also a not a statistically significant difference between males and females for the number of credit hours currently taken (p = .221), but females were more likely to take more credit hours. CONCLUSION: Comparison revealed no statistical difference between collegiate settings. However, female athletes are at greater risk of depression, anxiety, and stress than males.

PURPOSE: To investigate whether there is a significant difference in the GRF and the time to vertical peak GRF in the trail leg in skilled versus recreational baseball hitters. METHODS: Twenty-two players (3 professional, 1 amateur, 5 college, 13 high school), mean age 18.09 ± 3.90 years, underwent 3D biomechanical baseball swing analysis. RESULTS: Skilled group demonstrated a significantly lower posterior peak GRF (Recreational = -0.40 ± 0.23, Skilled = -0.54 ± 0.23, p = 0.002), a significantly higher vertical peak GRF (Recreational = 0.97 ± 0.03, Skilled = 1.03 ± 0.02, p = 0.005) and a reduction in time to vertical peak GRF in the trail leg (Recreational = -0.40 ± 0.06 ms, Skilled = -0.54 ± 0.11 ms, p = 0.028) in comparison to the recreational group. CONCLUSION: The ability of the skilled athletes to control their trail leg peak GRF, while creating a significantly higher peak GRF and reaching the peak GRFs faster helps to both facilitate velocity of the swing and control their body movement. Combining these three distinct kinetic differences in the swing could lead to differences in bat velocity and skill level between these two groups.

PURPOSE: Successful hitting a baseball requires the hitter to properly use ground reaction forces (GRFs) in all three directions. The normal pattern of the GRFs during the baseball swing and the importance of the timing of those forces have been identified, but have not been compared among hitters across various competition levels. Therefore, the purpose of this study was to investigate how the peak GRFs in the medio-lateral direction (GRFx), anterior-posterior direction (GFRy), and vertical direction (GFRz), as well as time to reach peak GRFs for the lead and trail legs vary between athletes who play at the collegiate level and those who have not. METHODS: Active baseball players were recruited and separated into two groups, recreational (n = 6) and skilled (n = 6), with the skilled players competing at the NCAA level. Each athlete performed three swing trials while standing in their normal hitting stance on two force platforms sampling at 1000 Hz. The dependent variables included the peak GRFs, GFRy, and GFRz normalized to bodyweight, and the time to peak GRFx, GFRy, and GFRz in milliseconds before ball contact for the lead and trail legs, as determined by Visual3D software. Values were averaged for each respective group and compared using independent t-tests (p < 0.05). RESULTS: The skilled group demonstrated a significantly lower posterior peak GRF (Recreational = -0.26 ± 0.03 BW, Skilled = -0.23 ± 0.03 BW, p = 0.02), a significantly higher vertical peak GRF (Recreational = 0.97 ± 0.03 BW, Skilled = 1.03 ± 0.02 BW, p = 0.005) and a reduction in time to vertical peak GRF in the trail leg (Recreational = -0.40 ± 0.06 ms, Skilled = -0.54 ± 0.11 ms, p = 0.028) in comparison to the recreational group. CONCLUSION: The ability of the skilled athletes to control their trail leg peak GRF, while creating a significantly higher peak GRF and reaching the peak GRFs faster helps to both facilitate velocity of the swing and control their body movement. Combining these three distinct kinetic differences in the swing could lead to differences in bat velocity and skill level between these two groups.
correlated with max trail hip rotation angle during the swing (r=0.570, p= 0.006). No correlation of peak XF and passive hip rotation measures or hip rotation angles during the swing reached significance set at p < 0.05.

CONCLUSIONS: Findings do not support the use of XF as an indicator of bat speed. The variation in XF values may result from coaching differences or joint mobility compensation patterns. Athletes with limited hip rotation may attempt to compensate through generation of a large XF, possibly increasing the risk of back and oblique abdominous injuries. Clinicians caring for baseball players should screen for trail hip joint rotational mobility limitations.

Purpose: The effect of a single pitching bout on the material stiffness of the ulnar collateral ligament (UCL) was investigated in five competitive baseball pitchers (age: 20.0 ± 2.6 years). Differences in the response were compared between one pitcher with arm trouble and four asymptomatic pitchers. Methods: Shearwave ultrasound elastography was used to measure the material stiffness of the UCL prior to, and on the four days following, a moderately-intense pitching bout. The pitching bout consisted of a minimum of 50 full-effort pitches in either a practice or game situation. Pitch velocity was measured and maintained within 10% of expected maximum velocity to ensure full effort was given. Participant arm health was measured using the Kerlan-Jobe Orthopaedic Clinic Shoulder and Elbow Score (KJOC) prior to the first imaging session. Results: Four pitchers reported “playing without any arm trouble” with a mean KJOC score of 90.4 out of 100.0. One pitcher reported “playing, but with arm trouble” and had a KJOC score of 60.2. Each of the asymptomatic pitchers showed an immediate increase in UCL stiffness (mean increase = +15.99%) compared to a moderate pitching bout compared to a small sample of asymptomatic pitchers. An average of 3 different KSs were observed per pitcher.

RESULTS: None of the 71 pitchers demonstrated the proximal-to-distal KS order. Eleven different KS patterns were demonstrated, and the most prevalent order was pelvis-> trunk->arm and hand segments peaking simultaneously -> forearm. No players performed only 1 KS pattern among the curveball pitches. An average of 3 different KSs were observed per pitcher.

CONCLUSIONS: Deviation from the proximal-to-distal KS during pitch delivery results in an inefficient movement. The KS patterns of the fastball pitch have recently been described. This study evaluated the KS patterns of the curveball pitch. The most frequently performed KS during the curveball is with the forearm segment generating peak velocity simultaneously after the hand and shoulder velocity peaks. It is not known how the stresses across the shoulder and elbow are associated with this KS. Variation in KSs performed through curveballs may help prevent injury to the throwing arm, in particular if some KS patterns create more stress on the throwing arm than others.

Table 1. Pitcher characteristics and number of curveball kinematic sequences performed per pitcher. *LOP: Level of Play (P: professional, C: collegiate, HS: high school)

<table>
<thead>
<tr>
<th>ID</th>
<th>LOP</th>
<th>Throwing hand</th>
<th>Ball speed (MPH)</th>
<th># pitch trials</th>
<th># of KS</th>
</tr>
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<tbody>
<tr>
<td>1</td>
<td>P</td>
<td>Right</td>
<td>68.64</td>
<td>3</td>
<td>5</td>
</tr>
<tr>
<td>2</td>
<td>P</td>
<td>Left</td>
<td>71.68</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>3</td>
<td>C</td>
<td>Right</td>
<td>59.24</td>
<td>3</td>
<td>5</td>
</tr>
<tr>
<td>4</td>
<td>C</td>
<td>Right</td>
<td>63.96</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>5</td>
<td>C</td>
<td>Right</td>
<td>72.26</td>
<td>2</td>
<td>5</td>
</tr>
<tr>
<td>6</td>
<td>C</td>
<td>Right</td>
<td>62.36</td>
<td>2</td>
<td>5</td>
</tr>
<tr>
<td>7</td>
<td>C</td>
<td>Right</td>
<td>63.14</td>
<td>2</td>
<td>5</td>
</tr>
<tr>
<td>8</td>
<td>C</td>
<td>Right</td>
<td>70.06</td>
<td>2</td>
<td>5</td>
</tr>
<tr>
<td>9</td>
<td>C</td>
<td>Left</td>
<td>65.62</td>
<td>4</td>
<td>6</td>
</tr>
<tr>
<td>10</td>
<td>C</td>
<td>Left</td>
<td>66.68</td>
<td>3</td>
<td>5</td>
</tr>
<tr>
<td>11</td>
<td>HS</td>
<td>Right</td>
<td>64.62</td>
<td>2</td>
<td>5</td>
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<tr>
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<td>Left</td>
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<td>2</td>
<td>5</td>
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<td>HS</td>
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<td>57.4</td>
<td>2</td>
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<tr>
<td>14</td>
<td>HS</td>
<td>Left</td>
<td>59.4</td>
<td>3</td>
<td>5</td>
</tr>
</tbody>
</table>

The flow of mechanical energy of segmental motion provides a mechanism by which the throwing arm is accelerated during baseball pitching. Muscles can indirectly influence the energy level of distal segments to which they are not attached by way of the interaction torques transferring energy up the kinetic chain. No study to date, however, has addressed these causal components of mechanical power, specifically in relation to valgus loading at the elbow, which is prone to pitching-related injuries.

PURPOSE: To determine the components of muscle and velocity-dependent torques that contribute to the power of throwing arm segments when the elbow is under valgus load during pitching.

METHODS: The throwing motions of 10 adult pitchers (age = 22.9 ± 4.1 years, height = 1.87 ± 0.93 m, and mass = 86.5 ± 7.4 kg) were biomechanically measured using 3D motion capture after written informed consents were provided by the participants.
The resulting kinematic and kinetic data were included in a state-space power analysis using a 10-DOF model. The contributions of the torque-induced components to the mechanical work of the forearm were determined by integrating the power curves in time between the instants of front foot contact (FC) and maximum external rotation (MER) of the throwing shoulder.

RESULTS: Pitchers threw with a maximum elbow valgus torque of 70.1 ± 2.2 Nm. The trunk flexion (r1) and rotation (r3) components of the muscle-induced torque were the greatest positive contributors to the work of the forearm. Muscle torques contributed a total of 44.5 ± 23.4 J while velocity-dependent torques absorbed 69.6 ± 37.1 J, representing 61% of the total work (114.1 J) of the distal arm segments during the arm-cocking phase (Figure 1).

CONCLUSIONS: Trunk motion in the early part of the arm-cocking phase appears to drive the power of accelerating the throwing elbow in valgus via velocity-dependent torques.
**MEDICINE & SCIENCE IN SPORTS & EXERCISE®**

**F-32 Thematic Poster - Exercise and Neuroscience**

**Friday, May 31, 2019, 3:15 PM - 5:15 PM**

**Room: CC-101B**

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**2852 Chair: J. Carson Smith, FACSM. University of Maryland, College Park, MD.**

(No relevant relationships reported)

The Impact of Varying Exercise Protocols on Neurogenesis and Angiogenesis in the Dentine Gyrus

Darrin Lenthart, East Stroudsburg University, Seton Hall University, East Stroudsburg, PA. (Sponsor: Shala Davis, FACSM)

Email: dlenuhart@esu.edu

(No relevant relationships reported)

**PURPOSE:** To investigate the effects of varying exercise protocols on indices of neurogenesis and angiogenesis in the dentate gyrus of the hippocampus to inform efforts to forecast cognitive decline associated with neurodegenerative disease.

**METHODS:** The indices of neurogenesis and angiogenesis were assessed using the surrogate measures of maximal oxygen uptake (VO_{2peak}), cognitive function as assessed by the Rey auditory verbal learning test (RAVLT), and urinalysis of brain-derived neurotrophic factor (BDNF) concentration taken just prior to and just after a six-week training program. Twelve college-aged males were randomized into either a high intensity interval training group (HIIT) or a steady-state training group (SS) and were compared to six sedentary controls over the course of a six-week supervised training study.

**RESULTS:** Findings reflect an association between exercise and improved cognitive function. Specifically, cognitive function improved significantly with HIIT training (ARAVLT=3.66, p<0.045) and a significant correlation between cognitive function and improved VO_{2} from HIIT training was also shown (r=0.98;  p<0.010). Cognitive function and neurotrophin concentration both increased significantly with steady state training compared to controls (ARAVLT=4.40, p=0.011; ΔBDNF=54.09pg/ml, p=0.007).

**CONCLUSION:** varying exercise protocols have a varying impact on cognitive function as assessed by the RAVLT, urine BDNF, and VO_{2}. Findings hold implication for pathologies that involve cognitive decline.

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**2853 Board #1 May 31 3:15 PM - 5:15 PM**

The Impact of Varying Exercise Protocols on Neurogenesis and Angiogenesis in the Dentine Gyrus

Darrin Lenthart1, Chad A. Witmer2, Shala E. Davis3, Gavin Moir4, Christopher Esposito5, Sharhan Percil1 East Stroudsburg University, East Stroudsburg, PA, Seton Hall University, South Orange, NJ

Exercise is being considered for associations with improved neuronal health and longevity, synaptic plasticity, increased cerebral blood volume and angiogenesis, overall brain volume, and neurogenesis which collectively may have the power to forestall neurodegenerative disease.

**PURPOSE:** To investigate the effects of varying exercise protocols on indices of neurogenesis and angiogenesis in the dentate gyrus of the hippocampus to inform efforts to forecast cognitive decline associated with neurodegenerative disease.

**METHODS:** The indices of neurogenesis and angiogenesis were assessed using the surrogate measures of maximal oxygen uptake (VO_{2peak}), cognitive function as assessed by the Rey auditory verbal learning test (RAVLT), and urinalysis of brain-derived neurotrophic factor (BDNF) concentration taken just prior to and just after a six-week training protocol. Twelve college-aged males were randomized into either high intensity interval training group (HIIT) or a steady-state training group (SS) and were compared to six sedentary controls over the course of a six-week supervised training study.

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**CONCLUSION:** varying exercise protocols have a varying impact on cognitive function as assessed by the RAVLT, urine BDNF, and VO_{2}. Findings hold implication for pathologies that involve cognitive decline.

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**2854 Board #2 May 31 3:15 PM - 5:15 PM**

**Not Just for Joints: Physical Activity is Associated with Greater Cortical Thickness among Adults with Osteoarthritis**


Email: ryan.falck@hiphealth.ca

(No relevant relationships reported)

**PURPOSE:** Preliminary evidence suggests osteoarthritis (OA) is a risk factor for dementia. One potential reason is 87% of adults with OA are inactive, and low moderate-to-vigorous physical activity (MVPA) and high sedentary behaviour (SB) are each risk factors for brain atrophy. While regular MVPA and low SB are thus critical moderate-to-vigorous physical activity (MVPA) and high sedentary behaviour (SB) are associated with less cortical thickness independent of MVPA.

**RESULTS:** Participants had a mean age of 61 years (SD=9 years), and 80% were female. Higher MVPA was associated with greater cortical thickness independent of SB; and 2) SB was associated with less cortical thickness independent of MVPA.

**CONCLUSIONS:** Higher MVPA is associated with greater cortical thickness in adults with OA, however SB does not appear to be strongly associated with brain structure. Promoting MVPA among adults with OA may thus be an important strategy for maintaining cognitive health among this population.

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**2855 Board #3 May 31 3:15 PM - 5:15 PM**

**Fitness Trumps Fatness: An Examination of Cognition and Cerebral Volume**

Julian M. Gaitan, Sarah R. Lose, Ryan J. Dougherty, Jennifer M. Oh, Catherine L. Ellaguir, Cynthia M. Carlson, Howard A. Rowley, Yue Ma, Sanjay Asthana, Mark A. Sager, Bruce P. Hermann, Sterling C. Johnson, Barbara B. Bendlin, Dane B. Cook, FACSM, Ozioma C. Okonkwo. University of Wisconsin - Madison, Madison, WI.

(No relevant relationships reported)

**PURPOSE:** To determine whether cardiorespiratory fitness (VO_{2}peak) is related to cognition and cerebral volume in the presence of fatness in a late-middle-aged cohort at risk for Alzheimer’s disease (AD).

**METHODS:** 127 enrollees in the Wisconsin Registry for Alzheimer’s Prevention (age = 64.1 ± 5.8 years, N = 127, 43 male) underwent a graded maximal exercise test, anthropometric measurement, neuropsychological examination, a structural brain MRI scan, fasting venipuncture to assess insulin resistance (HOME-IR), and APOE genotyping. Subjects were categorized as high vs low on VO_{2}peak using age- and sex- specific cutoffs from normative data and high vs low on waist-to-height ratio using sex-specific cutoffs. This resulted in four groups: Low fit/High fat (Lofit-Hifat; n = 43); Low fit/Low fat (Lofit-Lofat; n = 11); High fit/High fat (Hifit-Hifat; n = 28); High fit/Low fat (Hifit-Lofat; n = 41). Four cognitive domains were examined: Verbal Learning & Memory, Immediate Memory, Speed & Flexibility, and Working Memory. Cerebral volume was computed from MRI scans as the ratio of cerebrospinal fluid to the sum of gray and white matter.

**RESULTS:** unfollow-ups of ANCOVAs (adjusted for HOME-IR, APOE, and in a secondary analysis, sex) were used to test whether fitness/fatness group associated with cognition and cerebral volume. When sex was added to the statistical models, there was no longer an effect of group on cognition or cerebral volume. MANCOVA and follow-up ANCOVAs (adjusted for HOME-IR, APOE, and in a secondary analysis, sex) were used to test whether fitness/fatness group associated with cognition and cerebral volume. Results: There was a significant main effect of group on Verbal Learning & Memory (p = .003). Compared to the Hifit-Lofat group, Hifit-Lofat and Hifit-Hifat (β =0.476, p =.013; β = 0.719, p = .001) performed better, whereas Lofit-Lofat did not (β = 0.023, p = .939). There was a significant main effect of group on cerebral volume (p = .012). Relative to the Lofit-Hifat group, Hifit-Hifat had significantly greater cerebral volume (β = -0.052, p = .007) while Hifit-Lofat and Lofit-Lofat were not different (β = -0.027, p = 151; β = 0.020, p = .451). When sex was added to the statistical models, there was no longer an effect of group on cognition or cerebral volume.

**CONCLUSION:** In a cohort at risk for AD, cardiorespiratory fitness is associated with better cognition in Verbal Learning & Memory and greater cerebral volume even in the presence of high fatness, while no such relationships were found. Cardiorespiratory fitness may be more important than achieving a favorable body habitus for preserving cognition and brain health.

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**2856 Board #4 May 31 3:15 PM - 5:15 PM**

**Brain Activity For Food Inhibition In Children With Higher Cardiorespiratory Fitness: An Fmri Study**

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Inhibitory cognitive control in children has been associated with future educational attainment, healthy body composition, and eating behavior. However, the practice of aerobic exercise has shown to improve inhibitory cognitive control in children, however the brain areas involved in this cognitive domain, in particular those related to the inhibition of high caloric food, are unclear.

**PURPOSE:** To identify the effects of enhanced cardiorespiratory fitness on brain activity involved in food-specific inhibitory control in children.

**METHODS:** 22 children aged 7-11 years (10.1 ± 1.4 years old) participated in this study by completing general anthropometric assessments, a graded shuttle run test to estimate cardiorespiratory fitness (VO_{2}max) and a food-specific cognitive task while acquiring functional magnetic resonance imaging (fMRI) data by a 1.5 T MRI scanner.
During the scanner children performed a Go/No-go task. Pictures of objects (neutral) were used as Go stimulus and caloric food and toys pictures as No-go stimulus. The entire protocol consisted of three blocks—No-go food, and three No-go toy. Each block contained 50 trials (80% Go stimulus). Children were divided into two groups (Lower fitness x Higher Fitness) separated by the median value of VO_{max}. Unpaired Student’s t-tests were used to compare cognitive performance between groups. Food specific-inhibitory control was assessed comparing which brain areas were more activated during No-Go conditions (Food) between groups by a two sample t-test.

RESULTS: No differences were found between groups for the cognitive performance (number of errors) and general anthropometric variables (p>0.05). However, children with higher cardiorespiratory fitness during the food-specific cognitive task had greater activation of areas related to cognition (prefrontal cortex and inferior parietal lobule), motor control (primary motor cortex and primary somatosensory cortex) (r=2, p<0.005).

CONCLUSION: Cardiorespiratory fitness might influence the brain activity during inhibition control of high caloric food in children. This finding suggests that regularly performed aerobic exercise by children may promote functional adaptations on the brain that could affect future eating behaviors.

Neuroimaging investigations in non-exercise contexts have shown that the dorsolateral prefrontal cortex (dlPFC), medial PFC and anterior cingulate, are engaged when individuals attempt to cognitively control negative affect. Moreover, there are indications that aversive interoceptive stimuli preferentially activate the right hemisphere. We theorized that affective responses to incremental exercise would be regulated by the same prefrontal network implicated in non-exercise affect regulation. We hypothesized that there would be preferential right-dlPFC activation, among individuals with low tolerance to exercise intensity and, therefore, less positive affective responses to challenging intensities of exercise (i.e., above ventilatory threshold, VT).

PURPOSE: To investigate dlPFC activation and affective responses during incremental exercise. 

METHODS: Thirty-eight participants (15M, 21F; Age: 23.7 ± 6.9 y; BMI: 24.0 ± 4.8 kg·m⁻²; VO₂peak: 32.8 ± 7.8 ml·kg⁻¹·min⁻¹) completed an incremental cycling test to volitional termination. They were divided into low- and high-Tolerance groups based on a median split of their Tolerance scores (Preference for Exercise Tolerance of the Intensity of Exercise Questionnaire). Near-infrared spectroscopy (NIRS) was used to assess changes from rest in the Tissue Oxygenation Index (ΔTOI) in the left (AF3) and right (AF4) dlPFC. Affective valence ratings (Feeling Scale; FS) were collected each min. 

RESULTS: Tolerance scores were positively correlated with FS ratings above VT (β = 0.28, p<0.05). There was no significant difference in ΔTOI between tolerant and low-tolerant individuals. For ΔTOI, a significant interaction was found between Tolerance and Fs ratings above VT (β = .04), such that lower-Tolerance individuals reported lower FS ratings. For ΔTOI, a significant interaction was found between Tolerance and Fs ratings above VT (β = .04), such that lower-Tolerance individuals reported lower FS ratings. For ΔTOI, a significant interaction was found between Tolerance and Fs ratings above VT (β = .04), such that lower-Tolerance individuals reported lower FS ratings.

CONCLUSION: Acute moderate-intensity exercise alters functional activation in brain regions involved in executive function and inhibitory control, which align with previous exercise studies showing a conflict-related shift from ACC to SPL activity. Our findings suggest that the short-term effects of acute exercise may accumulate and promote the cognitive improvements linked to exercise training. Moreover, our findings suggest that greater time awake after initial sleep onset (i.e., sleep fragmentation) may attenuate the benefits of aerobic exercise on functional activation in the aging brain. Randomized controlled trials are necessary to further evaluate the interactive effects of sleep and acute exercise in older adults. 

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Acute exercise (EX) affects neural activation, assessed with functional magnetic resonance imaging (fMRI), and is a suggested mechanism in the effects of EX on behavioral measures of cognition. PURPOSE: We investigated the effect of EX on neural activation during a set switching task (SST). METHODS: Six healthy, right-handed older adults (M=71.4±5.1) completed two separate visits [EX; 30-min of cycling at 55-65%Heart Rate Reserve and rest (RS); 30-min of seated rest]. After EX or RS participants completed a SST during an fMRI. Ss are a measure of executive function where participants shift attention between sets of rules during the task. Switch cost (cost) is the performance difference between switching (i.e. A, B, A) and repeat trials (i.e. A, A, A). The conditions included rest, a high switching block [70% switching, 30% repeat trials (HS)], and a low switching block [20% switching, 80% repeat trials (LS)]. fMRI analyses using FSL included assessment of main effects of activation during HS and LS blocks during EX and RS and a comparison of activation with reaction time cost. RESULTS: Across both HS and LS and EX and RS, participants similarly activated the lateral occipital cortex and frontopolar area. In addition, there was significant activation of the superior and inferior frontal gyri, middle frontal gyrus, cerebellum VIIb, thalamus, caudate, and insula following RS in HS and LS. There were no unique areas of activation in HS following EX, however in LS there was activation in the temporal occipital fusiform gyrus, inferior frontal gyrus, and middle frontal gyrus. In relation to performance, cost during HS was associated with activation of the cerebellum VIIb following EX and activation of the thalamus and occipital pole following RS. Further, cost during LS was associated with activation in the frontopolar area after EX and activation in the thalamus following RS.

CONCLUSION: Similar activation during HS and LS following rest and EX suggests a common network for SSs. During the HS blocks, EX did not elicit additional unique activation, as seen following RS or the LS block, suggesting EX-induced reduced expression. More research is needed to better understand the implication of differential activation. Results presented at ACSM will include additional participants; findings and conclusions will reflect the final analyses.

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METHODS: On separate days, 32 physically active older adults (24F, 66.3 ± 7.3 years) completed 30 minutes of moderate-intensity cycling (RPE 14-15) or rest in a counterbalanced order prior to resting-state fMRI data acquisition. Actigraphic sleep indices, including total sleep time (TST) and sleep efficiency (SE; proportion of time in bed spent asleep), were calculated using wrist actigraphy data from 8 ± 3.5 nights prior to the first study visit. We utilized a seed-based correlation analysis (seed: left posterior cingulate cortex [PCC]; MN1.2-54) to determine the effect of exercise on DMN-rsFC. We tested the association of TST and SE with residualized exercise-induced change in DMN-rsFC (ΔDMN-rsFC) with multiple linear regression.

RESULTS: A paired-samples t-test revealed decreased DMN-rsFC in the left inferior parietal lobule (IPL; MNI −41 −51 45, k = 108, 864 mm³) after exercise compared to rest. TST and SE explained 25% of the variance in exercise-induced ΔDMN-rsFC (R² = 0.253, F(2,29) = 4.91, p = .015). Every 30-minute increase in TST was associated with a β = 0.019-unit decrease in DMN-rsFC between the left PCC and left IPL (β = −3.13, p = .004).

CONCLUSION: Our findings suggest that acute moderate-intensity cycling exercise reduces functional connectivity between the left PCC and left IPL, two core DMN regions. Shorter sleep duration was associated with attenuated exercise-induced reduction in functional connectivity between these regions. Given the vulnerability of DMN regions to beta-amyloid deposition, our finding that exercise-induced effects on DMN-rsFC are modulated by sleep duration may have implications for optimizing results of exercise-based interventions aimed at preventing AD. Further research is needed to investigate this possibility.

Previous authors have demonstrated that the availability of neighborhood parks and greenspace is positively associated with physical activity engagement and health outcomes in youth. Yet, given the documented influence of perceptions of neighborhood safety, cleanliness, and traffic calming measures on physical activity participation in youth, further investigation is needed to consider the impact of perceived park access on youth health outcomes. PURPOSE: To examine the relationship between park access on youth health outcomes. METHODS: Data were obtained from 62 low-income 4th grade students in a central Texas school participating in TX Sprouts—a large, school-based gardening, nutrition, and cooking randomized controlled trial. A wall-mounted stadiometer and Tanita scale were used to measure students’ height, weight, and body fat percentage, respectively. Actigraph wGT3X+BT accelerometers captured student PA on garden days and non-garden days. Evenson (2008) cut points were used to calculate time spent in sedentary (SED) and in moderate-to-vigorous PA (MVPA). Total step counts (TSLS), and energy expenditure (kcal) were also obtained. Linear mixed modeling was used to determine the effect of TX Sprouts on PA, controlling for age, sex, and BMI. RESULTS: Students were 60.3% female, 59.7% Hispanic with a mean age of 9.2 ± 0.4 years, and 45% of students were affected by overweight/obesity. When compared to non-garden days, on garden days students demonstrated greater MVPA (β = 2.96, p < 0.001), TLSC (β = 551.45, p < 0.001), kcals (β = 18.04, p < 0.001), and a reduction in SED (β = −9.21, p < 0.001). This equates to an increase of approximately 3 minutes MVPA, 549 steps, 17.6 kcals, and a decrease of 9.4 minutes TMESD. CONCLUSION: Results showed increased PA for students on garden days vs. non-garden days. While findings reflect PA during one hour of a school day, garden lessons could have a substantial and meaningful impact on children’s PA if incorporated multiple times throughout the school week. Supported by NIH Grant R01 HL123865.

Previous studies have suggested that sedentary behaviors and physical inactivity might be independent risk factors for executive dysfunction. PURPOSE: To examine the independent and combined relationships of after-school sedentary time (ST) and daily physical activity (PA) with executive function in children and tentatively explore which of these two behaviors had greater impact on children’s executive function. METHODS: A total of 4,304 children aged 6-12 years were recruited in 2017. ST, PA and executive function were assessed using the International Physical Activity Questionnaire Short Form (IPAQ-SF) and the Behavior Rating Inventory of Executive Function (BRIEF), respectively. Subgroups were identified as: low ST, after-school ST<2 hours/day; high ST, after-school ST≥2 hours/day; low PA, moderate-to-vigorous physical activity (MVPA)≤60 minutes/day, high PA, MVPA>60 minutes/day. Participants were categorized into 4 groups: 1) low ST, high PA; 2) low ST, low PA; 3) high ST, high PA; 4) high ST, low PA. RESULTS: The mean age of the participants was 9.01 ± 0.4 years. Children in group 4 had the highest T-scores of BRIEF indices (48.23±8.44, increased symptom), followed by those in group 3 (47.10±8.45), group 2 (45.8±17.78), and group 1 (44.41±17.13), with P < 0.05 for each pairwise comparisons except for that between group 1 and 2. Multiple linear regressions showed that ST was positively related to the T-score of all indices, independent of MVPA (P < 0.05). However, MVPA was negatively associated with the T-score of metacognition index (MI) and global executive composite (GEC) only in the high ST subgroup (P < 0.05). CONCLUSION: Children with both low ST and high PA may have beneficial influence on their executive function. Notably, children with high ST and low PA demonstrated more significant deficits on the BRIEF than those with low ST and low PA, which suggested that intervention efforts should be paid more on reducing ST in addition to promoting PA.
Physical activity (PA) is associated with a wide range of health benefits in children and youth. Identifying factors that might influence activity level is important to aim future public health strategies. Cross-sectional studies have demonstrated an association between motor skills and PA in childhood, however few studies have examined whether early motor development in infancy is associated with PA in childhood. PURPOSE: To examine whether age for onset of walking predicts PA in 7 year olds. METHODS: We used data from the Norwegian Mother and Child Cohort Study (MoBa), which is an ongoing population-based birth cohort study. The mothers reported age for onset of walking (months) and PA at 7 years (frequency of participation per week in moderate-to-vigorous PA (MVPA)) through questionnaires. The PA-questionnaire’s validity is tested against accelerometer assessed MVPA (spearman’s rho = 0.38). We used multiple regression analyses and adjusted the analyses for gestational age, sex and weight at 1 year and parental education as a marker for socio-economic status. A formal test showed no evidence of an interaction by sex. RESULTS: A total of 33013 participants are included in the analysis (49% girls), and for gestational age, sex and weight at 1 year and parental education as a marker for socioeconomic status. The mean age (sd) were 7.1 (0.14) years at follow-up. The average age (sd) for onset of walking were 12.9 (1.86) months, and average participation rate (sd) were 4.3 (2.45) times/week in MVPA. We observed a negative association between age for onset of walking and participation in MVPA in childhood (B=-0.08, 95%CI=-0.10, -0.07) independent of confounders. CONCLUSION: This finding indicate that earlier age for onset of walking may predict PA in childhood. However, while the association may be considered week, i.e. each month earlier onset of walking is associated with 0.08 higher participation rate in MVPA (frequency per week), self-reported PA is likely prone to random measurement error attenuating the true association.

PURPOSE: To describe the prevalence of responders (R) and non-responders (NR) for hepatic fat content and liver enzyme levels between overweight children participating in a family-based lifestyle intervention (LS) or in a family-based lifestyle plus exercise intervention (LS+Ex). METHODS: This study included 102 overweight children (8-12 y; 55% girls; 57% with obesity according WOF criteria) that completed the 22 weeks of the EPIFROG (ClinicalTrials.gov id: NCT02258126) two arms parallel intervention trial. The LS group (N=53; 10.6±1.1 y; 55% girls; 55% with obesity) attended a family based lifestyle and psycho-educational program composed by 11 sessions of 90 minutes. The LS+Ex group (N=49; 10.5±1.1 y; 55% girls; 55% with obesity) attended the same educative program and additionally participated in an exercise program that included aerobic and strength exercises, 3 days/week, 90 mins/session. Before and after the intervention, hepatic fat content was measured by magnetic resonance imaging, and alanine aminotransferase (ALT), aspartate aminotransferase (AST) and gamma-GT were measured in fasting plasma samples. Children were categorized as R when the effect size (d-cohen) was ≥0.2, and as NR when d-cohen was <0.2. RESULTS: Regarding hepatic fat content, there was a significantly higher prevalence of R (P=0.035) in the LS+Ex group (54%), than in the LS group (34%). Moreover, the difference in the prevalence of R between the two groups was also significant for GGT (69% and 38% of R, for the LS+Ex and LS groups, respectively, P=0.002), while there were no significant differences in the prevalence of R in changes in ALT (45% vs. 37% of R, for the LS+Ex and LS groups) and AST/ALT (40% vs. 35% of R, for the LS+Ex and LS groups) between the two groups (all P>0.05). CONCLUSIONS: There was a higher prevalence of responders for hepatic fat content and GGT levels in the group of children with overweight that participated in the family-based multimodality intervention program that included exercise. These results suggest that lifestyle intervention programs for improving obesity associated comorbidities in children should include exercise training to improve their hepatic health.
Guidelines and Risk Factors

There were no other associations between meeting the guidelines and cardiometabolic risk factors, with adjustment for age, sex, race, and adiposity in adolescents. METHODS: Adolescents, ages 10 to 16 years, wore an accelerometer for 7 days, including overnight to capture PA and sleep. The PA guideline was defined as ≥ 60 minutes of moderate-to-vigorous PA per day. The dietary guideline was based on the Healthy Eating Index 2015 (SE < 0.05 for all). Meeting one guideline was associated with a lower BMI% and lower WC (β = 0.02, p < 0.05), animal protein (β = 0.02 SE = 0.02, p < 0.15), vegetable protein (β = 0.03 SE = 0.04, p < 0.44), and insulin (β = 3.5 SE = 1.4, p < 0.01) were not associated with changes in total LM per unit of energy-adjusted protein intake. However, leucine (p = 1.8 SE = 1.2, p = 0.03) and valine (β = 3.7 SE = 1.4, p < 0.01) were positively associated with changes in total LM per unit of energy-adjusted protein intake.

CONCLUSIONS: There was no association with total protein intake and changes in LM in young adults enrolled in a 9-month RT intervention. However, there was a positive association with two of the branch chain amino acids, leucine and valine. Thus, the type of protein may be more important than total protein intake for increasing LM during a long-term RT intervention.

Rapidly digested and absorbed proteins enhance the muscle protein synthesis response following resistance exercise, with the degree of hyperaminoacidemia suggested to be an important consideration. However, most studies have used supplemental protein sources, with little focus on how consumption of protein within a mixed meal influences postprandial amino acid (AA) responses. PURPOSE: To examine the pattern of postprandial AA responses to consuming whey protein isolate before or within a mixed meal after resistance exercise. METHODS: Eight resistance trained men (age 21 ± 1 yr; body mass 80.2 ± 8.4 kg; body fat 13 ± 6.2 %) completed two trials in a randomized order. Trials consisted of ~1 h lower-body resistance exercise, a 30 min post-exercise feeding period and a further 150 min supine rest period. Post-exercise nutrition was identical in composition (400 mL water at 0 min; an oat flapjack + 600 mL water at 15-30 min) and included 20 g of whey protein isolate, which was either consumed in the drink at 0 min (SUPP) or mixed into the oat flapjack consumed at 15-30 min (MEAL). Blood samples were taken every 15-30 min post-exercise to determine amino acid, glucose and insulin concentrations. RESULTS: Compared to MEAL, leucine and essential AA (EAA) concentrations were higher at 30-50 min and lower at 150 min in SUPP. Peak leucine (SUPP 414 (70) mmol/L; MEAL 216 (40) mmol/L; P < 0.001), EAA (SUPP 2404 (411) mmol/L; MEAL 1502 (235) mmol/L; P = 0.001) and TAA (SUPP 4860 (759) mmol/L; MEAL 3450 (467) mmol/L; P < 0.01) concentrations were all greater during SUPP vs MEAL, with peak concentrations also achieved earlier in SUPP. Total postprandial area under the curve for leucine, EAA and TAA concentrations were all greater during SUPP (P < 0.05). There were no between-trial differences for glucose or insulin responses (P > 0.05). CONCLUSIONS: Consumption of protein in supplemental form prior to, rather than within a mixed meal, facilitates a more rapid and pronounced postprandial aminoacidemia following resistance exercise. This might offer some advantage where maximizing the anabolic effect of resistance exercise is desirable. This project received no funding. The whey protein isolate was provided by Volac International Ltd.
Dietary protein consumption maximizes the anabolic response during resistance training (RT) by triggering muscle protein synthesis and providing the indispensable amino acids for the optimum protein balance. Leucine is considered the key amino acid in this process, suggesting that differences in protein quality may influence RT-induced gains in muscle mass and strength. In this respect, despite adequate evidence on lower anabolic properties of plant- vs. animal-based protein, the effects of an exclusive plant-based dietary protein diet on RT-induced adaptations are currently unknown. **PURPOSE:** To investigate the impact of dietary protein source (plant- vs. mixed-diet-based protein) on RT-induced changes in muscle mass and strength in total protein-matched young healthy men. METHODS: Nineteen vegan (VEG 26±5 y; 72.7±7.1 kg, 1.78±0.06 m) naïve physically active young men were enrolled in a 12-week, twice-weekly, lower-limb RT program. Dietary intake was adjusted to 1.6 g/kg/day for both groups via supplementing either soy (VEG) or whey (OMN) protein. Leg lean mass (LLM, by DXA) and lower-limb maximal strength (leg-press one-repetition-maximum, 1-RM) were determined PRE and POST intervention. Six 24-hour dietary recalls were performed at baseline (for habitual protein intake determination) and three during the intervention, for monitoring purposes. RESULTS: Significant increases in LLM were observed in both VEG (PRE=251±59 kg and POST=271±62 kg, ∆%=8.3±4.5 %, p<0.001) and OMN (PRE=19.1±2.4 kg and POST=20.3±2.7 kg, ∆%=6.1±3.9 %, p<0.001), and protein intake was similar between groups (VEG: 1.6±0.4 kg/d and OMN: 1.7±0.2 kg/d, p<0.30). CONCLUSION: This study was supported with product by Dymatize Nutrition.

**CONCLUSION:** Older adults have shown an attenuated post-exercise increase in muscle protein synthesis rates following ingestion of smaller amounts of protein when compared to younger adults. Consequently, more protein may be required to increase exercise training-induced gains in muscle mass and strength. In this respect, despite adequate evidence on lower anabolic properties of protein, rather than protein quality, may be more important for muscle adaptation in older adults. Supported by FAPESP grant 2016/22083-3.

**PURPOSE:** Leucine co-ingestion augments the muscle protein synthetic response to the ingestion of 15 g protein during recovery from resistance exercise in older men. METHODS: Sixty recreationally active males (age: 27±6 y; BMI: 23.8±2.6 kg·m−2) were subjected to 12 weeks of triweekly endurance exercise training. After each session and each night prior to sleep, participants ingested either a protein supplement (PRO; 35 g, 2873 kcal) or an isocaloric carbohydrate placebo (PLA; 7.2g, 10 kcal) 30 min prior to bed time on two separate occasions separated by 48-hours. RMR and measures of hunger, desire to eat, and satiety were analyzed using Paired T-tests. Significance was accepted at p<0.05. RESULTS: RMR (CP: 138±159 kcal/day) and relative oxygen consumption (CP: 3.41±0.44; PLA 3.36±0.38 ml/kg/min) were not different between CP and PLA. There were also no effects of CP and PLA on measures of appetite (Hunger: CP: 3.83±3.0; PLA: 3.1±2.7; Satiety: CP: 4.13±3.4; PLA: 4.7±2.7 cm; Desire to Eat: CP: 3.7±3.6; PLA: 2.8±2.1 cm). CONCLUSION: There were no differences in RMR and measures of appetite between CP and PLA. There is growing evidence that a small snack before sleep (150-200 kcal) is not harmful to metabolism or appetite. This study may be supported with product by Dymatize Nutrition.

**PURPOSE:** Pre-sleep consumption of casein protein on resting metabolic rate and appetite in premenopausal women. METHODS: Twenty-five premenopausal women (age: 28±4 y; BMI: 24.3±2.2 kg·m−2) were subjected to 12 weeks of triweekly endurance exercise training-induced gains in muscle mass and strength. In this respect, despite adequate evidence on lower anabolic properties of protein, rather than protein quality, may be more important for muscle adaptation in older adults. Supported by FAPESP grant 2016/22083-3.

**CONCLUSION:** To determine the acute effects of nighttime protein/intake on muscle protein synthesis of casein protein (CP) and a placebo (PLA) supplement on next-morning measures of resting metabolic rate (RMR) and appetite in sedentary premenopausal women. METHODS: This study was a randomized crossover double-blind placebo-controlled trial. Seven premenopausal (age: 19.9±1.2 yrs, BMI: 23.1±2.6 kg/m²) women participated. Subjects had body composition (DXA), RMR (indirect calorimetry), and appetite (visual analog scale, VAS) measured. Subjects consumed either CP (35.3 g, 130 kcal) or PLA (7.2 g, 10 kcal) 30 min prior to bed time on two separate occasions separated by 48-hours. RMR and measures of hunger, desire to eat, and satiety were analyzed using Paired T-tests. Significance was accepted at p<0.05. RESULTS: RMR (CP: 138±159 kcal/day) and relative oxygen consumption (CP: 3.41±0.44; PLA 3.36±0.38 ml/kg/min) were not different between CP and PLA. There were also no effects of CP and PLA on measures of appetite (Hunger: CP: 3.83±3.0; PLA: 3.1±2.7; Satiety: CP: 4.13±3.4; PLA: 4.7±2.7 cm; Desire to Eat: CP: 3.7±3.6; PLA: 2.8±2.1 cm). CONCLUSION: There were no differences in RMR and measures of appetite between CP and PLA. There is growing evidence that a small snack before sleep (150-200 kcal) is not harmful to metabolism or appetite. This study may be supported with product by Dymatize Nutrition.

**PURPOSE:** Dietary intake was assessed at baseline and during the intervention period. Repeated measures ANOVA was applied to assess whether training adaptations were different between groups.

**RESULTS:** Protein intake increased in PRO (1.2±0.4 to 1.6±0.3 g/kg) but not in PLA (1.3±0.4 to 1.2±0.3 g/kg), time x treatment interaction, P<0.001. Endurance exercise training induced an 11.6% increase in VO2max (time effect, P<0.001), with no differences between groups (PRO: 48.6±5.37 L·min⁻¹·kg⁻¹; PLA: 46.5±5.16 L·min⁻¹·kg⁻¹; time x treatment interaction, P=0.50). Time to complete the time-trial was reduced by 14.7% (time effect, P<0.001), with no differences between groups (time x treatment interaction, P=0.13). Muscular endurance increased by 6.7% (time effect, P<0.001), with no differences between groups (time x treatment interaction, P=0.84). Whole body lean mass was unchanged over time (P=0.97). However, leg lean mass showed an increase following endurance exercise training (P<0.001), which tended to be greater in PRO (P=0.53; 0.7 kg; PLA: 0.2±0.6 kg; time x treatment interaction, P=0.07).

**CONCLUSION:** Protein supplementation after exercise and before sleep does not further augment the gains in whole-body oxidative capacity and endurance exercise performance following prolonged endurance exercise training in healthy, young males.

**REFERENCES:**

Maintenance of muscle strength helps preserve functional capacity and independence in aging populations. Protein intake above the current recommended dietary allowance (RDA) is believed to optimally facilitate resistance training adaptations; however, the suitability of consuming these protein amounts for middle-aged adults remains unclear. PURPOSE: To determine whether dietary protein ingestion above the RDA modulates muscle strength and body composition to resistance exercise training in middle-aged adults. METHODS: 27 participants were randomly assigned to consume either the RDA of protein (0.8-1.0 g/kg/d; 52 ± 2 y, BMI = 27.9 ± 0.1 kg/m²) or twice the RDA (1.6-1.8 g/kg/d; 52 ± 2 y, BMI = 28.1 ± 0.9 kg/m²) during a 10-wk progressive resistance training program. Participants were counseled on equal distribution of protein, and consumed either 15g or 30g protein in the immediate post-exercise period and nightly before sleep, respectively. Body composition was assessed by dual-energy x-ray absorptiometry. One repetition maximum assessments were used to determine muscular strength for both lower and upper body exercises. Strength assessments were performed at baseline and after the 10-wk intervention. RESULTS: There was a significant increase (P < 0.05) in muscle strength in all exercises for both groups across time (Table 1). However, there was no significant difference in strength between groups (P > 0.05) after the intervention. Body fat % was not significantly different in either group (P > 0.05), or after intervention (P > 0.05). Lower body lean body mass significantly improved (P < 0.05) with resistance training in both groups with no group differences (P > 0.05). CONCLUSION: Dietary protein intake comparable to the RDA coupled with moderate post-exercise and nightly protein doses is adequate to support training-induced muscle strength and mass gains in middle-aged adults.

Supported by USA National Cattlemen’s Beef Association (NCBA)

<table>
<thead>
<tr>
<th>RDA (n = 14) 2x RDA (n = 13)</th>
<th>Baseline</th>
<th>Post-Intervention</th>
<th>Baseline</th>
<th>Post-Intervention</th>
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</thead>
<tbody>
<tr>
<td><strong>Body Fat (%)</strong></td>
<td>34.9 ± 2.3</td>
<td>34.0 ± 2.3</td>
<td>31.7 ± 2.4</td>
<td>31.9 ± 2.4</td>
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<tr>
<td><strong>Lower Body Lean Body Mass (kg)</strong></td>
<td>16.2 ± 1.4</td>
<td>17.2 ± 1.4*</td>
<td>18.1 ± 1.4</td>
<td>18.8 ± 1.4*</td>
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<tr>
<td><strong>One Repetition Maximum (kg)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Leg Press</strong></td>
<td>100.8 ± 9.0</td>
<td>151.1 ± 18.8*</td>
<td>100.5 ± 10.1</td>
<td>149.3 ± 17.1*</td>
</tr>
<tr>
<td><strong>Leg Curl</strong></td>
<td>57.1 ± 4.5</td>
<td>72.5 ± 6.5*</td>
<td>65.6 ± 6.04</td>
<td>85.8 ± 7.2*</td>
</tr>
<tr>
<td><strong>Leg Extension</strong></td>
<td>63.3 ± 5.0</td>
<td>94.4 ± 10.3*</td>
<td>66.1 ± 5.4</td>
<td>97.4 ± 13.2*</td>
</tr>
<tr>
<td><strong>Chest Press</strong></td>
<td>39.6 ± 5.4</td>
<td>48.4 ± 6.2*</td>
<td>41.4 ± 5.5</td>
<td>55.2 ± 5.9*</td>
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<tr>
<td><strong>Shoulder Press</strong></td>
<td>16.9 ± 3.17</td>
<td>25.3 ± 3.9*</td>
<td>16.7 ± 2.3</td>
<td>28.6 ± 3.3*</td>
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<td><strong>Seated Row</strong></td>
<td>41.5 ± 4.2</td>
<td>53.6 ± 4.3*</td>
<td>46.2 ± 5.1</td>
<td>57.0 ± 4.9*</td>
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<td><strong>Bicep Curl</strong></td>
<td>16.4 ± 1.3</td>
<td>22.1 ± 2.2*</td>
<td>19.6 ± 2.1</td>
<td>28.2 ± 2.6*</td>
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</table>

Table 1

**Results:**

**CONCLUSION:** doi:10.1249/AJP-B.0000000000002151

**F-35**

Thematic Poster - Running

Friday, May 31, 2019, 3:15 PM - 5:15 PM

Room: CC-102B

**2877**

Board #7

May 31 3:15 PM - 5:15 PM

Higher Protein Intake does Not Potentiate Resistance Training-Induced Muscular Adaptations in Middle-aged Adults

Rafael A. Alamilla, Colleen F. McKenna, Amadeo F. Salvador, Susannah Scaroni, Isabel G. Martinez, Joseph W. Beals, Scott A. Paluska, FACSM, Nicholas A. Burd. University of Illinois at Urbana/Champaign, Urbana, IL. (Sponsor: Scott A. Paluska, FACSM)

(No relevant relationships reported)

**RESULTS:**

**CONCLUSION:** doi:10.1249/AJP-B.0000000000002151

**2878**

Chair: Christopher J. Lundstrom. University of Minnesota, Minneapolis, MN.

(No relevant relationships reported)

**2879**

Board #1

May 31 3:15 PM - 5:15 PM

Are Changes In Running Economy Associated With Changes In Performance in Runners? A Systematic Review and Meta Analysis

Ian J. O'Sullivan1, Mark I. Johnson1, Sarah B. Clarke2, Peter Francis1 (Leeds Beckett University, Leeds, United Kingdom. 2Northern Michigan University, Marquette, MI., Email: i.osullivan7595@student.leedsbeckett.ac.uk)

(No relevant relationships reported)

**RESULTS:**

**CONCLUSIONS:** doi:10.1249/AJP-B.0000000000002151

**2880**

Board #2

May 31 3:15 PM - 5:15 PM

Running Economy Strongly Related to Ground Contact Time Imbalances

Dustin P. Joubert, Nicholas A. Guerra, Eric J. Jones, Erica G. Knowles, Aaron D. Piper. Stephen F. Austin State University, Nacogdoches, TX. (Sponsor: Stephen F. Crouse, FACSM)

Email: joubertd@sfasu.edu

(No relevant relationships reported)
Results: A statistically significant negative correlation was found between DJ and day. The data were analyzed using Pearson correlation coefficients. Measurement using three-dimensional (3D) motion capture experiments on the second was significantly higher in the WALK trial (p < 0.01; ES = 0.8). Maximal values for RPE-O, RPE-L, and VO2 (all p-values > 0.05; all ES values < 0.2), was analyzed using dependent t-tests. The RUN and WALK trials produced similar results.

Conclusions: These results indicate that DJ and RER are important factors to consider when comparing running and walking exercise modes. Future research should explore how these variables affect VO2max and VO2peak in long-distance runners.
High-Speed Treadmill vs Ground-Based Training for Sprint Speed Among College Athletes

Keith A. Coury, Monica O’Rourke. California Baptist University, Riverside, CA.

Email: keith@questspeed.com

(No relevant relationships reported)

Introduction: Practitioners often debate as to which speed-training method is most effective for improving speed. Ground-Based Speed Training (GBST) has been the predominant method, however with technological advances, High Speed Treadmill Training (HSTT) has been implemented and used (Hauschildt, 2010; Jerome-Koral, Herrera, & Millet, 2018; Johnson, Eastman, Feland, Mitchell, Mortensen, & Eggett, 2013; Ross et al., 2009).

Purpose: This study compared HSTT and GBST for improving speed and reducing 40-yard sprint times among collegiate athletes.

Methods: Twenty-one collegiate football and baseball players were randomly assigned to HSTT (n = 7), GBST (n = 7) or control group (n = 7). Experimental groups completed 8 specialized training sessions 2 times a week for 4 weeks. HSTT group trained using PerformX Tread-X30 high-speed treadmill in each session with inclines of 5% to 30% GBST group performed sprints that involved resisted and assisted training modalities: tow sled, uphill running, partner runs and downhill running. Results: Pre-test 40-yard sprint-time scores indicated no significant difference between groups prior to intervention (F(2,18) = 1.059, p = .367, n² = .105). Post-intervention indicated there was a 19.3% difference in times between the three groups (F(2,18) = 2.152, p = .145, n² = .193). HSTT group exhibited a significant difference among pre-intervention 40-yard sprint time (M = 5.02, SD = .320) to post-intervention (M = 4.80, SD = .312), (n6) = 5.418, p = .002) while GBST group did not; pre-intervention (M = 4.95, SD = .305) to post-intervention (M = 4.97, SD = .306), (n6) = .488, p = .67). Conclusions: HSTT group increased linear speed and decreased sprint times over GBST and control groups. HSTT may be an effective way to improve sprint speed for times over various distances in a shorter period of training time than GBST and these improvements can be transferred to collegiate and professional athletic performance.

F-36 Free Communication/Slide - Energy Balance-Weight Control

Chair: Edward L. Melanson, FACSM. University of Colorado Denver, Denver, CO.

(No relevant relationships reported)

Overeating and emotional eating can lead to weight gain. While exercise may help protect against weight gain, the mechanisms through which exercise aids in weight control are poorly understood. PURPOSE: This efficacy trial tests the hypothesis that exercise training impacts eating behaviors, specifically through a reduction in overeating and internal disinhibition (the tendency to eat in response to cognitive or emotional cues), in a sample of women who are overweight or obese. METHODS: Participants were inactive at baseline and self-identified as ‘stress eaters’ (eating more than usual when ‘moderately’ or ‘extremely’ stressed). They were randomized to 12 weeks of exercise training (EX) or to a no-exercise control (CON). EX participants were given an exercise goal of 200 min/wk of combined supervised and home-based exercise (30% supervised; home-based exercise was confirmed via accelerometry). No dietary instructions were provided to any participants. Assessments occurred at baseline and 12 weeks. Overeating episodes were measured over 14 days at each assessment using ecological momentary assessment (EMA; 5 surveys/day delivered randomly via smartphone). Internal disinhibition was assessed questionnaire.

RESULTS: 39 participants (EX: n=19, CON: n=20) completed the study (age: 40.8±10.3 years BMI: 31.6±3.9 kg/m²). Adherence to the exercise intervention was high (99.4% of all prescribed exercise was confirmed via accelerometry) and 12-week weight change did not differ by condition (EX: -1.1±3.5% vs. 0.4±2.0%, p=0.11). At week 12, the proportion of eating episodes that were characterized as overeating episodes was 18.4% in EX vs. 24.5% in CON (p=0.01). The odds of an overeating episode were lower in EX relative to CON and became more pronounced over time (condition*time=-0.05, SE=0.02, p=0.01). Specifically at week 12, the odds of having an overeating episode among EX participants was 0.58 times the odds of having an overeating episode within CON’s. Internal disinhibition decreased in EX (pre: 4.1±2.2, post: 2.8±1.8), but not CON (4.3±2.6 to 4.2±2.3, p=0.02). CONCLUSIONS: Exercise...
training reduced the likelihood of overeating, and in eating in response to emotional or cognitive cues, in women who self-identified as stress eaters. Thus, this may be one pathway by which exercise impacts body weight.

**2889 May 31 3:30 PM - 3:45 PM Compensatory Reduction in Non-Exercise Energy Expenditure Among Weight-Stable Overweight and Obese Adults**

Gregory A. Hand, FACSM1,2, Daniel P. O’Connor, FACSM3, Robin P. Shoek1, Stephanie Burgesses1, Steven N. Blair, FACSM1.

1West Virginia University, Morgantown, WV. 2University of Houston, Houston, TX. 3Children’s Mercy, Kansas City, MO. 4University of South Carolina, Columbia, SC.

**PURPOSE:** Increasing total daily energy expenditure is a critical component of weight management strategy. There is disagreement as to a potential compensatory reduction in non-exercise energy expenditure that could blunt the anticipated increase in total daily energy expenditure (TDEE) resulting from exercise participation. The purpose of the present study was to examine the effect of varying doses of exercise energy expenditure (EEex) on TDEE and non-exercise energy expenditure when body weight is maintained. **METHODS:** Seventy healthy, overweight or obese, young adult women and men participated in a 26-week exercise intervention. Based on the individual daily EEexes, participants were stratified into tertiles (T1, T2, T3) of increasing EEex. Paired sample t-tests determined significant within tertile differences between pre/post data for each variable. Linear regression models, adjusted for age, sex, race, and determined the significance of changes over time in selected variables. **RESULTS:** Average daily EEex was different among tertiles (39.9±9.7, 175.5±9.8, 282.9±9.8 kcal, respectively; p=0.001). No main effect of tertile was found for change in sedentary activity EE (p=0.028), moderate/vigorous EE (p=0.698), or TDEE (p=0.762). A negative main effect of tertile was found for a change in light activity EE (p=0.016) and for non-exercise energy expenditure (p=0.012), with a greater decrease in non-exercise energy expenditure in T3 (p=0.09). **CONCLUSION:** These data indicate that, when body weight is maintained, participation in the exercise program resulted in a compensatory reduction in light and non-exercise moderate/vigorous energy expenditure, as well as a less-than-expected increase in TDEE. These findings suggest that maintenance of non-exercise energy expenditure is critical for directly estimating the caloric deficit anticipated from participation in exercise as part of a weight loss program. Supported by an unrestricted grant from the Coca Cola Company.

**2890 May 31 4:35 PM - 4:45 PM The Effects of Steady State and High Intensity Exercise on Compensatory Eating Behaviors and Appetite**

Emily J. Sauers, Sarah E. Myles, Chad A. Wittmer, Shawn N. Munford, Shala E. Davis, FACSM. East Stroudsburg University, East Stroudsburg, PA (Sponsor: Shala Davis, FACSM)

Email: esausers@esu.edu

(No relevant relationships reported)

Exercise is often prescribed for weight control; however, it is not uncommon that weight loss is less than expected. Unexpected results may be influenced by compensatory eating behaviors following exercise. **PURPOSE:** The aim of this study was to examine differences in eating behaviors after steady state (SS) and high intensity (HI) active females. **METHODS:** Nine, recreationally active college-aged females participated in this study. Prior to testing, subjects completed a VO2 max test to individualize exercise. Subjects completed three trials in a randomized order: control (CON), HI exercise, or SS exercise. Each trial took place during the first week of the luteal phase of their menstrual cycle. During the CON trial, subjects remained seated during an exercise bout of 34 minutes. Food intake was recorded 24 hours before and up to 72 hours after each trial. Resting metabolic rate (RMR) was measured prior to and at 24, 48, and 72 hours following each trial. A visual analog scale was used to assess appetite before and immediately following each trial. **RESULTS:** Caloric expenditure was higher during SS (302.78±28.40 kcal) and HI (278.39±24.94 kcal) compared to CON (68.10±2.94 kcal) (p<0.001); however, no differences existed between exercise trials (p=0.53). Caloric intake was not different (p=0.82) between SS (1505.56±135.41 kcal), HI (1562.67±118.91 kcal), and CON (1485.89±136.52 kcal) 24 hours post exercise. Differences in caloric intake were not observed 48 hours post exercise (p=0.82) and 72 hours (p=0.60) post exercise. There were no differences (p=0.05) in RMR 24 hours after SS (1598.98±197.80 kcal), HI (1426.57±66.23 kcal), or CON (1430.83±68.93 kcal). Differences were not observed (p=0.72) in change in appetite following SS (2.89±7.13 mm), HI (8.22±10.57 mm), and CON (0.11±3.74 mm). **CONCLUSION:** Caloric intake and RMR were not different after SS or HI exercise. Appetite did not significantly change after exercise though large individual variability was observed; the largest change in appetite was observed following HI exercise. Compensatory eating may be highly individualistic and appetite exercise following should be considered further, particularly following HI exercise.
no difference between groups. VAT decreased across time (Baseline: 1518±907 cm³, 6-month: 1018±617 cm³, 12-month: 971±648 cm³; p<0.001) with no difference between groups.

CONCLUSIONS: The interventions were successful at reducing body weight and improving body composition in adults with obesity. The lack of additional weight loss, reductions in body composition and VAT with participation in MVPA at two different doses may suggest that there is a compensatory response in factors influencing energy balance that warrant further investigation. Supported by: NIH (R01 HL103646)

PURPOSE: To establish the effects of a diet combining intermittent fasting (IFM) with calorie restriction on energy expenditure and metabolic health, and to isolate the relative contributions of fasting and negative energy balance to any observed effects.

METHODS: After a 4-week control phase, 36 lean adults (mean±SD; age: 42±11 y, BMI = 23.9±2.1 kg/m²) were randomised to one of three conditions for 20 days; 1) daily calorie restriction (75.75; 75%; of habitual intake daily), 2) IFM with calorie restriction (0:150; alternating 24-h periods of fasting and feeding to 150% of habitual intake), 3) IFM without calorie restriction (0:200; alternating 24-h periods of fasting and feeding to 200% of habitual intake). In the IFM groups, transitions from feeding to fasting and vice versa occurred at 15:00 each day. In addition to free-living measures of energy intake (weighed record) and physical activity (combined heart rate/accelerometry), body composition (DEXA), metabolic rate and substrate oxidation (indirect calorimetry), fasted health markers and postprandial metabolic responses were measured at pre- and post-intervention.

RESULTS: Energy intake was reduced in the two energy-restricted groups (75.75 = 2602±904 kcal/d, 0.150 = 2105±1105 kcal/d; p=0.24) and maintained by 0.200 (+63.1±439 kcal/d; p=0.01) during control, with a pattern mirrored by changes in body mass (75.75 = 1.9±1.0 kg, 0.150 = 1.6±1.1 kg, 0.200 = -0.5±1.1 kg; p=0.46 75.75 v 0.150, p=0.01 75.75 v 0.200, p=0.04 0.150 v 0.200). However, the decrease in fat mass with 75.75 (1.8±0.8 kg) was greater than the decrease accompanying 0.150 (-0.8±0.9 kg, p=0.01 v 75.75), both of which differed from the stability seen following 0.200 (+0.1±0.7 kg, p=0.01 v 75.75, p=0.05 v 0.150). Furthermore, physical activity energy expenditure decreased following 0.150 when compared to 0.200 (0.150 = 4107±707 kcal/d, 0.200 = 247±594 kcal/d; p=0.07) but was unaffected by 75.75 (+452±77 kcal/d; p=0.24 v 0.150, p=0.31 v 0.200). Despite these differences, metabolic rate, substrate oxidation, fasting biochemistry and postprandial metabolism were all unaffected.

CONCLUSIONS: In lean adults, restricting calories through a complete alternate-day approach to IFM attenuated reductions in fat mass and prompted declines in physical activity, whilst metabolic health was unaffected.

PURPOSE: The purpose of this study was to examine the effects of exercise mode and intensity on energy expenditure (EE) during and after five time-matched aerobic and resistance exercise protocols in resistance-trained (RT) males. METHODS: Fourteen RT males (mean±SD; age:24.2±4.0 yrs; body mass:84.7±13.3 kg; height:181±2.88 cm; and body fat:15.9±4.6%) completed five separate protocols on separate days ≥48 hrs apart in random order, each lasting 40 min in duration: continuous aerobic (continuous), high intensity interval aerobic (HIIT), strength endurance (2x20), traditional resistance (3x10), and high intensity resistance (4x6). EE was measured before, during, immediately post- (0-30 min), and delayed post-exercise (60-90 min) using indirect calorimetry. RESULTS: No significant differences in exercise EE were seen between aerobic protocols. EE during both aerobic protocols was significantly greater (p<0.0001) than any of the three resistance protocols. EE during 4x6 was significantly greater than 3x10 and 2x20 by 38.10 kcal (p<0.04) and 67.8 kcal (p<0.01), respectively. From 0-30 min post-exercise, a mean increase in EE of 6.2% was seen only following the 2x20 protocol as compared to baseline pre-exercise (p<0.05). From 60-90 min post-exercise, the 3x10, 4x6, and HIIT protocols showed significant mean reductions in EE of 10.7%, 8.7%, 7.1% (p<0.05) as compared to baseline pre-exercise, respectively. The combined EE from during and after exercise resulted in the same rank order as during exercise (least to greatest: 2x20, 3x10,4x6, continuous, and HIIT). CONCLUSIONS: Significant reductions in EE were found in the 3x10, 4x6, and HIIT protocols from 60-90 min post-exercise as compared to baseline pre-exercise. Continuous and HIIT protocols had the greatest EE during exercise when compared to the resistance protocols. These results have important implications on EE during and after exercise and should be considered when designing exercise training programs. Given the reductions found in EE during 60-90 min post-exercise in the 3x10, 4x6, and HIIT protocols, special consideration should be given to post-exercise nutrition to avoid energy deficits which could negatively impact recovery. Supported by an ASPIRE I Grant from the University of South Carolina.
Resistance exercise that incorporates intra-set rest between repetition blocks (i.e., cluster sets (CS)) can produce a smaller metabolic stress and endocrine response than traditional sets (TS). PURPOSE: To examine the effect of CS on the acute cytokine response in resistance trained women. METHODS: 12 resistance-trained women (mean ± SD: 23.7 ± 1.1 years; 160.1 ± 5.5 cm; 62.5 ± 1.7 kg; 5 ± 1 years training) completed 3 sessions in the follicular phase. One-repetition maximum (IRM) back squat (BS) (98.7 ± 4.1 kg), and BS:body mass (1.6 ± 0.1) were determined in Session 1. For Session 2 (3 days post Session 1) and Session 3 (7 days post Session 2), subjects were randomly assigned to either 4 sets of 10 reps with 120 seconds (s) inter-set rest (TS) or 4 x 4 (2 x 5 reps) with 30s intra-set rest and 60s inter-set rest (CS). All performed both protocols at 70% IRM BS. Instructions were to perform every rep “as explosively as possible”. Blood was collected pre-exercise (PRE), immediately after sets 1, 2, 3, 4, and at 5 +5, 15 +5, 30 +30, and 60 +60 min post-exercise and analyzed for interleukin (IL)-β, IL-2, IL-6, IL-8, IL-10, and IL-15. Data were analyzed using repeated measures ANOVAs (2 x 9). RESULTS: A significant main effect of time (p<0.05) was found for IL-β, IL-2, IL-8, IL-10, and IL-15. Concentration of IL-β was smaller at +5 (5.3 ± 0.4 ng/mL) compared to PRE (5.6 ± 0.4 ± 0.3) and smaller at +60 (3.7 ± 0.4) compared to IP (4.1 ± 0.4). IL-2 was greater after set 1 (10.8 ± 1.0 ng/mL) and set 2 (11.0 ± 1.2) compared to PRE (10.2 ± 0.4), and smaller at +30 (9.9 ± 0.3) compared to IP (11.0 ± 1.0). IL-8 was greater after set 1 (8.4 ± 0.6 ng/mL), set 2 (8.6 ± 0.7), and set 3 (8.5 ± 0.7) compared to PRE (8.0 ± 0.6). IL-10 was smaller at +30 (31.3 ± 7.4 ng/mL) compared to PRE (34.0 ± 7.4), and also smaller at +15 (32.6 ± 7.9 ± 30 ± 31.3 ± 7.4, and +60 (33.4 ± 8.6) compared to IP (38.0 ± 8.6). IL-15 was greater at IP (15.5 ± 4.0 ng/mL) compared to PRE (13.5 ± 3.5), and smaller at PRE (13.5 ± 3.5), +30 (11.9 ± 3.3), and +60 (16.0 ± 8.2) compared to IP (15.5 ± 4.0). No condition × time point effects were observed. CONCLUSIONS: Both TS and CS induced an acute cytokine response in resistance-trained women; incorporating intra-set rest (CS) did not appear to affect this cytokine response. Supported in part by a grant from the National Strength and Conditioning Association Foundation.

**Purpose:** To identify relationships between cytokines and time spent above critical body temperatures in response to aerobic exercise in various environments. METHODS: 12 recreationally active men (24.4 ± 3.1 yrs; 1.81 ± 0.07 m; 81.5 ±8.0 kg; 47.2 ± 4.8 ml/kg/min) completed five experimental visits: a VO2 max, and a cycling trial in 23°C/45%RH, 23°C/70%RH, 34°C/20%RH and 34°C/45%RH. After supine rest, exercise conditions consisted of 60mins of cycling at 60% VO2max, a 15min rest, and a time to exhaustion (TTE) trial at 90% VO2max. Blood was obtained before exercise (PRE), after 60min cycling (60), and after TTE (90). Serum concentrations of IL-1β, IL-1α, IL-6, IL-10 and TNF-α were analyzed via ELISA. Participant’s rectal (T_r) and skin temperatures (T_s) at five locations: Chest, Triceps, Forearm, Thigh and Calf were monitored continuously. Whole body temperature (T_w) and T_r were calculated via weighted averages. Area Under the Curve with respect to increase (AUCi) was calculated for T_w and T_r. Data were analyzed as Pearson Product Moment Correlations between AUCi for T_w and T_r with changes in cytokine concentration. Time spent above specific critical temperatures for T_w and T_r were related to changes in cytokine concentrations from PRE-60 and PRE-90 using stepwise linear regression. RESULTS: Correlations were observed between TNFα PRE-60, and PRE-90 with T_w (r=0.576 p=0.001; r=0.561 p=0.001; r=0.516 p=0.001, respectively) but not T_r. Time spent with T_w above 33.5°C and 35°C were predictive of increases seen in TNFα PRE-60 (r=0.695, p=0.001). TNFα PRE-90 was related to time spent above 33.5°C for T_r (r=0.593, p<0.001). Time spent with T_w above 38°C was correlated to, but not predictive of increases seen in TNFα from PRE to 60 and PRE to 90 (r=0.030, p=0.020). Time spent above 38.5°C for T_r displayed significant correlations with increases seen in IL-6 PRE-60 (r=0.470, p=0.002) No other correlations or relationships were observed with changes in cytokine concentration and body temperature. Conclusions: Data indicate that changes in TNFα may be related to time spent above critical T_w of 33.5°C and 35°C. Increases in IL-6 appear to be related to time spent above T_r of 38.5°C.

**Inflammatory cytokines are thought to be at the root of prostate tumor progression. Exercise has been shown to be beneficial in men with prostate cancer (PCa), however, the impact of exercise on tumor physiology is not clearly understood. PURPOSE: To test the hypothesis that exercise inhibits tumor progression and modulates pro-tumorigenic cytokine concentrations in the transgenic adenocarcinoma of mouse prostate (TRAMP) model. METHODS: Thirty, 10-week old TRAMP mice were randomized to either voluntary wheel running (VWR) or control group. Palpable tumors and VWR activity were monitored weekly. Mice were sacrificed at 4, 8, 12 and 20-weeks to assess time point differences. Excised tumors were paraffin embedded, sectioned, and stained with hematoxylin and eosin. Sectioned tumor slides were scored by a pathologist blinded to the groups. Serum collected from mice sacrificed at the 4-week and 20-week time points were assayed in duplicate using a 32 panel Mouse Cytokine Magnetic Multiplex Assay. Analysis of variance was performed to determine significant differences between treatment groups. RESULTS: Control mice presented first with palpable tumors at 14 weeks of age. VWR significantly delayed the presence of palpable tumors by 5 weeks (19 weeks old; p<0.05). No significant pathological changes were observed as a function of time. Furthermore, data were pooled for analysis. A treatment effect was observed with VWR mice having significantly lower number of high-grade tumors compared to controls. Specifically, 71% of control mice had high grade tumors compared to only 17% in the VWR group (p<0.001). Of the 32 cytokines measured, VWR significantly lowered concentrations of tumor modulating cytokines eotaxin (pre: 1291.2±310; post: 702.2±273; p=0.01), IL-1α (pre: 457.97; post: 167.161; p=0.03), IL-6 (pre: 4.7±0.2; post: 1.9±0.4; p=0.001), IL-12(p40) (pre: 16.9±1.5; post: ND; p=0.001) and VEGF (pre: 1.27±0.3; post: 0.31±0.3; p=0.04). No changes were observed in the control group. After 20 weeks, VWR group had significantly lower IL-5 (Con: 3.75±0.7; VWR: 1.9±0.4; p=0.01) and VEGF (Con: 1.72±0.7; VWR: 0.31±0.3; p=0.02) compared to controls. CONCLUSIONS: These results suggest VWR suppresses tumor aggressiveness by altering the inflammatory cytokine profile. Further research on mechanisms of action is needed.
Vol. 49 No. 5 Supplement

MEDICINE & SCIENCE IN SPORTS & EXERCISE®

R. J. Thompson1, C. R. Wittenborn2

Tumour hypoxia following 30 min treadmill running

Hypoxia fraction (%)

0 5 10 15 20

0 m/min 6 m/min 12 m/min 18 m/min

Running speed @ 25 degree incline

p=0.046

p=0.034

p=0.19

INTRODUCTION: Low blood perfusion and hypoxia are characteristic features of tumors and are factors of resistance to radiation and chemotherapy. A few rodent studies show that aerobic exercise, that has no severe side effects, may improve perfusion and reduce hypoxia but the significance of exercise intensity is unknown.

METHODS: Female CDF1 mice were injected with the C3H mammary carcinoma and immediately after exercise injected with Hoechst 33342 before being sacrificed 1 minute later. Tumors were excised, and histological sections prepared. Hypoxia was determined from the degree of Pimonidazole binding, while analysis of the Hoechst 33342 staining enabled analyses of perfused vessels in the tumor (latter analyses ongoing. Data not presented).

RESULTS: The mean hypoxic fraction was 9.0±5.2% for mice exposed to the high intensity running schedule and was significantly lower compared with the hypoxic fraction in tumors from the control group (14.2±6.2%, Student’s T-test p=0.046) and low intensity group (13.6±4.0%, p=0.034) but not the moderate intensity group (12.6±7.0%, p=0.19).

CONCLUSION: High intensity for 30 minutes may reduce tumor hypoxic fraction in mice and our current studies investigate the duration of the reduction in hypoxia after exercise cessation and examine the effect of this this exercise regime on tumor radiation response.

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Supported by: New Faculty Start-up Funds.

A Single High-Intensity Exercise Bout Reduces Tumour Hypoxia in Mice.

Simon Lonbro1, Pernille Byralsen Elming2, Thomas Wittenborn1, Michael R. Horsman3, Aarhus University, Aarhus C, Denmark.

INTRODUCTION: Low blood perfusion and hypoxia are characteristic features of tumors and are factors of resistance to radiation and chemotherapy. A few rodent studies show that aerobic exercise, that has no severe side effects, may improve perfusion and reduce hypoxia but the significance of exercise intensity is unknown.

METHODS: Female CDF1 mice were injected with the C3H mammary carcinoma in the mammary fat pad and allocated to either a Control group (no exercise) or a group performing low (6 m/min), moderate (12 m/min) or high intensity (18 m/min) treadmill running for 30 minutes (n=11/group). Prior to running, all mice were injected with Pimonidazole and immediately after exercise injected with Hoechst 33342 to determine the degree of Pimonidazole binding, while

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Complications Post Unicompartmental Knee Arthroplasty and Physical Therapy Manual Therapy

Julie B. Barnett, UT Health San Antonio Texas, San Antonio, TX. Email: barnettj3@uthscsa.edu
(No relevant relationships reported)

HISTORY: 65 year old male underwent an initial medial unicompartmental knee arthroplasty and physical therapy manual therapy and exercise. The patient had significant increase in pain after physical therapy manual techniques in extension and exercises interventions. Subsequently, the patient underwent a total knee arthroplasty after a lateral tibial plateau fracture was revealed.

PHYSICAL EXAMINATION: Patient had approximately minus 10 degrees of knee extension at eight weeks post unicompartmental medial arthroplasty.

DIFFERENTIAL DIAGNOSIS: Joint adhesions vs muscular restrictions vs fracture.

TEST AND RESULTS: Passive range of motion measurements taken during physical therapy with restrictions in knee extension passive range of motion.2nd MRI revealing lateral tibial plateau fracture.

FINAL WORKING DIAGNOSIS: Lateral tibial plateau fracture per MRI

TREATMENT AND OUTCOMES: Total knee arthroplasty performed and patient eventually gained full range of motion of the knee joint, normal gait, and reduction in pain.

Transplant Frailty Prehabilitation

Demitri Constantinou, Keegan Willemsen. University of the Witwatersrand, Wits, South Africa. (Sponsor: Yoganathan Coopoo, FACSM)
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(No relevant relationships reported)


PHYSICAL EXAMINATION: Colour - ashen/pallor. HR = 62 bpm, regular, good volume. BP = 96/74 mmHg. Cor - NAD Lungs - NAD. Abdomen - NAD. Clinically balance reduced, generalised muscle weakness.

DIFFERENTIAL DIAGNOSIS: Anemia, paraneoplastic syndrome, chemotherapy / oncology deconditioning, cardiac dysfunction

TEST AND RESULTS: Lab results - marginally raised liver enzymes. No current anemia. Staged treadmill test using modified Bruce Protocol with ECG monitoring and mobile metabolic measurements. The results showed pre-exercise HR = 60 bpm, regular, pre exercise BP = 94/76 mmHg; maximum BP post exercise expected increases with peak RPE of 15-20 although physically could not continue. ECG normal at all and with effort; Peak heart rate = 184 (112% of predicted). Exercise time = 9.58 minutes. Maximum load to stage 5 = 17 mets. Peak Vo2 = 18.8 ml/min/kg at 08.30 minutes. RER reached 1 at 3.15 mins. Ventilatory equivalent was high, and occurred early - implying early anaerobic dependent metabolism, likely from compromised aerobic energy system. Liver dysfunction with effects on glycolgenolysis and glucosegenesis unknown.

FINAL WORKING DIAGNOSIS: General deconditioning of multiple etiologies related to liver tumor

TREATMENT AND OUTCOMES: Exercise prehabilitation for transplant to improve aerobic function, muscle strength and balance. Exercise sessions three times per week, with significant improvements in objective outcome measures and subjective energy levels, function and quality of life.

Age and Gender Specific Issues - Power Based Exercise Program in a Postmenopausal Female

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(No relevant relationships reported)

HISTORY: 70 year old female with Osteoporosis was referred to Physical Therapy for gait and balance training. The patient denies any prior history of cancer, diabetes, neurological history, prior orthopedic injuries/surgeries, or major cardiac events/surgeries. Her
current prescribed medications include Lipitor, Norvasc, Hylaar and Lexapro. The patient further mentions a history of osteopenia, but a recent DEXA scan classified the patient as Osteoporotic at femoral neck with a T-score of -2.5. The patient was prescribed 70 mg of Fosamax QD and continued with supplemental Calcium with Vitamin D. The patient reported reduction of balance with day to day activities and reported a fear of falling, but denied any falls.

**Physical Examination:**
Postural assessments demonstrated excessive forward head posture, with increased thoracic kyphosis along with excessive lumbar lordosis. Neurological assessment and ROM at the lumbar spine and hips were all within normal limits. Limited muscular strength was noted in bilateral lower extremities. Deficits in static balance were also noted with tandem stance.

**Test and Results:**
Dynamic Gait Index Score of 15/24, consistent with an increased fall risk. DEXA results at femoral neck: T-Score: -2.5; BMD: .572 gr/cm². DEXA results at lumbar spine: T-Score: -2.2; BMD: .807 gr/cm².

**Intervention:**
A Progressive Resistive Functional Power based exercise program was conducted an average two times per week for one year. A treadmill warm-up followed by progressive functional activities such as sit to stands for speed, forward step ups for speed, hip abduction and hip extension for speed were included. Progressions consisted of increased resistance and increased speed of movement.

**Outcomes:**
DEXA scan demonstrated BMD improvements of 29% (742 gr/cm²) and 24% (1.003 gr/cm²), as well as improvements in T-score to -2.1 to -1.5 at her femoral neck and lumbar spine, respectively. The changes attenuate fracture and mortality risk. Furthermore, a 7 point change in her Dynamic Gait Index score was noted post intervention, resulting in a decreased risk of falling. The patient has continued to be independent with a home exercise program along with continued use of her prescribed medications.

**2910 May 31 4:15 PM - 4:35 PM**

**Mitochondrial Myopathy, The Use Of Resistance, Mobility And Neuromuscular Exercise Training In A Community Clinic.**

_Catherine R. Moss. Optimize Health Ltd, The University of Auckland, Auckland, New Zealand._

(No relevant relationships reported)

**History:**
A Female 68 yrs old was presented to the exercise rehabilitation clinic with:
- Mitochondrial Disease (ragged red muscle fibers, excessive mitochondria)
- POLG-associated CPEO
- Osteoporosis

**Physical Examination:**
- Extreme muscle weakness
- Low BMI
- No eye movement tracking, eyelids paralyzed
- Fatigue

**Differential Diagnosis:**
- Severe cervical kyphosis and mild thoracic kyphosis and anterior pelvic tilt, low muscle strength.

**Testing and Results:**
A continuous recumbent cycle protocol with peak power of 28 Watts, peak blood pressure 168/74 mmHg, 110 bpm.

Function testing findings: 30-second Sit to stand test: 3 reps in 30 seconds; Dumbbell bicep curl test (60 seconds): Left arm was 30 reps, right arm was 20 reps; Romberg (eyes open): <3 seconds for each leg, Tandem stance balance test: not possible without modification.

**Results**
- Post 8 week test results
  - 30-second Sit to stand test: 6 reps in 30 seconds (100% increase); Dumbbell bicep curl test (60 seconds): Left arm was 47 reps (17 rep increase), right arm was 41 reps (21 rep increase); Romberg (eyes open): Left leg was 4.50 seconds (~2 second improvement) and right leg was 5.46 seconds (~3.5 second improvement), Tandem stance balance test: Left leg was 6.12 seconds and right leg was 5.59 seconds (and decrease on both sides from 0 seconds).

**Working Diagnosis:**
Mitochondrial myopathy with POLG-associated CPEO and osteoporosis with associated poor muscular strength, poor balance and posture.

**Treatment and Outcomes:**
The client attended a community clinical exercise rehabilitation program for 8 weeks, 2 x week 30 minutes. After a 5-minute warm up on a recumbent cycle (28-30 Watts), the client went through a one-on-one resistance & mobility training session focusing on variations of: Strength training, proprioception training, upper body & neck mobility & posture, co-ordination and muscle activation, functional balance training

**Outcomes:**
A low intensity progressive resistance program that incorporates a variation of balance, proprioception, flexibility and muscle activation as well as upper back mobility training is recommended for the mitochondrial myopathy conditions. Program should be continued for a further 10-12 weeks, 2 x per week of ~30 minutes with slow to moderate intensity progression.
Back Pain in a Multi-Sport High School Athlete

John Diefenderfer, Rob Stevens. Maine General Sports Medicine, Augusta, ME. (Sponsor: James Dunlap, FACSM) (No relevant relationships reported)

HISTORY: A 15-year-old male football player presented with low back pain that was worse on the left side. His injury occurred about 3 weeks ago during practice where he dove to tackle another teammate and had sharp pain in his lower back. He stated running, sprinting, jumping, twisting to throw the football, and sometimes bending forward all worsened the pain. Rest seemed to help, but he continued to have a dull ache in his low back that was fairly constant. He has tried heat and stretching before practice. He denies numbness, tingling, or weakness. He denies any bowel/bladder incontinence. He is a year round athlete and also participates in basketball and hockey.


DIFFERENTIAL DIAGNOSIS: Lumbar muscle strain, iliolumbar ligament sprain, SI joint dysfunction, Spondylolysis with or without spondylolisthesis, Ankylosing Spondylitis.

TEST AND RESULTS: X-rays lumbar spine: Bilateral pars defect L5 with mild Grade 1 spondylolisthesis of L5/S1. MRI lumbar spine without contrast: Acute bilateral pars defects at L4. At L5/S1 there are bilateral L5 pars defects which appear chronic and have no associated edema. There is resultant uncovering of the disc and some mild bilateral foraminal narrowing at L5/S1. No spondylolisthesis at L4/5.

TREATMENT AND OUTCOMES: Physical therapy without bracing due to patient choice. Relative rest and discontinuation of contact sports while in PT. Discussion about further return to play will take place upon completion of PT.

Back Pain - Swimming and Lacrosse

McKayla Schmitt. University of Minnesota, Minneapolis, MN. (Sponsor: Suzanne Hecht, FACSM) (No relevant relationships reported)

HISTORY: A 17-year-old senior swimmer and lacrosse player has had 6 months of low back pain. She had no acute injury but reports gradual onset of pain that has progressed causing her to be unable to participate in her sports. She has almost nightly awakening secondary to back pain. She denies numbness, tingling, weakness, or radiation of pain into her lower extremities. She has a history of celiac disease. There is a family history of hypothyroidism, celiac disease, and rheumatoid arthritis.

PHYSICAL EXAMINATION: Exam revealed bilateral, left greater than right, paraspinal muscle tightness from T10-L5. She had full forward flexion, extension, rotation, and lateral flexion. She had a negative straight leg raise, slump test, and stork test, bilaterally. No neurological signs or symptoms.


TESTS AND RESULTS: Thoracic and lumbar spine anterior-posterior and lateral radiographs:
FRIDAY, MAY 31, 2019

2918 May 31 4:35 PM - 4:55 PM
Elite Weightlifter With Acute Back Pain
Taoufik Bel Fekih, Nidal Hammad, Louis Holtzhausen, FACSM, Yasin Al Makhdma. Email: taoufik.belfekih@aspetar.com

HISTORY: An 18 years old male, elite weightlifter sustained a sudden onset of sharp pain in the low back during back squat training (150 kg), with an episode of numbness of posterior right thigh which quickly resolved.

The pain was localized in the right lateral L4-L5 area, with intensity rated 8/10 on a Numerical Pain Scale. Training history: Weightlifting and resistance training 6 days (30 hours)/week.

PHYSICAL EXAMINATION: No gait abnormality
No neurological deficit. Straight leg raise test negative
Para-spinal muscular spasm and a mildly limited ROM in right rotation, lumbar spine extension, lateral flexion to the right.

Pain-free sacroiliac joint.

Tenderness on palpation of spinous process and L4-L5 facet area on the right side.

Neurological examination normal, including motor function, sensory and reflexes.

Differential Diagnosis: A simple “lumbago”

Vertebral disc prolapse

Burst fracture

Spondylolisthesis

Acute deterioration of spondylolisthesis

Standard X-rays showed probable L5 pars lesion. Loss of disc height at L4-L5. An osseous fragment overlying the L4-L5 neural foramina.

MRI images showed an apophyseal ring fracture involving the postero-inferior L4 vertebral body, with mild bone edema. There was no clear root impingement. There was an L5-S1 disc hernia.

CT scan with 3D rendering confirmed the presence of L4-L5 (acute) ring fracture; and CT scan with 3D images showed an apophyseal ring fracture involving the postero-inferior L4 vertebral body, with mild bone edema. There was no clear root impingement. There was an L5-S1 disc hernia.

TREATMENT AND OUTCOMES:
1. Referral to rheumatology
2. Initiation of Methotrexate and Humira
3. Referral to rheumatology
4. Initiation of Humira, with significant reduction in low back pain

Data have demonstrated that an acute bout of resistance exercise (ARE) reduces vagal modulation. However, only a handful of studies have evaluated differences between resistance-trained (RT) and untrained (UT) individuals in response to an ARE.

PURPOSE: To compare alterations in vagal modulation during recovery from ARE in RT and UT individuals.

METHODS: Eighteen RT individuals (Mean±SD; Age: 23±3 yrs; Ht: 1.71±0.01m; Wt: 75.2±15.6kg) and eight UT individuals (Age: 24±3 yrs; Ht: 1.60±0.09m; Wt: 61.9±10.8kg) volunteered to participate. Vagal modulation was assessed using heart rate variability (HRV) in the frequency domain [High-frequency power (lnHF)], as well as heart rate complexity (Sample Entropy (SampEn) and Lempel-Ziv entropy (LZEn)). Data were collected at rest, 15 minutes (Rec1) and 30 minutes (Rec2) during recovery from ARE and a control (CON). The ARE utilized 3 sets of 10 repetitions at 75% 1-repetition maximum (1RM) and 2 minutes of rest between sets and exercises on the chest press, leg press, latissimus dorsi pulldown, leg curl and leg extension. A 2x2x3 repeated measures ANOVA was used to examine groups (RT, UT) across conditions (CON, ARE) on the repeated factor of time (rest, Rec1, Rec2).

RESULTS: The groups were similar (p>0.05) for age, and height, but not weight. The HRMs on all the exercises were different (p<0.05) between groups. At rest, all measures of vagal modulation were similar between groups. In addition, there were no 3-way interactions for any measures of vagal modulation. There were significant time x condition interactions for lnHF (ARE: rest: 7.5±1.2ms²; Rec1: 5.8±2.2ms²; Rec2: 4.5±1.2ms²; p=0.001), SampEn (ARE: rest: 1.5±0.4; Rec1: 1.3±0.4; Rec2: 1.4±0.4; p=0.022), and LZEn (ARE: rest: 0.8±0.08; Rec1: 0.7±0.1; Rec2: 0.7±0.2; p=0.001). lnHF and LZEn were reduced at Rec1 and Rec2 compared to rest, with similar responses between the resistance-trained and untrained groups. SampEn was reduced only at Rec1 compared to baseline, with no difference between groups.

CONCLUSIONS: These data demonstrate that both resistance-trained and untrained individuals have similar reductions in vagal modulation in response to an acute bout of resistance exercise using weight machines.
and IL-6 (p<0.01; Table). Mean arterial pressure and PWV were unaltered (p=0.05), and heart rate increased at 24h (p=0.05). β-stiffness and pulse pressure increased in high fit participants, with no change in low fit (interaction, p=0.02). Carotid wall reflections were reduced at 24h in both groups (p<0.05). CONCLUSION: While neither fitness nor acute inflammation altered aortic stiffness, fitness may alter the sensitivity of the carotid artery to acute inflammation. Future research is necessary to examine the mechanism of these differential stiffness responses during acute inflammation and their implications for the cerebrovasculature.

### 2924 May 31 3:35 PM - 3:55 PM

**Vascular Responses To Acute Exercise Following Catheterization-induced Damage In Humans.**

Andrea Tryfonos1, Rafaela Rodighiero1, Matt Cock3, Joseph Mills2, Daniel J. Green3, Ellen A. Dawson1. 
*Liverpool John Moores University, Liverpool, United Kingdom. 1Liverpool Heart and Chest Hospital, Liverpool, United Kingdom. 2The University of Western Australia, Perth, Australia.*

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(No relevant relationships reported)

Diagnosis and treatment for coronary artery disease (CAD) includes angiography and/or percutaneous coronary intervention. However, catheterization may result in acute artery dysfunction and damage. Whilst exercise training is recommended for CAD patients following catheterization, it is not known if there is an acute period when exercise may be detrimental due to the prior catheterization. In support of this, animal models have demonstrated exercise-induced paradoxical vasoconstriction post catheterization. PURPOSE: This study, for first time in humans, aims to examine the vascular responses to acute exercise following catheterization. METHODS: 24 CAD patients (age: 66.1±7.1 years 31.9±7 kg/m², 83.3% males) undergoing transradial catheterization were assessed pre and 1 week post intervention. Endothelial function was assessed by radial artery (RA) flow mediated dilation (FMD) in both catheterized and control arm. Bilateral RA diameter and blood flow were assessed during handgrip exercise (HE), 3m stages at 5%, 15% of maximum voluntary contraction.

Differences pre-post catheterization, between the catheterized and control arm, and between HE intensities were determined using mixed-linear model (SPSS 25).

RESULTS: FMD was impaired in the catheterized arm [6.4% (5.0, 7.7) to 4.3% (2.9, 5.6)] but not in the control arm [6.5% (5.2, 7.8) to 6.5% (5.2, 7.9)], post catheterization (time*arm p<.05). There was a significant dose-dependent increase in blood flow with incremental exercise (p<.001). However, there was no difference in the exercise responses between arms or pre-post catheterization. Baseline RA diameter was higher in the catheterized arm post catheterization [0.28cm (0.26, 0.30) to 0.29 (0.28, 0.31) p<.001]. There was no dilation in the RA, in any condition, with increasing exercise intensity (p<.05). CONCLUSION: Endothelial function, assessed by FMD, was impaired 1 week post catheterization. Interestingly, the RA ability to dilate with increased blood flow was not apparent pre or post catheterization. This suggests either the artery does not dilate at these exercise intensities, or that these patients have an inherent impaired vasodilation. Further work is needed to examine this with different exercise intensities/modes and in different groups following catheterization.
HIGH-INTENSITY INTERVAL TRAINING (HIIT) is considered a more time-efficient alternative to moderate-intensity continuous training (MCT) that can optimize metabolic and cardiovascular health though its impact on the cerebrovasculature is unknown.

**PURPOSE:** Pilot examination to characterise local cerebrovascular shear stress responses during an acute bout of HIIT and MCT.

**METHODS:** Following ethics approval, 2 physically-active males (21-23 yrs) were randomly assigned to HIIT or MICT (semi-recumbent cycling) preceded by a standardized warm-up and separated by sufficient time to allow for full haemodynamic recovery. During HIIT, subjects performed 3 intervals (each consisting of 2 mins at 60W and 2 mins at 100W) and for MICT, isovolumic work performed continuously at 80W for 12 mins. Diameter, blood flow and shear rate in the internal carotid artery (ICA) were measured using Doppler ultrasound at rest and averaged over the final 4 mins of HIIT and MCT. The end tidal partial pressure of carbon dioxide (PET\textsubscript{CO\textsubscript{2}}), heart rate (HR), mean arterial pressure (MAP) and oxygen uptake (VO\textsubscript{2}) were recorded continuously photoplethysmography and respiratory gas analysis.

**RESULTS:** Exercise-induced increases in HR, MAP and VO\textsubscript{2} were comparable between HIIT and MCT and were accompanied by an equated, progressive reduction in PET\textsubscript{CO\textsubscript{2}}. In contrast, ICA diameter decreased more markedly during HIIT [a (exercise minus rest) HIIT: 0.15 mm vs. MICT: 0.01 mm] with increased velocity (ΔHIIT: 7.75 vs. ΔMICT: 3.39 cm/s) and corresponding elevation in shear rate (ΔHIIT: 38 vs. ΔMICT: 9 s\textsuperscript{-1}).

**CONCLUSIONS:** These findings, albeit proof-of-concept, provide preliminary evidence highlighting a fourfold greater elevation in local cerebrovascular shear stress during HIIT compared to an equivalent volume of MCT. This is primarily attributable to local vascondensation that cannot be explained by hyperventilation-induced hypocapnia though likely represents a functional response coupling cerebral O\textsubscript{2} delivery to demand. To what extent repeated exposure to the intermittency of HIIT-induced cerebrovascular shear stress confers enhanced neuroprotection in the long-term is currently under investigation.

Supported by a Royal Society Research Fellowship (#WM 100707)
performance on three vertical jump protocols and agility time in youth female volleyball athletes. METHODS: Eleven female youth volleyball players (ages: 15±2.7 yrs.; height: 68.2±1.3 in; mass: 143.5±14.8 lbs) completed an 8-week summer HIIT-PT conditioning program. The 8-week summer conditioning program consisted of combined 2 x week (60 min each) high intensity interval exercises and 2 x week (60 min each) plyometric exercises. Three vertical jump protocols (BJV, CMJ, AVJ) and an agility test (9C) were administered at the beginning of the first week and at the end of week 8 of the summer HIIT-PT conditioning program. RESULTS: Prior to data comparisons, a Kolmogorov-Smirnov test of normality was performed for each of the four variables and determined to be from a normal distribution (BJV: p = .096, CMJ: p = .200, AVJ: p = .187, 9C: p = .127). A series of paired sample t-tests were performed to compare pretest and posttest vertical jump heights (inches) and agility times (seconds). All three vertical jump protocols significantly increased (BJV: 14.6 ±16.1, p<0.000; CMJ: 17.5 ± 18.4, p<0.000; AVJ: 21.0 ± 23.1, p<0.001) and agility times decreased (9C: 25.3 ± 23.6, p<0.000) following the 8-week HIIT-PT summer conditioning program. CONCLUSION: Results from this study indicate that employing an 8-week combined HIIT-PT conditioning program may improve jumping and change-of-direction outcomes in youth female volleyball athletes.

With physical training and normal adolescent growth, gains in lean muscle mass can be seen among this population has yet to be proven. Nevertheless, this prediction equation can assist in monitoring changes in lean muscle mass during adolescence.

**RESULTS:**

<table>
<thead>
<tr>
<th>Method</th>
<th>ΔLM</th>
<th>ΔSLJ</th>
<th>ΔPU</th>
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<tr>
<td></td>
<td>r</td>
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<td>0.315</td>
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**CONCLUSIONS:** Along with anthropometric developmental factors, the SLJ and PU tests can be used to estimate changes in lean muscle mass. However, these factors only account for approximately 60% of the change in lean muscle mass leaving the remaining 40% attributable to other (neural, mechanical, motivational) factors. Nevertheless, this prediction equation can assist in monitoring changes in lean muscle mass during adolescence.

### Board #2

**May 31 2:00 PM - 3:30 PM**

**The Talk as a Measure of Exercise Intensity in Children**

Peter T. Gittings, Carl Foster, FACSM, Debra Sazma, Cristina Cortis, Andrea Fusco, John P. Porcari, FACSM. University of Wisconsin-La Crosse, La Crosse, WI.

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(No relevant relationships reported)

**Purpose:** The purpose of this study was to determine if the Talk Test (TT) is a valid measure of ventilatory threshold (VT) in children. Methods: Thirteen healthy children (age 8-12 y) performed maximal incremental exercise with respiratory gas exchange and with the TT. During the last 30 seconds of each stage they read a passage containing 100-106 words and were asked if they could “speak comfortably”. Gas exchange was measured and was used to identify VT. Comparison measurements occurred at the last positive (LP), equivocal (EQ), and negative (NEG) stages of the TT. Results: There were significant (p<0.05) differences in VO2 (VT vs LP and NEG stages; 0.95±0.580 vs 0.71±0.284* and 1.17±0.504*), HR (VT vs LP, EQ, and NEG stages; 136.0±19.0* vs 126.2±12.91* and 152.5±15.40* and 160.5±16.28*), and RPE (VT vs LP and NEG stages; 5.2±7.0 vs 3.6±1.32* and 7.2±1.09*). Conclusion: It was concluded that the EQ stage of the TT is a valid measure of the exercise intensity at VT in children, as it is already known to be in adults.

![Results-VO2](image)

### Board #3

**May 31 2:00 PM - 3:30 PM**

**Predicting Changes in Adolescent Muscle Mass with Field Testing**

Laura S. Kabiri1, Wayne Brewer2, Alexis Ortiz, FACSM3, 1University of Texas, Houston, TX. 2Texas Woman’s University, Houston, TX. 3UT Health Science Center, San Antonio, TX.

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(No relevant relationships reported)

With physical training and normal adolescent growth, gains in lean muscle mass can be seen among the healthy adolescent population. Assessing this gains is crucial to monitoring and adjusting training protocols and helping with client motivation and investment. However, the ability of common field tests to accurately predict changes in muscle mass among this population has yet to be proven.

**PURPOSE:** The purpose of this study was to assess the ability of the standing long jump (SLJ) and 90° push-up (PU) test to accurately predict changes in lean mass (ΔLM) among healthy adolescents aged 12-18 years.

**METHODS:** Forty-five healthy adolescents completed the standing long jump, 90° push-up test, and a full-body dual energy x-ray absorptiometry (DEXA) scan twice with 7-10 months between test sessions. The difference in each outcome was calculated and used to indicate change. Field test predictive ability was evaluated using multiple regression equations, and accounted for age (yrs), sex (female = 0, male = 1), height (cm), body mass, and pubertal stage using the Pubertal Development Scale (PDS).

**RESULTS:** A mean change of 2198.82 g of lean mass (range = -1193.60, 7307.70; SD = 1816.67) was shown using DEXA. The SLJ and PU had a mean change of 5.11 cm (range = -36.00, 35.70; SD = 16.40) and 0 repetitions (range = -13, 11; SD = 5.30) respectively. Both SLJ (r = 3.40, p<0.01) and PU (r = 3.15, p = 0.18) had significant moderate relationships to ΔLM. The inclusion of SLJ and PU in the model accounted for an additional 8.8% of the variability (R² = .551 from .463) and 4.2% (R² = .593 respectively). The overall model explained 59.3% of the variability in lean mass change and resulted in the following predictive equation: ΔLM = 1237.59 + (-630.44 x age) + (-1693.4 x PDS) + (847.31 x gender) + (33.89 x height) + (199.04 x BMI) + (29.07 x SLJ) + (73.13 x PU).

**CONCLUSIONS:** Along with anthropometric developmental factors, the SLJ and PU tests can be used to estimate changes in lean muscle mass. However, these factors only account for approximately 60% of the change in lean muscle mass leaving the remaining 40% attributable to other (neural, mechanical, motivational) factors. Nevertheless, this prediction equation can assist in monitoring changes in lean muscle mass during adolescence.

### Board #4

**May 31 2:00 PM - 3:30 PM**

**Relationship Between Physical Activity and Motor Skills in 3-5 year olds: National Youth Fitness Survey**

Aaron P. Wood1, Satomi Imai2, Amy Gross McMillan2, Damon Swift1, Katrina D. DuBoise, FACSM1. 1University of Tennessee, Knoxville, TN. 2East Carolina University, Greenville, NC. 3East Carolina University, Greenville, NC.

**Email:** awood46@vols.utk.edu

(No relevant relationships reported)

**PURPOSE:** The purpose of this study was to examine what kind of physical activity would have a positive relationship with motor skills in children through secondary data analysis.

**METHODS:** Data from children 3-5 years old (N=352, 179 males) who participated in the National Youth Fitness Survey (2012) were used. Included in this study were demographics, anthropometrics, physical activity questionnaire by parent report, and motor skill score determined by Test of Gross Motor Development-2nd Edition. Multiple regression was conducted to examine the relationship between physical activity and motor skills controlling for sex, race, and parent’s socioeconomic status. RESULTS: The most commonly reported activities were running (43%), playing outdoor games (35%), and riding a bike (34%). Motor skills standard scores were locomotor (Mean (SE)=9.99 (1.66)), object control (Mean (SE)=8.52 (0.14)), and gross motor skill (Mean (SE)=95.57 (6.89)). Participation in the following activities were positively related to gross motor skill score: riding a bike (β (SE) =5.27 (2.02), p<0.02), and water riding (β (SE) =9.83 (2.59), p<0.002), swimming (β (SE) =9.83 (2.59), p<0.004), and jumping on a trampoline (β (SE) = 7.45 (3.09), p<0.03). With the exception of riding a bike the activities positively related to gross motor skill score had a reported range of participation between 7-12%. **CONCLUSIONS:** The key findings of this study indicated that participation in specific physical activities were related to gross motor skill score in preschool aged children. Further, it showed that with the exception of riding a bike the activities that the children participated in the most were not the same as those activities that were positively related to their gross motor skill score.

### Board #5

**May 31 2:00 PM - 3:30 PM**

**Tri-Ponderal Mass Index and Fitnessgram BMI Classification in Sixth-Grade Children**

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(No relevant relationships reported)

To classify the health status of children, criterion standards for body composition and body mass index (BMI) have been established by FITNESSGRAM according to gender and age. Standards for aerobic capacity (AC) have also been established to assess cardiorespiratory function. Tri-Ponderal Mass Index (TMI) has been shown to better classify overweight and obesity than BMI in youth. **PURPOSE:** The purpose of this study was to determine the association between TMI and FITNESSGRAM BMI classification in sixth-grade children. **METHODS:** Subjects were 439 sixth-grade boys and girls, ages 11-13, who completed each of the FITNESSGRAM components as a part of their yearly assessment. In addition to height and weight, subjects’ AC was determined from one-mile run/walk times, age, gender and BMI. 43% percent of these students were classified within the Healthy Fitness Zone (HFZ) for BMI. 42% percent of these students were classified as High Risk for BMI. **RESULTS:** The correlation
between TMI and BMI was .98, and the correlation between BMI and AC was .82. The correlation between TMI and AC was .80. Receiver Operating Characteristic (ROC) analysis indicated that a TMI of 13.97 represents the best cut-off score for classifying girls within the HFZ for BMI, with 94% classified correctly, and AUC = .93. Also, a TMI of 13.41 represents the best cut-off score for classifying boys within the HFZ for BMI, with 94% classified correctly, and AUC = .98. For determining High Risk classification for BMI, a TMI of 14.90 represents the best cut-off score for classifying girls as High Risk for BMI, with 96% classified correctly and AUC = .98. Also, a TMI of 15.24 represents the best cut-off score for classifying boys as High Risk for BMI, with 94% classified correctly, and AUC = .98. CONCLUSIONS: TMI is strongly associated with classification according to FITNESSGRAM BMI standards in sixth-grade children. These data suggest that a TMI of 13.97 for girls and 13.41 for boys are the best criteria for HFZ classification for FITNESSGRAM BMI. Also, a TMI of 14.90 for girls and 15.24 for boys are the best criteria for High Risk classification for FITNESSGRAM BMI. TMI is a substantial factor in determining overweight and obesity, and body size has been shown to be an important health-related outcome, especially in youth.

Board #6
May 31 2:00 PM - 3:30 PM
A Comparison Of Health-related Fitness Variables Between Youths In Singapore And Taipei
Yew Cheo Ng1, Govindasamy Balasekaran, FACSM1, Stanley Sai Chee Chui, FACSM2, Vishvasrao Victor Godivindaswamy3, Jolene Lim1, Peggy Bogy1. 1Nanyang Technological University, Singapore, Singapore. 2The Chinese University of Hong Kong, Hong Kong, Hong Kong. 3Concordia University Chicago, Chicago, IL.

Health-related fitness (HRF) variables may reduce cardiovascular risk factors if detected early in youths. A comparison between two similar high-density cities may reveal more information on their health status. PURPOSE: To compare HRF variables between youths in Singapore (SGP) and Taipei (TP).

METHODS: A total of 1559 youths from SGP (age: 13.49 ± 1.21 years, height: 159.76 ± 8.94 cm, weight: 51.91 ± 13.83 kg, Body Fat (BF): 21.51 ± 10.25 %) and 1629 youths from TP (age: 13.84 ± 0.91 years, height: 160.89 ± 7.86 cm, weight: 55.57 ± 13.35 kg, BF%: 23.29 ± 10.30 %) participated in this study. Body Mass Index (BMI) was calculated and BF% was measured by bio-electric impedance analysis. Aerobic fitness, lower limb flexibility, arm strength, and abdominal endurance were tested using the 15m youth Progressive Aerobic Cardiovascular Endurance Run (PACER) test, one-legged sit-and-reach (SRT), handgrip strength (HS) test, and 1-minute sit-up test (SUT) respectively.

RESULTS: Higher percentage of youths from TP were in the normal (TP: 54.88%, SGP: 46.89%) and overweight (TP: 12.70%, SGP: 20.41%) categories as compared to TP (26.98%). Significant differences were found between SGP and TP for height (SGP: 159.76 ± 8.94 cm, TP: 160.89 ± 7.86 cm, p < 0.0005), weight (SGP: 51.91 ± 13.83 kg, TP: 55.57 ± 13.35 kg, p < 0.0005), BMI (SGP: 20.19 ± 4.21 kg/m², TP: 21.35 ± 4.28 kg/m², p < 0.0005), BF% (SGP: 23.29 ± 10.30 %, TP: 25.45 ± 7.73 %, p = 0.032), with SGP having a lower obesity rate (SUG: 12.7%, TP: 18.15%). CONCLUSIONS: Higher BMI and BF% values were found in TP as compared to SGP. While youths in both countries had similar arm strength, SGP youths had higher abdominal endurance, better flexibility and higher aerobically fitness as compared to TP youths. Youths from both countries have differences even with similar population density and should maintain their fitness health status through physical activities as this will help to reduce the risk of cardiovascular diseases in the future.

Board #7
May 31 2:00 PM - 3:30 PM
High Intensity Interval or Moderate Continuous Training in Health Indicators of Adolescents with Central Obesity
Fabricio Boscolo Del Vecchio1, Flávio R. Guilherme2, Wilson Rinaldi1. 1Federal University of Pelotas, Pelotas, Brazil. 2State University of Maringá, Maringá, Brazil.

PURPOSE: To evaluate the effects of HIIT and moderate intensity continuous training (MCT) on health indicators from adolescents with central obesity.

METHODS: This is a randomized clinical trial, with three evaluations: baseline, after 8 and after 16 weeks. The sample was composed by 42 participants, randomized in two groups: HIIT (n = 22) and a MCT (n = 20). After 16 weeks of training (3 sessions/week), 34 adolescents finished the program (HIIT, n = 21; MCT, n = 13). The HIIT group performed different models of interval training, progressively organized, and the MCT trained in a fixed intensity from 60 to 80% of HRmax. Anthropometrical data (BMI, Waist Circumference [WC], Height Waist Ratio [HWR], Body Fat Percentage [%BF]), cardiorespiratory fitness (CRF), blood pressure (systolic and diastolic) and metabolic profile (fasting blood glucose [FBG], high density lipoprotein [HDL-C], low density lipoproteins [LDL-C], total cholesterol, non-HDL cholesterol and triglycerides [TG]) were analyzed.

RESULTS: Sixteen weeks of aerobic training resulted in significant reductions in BMI (HIIT = -4.5% [ES = -0.26] vs MCT = -3.9% [ES = -0.24]), WC (HIIT = -6.9% [ES = -0.64] vs MCT = -6.6% [ES = -0.61]), HWR (HIIT = -10.5% [ES = -1.00] vs MCT = -5.2% [ES = -0.50]), %BF (HIIT = -14.3% [ES = -0.59] vs MCT = -9.8% [ES = -0.60]), FBG (HIIT = -6.1% [ES = -0.65] vs MCT = -11.1% [ES = -0.89]) and non-HDL cholesterol (HIIT = -14.1% [ES = -0.68] vs MCT = -11.0% [ES = -0.37]), and increased CRF (HIIT = 13.0% [ES = 1.77] vs MCT = 10.3% [ES = 0.76]). Only HIIT improved diastolic blood pressure (-17.0%, ES= -0.87), LDL-C (-13.3%, ES= -0.34) and total cholesterol (-11.9%, ES = -0.47), but only MCT changed positively TG (-23.4%, ES = -0.84). No changes were observed for systolic blood pressure and HDL-C. No differences were found in all variables between groups. Relating to inadequacy cases, both groups changed TG (HIIT = 20 to 11, MCT 13 to 6), but only HIIT decreased the number of adolescents in inadequacy from CRF and blood pressure (from 14 to 3).

CONCLUSIONS: 16 weeks of HIIT or MCT positively impact anthropometrical variables, metabolic profile and CRF in obese adolescents.

Board #8
May 31 2:00 PM - 3:30 PM
Physiological And Anthropometric Profiles Of Elite Teenage Cyclists In The United States
Michael J. Saunders, FACSM, David N. Lenzi, Nicholas D. Luden, Stephanie P. Kuri, Katherine R. Smith, Christopher J. Womack, FACSM. James Madison University, Harrisonburg, VA.

PURPOSE: Maximal oxygen consumption (VO2max, Wmax), lactate threshold (LT), and several anthropometric characteristics are related to elite cycling performance in adults. These factors may change during adolescent development, yet little is known about how values among teenage cyclists compare to their adult counterparts. Low bone mineral density (BMD) has also been reported in competitive adult road cyclists versus recreationally active controls, but BMD in younger cyclists has not been thoroughly investigated.

METHODS: We examined variables from a graded exercise test (LT, VO2max, Wmax) and anthropometric characteristics (height, weight, % fat) in 8 elite male teenage cyclists (16.8 ± 1.4 y) and compared them to junior Italian cyclists and professional cyclists in the literature. BMD was also measured via DEXA, and compared to age-specific norms.

RESULTS: Our cohort possessed comparable absolute/relative VO2max (4.6 ± 0.7 L/min; 74.9 ± 6.6 mL/kg/min) and Wmax (375 ± 67 W; 6 ± 0.7 W/kg) values to previously studied junior Italian cyclists, with inter-study differences potentially explained by different rater specializations and competitive-levels, and methodological differences between studies. Our teenage cyclists were smaller (176 ± 6 cm), lighter (61.5 ± 5.0 kg), and had lower absolute VO2max and Wmax than professional adult cyclists in prior studies. Total BMD values (1.142 ± 0.088 g/cm²), and values for the spine, femur, and femoral neck were all > 50 percentile for age/sex.

CONCLUSIONS: The largest differences in exercise responses between competitive teenage and adult cyclists were in absolute aerobic power (rather than per kgBW), which would presumably diminish with any further increases in size/mass with maturation in young cyclists. The healthy BMI levels in this group could be related to age, or to mountain biking and other cross-training completed by this group of athletes.

Board #9
May 31 2:00 PM - 3:30 PM
The Chinese Assessment Of Motor Quotient: Methods For Children In 7 To 9 Years Old
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PURPOSE: Motor quotient is described as an index of the present rate of development and, possibly, predicts future development. As such, it is expected that those who have greater motor quotient would be more likely to obtain the health benefits offered by habitual physical activity. A theoretical model and assessment frame, the Chinese
Assessment of Motor Quotient (CAMQ), for the assessment of childhood motor quotient had been proposed in theory, but validity data were lacking. The purpose of this study was to explore validity evidence of the CAMQ among children 7 to 9 years.

METHODS: The CAMQ validity was evaluated through two analyses that utilized cross-sectional data obtained through local schools in Chongqing, China. A confirmatory factor analysis (CFA) compared the data to the theoretical model. Patterns of association between age and gender and the CAMQ total and domain scores were examined in regression models. The CAMQ was completed by 572 children (53 % male) in 7 to 9 years (mean 8.2 years), with all guardian of children approached agreeing to participate.

RESULTS: The CAMQ model included three domains: physical competence (fitness), athletic performance (motor skill) and motor behavior (motivation). Using CFA analyzed the validity data 557 children with complete raw scores. The results showed the GFI=0.67, AGFI=0.67, TLI=0.90, CFI=0.90, RMSEA=0.05. Regression models showed that interpretative categories, developed from age and gender-adjusted normative data, were not associated with age indicating that the CAMQ is suitable for use across this age range. Children’s gender was associated with physical competence and athletic performance domain scores, indicating that further research is required regarding the gender adjustment of the raw CAMQ scores.

CONCLUSIONS: The CAMQ offers a comprehensive assessment of physical competence, athletic performance, and motor behavior as components of children motor quotient (7 to 9 years). Monitoring of these measures enhances our understanding of children’s motor quotient and assists with the identification of areas where additional supports are required.

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### 2964 Board #10 May 31 2:00 PM - 3:30 PM
**Comparison Of Adolescents' Fitness Between Hong Kong, Taipei And Shanghai**

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[No relevant relationships reported]

### 2965 Board #11 May 31 2:00 PM - 3:30 PM
**The Effects of Plyometric or Combined Training on Kicking Time in Teenager Taekwondo Athletes**


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[No relevant relationships reported]

### Purpose
To compare the effectiveness of a general plyometric training (GP) and a GP plus transfer exercises (GP + TE) on kicking time (KT) in cadet and junior taekwondo athletes.

### Methodology
Volunteers were 33 athletes between 12 and 17 years old and taekwondo practice experience of 3.0 ± 1.2 yr. Participants were randomly assigned to GP, GP + TE, or a control (CON) group, and underwent a 3-week intervention, training 3 times per week. The training session was divided into a stretch, a general warm-up and the treatment phase, according to the specifications for each group, each lasting approximately 10-min. Following the intervention, the athletes completed their regular training. The exercises performed by the participants only differed in the 10-min lasting the intervention. The GP group completed 8 sets of 6 repetitions of countermovement jumps (CMJ), the GP+TE completed the same exercise exercises as the GP group immediately followed by a taekwondo kicking technique on a kicking pad. The CON group only performed static stretching. A Fitlight Trainer System was used to measure before and after KT performance. For the KT drill, the athlete was instructed to use the dominant leg in a circular kick (“Bandal Chagui”) and in a frontal kick (“Mipum Chagui”). The front leg was used for both kicks, and the first sensor of the measurement system was located at ankle height to start the time and a second sensor was located at the height of the performer’s navel to stop the time and register the KT.

### A 3 x 2 (groups x measurements) general linear model ANOVA was used to analyze KT. Results:
No significant interaction or main effects were shown on circular kick KT scores (p > 0.05). A significant measurement main effect was found on frontal kick KT (F = 4.743, Pre=.034 < .0004 vs. Post = 0.344 ± 0.004.5; p = 0.037) regardless of the experimental group. Conclusion: The GP and the GP+TE training elicited similar improvements in frontal kick KT in cadet and junior taekwondo athletes. Circular kick KT was unaffected by training.

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### 2966 Board #12 May 31 2:00 PM - 3:30 PM
**Which Is Better In Physical Fitness Between Obese And Lean Young Children?**

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[No relevant relationships reported]

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**Abstracts were prepared by the authors and printed as submitted.**
PURPOSE: This study aimed to measure the intensity of a given physical exercise during an elementary school level physical education class.

METHODS: The subjects of this study were 28 elementary school children (16 boys and 12 girls) in the 5th grade. To measure exercise intensity, a Lifecorder GS (manufactured by SUZUKEN Co., Ltd) was used. There were five target units of exercise including long jump, expression, tag rugby, hurdle run, and Tee-ball.

The length of each class as well as the proportion of each exercise were measured according to the period recording method (Instruction, Management, Motor learning, Cognitive learning). To assess the difference in intensity across each of the five units of exercise, the coefficient of variation (CV) was calculated. A corresponding one-way analysis of variance was performed. Where a main effect was observed, multiple comparison test was used for clarification. In addition, when Bartlett’s test was applied and a significant main effect was observed, a test of equal variances between the two groups was used.

RESULTS: Regarding individual differences in exercise intensity, significant differences were found between tag rugby and both tee balls and long jump, as well as between expression and long jump. The coefficient of variation was calculated as follows: expression (29%), tag rugby (27%), Tee-ball (25%), hurdle run (18%), long jump (17%). In addition, differences in units were significantly higher in exercise intensity between hurdle run and tag rugby, expression and tee ball, as well as between long jump and Tee-ball.

CONCLUSIONS: In physical education classes, there is a difference in physical activity among the five exercises measured, and it is presumed that the magnitude of these differences varies depending on the individual exercise. That such individual differences exist in physical education classes is, in itself, not a problem. However, this would become undesirable in any situation in which the difference becomes large, thus failing to ensure consistency in the amount of physical activity and potentially resulting in children performing less physical activity. In order to secure a constant level of activity intensity in physical education lessons, it is necessary to take measures for children with less physical activity.
To compare elementary school children’s physical activity levels during two different seasons in Northern Norway.

**METHODS:** Elementary school children from 1st, 3rd, 5th and 7th grade were recruited to wear an accelerometer (GT3X-BT, ActiGraph, LLC, Pensacola, United States) for seven consecutive days during two different seasons: The winter season in November (n = 235), and the summer season in June (n = 214). The primary physical activity outcome was measured as total counts per minute and time spent at different activity intensities. We defined moderate-to-vigorous physical activity (MVPA) as ≥2000 counts per min, as previously used (Ekelund et al., 2004).

**RESULTS**

Girls had more counts per minute during the measured week in the summer season (616 ± 380.5) compared to the winter season (589 ± 124.8) (p<0.001), while there was no significant differences among boys. Boys spent more time in MVPA during the winter season (71.5 minutes ± 26.7) compared to the summer season (61.5 minutes ± 12.9) (p<0.05). Children in 7th grade spent more time in MVPA during the winter season (64.8 minutes ± 26.1) compared to the summer season (44.9 minutes ± 23.6) (p<0.001). There were no differences between sexes for time spent in MVPA or counts per min (p>0.05) during the winter season, except for counts per min in 1st grade (p<0.05). During weekdays in the winter season, 53.1% of the children reached MVPA ≥60 minutes physically active daily. In weekdays during the summer season, 62.5% of the children reached MVPA ≥60 minutes.

**CONCLUSION**

Girls had more counts per minute during the summer season compared to the winter season, but there were no differences in time spent in MVPA. Boys spend more time in MVPA during the winter season compared to the summer season. 62.5% met the recommended 60 min per day of MVPA during the summer compared to the winter where 53.1% met the recommendations.

**Board #18**

**May 31 2:00 PM - 3:30 PM**

**Associated Factors To Health Risk Behaviors in Adolescent’s Athletes**

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(No relevant relationships reported)

**PURPOSE:** To verify associated factors with health risk behaviors (HRB) in Brazilian adolescents’ athletes. **METHODS:** Cross-sectional study, with 367 athletes (15.68±0.78 years) from Curitiba-PR, Brazil. The HRB evaluated were: insufficient levels of physical activity, high TV and videogame time, low consumption of fruits and vegetables, consumption of alcohol, tobacco and illicit drugs, sexual and violent behavior. Investigated associated factors were: sex, age, socioeconomic status, type of sport, years of training and weekly training volume, evaluated through questionnaires. Poisson regressions analyzed the factors associated with HRB, adopting p<0.05.

**RESULTS**

Positive associations were seen for age (PR: 9.59; 95% CI: 3.36-27.38) and weekly training volume (PR: 1.64, 95% CI: 1.32-2.03) for mild and excessive physical activity. On the other hand, inverse associations were seen for age (PR: 0.59, 95% CI: 0.39-0.89) and for the weekly training volume (PR: 0.92, 95% CI: 0.86-0.99), but not for years of practice (PR: 1.12, 95% CI: 1.01-1.25). For vegetable consumption, inverse associations were seen for the weekly training volume (PR: 0.98, 95% CI: 0.96-0.99) and age (PR: 1.05, 95% CI: 1.02-1.09) for alcohol consumption. Positive associations were seen for age (PR: 9.59; 95% CI: 3.36-27.38) and weekly training volume (PR: 1.20; 95% CI: 1.01-1.45) for tobacco consumption, and for age for illicit drug use (PR: 18.08; 95% CI: 3.38-56.65). Girls were less likely to have sexual (PR: 0.28, 95% CI: 0.08-0.94) and violent (PR: 0.23, 95% CI: 0.08-0.62) risk behaviors. **CONCLUSIONS:** It was observed that characteristics of sports practice, such as years of practice and weekly training volume may favor healthy behaviors such as a lower videogame time, alcohol consumption and increased consumption of vegetables in adolescent’s athletes.

**Board #20**

**May 31 2:00 PM - 3:30 PM**

**Relationship Between Physical Fitness Level At Age 6 And Motivation And Perseverance**

Rio Kojima1, Kosho Kasuga2. 1Gifu University graduate school, Gifu, Japan. 2Gifu University, Gifu, Japan. (Sponsor: Kiyoji Tanaka, FACSM)

(No relevant relationships reported)

**[Purpose]**

The purpose of this study was to investigate the relationship between physical fitness (PF) level at the age of 6 and longitudinal change of motivation (M) and perseverance (P).

**[Methods]**

The participants were 186 young children (87 boys and 99 girls). For measuring PF, PF tests for young children were conducted. Principal component analysis was performed for the seven PF test parameters, and first principal component scores were converted into T-scores classified by sex and age (categories spanning 0.5 years), which were treated as overall PF scores. The upper 25% of the overall PF scores was classified as a higher PF level group (47 participants), and the lower 25% of the overall PF scores was classified as a lower PF level group (47 participants). In addition, in order to objectively investigate young children’s personalities with regard to “M” and “P”, a questionnaire survey was administered to the young children’s schoolteachers. A two-factor analysis of variance (PF level group × grade) that corresponded to the PF level and grade; however, a significant main effect was observed between the PF level groups and grade.

The multiple comparison test between the grade levels showed that both “M” and “P” were significantly higher in the higher PF level group at age 6 than at age 4 and at age 5.

[Discussion]
Infants with high PF at the age of 6 show high "M" and "P" at the age of 4. Further, the difference widens with successive grade levels, thereby suggesting that the bipolarization of "M" and "P" originates in early childhood.

Integrative neuromuscular training (INT) is a method of conditioning that includes strength and conditioning exercises which are designed to enhance both health- and skill-related components of physical fitness. While previous investigations have examined the effects of INT on performance, the acute cardiometabolic responses to INT have not been examined. PURPOSE: To examine the acute cardiometabolic response to a specific INT protocol and to compare these responses to a bout of moderate intensity treadmill (TM) walking in children. METHODS: 14 children (10.7±1.1 yr) were tested for peak oxygen uptake (VO2peak) and peak heart rate (HR) on a maximal TM test and subsequently participated in 2 experimental conditions on nonconsecutive days: a 12-min INT protocol of 6 exercises and a 12-min TM walking protocol at 50% VO2peak. The INT protocol included balance board squats (EX1), medicine ball squats with toss (EX2), planks with side step (EX3), medicine ball forward lunges (EX4), battling rope double arm waves (EX5) and medicine ball slams (EX6). Each INT exercise was performed twice for 30 sec with a 30-sec rest interval between sets and exercises. Participants performed the INT and TM protocols while connected to a metabolic system and HR monitor. RESULTS: Throughout INT mean HR significantly increased from 121.1±9.0 bpm during EX1 to 183.2±7.9 bpm during EX6 and mean VO2 significantly increased from 14.9±3.6 ml kg-1 min-1 during EX1 to 33.3±6.0 ml kg-1 min-1 during EX6 (p<0.05). Mean HR and VO2 values during INT ranged from 60.9% to 92.4% of HRpeak and from 28.1% to 63.0% of VO2peak respectively. During the TM condition, mean HR and VO2 INT ranged from 60.9% to 92.4% of HRpeak and from 28.1% to 63.0% of VO2peak.

3976 Board #24
May 31 2:00 PM - 3:30 PM
Acute Cardiometabolic Responses to Integrative Neuromuscular Training in Children
Avery D. Faigenbaum, FACSM, Jie Kang, FACSM, Nicholas A. Ratamess, Anne Farrell, Mina Belfort, Sean Duffy, Cara Jenson, Jill A. Bush, FACSM. The College of New Jersey, Ewing, NJ. Email: faigenba@tcnj.edu

3978 Board #27
May 31 2:00 PM - 3:30 PM
Criterion-related Validity Of A Cadence Rope Skipping Test For Estimating VO2peak In Adolescents
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Rope skipping is a fun and excellent moderate to vigorous physical activity (MVPA) for school students especially for elementary and junior high schools. Studies demonstrate that prolonged rope skipping exercise could effectively improve aerobic fitness. Considering the specificity principle in fitness evaluation, it is desirable to develop a rope-skipping specific exercise testing for evaluating aerobic fitness. PURPOSE: To develop a prediction model to estimate peak oxygen uptake (VO2peak) from a sub-maximal cadence rope skipping test among secondary school students. METHODS: A total of 58 secondary school students (38 boys, 20 girls, age=13.8±1.1 yrs) completed two different forms of rope-skipping exercises (free-style skipping & Gallop-style skipping, in randomized order) with a steady cadence of 60 skips per min, for 3 min each and at least 20 min apart. Exercise heart rates (EHR) throughout the 3-min skipping and additional 1-min post-exercise HR (PHR) were monitored continuously using Polar HR monitor. Students also completed a treadmill VO2peak test using calibrated direct VO2 metabolic measuring system (COSMED K4b2). Moderate to vigorous physical activity habits (MVPA), in term of average min per day were assessed by questionnaire. VO2peak was then correlated with HER and PHR at various time points, as well as MVPA, BMI, age, and gender, using stepwise regression, to determine criterion-related validity. Results: Regardless of skipping style, VO2peak was best correlated with PHR at 20s after the exercise, followed by MVPa, gender, and BMI. The best equation was: VO2peak = 70.422 + (7.542 x gender) + (.126 x MVPA) -.470 x BMI) + .167 x PHR(20s); R2 = .807, SEE = 4.54 ml kg-1 min-1 using the free-style rope skipping test. Both free-style and Gallop-style rope skipping gave similar level of criterion-related validity. Conclusion: A 3-min free-style cadence rope skipping submaximal test was effective to estimate VO2peak of secondary school students using post-exercise heart rate at 20 seconds after the exercise, gender, and MVPA. This test is particularly suitable for athletes of rope skipping to evaluate aerobic fitness due to its' good validity and specificity.
greater muscle requirement for multi-joint, dynamic movements and could explain the reduced post-exercise enjoyment. Future research should investigate higher volume protocols utilizing different body-weight exercises.

### 2979 Board #25 May 31 2:00 PM - 3:30 PM

#### The Effect Of Comprehensive Coordination Training On Children's Cognitive Function

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(No relevant relationships reported)

#### PURPOSE:

The aim of this study was to investigate the impact of comprehensive coordination training on children’s cognitive function by adding two extracurricular exercises per week.

#### METHODS:

A sample of 120 children aged 7-9 years old who participated in the “MQ101” program were randomly divided into two groups. The experimental group composed of 58 people and the control group of 62 people. The experimental group participated in extracurricular comprehensive coordination training for 12 weeks, 2 times a week, and 1 hour each time. The control group did not participate in specialized training courses (not including students’ self-exercise). The height, weight, 50-meter run, and Body Comprehensive Coordination Test (BCCT) and the Eriksen Flanker tests were tested in the pre-post experiment. The independent sample T-test and factor analysis were used to analyze the change values between the experimental group and the control group.

#### RESULTS:

The two groups had no significant demographic differences in age, gender, height, weight, physical fitness tests or BCCT before the experiment. After the experiment, height, weight, and 50-meters run had significantly changed in two groups (p<0.05). However, regarding a body comprehensive coordination test, only the experimental group has significant differences before (29.75±6.75) and after (32.80±5.21) the experiment (p<0.05). The results of Flanker Test indicated that the post-test period had a higher accuracy rate in both congruent (95.27% ± 9.76%) and incongruent (91.03% ± 6.97) trials compared with those in the pre-test period (84.7% ± 10.29 and 73.69% ± 7.79, respectively) in the experimental group. Additionally, no significant differences were found in the reaction time between the experimental group and the control group.

#### CONCLUSIONS:

Comprehensive coordination training has a great impact on the development of children’s coordination skills. In addition, behavioral testing results also suggest that coordinated training may specifically benefit prefrontal-dependent development of children’s coordination skills. In addition, behavioral testing results also suggest that coordinated training may specifically benefit prefrontal-dependent development of children’s coordination skills.

### 2981 Board #27 May 31 2:00 PM - 3:30 PM

#### Body Mass Index and Physical Fitness Measures of 6th, 7th, and 8th Grade Boys and Girls

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(No relevant relationships reported)

#### PURPOSE:

To describe the anthropometric and fitness profiles of 6-8 grade students who participated in 2-3 days/week of PE classes during the academic year.

#### METHODS:

Data was collected on all willing 6-8 graders from the years 1992 to 2002, for a total of 10 years. Body Mass Index (BMI), 2500 meter run, Upper Body Power Test (UBPT), one-mile run (height 59.33 ± 3.3 in, weight 102.6 ± 28.2 lbs), 1267 7th graders (height 62.4 ± 3.0 in, weight 117.7 ± 31.4 lbs), and 634 8th graders (height 63.1 ± 3.2 in, weight 125.7 ± 29.7 lbs) at a Chambersburg, PA junior high school. Participants completed fitness markers (height, weight, one-mile run, and curl ups) once in a year. Descriptive/frequency statistics were used to examine dependent variables for each participant, analyzing by grade and gender. Values were compared to the normative healthy fitness zones (HFZ) by FITNESSGRAM.

#### RESULTS:

6th grade boys had a mean body mass index (BMI) of 19.7 ± 3.7 kg/m², one-mile run of 9.4 ± 2.3 minutes, and curl ups of 45.8 ± 10.1; 63.9% met the HFZ for BMI, 77.5% met the HFZ for one-mile run, and 96.5% met the HFZ for curl ups. 6th grade girls had a mean BMI of 20.6 ± 4.8 kg/m², one-mile run of 10.7 ± 2.3 minutes, and curl ups of 39.9 ± 10.7; 57.5% met the HFZ for BMI, 70.0% met the HFZ for one-mile run, and 94.7% met the HFZ for curl ups. 7th grade boys had a mean BMI of 20.2 ± 3.8 kg/m², one-mile run of 9.0 ± 2.6 minutes, and curl ups of 49.7 ± 11.6; 71.9% met the HFZ for BMI, 72.2% met the HFZ for one-mile run, and 97.1% met the HFZ for curl ups. 7th grade girls had a mean BMI of 21.5 ± 5.0 kg/m², one-mile run of 10.7 ± 2.6 minutes, and curl ups of 41.3 ± 10.7; 63.8% met the HFZ for BMI, 69.2% met the HFZ for one-mile run, and 98% met the HFZ for curl ups. 8th grade boys had a mean BMI of 21.1 ± 3.7 kg/m², one-mile run of 9.2 ± 3.3 minutes, and curl ups of 50.9 ± 11.6; 67.2% met the HFZ for BMI, 53.1% met the HFZ for one-mile run, and 85.3% met the HFZ for curl ups. 8th grade girls had a mean BMI of 22.6 ± 4.9 kg/m², one-mile run of 10.5 ± 1.8 minutes, and curl ups of 38.0 ± 9.6; 54.0% met the HFZ for BMI, 59.7% met the HFZ for one-mile run, and 80.1% met the HFZ for curl ups.

#### CONCLUSIONS:

Many junior high aged children are not meeting standards that are accepted regarding BMI, one-mile run, and curl ups. More work is needed to decrease BMI and obesity in children. More physical activity/sports involvement outside of PE programs may be needed for children not meeting these HFZ standards.

### 2982 Board #28 May 31 2:00 PM - 3:30 PM

#### The Role of Growth and Maturation During Adolescence on Team Selection and Short-Term Sports Participation

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(No relevant relationships reported)

Older (born in a month at the start of the team selection year; termed relative age (RA), more maturing athletes are more likely to be selected onto youth teams. However, little is known as to whether selection onto a team influences an individual’s short-term sports participation. **Purpose:** (i) to investigate the relationship of RA, anthropometrics, and maturity on team selection and (ii) the short-term (3 years) consequence on selection of sports participation. **Methods:** 851 participants were recruited five-sixth grade youth who were more likely to be selected onto youth teams. Parental heights, date of birth, date of test, sitting height and weight were recorded and age at peak height velocity (APHV) and final adult height predicted. Athletes were placed in month quartiles for month of birth. **Results:** The number of parents intending to create more opportunities for children to exercise increased. However, this change in consciousness did not necessarily lead to an actual increase. The result suggests that other factors are involved in increasing opportunities for children to exercise, such as time and environment. This study was limited by time constraints. Therefore, it is necessary to continue the program over a longer period of time and analyze further changes in parental consciousness to determine the influence on opportunities for children's exercise activities.
Changes in skeletal muscle occur during the process of maturation that influence the expression of muscular strength. The isometric mid-thigh pull (IMTP) is used to measure force-time characteristics [peak force (PF) and rate of force development (RFD)], while the bioelectric properties of body tissues can be used to estimate lean body mass (LBM) and cellular health via phase angle. PURPOSE: To evaluate the contributions of segmental LBM, phase angle, and potentially relevant development indicators on IMTP performance in adolescents. METHODS: Twenty-three high school students (14 girls and 9 boys; age: 15.4 ± 0.7 yrs.; body mass: 68.9 ± 14.9 kg) underwent anthropometric measurements to determine somatic maturity and multi-frequency bioelectrical impedance analysis to determine whole body phase angle (50 kHz), overall LBM, and segmental LBM of the arms, legs, and trunk. Participants performed an IMTP with a custom-built rack and force plates to determine peak RFD, absolute PF, and PF relative to body mass. Stepwise linear regressions were used to determine the relationships between IMTP performance and exercise. LBM as well as specific developmental indicators (segmental LBM and somatic maturity). Independent sample t-tests were used to evaluate sex-based differences. Pearson correlations were also used to compare IMTP performance with overall LBM and whole body phase angle. RESULTS: Sex-based differences (p < 0.05) were shown for maturity (M for females, 2.50 ± 5.60; males, 2.26 ± 4.06). The overall LBM (female: 101.3 ± 15.9 kg; male: 117.8 ± 18.3 kg), arm LBM (female: 10.2 ± 2.6 kg; male: 12.7 ± 2.7 kg), RFD (female: 1596.17N•s−1; male: 2742.41N•s−1) were significantly associated with arm LBM (r = −0.239; p < 0.05) while the addition of trunk LBM improved the model (r = −0.454; p < 0.05). Neither chronological age nor somatic maturity were associated with any of the IMTP variables, while RFD was significantly correlated with both whole body phase angle (r = 0.493; p < 0.05) and overall LBM (r = 0.476). CONCLUSION: Significant sex-based differences in the upper body musculature likely influence RFD in high school students despite girls displaying greater somatic maturity than boys. Phase angle may also play a role in the rate of muscular strength expression in adolescents.
exist, submaximal and peak physiological and perceptual responses were similar to a ramp protocol. Both protocols may be appropriate in children to measure aerobic fitness.

2987 Board #33 May 31 2:00 PM - 3:30 PM Determinant Factors of Cellular Health Among Adolescent Girls and Boys

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Several studies have demonstrated that cardiorespiratory fitness (CRF) and body adiposity are strong indicators of health during childhood and adolescence. However, it is not known if these parameters are associated with cellular health. For example, phase angle (PA) is used to evaluate nutritional status and is an indicator of cellular health. PURPOSE: In this study, we test if body composition and CRF have an influence on cellular health among adolescents of both genders. METHODS: 203 girls (12.7 ± 1.3 years) and 221 boys (12.8 ± 1.3 years) were evaluated. The peak of height velocity (PHV) was used as an indicator of somatic maturation. The percentage of fat mass (%FM) was calculated based on skinfold thickness (triceps and calf). CRF was assessed with the Leger test. Bioelectrical impedance analysis provided parameters to calculate the values of PHA, %FM, and FF. Bivariate correlation was used to verify the association between PHA with PHA, %FM, and FF. We used partial correlation to evaluate if PHV was a mediator of the relationship between PHA, %FM, and CRF. A linear regression analysis adjusted by PHV was used to verify if variables (%FM, FF, and CRF) influenced cellular health among adolescents of both genders. RESULTS: The PHV showed a significant positive correlation with FF in girls (r = 0.83, p < 0.001) and boys (r = 0.83, p < 0.001); with PHA in girls (r = 0.24, p = 0.01) and boys (r = 0.38, p < 0.001); and with %FM but only in girls (r = 0.15, p < 0.05). PHV was negatively correlated with CRF in girls (r = -0.54, p < 0.001) and boys (r = -0.20, p < 0.01). Linear regression of the PHA adjusted by the PHV had an effect on %FM in girls (β = 0.234, p < 0.001) but not in boys (β = 0.03, p = 0.834), on CRF in boys (β = 0.166, p < 0.05) but not in girls (β = 0.007, p = 0.931), and on FF in girls (β = 0.697, p < 0.001) and in boys (β = -0.614, p < 0.001). CONCLUSION: We discovered that PHA when controlled by somatic maturation seems to be more influenced by %FM in girls, CRF in boys, and FF in both genders of adolescents. Interestingly, cellular health and CRF (for girls) and %FM (for boys) were not associated with PHA. This has implications for physical activity behavioral for improved health in adolescents of both genders. Supported by CAPES (No. 23001.004222/98-30)

2988 Board #34 May 31 2:00 PM - 3:30 PM Resting Energy Expenditure and Metabolic Equivalents in Youth: Impact of Inconsistent Operational Definitions

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Youth metabolic equivalents (MET) are multiples of resting energy expenditure (REE), but there are different operational definitions for REE, including basal metabolic rate (BMR) and resting metabolic rate (RMR). PURPOSE: To compare MET, defined as multiples of BMR (METBMR) versus RMR (METRMR). METHODS: Data from two studies (N = 255, 47.4% male, mean ± SD age 10.2 ± 1.5 years) were analyzed. For all participants, BMR was predicted using Schofield’s equations. RMR was assessed during 30-min supine rest while wearing a portable metabolic unit (Cosmed K4b2). Participants also performed structured physical activities (PA) ranging from sedentary behaviors (SB) to vigorous PA. METBMR and METRMR were calculated by dividing steady state oxygen consumption by BMR and RMR, respectively. Values were compared using two-way (Activity X MET) calculation analysis of variance on a mixed-effects model. Post-hoc tests were performed with Bonferroni correction (α = 0.05). METBMR and METRMR values were also classified as SB (<1.50 MET), light PA (1.51-2.99 MET), moderate PA (3.00-5.99 MET), or vigorous PA (≥6.00 MET). Classifications were compared with a confusion matrix. RESULTS: There was a significant interaction (F[30] = 19.1, p = 0.001) between activity and MET calculation. METRMR and METBMR differed significantly for 20 of 31 activities (64.5%), with differences ranging from 0.2 MET for supine rest to 4.8 MET for the running course (p < 0.001). For intensity classification, METRMR and METBMR gave the same classification in 61.4% of cases (see table). CONCLUSION: METRMR and METBMR are comparable (within 0.5 MET) for SB, but increases in METBMR becomes progressively higher than METRMR as intensity increases, reaching differences >40% METRMR and METBMR are not interchangeable units, and care is necessary when interpreting and comparing the findings of studies that use MET.

2989 Board #35 May 31 2:00 PM - 3:30 PM Comparative Study on Body Composition Distribution Between Obese and Normal Children in China

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The prevalence of obesity among Chinese children is on the rise, and Asian are more likely to have centripetal obesity.

PURPOSE: To compare the body composition and distribution of obese children and normal children, and to find out the changing rules among different ages.

METHODS: We recruited 219 Chinese children (12.18±3.05 yr.; height: 155.24±15.66 cm; mass: 48.60±14.41 kg; boys: 48.4%). The age ranges from 7 to 17, and is divided into three age groups, including 7-9, 10-13 and 14-17. According to national standards, <Screening for overweight and obesity among school-age children and adolescents >, they are divided into normal group(n=161) and obesity group(n=58). Their body composition was measured using dual-energy X-ray absorptiometry (DEXA);the main indicators were bone mineral content (BMC), fat mass(FM) and lean mass(LM) of trunk and limbs, and body fat percentage(BFP), trunk fat Percentage(TFP), trunk LM Percentage(TLP),trunk BMC Percentage(TBP). Paired samples t test and correlation analysis with age control was used for statistics.

RESULTS: BFP and FM in obesity group were higher than those in normal group with significant difference (p<0.01). BMC and FM were higher in obesity groups, but there was no significant difference. The TFP of normal group was significantly lower than that of obesity group in each sex. (p < 0.01). Boys TBP normal group was significantly lower than obesity group(p<0.05), and TLP had no significant difference. Girls have completely opposite results. In 7-9 years old group, there was no significant difference in all indexes between obesity group and normal group. In 10-13 years old group, TFP in obesity group was higher than that in normal group(boys p<0.01; girls p=0.51), and in 14-17 years old group, there was no significant difference in TFP ratio between obesity group and normal group. There was a moderate negative correlation between FM and BMC in the trunk of overweight women (r = −0.515, p < 0.05). TFP was negatively correlated with LM in obesity group(boys r =−0.460;p<0.01;girls r =−0.545;p<0.01) but there was no correlation in normal group.

CONCLUSIONS: TFP was higher in obese children, and the trend of fat centripetal distribution increases first and then decreases with age. Children with centripetal obesity tend to have lower LM, and girls also have lower BMC.

2990 Board #36 May 31 2:00 PM - 3:30 PM Systolic Blood Pressure Mediates the Relationship Between Body Mass Index and Inhibitory Control in Children

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Abstracts were prepared by the authors and printed as submitted.
was evaluated based on number of errors during No-go stimuli. T-tests were applied to verify differences between independent variables and cognitive performance. Thereafter, a four step mediation was applied using SIBP as a mediator of the relation between BMI and number of errors. RESULTS: NNT group had higher number of errors compared to NT one (4.14 ± 0.92 vs. 2.43 ± 0.54, p < 0.002). In addition, a relationship between BMI and number of errors (β = 0.38, SE = 0.16, p < 0.02) was found. However, when considering SBP, this relationship was not longer statistically significant (β = 0.16, p = 0.13). The bootstrapped unstandardized indirect effect was 0.13 and the 95% confidence interval ranged from 0.02 to 0.35. This indicates SBP as a full mediation of the relation between BMI and inhibitory control. CONCLUSION: We confirm the relationship between body mass index and cognitive inhibitory control in children and for the first time present systolic blood pressure as a mediating mechanism.

2991 Board #37 May 31 2:00 PM - 3:30 PM Examining the Relationship Between Physical Activity and Cardiometabolic Biomarkers in Youth with Overweight or Obesity
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While physical activity is known to have beneficial effects in youth, including short-term improvements in adiposity, little is known regarding the association of physical activity with cardiometabolic biomarkers among youth. This is especially true in youth with overweight or obesity. PURPOSE: To determine the relationship between achieving 30 minutes of moderate-to-vigorous physical activity (MVPA) per day and markers of cardiometabolic health in youth with overweight or obesity. METHODS: Eighty-one children (mean age 6.7 years ± 1.2, 54% male, 47% with overweight, 53% with obesity), who were participating in a longitudinal intervention to increase physical activity and cardiometabolic health provided data on physical activity (via accelerometer), body composition (via DXA), blood pressure, and fasting biomarkers (insulin, glucose, triglycerides, & cholesterol). A series of ordinary least squares regressions were conducted examining the relationship between the various markers and achieving 30 minutes of MVPA, while controlling for age and sex (model one) and age, sex, and percent body fat (model two). RESULTS: Our results indicated that percent body fat was negatively associated with achieving 30 minutes of MVPA (b = −2.98, P < 01) after controlling for age and sex. Of the remaining biomarkers, only fasting insulin was associated with achieving 30 minutes of MVPA (b = −3.81, P < 05), but this relationship became non-significant (b = −2.36, P = 0.16) when adding percent body fat to the model (b = 0.50, P < 01). CONCLUSIONS: Achieving 30 minutes of MVPA was negatively associated with adiposity, but other cardiometabolic biomarkers were not associated with achieving 30 minutes of MVPA among youth with overweight and obesity.

Supported by University of Málaga (Campus of International Excellence Andalucía with overweight and obesity).

2992 Board #38 May 31 2:00 PM - 3:30 PM Negative Impact of Icing Treatment on Qualitative Recovery of Injured Soleus Muscle in Rats
Tsusaba Shihibuchi1, Claudia Pérez-López2, Takao Sugiiara1, Kazumi Masuda3. 1Kanazawa University, Kanazawa, Japan. 2Yamaguchi University, Yamaguchi, Japan. Email: dekker.timothy@mayo.edu

Although the RICE (Rest, Ice, Compression, and Elevation) treatment has been recognized as the gold standard of first aid treatment for sports injuries, we and the others previously demonstrated that a transient icing treatment immediately after skeletal muscle injury impaired muscle regeneration. However, the information about the influence of icing treatment following skeletal muscle injury remains limited. This study was, therefore, to investigate the impact of icing as a first-aid treatment on qualitative recovery of damaged muscle in terms of fibrosis and myosin heavy chain (MyHC) profile.

METHODS: Male Wistar rats (9-10 weeks of age) were randomly assigned to control (Con), injured, and injured with icing groups (Ice). Bupivacaine (BPVC) was injected into slow soleus muscles bilaterally in order to induce muscle injury in the two injury groups. Application of icing treatment (ice pack, 0°C for 20 min) to the icing group was carried out immediately after the BPVC injection. At 3 days-4 weeks after BPVC injection, soleus muscles were removed and analyzed.

RESULTS: Compared with the Con group, a significant increase in fibrotic area was observed after 2 weeks following injury in the injured groups, but after 1 week following injury in the Ice group (p < 0.05). This area was also tended to be higher in Ice than in injured animals during 1-4 weeks of recovery period. In addition, the number of Tel-4 positive nuclei, a fibroblast marker, located in interstitial spaces in both injured groups markedly increased 1 week after BPVC injection. The numbers were tended to be more magnified in the Ice group than in the injured group, then their number in both injured groups gradually decreased thereafter. Injury-related de novo appearance of embryonic, neonatal, IId/x, and IIB MyHC isoforms was noted in both injured groups 1 week after BPVC injection. These MyHC isoforms were significantly decreased toward the undetectable level thereafter. However, the embryonic MyHC isoform was still detectable in icing, but not in injured, animals 4 weeks after BPVC injection.

CONCLUSIONS: Our results suggested that icing treatment following skeletal muscle injury will have a negative impact on recovery process (fibrosis and normalization of MyHC profile) of regenerating muscle.

2993 Board #39 May 31 2:00 PM - 3:30 PM Stressed Outover Stress Fractures? Potential Predictive Model To Determinethose At Risk
Timothy M. Dekker. Mayo Clinic, Jacksonville, FL. (Sponsor: George Pujalte, FACSM) Email: dekker.timothy@mayo.edu

Purpose: Stress fractures are injuries caused by cumulative, repetitive stress that leads to abnormal bone remodeling. There are two causes of stress fractures, excessive stresses causing weakening of bone material and typical stresses acting on abnormal bone. Stress fractures are more common in certain populations including women, military personnel, high-level athletes, and the middle aged/elderly. Stress fractures have a large socioeconomic impact as they cause prolonged periods away from competition and a significant amount of healthcare spending. A reliable, reproducible method to determine which individuals are most susceptible within the predisposed populations would provide cost-effective prevention strategies. Advanced numerical simulation tools may be key to modeling the mechanical behavior of bones under different loading conditions.

METHODS: The hybrid finite-discrete element method (FDEM) combines aspects of the finite element method to model the elastic behavior of materials and the discrete element method to model the initiation and propagation of fractures. The FDEM is used to simulate the deformation and fracturing in materials such as bone and rock. This can capture the transition of a solid from a continuous to a discontinuous state by directly simulating fracturing processes. See the Image 1 for further explanation of methods.

RESULTS: Refer to Image 2 for graphs and model results.

CONCLUSION: The FDEM model shows promise to help predict stress fractures. Further studies are needed; including realistic bone loadings to real life situations.
Patellar tendinopathy (PFP) is a multifactorial knee pathology and prevalent in physically active individuals. Running is one of the most popular forms of exercise accounting with nearly 17 million runners in the US. Despite the health benefits, running may lead to injury with more than 20% of runners injured annually. Of those, 10% develop PFP. Emerging evidence suggests chronic PFP may lead to patellar tendinopathy osteoarthrits, a condition characterized by cartilage breakdown. However, little is known about how activities that cause the symptoms of PFP influence cartilage health. Diagnostic ultrasound imaging is an emerging technique to measure cartilage thickness immediately after physical activity. No research has analyzed femoral cartilage deformation followed by running in patients with PFP.

**METHODS:** As part of an ongoing investigation, 6 adults (n=3 PFP, age: 21±3±6 yrs, body mass index [BMI]: 20±3±2 kg/m²; n=3 healthy, age: 21±0±1 yrs, BMI: 21±9±1.4kg/m²) participated. A GE LOGIQe diagnostic ultrasound machine with a 12MHz linear probe was used to obtain the knee cartilage images before and after 30 minutes running. Perceived pain level was measured using a 10cm Visual Analog Scale (VAS). Correlation between percent cartilage thickness change and VAS was performed to measure the association between two variables and a simple regression analysis was performed to determine the predictability of cartilage thickness measure according to the pain level change.

**RESULTS:** Pain level change and cartilage deformation showed a strong correlation (r=0.85, p=0.033), and pain level change explained 72% of the variance in cartilage thickness (R²=0.72, p = 0.03)

**CONCLUSIONS:** Though continuation of this investigation is needed to confirm our findings, the strong positive association between pain level and cartilage deformation implies that measuring pain by VAS before and after physical activities may be an easy and effective means for clinicians to evaluate cartilage deformation.
men, 9 women). Each participant stood on one leg unsupported, with the opposite foot reaching as far as they could without losing balance in 3 directions: anterior (ANT), posteroanterior (PA), and posterolateral (PL). In the PA and PL directions, the participant performed a total of 9 trials for each direction and for each limb, but only the last 3 trials were measured and normalized to the corresponding leg length for later statistical analysis. Two separate 2 (group) x 3 (direction) ANOVAs with repeated measures were used to determine differences between groups, one for the dominant (right) leg and the other for the non-dominant (left) leg. There were significant differences in age and body mass index (p < 0.05) between groups. When standing on the dominant (right) leg, there was a significant difference (p = 0.037) in the PM reach distance between groups, with the left LBP group (86.1 ± 4.7 cm) reaching a shorter distance than the right LBP group (101.6 ± 5.2 cm). There were no significant differences in the ANT and PL directions. In addition, there were no differences in all directions between groups when standing on the non-dominant (left) leg.

CONCLUSIONS: The results of the study suggest that using a composite score may fail to show dynamic balance deficits. The PM reach direction appears to be the most challenging testing component for patients with LBP.

Total hip arthroplasty (THA) leads decrease of physical activity and muscle function, and it would induce asymmetric motor performance in daily life since most cases of THA are applied to one side. For prevention of muscle dysfunction, some sports activities such as golf, walking, swimming and so on are recommended after THA. Recently, muscle quality, i.e. fat and/or connective tissue muscles, has been used as one of important factors to determine muscle function. PURPOSE: The purpose of this study was to compare muscle size, quality and function between the operated and non-operated legs in patients with one side THA with several year’s result of several years passing after THA, the difference of thigh muscle size, quality and function was not shown between operated and non-operated leg. Several year’s exercise habits can improve not only muscle size and function but also muscle quality.

RESULTS: Fourteen men and women (67.1 ± 5.3 years; male: n=5, female: n=5) completed an eccentric exercise protocol for 6 days. Visual analog scale assessed pain and strength (KE) were measured in both operated and non-operated legs. Muscle thickness as an index of muscle size, echo intensity as an index of muscle quality and KE were compared between operated leg and non-operated leg in patients with one side THA with several year’s of THA are applied to one side. For prevention of muscle dysfunction, some sports activities such as golf, walking, swimming and so on are recommended after THA. Recently, muscle quality, i.e. fat and/or connective tissue muscles, has been used as one of important factors to determine muscle function. PURPOSE: The purpose of this study was to compare muscle size, quality and function between the operated and non-operated legs in patients with one side THA with several year’s result of several years passing after THA, the difference of thigh muscle size, quality and function was not shown between operated and non-operated leg.

CONCLUSIONS: The results of the study suggest that using a composite score may fail to show dynamic balance deficits. The PM reach direction appears to be the most challenging testing component for patients with LBP.
simple and easy approach. Using a randomized controlled trial design, we examined the effectiveness of 1-yr. supervised FMS (functional movement system) based training.

METHODS: 122 male, healthy college pilot trainees (20.1 ± 0.3 yr.) were randomly assigned to FMS training (n = 62) and regular physical education control (n = 60). 178.99 hrs, about 192 hrs in total, during one year, and their height, weight and a set of fitness were measured before and after the study.

RESULTS: Overall adherence to prescribed exercise sessions was 178.99±12.95 times or a 93.6% adherence rate, and there is no difference between groups. FMS scores in the training group increased by 29.7% (from pretest of 13.8 ± 1.44 to posttest of 17.9 ± 1.03), but only 5.1% improvement in the control group (from 13.7 ± 1.28 to 14.4 ± 1.06). Similar changes were observed in weight, BMI, hand-grip (HG), stand-long-jump (SLJ) and Sit-&-Reach (S&R), which are summarized in the table below (M±SD).

Conclusions: The FMS based training can effectively improve FMS and other physical fitness of college pilot trainees.

KEY WORDS: exercise intervention, randomized controlled trial, college students

High-intensity interval training (HIIT) has been proposed as a time-efficient protocol to improve metabolic health. However, its practical efficacy in terms of cardio-metabolic and adherence相比 higher-volume moderate-intensity continuous exercise (MICE) remains unclear.

PURPOSE: To compare the training effects between low-volume HIIT and higher-volume MICE in cardio-metabolic and psycho-perceptual responses in overweight/obese middle-aged men.

METHODS: Twenty overweight/obese men (mean age: 48.0 ± 5.7 years) were randomly assigned to undertake either HIIT (n=10) or MICE (n=10) training for 8 weeks (3 sessions/week). HIIT sessions consisted of ten 1-minute intervals of exercise at 80-90% HRmax separated by 1-minute active recovery. MICE sessions involved 50-minute continuous exercise at 65-70% HRmax. Health-related variables including cardiovascular fitness (VO2max), body composition and cardio-metabolic blood markers were assessed before and after the intervention. Adherence-related psycho-perceptual variables including enjoyment and self-efficacy were also assessed after the intervention. Paired-sample t-tests were used to compare changes within a group before and after the intervention. Analysis of Covariance was used to compare the group difference in outcome variables after controlling for baseline values.

RESULTS: Both groups showed similar VO2max increase over the 8-week intervention (HIIT: 32.5 ± 5.6 to 36.0 ± 6.2; MICE: 36.3 ± 6.0 to 21.5 ± 40.2 ± 5.1 mL kg^-1 min^-1, both p < 0.05). Both groups had significant fast's loss (HIIT: 24.5 ± 3.4 to 23.2 ± 3.5; MICE: 23.0 ± 4.3 to 21.5 ± 4.1, both ps < 0.05) and there was a trend favoring MICE (p = 0.054). Compared to the baseline, MICE group significantly decreased weight, body mass index (BMI), waist circumference and glycated hemoglobin whereas HIIT increased high-density lipoprotein after the intervention. However, these variables did not differ significantly upon group comparison. The self-efficacy and enjoyment responses were found similar between HIIT and MICE (both ps > 0.05).

CONCLUSIONS: Our findings suggest that low-volume HIIT elicits a similar improvement of cardiovascular fitness and adherence-related psycho-perceptual responses as traditional higher-volume MICE in overweight/obese middle-aged men.

<table>
<thead>
<tr>
<th>Group</th>
<th>Weight (kg)</th>
<th>Height (cm)</th>
<th>BMI</th>
<th>FMS</th>
<th>HG (kg)</th>
<th>SLJ (cm)</th>
<th>S&amp;R (cm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control</td>
<td>0.85±1.50</td>
<td>0.02±1.1</td>
<td>0.70±81</td>
<td>1.83±1.69</td>
<td>0.10±0.7</td>
<td>2.42±1.05</td>
<td></td>
</tr>
<tr>
<td>Training</td>
<td>0.92±2.04</td>
<td>0.06±3.3</td>
<td>-0.31±1.36</td>
<td>4.10±1.36</td>
<td>4.11±2.17</td>
<td>0.18±0.6</td>
<td></td>
</tr>
<tr>
<td>Effect size</td>
<td>-0.26</td>
<td>0.09±6.6</td>
<td>84</td>
<td>51</td>
<td>49</td>
<td>67</td>
<td></td>
</tr>
</tbody>
</table>

*p<05, **p<01, ***p<001.

CONCLUSIONS: The FMS based training can effectively improve FMS and other physical fitness of college pilot trainees.

KEY WORDS: exercise intervention, randomized controlled trial, college students

The proprioceptive neuromuscular facilitation and stretching methods are commonly applied in warm-up routines, often with the aim of injury prevention. PURPOSE: To investigate the effect of a 12-week program of flexibility training on range of motion (ROM) of shoulder and lumbar spine joints in male militaries. METHODS: 90 young male militaries (17.02 ± 1.24 years old), of a universe of 500 students from Air Cadets Preparatory School, were randomly assigned in 3 groups with 30 subjects each one: stretching (SG), proprioceptive neuromuscular facilitation (FNP) and control (CG). The ROM was measured by goniometry based on LABFIBE protocol in three moments: before, during (6-week) and after training (12-week). The experimental groups performed 3 sets with 5 seconds rest intervals, 5 times a week, for shoulder horizontal flexion (SHF), shoulder horizontal extension (SHE) and lumbar spine flexion (LSF). The scale of perceived exertion in the Flexibility (PERFLEX) (0 = 110) was used to control the intensity in both groups, CG (31 ± 60) and FNP (61 - 80). The exercise duration was 5 seconds for the SG and 8 seconds for each phase (contraction-relaxation) for the FNP. RESULTS: There were no significant differences among 3 groups in the ROM baseline values. The comparative analysis of ROM rates, defined through one-way ANOVA combined with Tukey post-hoc test, showed significant differences in the following movements to the FNP: SHF (Δ% = 4.6, p < 0.001), SHE (Δ% = 8.6, p < 0.002) and LSF (Δ% = 56.1, p < 0.001). CONCLUSION: It was concluded that the program of flexibility training by FNP resulted in higher rates of development of ROM when compared to the stretching.
Chinese Preschool Children (3-6 years old) Physical Activity Guidelines (2018 ed) recommends that preschool children should accumulate at least 180 minutes of physical activity (PA) at any intensity throughout the day, including no less than 60 minutes of Moderate-to-Vigorous PA (MVPA).

**POUERE**: Step count (SC) targets correspond to these recommendations to assist parents and childcare workers who will guide children to achieve the PA goal.

**METHODS**: 903 preschool children were instructed to wear the ActiGraph GT3x accelerometers sensor for more than 4 days, including at least 3 workdays and 1 weekend, for at least 8 hours per day. The sample included 903 preschoolers (SSB), Light PA (LPA), Moderate PA (MPA), Vigorous PA (VPA), MVPA, Total PA (TPA) and SC were obtained from GT3x. Receiver operating characteristic curve (ROC) was applied to analyze the ROC analysis of SC and MVPA which reached to 60min or more did not reach to 180min of TPA. The consistency test result was Kappa = 0.987 (P<0.0001). Thus, the evaluation of MVPA was more valuable.

The study also carried out ROC analysis of SC and MVPA which reached to 60min or not. The results showed the Area Under Curve index was 0.5900, corresponding to the SC of 7686 steps. The specificity was 0.8505 and sensitivity was 0.7395. When setting the SC standard as 8000, which is close to 7686 steps, the consistency test result was Kappa = 0.5715 (P<0.0001), and it was acceptable.

**CONCLUSION**: Based on the data, we suggest that SC target of 8000 steps per day can be used to determine whether Chinese preschool children meet the PA recommendations by the national guideline. Supported by Jiangsu Province Education Science 12th Five-Year Plan (T/2015/010) and General Administration of Sport of China Scientific Research Project (2015B072).

**RESULTS**: Female preschool educators scored significantly higher in HRFK (85% HRFK, F[2,794]=4-17, r=2.85, p<.002 [r=.102, d=21]), and reported less weekly minutes of vigorous PA (142.2 min/wk, F[2,794]=21.78, p<.002 [r=.114, d=9]) than male counterparts (82% HRFK, 157.5 min/wk vigorous PA). Female educators also reported significantly greater teaching of HRFK (14.8 vs.13.9, F[2,794]=3.09, t=2.37, p<.009 [r=.09, d=17]), and assessment of HRFK than male physical educators, approaching significance (9.7 vs. 9.3, F[2,794]=1.24, r=.157, p=.058, [r=.06, d=11]).

No differences in moderate and light PA were observed.

**CONCLUSIONS**: In spite of participating in less weekly vigorous PA, female physical educators in the study demonstrated greater HRFK and emphasized teaching and assessing HRFK more, thus may be more effective in promoting health-related fitness and lifelong PA.

**As female students enter college they are given many opportunities to be physically active including fitness classes and student gym memberships. Despite many benefits and opportunities, many female college students are not achieving the recommended activity levels.**

**PURPOSE**: The primary purpose of this study was to determine the relationship of HRFK, PA, and HRFK instructional practices among female and male physical educators.

**METHODS**: A three-part questionnaire was administered to physical educators (N = 796, 409 female) from seven US states. Part 1 of the questionnaire included the International Physical Activity Questionnaire (IPAQ), measuring vigorous, moderate, and light PA min/wk. Part 2 included 10-items from PE Metrics Standards 3 & 4 Assessment, measuring participants’ HRFK. Part 3 included the Physical Education Curriculum Analysis Tool (PECAT) to determine the extent to which participants teach and assess student HRFK. Survey responses were adapted to a 5-point likert scale. One-way ANOVA along with post-hoc-t-tests were conducted and gender comparisons made.

**RESULTS**: Female physical educators scored significantly higher in HRFK (85% HRFK, F[2,794]=4-17, r=2.85, p<.002 [r=.102, d=21]), and reported less weekly minutes of vigorous PA (142.2 min/wk, F[2,794]=21.78, p<.002 [r=.114, d=9]) than male counterparts (82% HRFK, 157.5 min/wk vigorous PA). Female educators also reported significantly greater teaching of HRFK (14.8 vs.13.9, F[2,794]=3.09, t=2.37, p<.009 [r=.09, d=17]) and assessment of HRFK than male physical educators, approaching significance (9.7 vs. 9.3, F[2,794]=1.24, r=.157, p=.058, [r=.06, d=11]).

No differences in moderate and light PA were observed.

**CONCLUSIONS**: The results of this study provided two valuable insights. First, this study provided evidence of the effectiveness of online courses in influencing students’ intentions to continue exercising and exercise self-efficacy. Second, these results demonstrated students can receive similar benefits from online courses as they receive face-to-face activity courses.

Lifelong physical activity (PA) is an important outcome of physical education (PE) programs. To effectively promote student PA, educators must possess adequate health-related fitness knowledge (HRFK), utilize effective instructional practices related to HRFK, and model a physically active lifestyle. Research among US adults shows that females tend to be less physically active than male counterparts, however, no research has documented gender differences in HRFK nor instructional practices related to HRFK.

**PURPOSE**: To determine the relationship of HRFK, PA, and HRFK instructional practices among female and male physical educators.

**METHODS**: A three-part questionnaire was administered to physical educators (N = 796, 409 female) from seven US states. Part 1 of the questionnaire included the International Physical Activity Questionnaire (IPAQ), measuring vigorous, moderate, and light PA min/wk. Part 2 included 10-items from PE Metrics Standards 3 & 4 Assessment, measuring participants’ HRFK. Part 3 included the Physical Education Curriculum Analysis Tool (PECAT) to determine the extent to which participants teach and assess student HRFK. Survey responses were adapted to a 5-point likert scale. One-way ANOVA along with post-hoc-t-tests were conducted and gender comparisons made.

**RESULTS**: Female physical educators scored significantly higher in HRFK (85% HRFK, F[2,794]=4-17, r=2.85, p<.002 [r=.102, d=21]), and reported less weekly minutes of vigorous PA (142.2 min/wk, F[2,794]=21.78, p<.002 [r=.114, d=9]) than male counterparts (82% HRFK, 157.5 min/wk vigorous PA). Female educators also reported significantly greater teaching of HRFK (14.8 vs.13.9, F[2,794]=3.09, t=2.37, p<.009 [r=.09, d=17]), and assessment of HRFK than male physical educators, approaching significance (9.7 vs. 9.3, F[2,794]=1.24, r=.157, p=.058, [r=.06, d=11]).

No differences in moderate and light PA were observed.

**CONCLUSIONS**: In spite of participating in less weekly vigorous PA, female physical educators in the study demonstrated greater HRFK and emphasized teaching and assessing HRFK more, thus may be more effective in promoting health-related fitness and lifelong PA.

**College athletic staff are confronted with numerous day to day problems in attempting to advance the performance of their athletes with suitable nutrition playing a dynamic role in that task. Having adequate nutrition knowledge is key to providing satisfactory and appropriate information to improve performance.**

The ideal providers of such knowledge are Registered Dietitians with a specialty in Sports Dietetics who may not be obtainable or have scarce contact to athletes on a smaller, less resourced Division II campus. **Purpose**: First establish the knowledge base of those that have regular contact or have scarce contact to athletes on a smaller, less resourced Division II campus.

**METHODS**: Participants (N=42, mean age = 20.1 ± 1.5 years) college undergraduate students. Study consisted of 3 main parts. Experimental group contained 14 students enrolled in online walking. Control group one had 14 females students enrolled in face to face activity course and the other contain 14 students who never took an activity course. Each group was given a survey measuring exercise self-efficacy and intention to exercise at the start of the semester and then 15 weeks later.

**RESULTS**: Two 3group X 2 time MANOVA were run to test the interactions. There were significant improvements by time interactions for both intention to continue exercising [F (2, 39) = 9.26, p<.001, η²p =.27] and exercise self-efficacy [F (2, 39) = 23.03, p<.001, η²p =.17] and both indicated large effect sizes (Cohen, 1969). The group by time interactions indicated that participating in activity courses whether online or face to face positively affected students’ intention to exercise as well as their exercise self-efficacy. Control group had no significant changes.
post-survey results. Conclusion. Educating an athletic staff with 3 nutrition education interventions amplifies their knowledge base and self-efficacy; regardless of gender, title, or education level. This study warrants the need for further research to examine the implementation of this new knowledge base from the athletic staff to the athletes.

3009 Board #55
May 31 3:30 PM - 5:00 PM
Gender Differences in Golf Performance After Various Warm-ups
Andrea Fradkin, FACSM. Bloomsburg University, Bloomsburg, PA.
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(No relevant relationships reported)

Distinct injury differences exist between genders in golf, however, performance improvement benefits have not been studied.

PURPOSE: To examine golf performance differences by gender following individual and combined warm-up components.

METHODS: Sixty-five (31 male, 34 female) proficient golfers performed 5 baseline swings, followed by 10 swings after seven randomly ordered warm-up combinations (aerobic exercise (AE); stretching (ST); specific activity (SP); aerobic exercise & stretching (AE+ST); aerobic exercise & specific activity (AE+SP); stretching & specific activity (ST+SP); and all 3 components (ALL)), on non-consecutive days. Club and ball flight characteristics were measured.

RESULTS: Clubhead speed (CHS) improved following AE, SP, AE+ST, AE+SP, ALL (p<0.001), ST, and ST+SP (p≤0.05). Carry distance (CD) improved after AE, AE+ST, AE+SP, ALL (p<0.001), SP, ST (p<0.01), and ST+SP (p<0.05). Significant improvements were also seen in ball speed (BSPEED) for AE, AE+ST, AE+SP, ALL (p<0.001), SP, and ST (p<0.01), however, ST+SP showed non-significant increases. For launch angle (LA), AE, ST, AE+SP, and ALL (female) showed non-significant increases, whereas ST+SP, AE+ST, and ALL (male) showed non-significant decreases. Finally, in backspin (BSPIN), AE, ST, AE+SP, ST+SP (male), and ALL (female) showed non-significant increases, whereas AE+ST, ST+SP (female) and ALL (male) had non-significant decreases.

CONCLUSION: There were no significant gender differences following a warm-up. AE was the most valuable element to complete for performance improvement, with the greatest increases seen after AE+SP, AE, and ALL. ST significantly decreased CD, BSPEED, and CHS, however, ST+SP showed significant increases in CD and CHS, suggesting that 30 seconds of SP off-sets any negative effects of static stretching. Performance also significantly increased with AE+ST, suggesting that pre-warming the body may also negate any harmful effects of static stretching. The overall reliability was high (0.831-0.989), suggesting golfers had consistent swings, thus the performance changes were a result of the warm-up components. This was further supported by significant changes in CHS and BSPEED but not LA or BSPIN, indicating that CD improved solely as a result of increased BSPEED attributed to increased CHS.

3010 Board #56
May 31 3:30 PM - 5:00 PM
Actions of The Nasf-ab In a City of The Extreme North of Brazil
Ana Paula de Azevedo Albuquerque1, Paula Paraguassú Brandão2, Valderi Nascimento Viana1, Thiago Santos Cardoso1, Isadora Canto1, Rodrigo Gomes de Souza Vale3, Luciana Bonilha1.
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(No relevant relationships reported)

PURPOSE: Analyze if the teams the Núcleo Ampliado de Saúde da Família e Atenção Básica (NASF-AB) - Extended Core of family health and primary health care - of Sistema único de Saúde do Brasil (SUS) - Unified Health System – of Brazil, of the city of Macapá in the State of Amapá, It's an act in accordance with what is proposed by the Ministry of health.

METHODS: The present study is a descriptive and explanatory research. It includes both qualitative and quantitative character. Which is used the monthly reports of the teams of the Extended Core of family health and primary health care from May to September 2018. The reports used to analyze belongs to 8 teams of NASF-AB that exist in the city of Macapá in the State of Amapá, how that teams work through matrix support each of which is composed of six distinct areas professionals among there are the Physiotherapist, social worker, nutritionist, psychologist, speech therapist and physical education professional.

RESULTS: The results obtained from the documentary survey allow a good analysis about NASF-AB professionals' actions. It was analyzed 3 among 9 available which are health actions, individualized care and home visits accompanied with the Estratégia Saúde da Família (ESF) - The family health strategy. The analysis took into account all the professionals that compose the teams and their actions of the selected items. Among the data obtained it is essential to emphasize that of all health actions only 7.5% of them had participation of the physical education professional, with the psychologist was 23.8%. When analyzing the number of individualized care in absolute terms there is a large difference between the number of attendances of the psychology professional, which was 1625 individuals, and the social work professional, which in 5 months took care of 632 users.

CONCLUSION: The research evidenced that the attendances made by the NASF-AB teams, among the 3 items analyzed, It is below the expected level of what should be, especially when it’s considered that the teams should work using the matrix support, which probably does not occur, If a chosen area is taken into account and the population selected It is understand that the population reach is still restricted. In front of exposed beliefs that should provide greater training for these professionals.

3011 Board #57
May 31 3:30 PM - 5:00 PM
A Seven Day Healthy Summer Camp Improved Body Composition And Lipid Profile In Obese Children
Carmen S.G. Campbell1, Maria C.F. Macedo1, Alisson L. Aquino1, Jéssica M.S. Barbosa1, Isabella R. Praga2, Jessica A. Bezerra2, Liliane R. Silva2, Laila I.J. Lenore3, André L. L., Araujo1, Karen J.S. Sarmento1, Leandro O. Araujo1, Gustavo L. Guedes1, Rebeca C.S. Senna1, Eliza R.D. Duarte1, William P.A. Dias1, Hanna S. Messias1, Leandro L. Sousa1, Suliane B. Raubert2.
1Catholic University of Brasilia, Taguatinga, Brazil. 2Institute of Higher Education of Brasilia, Asa Sul, Brazil. 3University Center UDF, Taguatinga, Brazil. 4University of South American Nations, Brazillandia, Brazil.
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(No relevant relationships reported)

PURPOSE: To investigate the effects of lipid profile and anthropometric measures in obese children based on a seven day participation at a health education camp (KIDS).

METHODS: Twenty children were enrolled in the KIDS (12 girls; 8 boys; 9.97±1.27 yrs.; 52.5±10.3 kg; 143.6±10.94 cm). The KIDS team was composed by a Physical Educator, Nutritionist, Psychologist, Physiologist and a Pedagogue which developed the multidisciplinary activities for parents and children. The parents attended the KIDS on the first two days to raise awareness about the healthy habits for the whole family. The children stayed for another five days. The blood sample for lipid profile and anthropometric data were collected before and after KIDS. The Student t test was applied to compare pre and post KIDS data. The level of significance was set at p<0.05. RESULTS: The results are presented at table 1.

<table>
<thead>
<tr>
<th>Parameters</th>
<th>PRE</th>
<th>POST</th>
<th>Δ (%)</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>BW (kg)</td>
<td>52.52±10.27</td>
<td>51.85±9.76</td>
<td>-1.13</td>
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</tr>
<tr>
<td>BMI (kg/m²)</td>
<td>25.23±2.35</td>
<td>24.94±2.24</td>
<td>-1.13</td>
<td>&lt;0.000</td>
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<tr>
<td>∑ST (mm)</td>
<td>64.85±15.0</td>
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<td>&lt;0.000</td>
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<tr>
<td>BF (%)</td>
<td>45.11±8.18</td>
<td>41.65±6.71</td>
<td>-7.25</td>
<td>&lt;0.000</td>
</tr>
<tr>
<td>FATM (kg)</td>
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<td>21.94±6.45</td>
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<td>&lt;0.000</td>
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<tr>
<td>LBM (kg)</td>
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<td>TC (mg/dL)</td>
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<td>&lt;0.000</td>
</tr>
<tr>
<td>TG (mg/dL)</td>
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<td>50.05±19.86</td>
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<td>&lt;0.026</td>
</tr>
<tr>
<td>LDL-C (mg/dL)</td>
<td>93.22±26.37</td>
<td>48.42±10.3</td>
<td>-26.5</td>
<td>&lt;0.000</td>
</tr>
<tr>
<td>HDL-C (mg/dL)</td>
<td>46.79±11.50</td>
<td>69.89±22.0</td>
<td>+5.3</td>
<td>&lt;0.000</td>
</tr>
</tbody>
</table>

BW-Body weight; BMI-Body mass index; ∑ST-Skinfolds thickness sum (Subscapular and suprailiac); BF-Body Fat; FATM-Fat mass; LBM-Lean Body Mass; TC-Total Cholesterol; TG-Triglycerides; LDL-C-Low Density Lipoprotein Cholesterol; HDL-C-High Density Lipoprotein Cholesterol. CONCLUSIONS: A seven-day health educational summer camp with multidisciplinary team and parent involvement induced a significant improvement in the lipid profile and anthropometric data of obese children.

Financial support: CNPq # 430012/2016-0

Abstracts were prepared by the authors and printed as submitted.
INTRODUCTION: The Health Peers Programme illustrates how healthcare providers from multiple disciplines work together to pilot a community health programme in partnership with community stakeholders supported by government health initiatives in the early intervention of diabetes. PURPOSE: To determine the impact of a multidisciplinary community health programme focusing on early intervention of diabetes in individuals who are at risk or who have been diagnosed with diabetes. METHODS: 137 volunteers were trained as Health Peers in 2017 through a structured programme developed by a psychologist, a dietician and a physician. All subjects underwent to coach those at-risk or diagnosed with diabetes. Each health peer reached out to at least 2 residents in a housing estate within 6 months. An outreach included an initial house visit with face-to-face interactions and two subsequent contact sessions, involving face-to-face interaction sessions, online text messaging or teleconferencing. The competency and confidence of the Health Peers to conduct health coaching were assessed post-training. A survey was conducted at 6 months post-outreach to assess the extent of translation from knowledge and awareness, to lifestyle changes by the residents. RESULTS: All Health Peers showed improvement in their competency post-training. Their confidence levels in health coaching showed increasing trends throughout the period of assessment. 88.9% of the residents reported an improved positive experience when interacting with the Health Peers. All of them reported that they would consult the Health Peers for assistance in their health goals. 87.3% agreed that the Health Peers have impacted their knowledge and awareness of diabetes and healthy living. 83.3% made positive changes to their eating habits and exercise based on the national recommendations after 6 months of health coaching. CONCLUSION: A successful and sustainable community health programme must aim to appeal and evoke ownership of its participants to champion chronic disease management and prevention by engaging them through their own experiences. This is achieved through a dynamic and structured programme developed by various expertise within the healthcare profession in collaboration with community stakeholders and supported by government health initiatives.

Overweight female population in China ranks first in the world. Overweight is a risk factor for many diseases. Hypoxic training can reduce body weight and improve metabolism. However, the mechanism of weight loss in hypoxia remains unclear. PURPOSE: To examine the effect of hypoxic training on plasma metabolites in overweight females. METHODS: 40 overweight females (age: 31.30±5.15 years, body mass index: 30.11±4.35 kg/cm²) were selected and grouped into hypoxic training groups (HT, n=20) and normoxic training group (NT, n=20). All subjects underwent a 6-week training, which included resistance training and endurance training for 30 minutes each, 3 times a week. Resistance training: dumbbells with 12RM, 8 actions, 2 groups for each action. Endurance training: treadmill with slope 0% at 60%-70% maximum heart rate. The HT group was trained under normobaric hypoxia (16% O₂). The NT group was trained in normoxia. The diet was not restricted. Body composition was detected before and after training. Plasma metabolites were analyzed by using liquid chromatography/mass spectrometry and principal component analysis. RESULTS: After training, the body fat and serum total cholesterol in HT group reduced more than that in NT group on average (8.37% vs 3.60%, p=0.035; 4.95% vs -14.28%, p=0.005). The metabolic characteristics were significantly different between HT and NT group, there were 50 endogenous metabolites (VIP>1 and p<0.05), of which 33 were increased and 17 were decreased. Major metabolites that changed with hypoxic training included sphingosine, sphingomyelin, phosphatidylcholine, L-valine, linoleic acid and oleic acid. CONCLUSION: Hypoxic training has a marked effect on the plasma metabolites in overweight females, which can improve the lipid metabolism by regulating the metabolic pathway of linoleic acid. These findings may lead to a better understanding of the mechanism of hypoxic training in weight loss.
PT-DA model of LCMs metabolomics data for post-training between HT and NT group

**3016**

**Board #62**

**May 31 3:30 PM - 5:00 PM**

**Top Down 1RM Testing May Facilitate Higher and More Reliable Maximal Strength Values Than Traditional Bottom-Up Methodologies**

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(No relevant relationships reported)

**PURPOSE:** Accurate determinations of individuals’ maximal strength (1RM) are critical when evaluating the effectiveness of exercise interventions involving progressive resistance training. ‘Bottom-up’ testing methods (BT), involving progression of values from low to maximal loads, are commonly employed in clinical and laboratory environments. Concerns about the reliability of this method in novice exercisers suggest that a different technique may be more effective. This study compared the reliability and effectiveness of BT testing to that of ‘top down’ 1RM testing (TDT), in which the initial testing load is greater than individual’s 1RM and loads are progressively reduced until a successful repetition is completed.

**METHODS:** 70 healthy adults (age = 45.03 ± 25.64 y) with diverse strength training experience were randomized into a reliability testing trial (n=33) or an optimal method trial (n=27) following a familiarization visit designed to introduce subjects to the procedures. Participants then performed either BT or TDT 1RM testing on 3 occasions separated by at least 3 days, while subjects in the optimal method trial performed each method once in random order on different days.

**RESULTS:** No between-group differences were identified at baseline with respect to age, BMI, previous training experience, or predicted leg and chest press 1RM for either trial. For the reliability trial, no significant between-group differences were identified in coefficient of variation over the three testing days for either the BT or TDT. However, the BT group produced significantly higher CP and LP 1RM values on the second testing day (Cohen’s d=0.67, p=0.014; Cohen’s d=0.70, p=0.011, respectively). For the optimal method trial, no order effect across days was identified between BT or TDT. However, significantly higher CP 1RM values were obtained using TDT (Cohen’s d=0.92, p=0.015). Untrained individuals in this sample obtained significantly higher LP 1RM values using TDT (Cohen’s d=2.72, p=0.001) and older individuals obtained significantly higher CP values (Cohen’s d=1.37, p=0.028) using TDT.

**CONCLUSION:** TDT may produce higher and more reliable 1RM values than BT across a wide spectrum of ages and experience levels.

**3017**

**Board #63**

**May 31 3:30 PM - 5:00 PM**

**Comparison between Caloric Expenditure Sitting on a Standard Chair, Stability Ball, and Balanced Active Sitting**

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(No relevant relationships reported)

Chronic sedentary behaviors can be detrimental to health and increase the risk of mortality. Products, such as stability balls and active balanced sitting chairs, have recently emerged as a way to reduce sedentary behaviors in office settings.

**PURPOSE:** To determine if differences in caloric expenditure and heart rate exist between a standard chair (SC), a stability ball (SB), and an active balanced sitting chair (ST). **METHODS:** Participants (n=20) performed a 10 minute reading task while sitting on a standard chair, a stability ball, and an active balanced sitting chair. All three conditions were randomized for each participant. Caloric expenditure and heart rate were monitored via a portable metabolic cart and a heart rate strap, respectively. Conditions were compared using a repeated measures ANOVA and significant comparisons were assessed through Bonferroni post-hoc analyses.

**RESULTS:** Heart rate response was greater on the ST (84±15 bpm) when compared to the SC (75±12 bpm; p<0.01) and SB (73±12 bpm; p<0.01). Total caloric expenditure on the ST (27.4±7.07 kcal) was greater than SC (16.55±3.07 kcal; p=0.01) and SB (16.85±2.54 kcal; p=0.01); however, no difference existed between SC and SB. Caloric expenditure per minute was greater on the ST (2.73±0.71 kcal) versus the SC (1.64±0.28 kcal; p=0.01) and SB (1.69±0.26 kcal; p=0.01). Additionally, the ST required increased MET values (2.35±0.49 METs) than the SC (1.43±0.28 METs; p=0.01) or the SB (1.50±0.33 METs; p<0.01). No significant differences were observed between the SB and SC for any of the comparisons.

**CONCLUSION:** The ST produced a greater heart rate response and caloric expenditure than the SC or SB, indicating that active balanced sitting may be a feasible way to reduce sedentary office behaviors. Consistent with previous literature, there were no differences in heart rate or caloric expenditure between the SB and the SC during any condition. These results suggest that active sitting, which includes a strong balance component, may be crucial to increasing energy expenditure beyond that of sitting on a SC.

**3018**

**Board #64**

**May 31 3:30 PM - 5:00 PM**

**Different Frequencies Of High-intensity Interval Training On Aerobic Fitness And Fatness In Overweight/obese Young Adults**

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(No relevant relationships reported)

**PURPOSE:** To compare the effect of high-intensity interval training (HIIT) on aerobic fitness, body composition, and blood pressure.

**METHODS:** Forty-seven overweight/obese young men aged between 18 to 30 years were randomly allocated to non-interventional control (CON; n=14), three HIIT sessions weekly (HIIT-3; n=14), two HIIT sessions weekly (HIIT-2; n=10), and one HIIT session weekly (HIIT-1; n=9). Each HIIT session consisted of 12–1 minute of 30–minute shuttle runs at 90% of heart rate reserve (HRR) and interspersed with 11–1 minute bouts of jogging at 70% HRR. Aerobic fitness, body fatness, and blood pressure were examined before, after 4 weeks and 8 weeks of the intervention. Aerobic fitness was measured by 20–meter shuttle multistage run test, body fatness was measured by bioelectrical impedance analyzer, and blood pressure was assessed by electronic sphygmomanometer.

**RESULTS:** Aerobic fitness in all HIIT groups were significantly higher than CON at post-test. Percent body fat mass, absolute body fat mass, trunk fat mass, and systolic blood pressure in all HIIT groups were significantly lower than CON at post-test. The change of aerobic fitness (∆% total running distance: r=0.6, p<0.01) was positively correlated with the exercise frequency of HIIT. ∆% absolute body fat mass (r=–1.105, p<0.01), ∆% absolute body fat mass (r=–0.5, p<0.01), ∆% absolute trunk fat mass (r=–0.4, p<0.01) and ∆% systolic blood pressure (r=–0.4, p<0.05) showed negative correlation with the exercise frequency of HIIT.

**CONCLUSIONS:** Dose–response in the improvement of aerobic fitness, reduction of body fatness, reduction of systolic blood pressure among different exercising frequencies of HIIT were observed. HIIT, even with lower frequency (once weekly), improved aerobic fitness, body fatness, and blood pressure in overweight or obese young adults.

**3019**

**Board #65**

**May 31 3:30 PM - 5:00 PM**

**The Experiences of College Students Enrolled in a Fitness Walking Class with Shelter Dogs**

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Many four-year colleges and universities no longer require physical activity courses as part of student curricula but continue to offer elective physical activity courses. These elective courses are important given the benefits associated with physical activity, the low levels of physical activity found within the college student population, and the importance of establishing lifelong physical activity habits at earlier life stages. Colleges and universities also stress the importance of community engagement within their courses. In the physical activity context, service-learning curricula has been used to teach responsibility, life skills, and values to students suggesting that addressing the physical activity needs of others, such as shelter dogs, within activity-based courses may benefit multiple entities. **PURPOSE:** The purpose of this study was to examine the experiences of students enrolled in a service-learning fitness walking course in which students walk local shelter dogs.

**METHODS:** Data were collected over six full semesters and three summer sessions. During this time, the course was offered twelve times and a total 66 reflection papers.
were submitted. These papers were guided by five questions constructed to assess the objectives of the course. Adopting a grounded theory approach, the papers were inductively analyzed first using open coding, followed by focused and axial coding. RESULTS: One central theme emerged under which several subthemes was identified. The central theme was the importance of walking to shelter dog physical and emotional well-being. As one subtheme, students described feeling motivated and obligated to attend class regularly so the dogs could get physical activity. Other subthemes included the importance of walking for humans, the importance of patience, enjoyment of interacting with the dogs, learning about the physical activity needs of dogs, and deconstructing stereotypes of shelter animals. CONCLUSIONS: The results of this study suggest that students enjoyed engaging in regular walks for the wellbeing of the shelter animals. While students did acknowledge that they were also getting physical activity, this was secondary. Findings suggest that multiple entities can benefit from service-learning physical activity courses and be sources of motivation for students.

3020 Board #66 May 31 3:30 PM - 5:00 PM A Survey of HBCU Nutritional Habits, Attitudes About Health and Risk Perception

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PURPOSE: The purpose of this study was to explore nutritional habits, attitudes about health, and risk perception in an HBCU population of rural northeastern North Carolina. Specific targets of assessment included nutritional status, perceptions surrounding health risks, environmental risks and risk perception related to common diseases such as prediabetes (PD), high blood pressure (HBP), stroke, asthma, cancer and cardiovascular disease (CVD).

METHODS: A total of 300 university students, faculty and staff (N = 300, M = 143, F = 157, ages 18-65 yrs, Mean = 23.39 yrs, SD = 8.40 yrs), of any activity level, from all parts of campus were surveyed utilizing the REAP-S and RPS-DD instruments. SPSS correlations and Chi Square tests were used to analyze survey and demographic data.

RESULTS: A strong positive correlation was demonstrated between the beliefs of “I feel I have very little control over risks to my health” and “If I am going to get diabetes, there is not much I can do about it” (N = 293, R = .524, p < .001). Beliefs that exercising regularly could reduce risk strongly correlated to controlling weight gain (N = 293, R = .737, p < .001), as did eating healthy and reducing the risk of diabetes (N = 292, R = .627, p < .001). Increased consumption of sweets (N = 295, R = .157, p < .007) and processed meals (N = 295, R = -.125, p < .032) correlated with beliefs related to a lack of control. A negative correlation was demonstrated between this perception and a willingness to make change (N = 287, R = -.123, p < .036), and beliefs that personal efforts would help control risk (N = 294, R = -.192, p < .001). Perceived risk for heart disease correlated with family CVD diagnosis (N = 292, R = -.507, p < .001), perceived cancer risk (N = 287, R = -.537, p < .001), perceived HBP risk (N = 283, R = -.389, p < .001), perceived stroke risk (N = 289, R = .556, p < .001), and perceived asthma risk (N = 286, R = -.340, p < .001).

CONCLUSIONS: Findings suggest perceived control is a powerful indicator of perceptions of the effectiveness of positive health behaviors, and engagement in management behaviors. Family CVD diagnosis strongly impacted personal perceptions of risk for cancer, HBP, stroke, and asthma risk. Future research should evaluate effective interventions centered around healthy exercise and nutrition practices, with an emphasis on internal locus of control.

3021 Board #67 May 31 3:30 PM - 5:00 PM Differences In Strategic Constructs Of The Transtheoretical Model Across The Levels Of Sitting Time

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Differences in Strategic Constructs of the Transtheoretical Model Across the Levels of Sitting Time

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The strategic constructs, such as processes of change, self-efficacy, and decisional balance, of the Transtheoretical Model (TTM) have been relatively neglected by researchers in spite of the fact that they potentially provide important insight into the content of behavior change interventions. As most criticisms of the TTM are targeted at the central organizing construct, the stages of change, due to its arbitrary stage classification, the direct comparison between objective values attaching to a specific behavior and the strategic constructs is warranted. PURPOSE: To investigate the differences in strategic constructs of the TTM across objectively measured sitting time. METHODS: A total of 201 college students conducted a TTM questionnaire for sedentary behavior and wore an accelerometer for seven consecutive days in order to obtain objective sitting time. Multivariate analyses of variances (MANOVA) with post-hoc pairwise comparisons were conducted to determine mean differences in the strategic constructs across quintiles of sitting time. Tests for linear trends were conducted using orthogonal polynomial coefficients. A two-sided P < .05 was considered statistically significant. RESULTS: Compared with participants in higher quintiles of sitting time, 7 out of 10 processes of change (e.g., mostly consciousness raising [η² = .099], social facilitation [η² = .008], contingency management [η² = .068], etc.) were used significantly more frequently by those in the lowest quintile (p < .05) with negative linear trends (p < .05). No significant differences were found in the constructs of self-efficacy and decisional balance across the quintiles. CONCLUSION: Based on this preliminary analysis it appears that the use of certain processes of change would be more beneficial to reduce sitting time or to protect their current sitting time from relapse.

3022 Board #68 May 31 3:30 PM - 5:00 PM Influence Of Non-cognitive Ability Scores On Physical Fitness Improvement: An Examination Using Longitudinal Data

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PURPOSE: The present study aimed to examine the influence of non-cognitive abilities on physical fitness improvement using longitudinal data.

METHODS: We conducted physical fitness tests and a non-cognitive ability survey on 264 young children. Data were collected during the same period for 2 years. Participants were classified into the improved and non-improved groups based on the extent of change in their ranking in the class. Differences in non-cognitive ability scores in the first and second years were examined second using ANOVA with physical fitness improvement, sex, and grade as factors.

RESULTS: No significant interaction was confirmed between gender, grade, and physical fitness improvement in any year. A significant main effect of sex, grade, and physical fitness improvement was observed in the first year, and of sex and physical fitness improvement in the second year. Girls’ non-cognitive ability score was significantly higher than that of boys. Among 4-year-olds, the non-cognitive ability score was significantly higher in the first year as compared to that in the second year. The non-cognitive ability score of participants in the improved group was significantly higher than that of participants in the non-improved group. CONCLUSIONS: The present findings confirmed that non-cognitive abilities have a positive effect on the extent of improvement in physical fitness.
familiarization. Trials two and three were identical, accept in one visit the participants remained seated for 5-h (SIT), and in the other visit they interrupted their sitting time every 30-min with a 3-min walk (WALK) or a motorized treadmill at a moderate walking speed (ratio of perceived exertion 12 - 14). Cognitive function was assessed using the Computerized Mental Performance Assessment System (COMPASS) at 15-min before baseline (-15-min), and then at 2.5-h and 5-h. The following tests were completed; serial-3 subtractions (2 min), serial 7 subtractions (2 min), simple reaction time (50 stimuli), choice reaction time (50 stimuli), and Stroop (60 stimuli). The visual analogue scale for fatigue (VAS-F) was completed at the same time intervals. Linear mixed models were used to examine differences in COMPASS and VAS-F for condition (SIT, WALK), and time (-15-min, 2.5-h, 5-h). Data is reported as effect size; ±90% confidence limit. RESULTS: There was a greater number of RVIP correct scores in WALK compared to SIT (0.84; ±0.06). There was a quicker reaction time (RT) for RVIP in WALK compared to SIT (-0.46; ±0.70). RVIP false was lower in WALK compared to SIT (-0.51; ±0.73). Stroop RT was quicker in WALK compared to SIT (-0.96; ±0.05). RT for congruent Stroop was quicker in WALK compared to SIT (-0.92; ±0.68). VAS-F was lower in WALK compared to SIT (-4.79; ±2.74). CONCLUSION: Interrupting prolonged sitting with moderate intensity walking offers an ecologically valid intervention to enhance cognitive function in Qatari females. Supported by Qatar University CHSS SEED grant (CHSS-SF-16-2).

3024 Board #70 May 31 2:00 PM - 3:30 PM
The Effects Of Regenerative Injection Therapy Compared To Corticosteroids For The Treatment Of Lateral Epicondylitis

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BACKGROUND The lateral epicondyle is a common site for chronic tendinosis, a condition characterized by overuse and degeneration of a tendon due to repeated microtrauma. This leads to pain and functional limitations. There is a growing interest in non-surgical forms of treatment for this condition including provision of corticosteroid injections and regenerative injection therapy (provision of autologous blood and platelet rich plasma injections).

PURPOSE: The study objective was to compare the effectiveness of corticosteroids compared to regenerative injection therapy for the treatment of chronic tendinosis at the lateral epicondyle (i.e. lateral epicondylitis).

METHODS: Researchers systematically reviewed randomized controlled trials published in English language from 2008-2018. Databases used included PEDro, Scopus, Pubmed, and CINAHL. Ten articles met our selection criteria as an RCT level of evidence with a total of 682 patients. Sackett’s ratings adapted to include PEDro scores helped assess study quality. Analyzed results focused on pain, function and return to sport outcomes.

RESULTS: The corticosteroid groups demonstrated greater benefits in the short-term follow up (36 months; level 1A) and the regenerative injection therapy groups (IR) and increases muscle strength; HIIT has a significant effect in reducing hepatic fat and enhancing cardiovascular fitness. (2) the frequency, duration, and intervention period of AE and RE are similar; achieve the same or better intervention effect, HIIT only requires the 1/3 exercise time of the previous two. (3) People of different age, gender, physical fitness and disease degree have different choices in sports mode. Scientific monitoring and medical supervision are necessary conditions for improving the relationship between the dose and effect of exercise.

CONCLUSIONS: RE may be more effective than AE in patients with poor cardiovascular fitness, sarcopenia, and NAFLD who are unable to tolerate or participate in AE; HIIT has certain advantages in the time-effect and dose-effect due to less exercise time and smaller amount of exercise, This is easy for the NAFLD people to accept, and it will facilitate long-term adherence in the future.

3025 Board #71 May 31 3:30 PM - 5:00 PM
Evaluation of Intervention Effects of Different Exercise Modes on Non-alcoholic Fatty Liver Disease

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METHODS: (1)Through searching in Pubmed,Web of science and other databases, articles were selected for analysis according to the corresponding inclusion criteria and exclusion criteria. (2)Expert survey (3)Interview method.

RESULTS: (1) AE, RE and HIIT can reduce hepatic steatosis and improve liver histology in NAFLD people, but their intervention effects are different. AE stands out in reduce body weight; RE stands out in reduce hepatic fat, decreases insulin resistance (IR) and increases muscle strength; HIIT has a significant effect in reducing hepatic fat and enhancing cardiovascular fitness. (2) the frequency, duration, and intervention period of AE and RE are similar; achieve the same or better intervention effect, HIIT only requires the 1/3 exercise time of the previous two. (3) People of different age, gender, physical fitness and disease degree have different choices in sports mode. Scientific monitoring and medical supervision are necessary conditions for improving the relationship between the dose and effect of exercise.

CONCLUSIONS: RE may be more effective than AE in patients with poor cardiovascular fitness, sarcopenia, and NAFLD who are unable to tolerate or participate in AE; HIIT has certain advantages in the time-effect and dose-effect due to less exercise time and smaller amount of exercise, This is easy for the NAFLD people to accept, and it will facilitate long-term adherence in the future.

3026 Board #72 May 31 3:30 PM - 5:00 PM
Visualization Analysis of International Research of Physical Activity Promoted built environment

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Background: Recently, studies regarding the relationship between the building environment, physical activity, and health have flourished in the areas of public health promotion (among urbanized countries). (Chen, 2014). The researchers found that land use structure, residential density, and street connectivity were positively correlated with the amount of daily moderate physical activity (Frank, 2005). Although the importance of building environment to promote physical activity has been emphasized, very little is known about the development trend and “hotspots” in this field.

Purpose: Through sorting out the process of studies focused on international physical activity promoting-type built environment, this paper aimed to reveal the basic characteristics and research “hotspots” in this field through software analysis and to provide suggestions for future research.

Methods: Based on the literature about international physical activity promoting-type building environment from the Web of Science, The researchers searched 3,678 research papers and references in the field of health promotion during 2004—2018 and used Citesepe Version 5.2 (Chen, 2018) for bibliometric analysis and visualized analysis.

Results: The results revealed that: (1) current studies mainly come from western countries (i.e., primarily the United States, Canada, and Australia); (2) the research “hotspots” focus on different forms of physical activity, obesity, and body mass index control in built environment.

Conclusion: Transportation planning and management, urban planning, and behavioral science have focused on building environments that can promote physical activity. Majority of the research has mainly emphasized the relationships between health and built environment and physical activity assessments. While facing the serious problem of childhood obesity, it is important to consider building environment construction as one of the main solutions.
3027 Board #73  May 31 3:30 PM - 5:00 PM
Health and Wellness Coaching as a Promising Strategy to Better Health and Quality Of Life
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Health and wellness coaching (HWC) is a promising strategy and potentially highly effective approach for weight loss in short term and healthy behavior change. As a partnership process between the coach and the client, it emphasizes behavior change to better client health. Coming up as a new approach that focuses on behavioral change without a diet prescription, HWC seems to be likely to promote body weight loss and improve quality of life. PURPOSE: the aim of this study is to present and evaluate HWC in promoting changes in body composition and to improve the self-assessment of quality of life. METHODS: 13 subjects completed the intervention. Body composition (BodPod®) and quality of life (WHOQOL-brief) were assessed at baseline (P1) and after 12 weeks of HWC (P2). 12 HWC sessions were completed, which were held weekly (1 hour each) + 36 Physical Activity sessions (1 hour each, 3 times a week). No diet was prescribed during the whole process. Data was collected at the School of Physical Education and Sport, University of São Paulo. RESULTS: In P2, HWC sessions were associated with reductions in body weight (-2.16 kg) and fat mass (-1.91 kg) while pairwise comparisons revealed significantly less work by the fourth (rep 2: Mdiff=.002±.001; rep 3: Mdiff=.014±.007) (p<.05). Similarly, a trend toward significance for differences in power was calculated as the change in the work over the change in time (equation 2).∆Power = ∆ Work / ∆t (2)Where: ∆t: the time spent lifting the jar between the shelf 1 and shelf 2. CONCLUSIONS: HWC was able to promote weight loss, fat loss, to maintain fat free mass and to improve quality of life in a 12 week program, combined with an exercise program. Therefore, the strategy was effective in promoting better health, once it empowers individuals to take actions for their own health.

3029 Board #75  May 31 3:30 PM - 5:00 PM
Differences In Male Vs Female Regional Body Composition Changes With Resistance Training
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Purpose: The purpose of this study is to analyze the effects of resistance training on regional body composition in normal-weight males and females. Methods: A total of 31 (n=14 males) young volunteers were randomized to intervention (9 females, 7 males) and control groups (8 females, 7 males). Females had a body mass index (BMI) of 22.6±1.95 kg/m², and percentage of body fat (%BF) of 32.3±7.8%; males had a BMI of 22.95±1.55 kg/m² and %BF of 18.14±6.22%. Body composition measurements were recorded using a dual-energy X-ray absorptiometry (DXA), and a maximal strength test was used on both upper and lower body at pre and post intervention. Left and right trunk, arms, and legs lean body mass (LBM) and body fat (BF) were recorded and percentage of change (%Δ) was calculated for each variable. The resistance training protocol consisted of 3 sessions per week for 3 weeks, using 7 exercises (i.e. bench press, barbell back squats, leg press, sit-ups, dead lifts, barbell rows, and jump squats) consisting of 10 repetitions per exercise for 3 sets. Results: Non-parametric tests showed a statistically significant difference in exercising males (p=0.001) in left leg %LBM (3.05±1.68%) when compared to controls (-2.32±2.14%). No statistically significant differences were found in any of the body composition variables for females in the resistance training group compared to the control group. Conclusions: Our results suggest that males and females exhibit different regional body composition changes in response to the same resistance training program. Further research is needed to increase the understanding of sex-related differences in resistance training-induced regional body composition changes.

3028 Board #74  May 31 3:30 PM - 5:00 PM
Power Outputs During Performance of a Simple Transfer Task
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Purpose: The Gallon Jug Shelf Test (GJST) is a validated assessment of an older persons’ capacity to transfer moderately heavy objects from a knee-high to a shoulder high shelf. Since power is a major determinant of performance during activities of daily living, we calculated power during the performance of the GJST. Methods: Sixty-six sedentary overweight office workers (mean ± SD: age = 45.3 ± 12.3 years, BMI = 32.4 ± 5.8 kg/m²) participated in this 12-month study. Participants were cluster randomized to a control (C), (N = 21), a sit-stand desk (D), (N = 23), or a treadmill desk (T), (N = 22) group. Group T was asked to accumulate 2 h of walking and 1 h of standing at the workstation in bouts of 10 to 30 min. Group D was asked to accumulate standing for 3 h/day in bouts of 10 to 30 min. Group C did not receive a workstation that enabled behavior change at work and was encouraged to meet the federal physical activity guidelines during the study. All participants self-reported regional musculoskeletal pain using the Modified Nordic Musculoskeletal questionnaire at baseline and month 12. Musculoskeletal regions included the lower back, upper extremity (neck and shoulders), wrist and forearm, and lower extremity (knees, ankles, and feet). Random interdict logistic regression models accounting for repeated measures and the effects of cluster randomization were used to determine change in the likelihood (odds ratio-OR) of self-reporting the presence or absence of pain. Post-hoc pairwise comparisons with Takey-Kramer corrections (for multiple hypotheses testing) were conducted to determine the location of any significant change. Results: There were no significant between group differences in self-reported OR for musculoskeletal pain at baseline. The 12-month intervention did not result in a significant change in self-reported pain in the two experimental conditions in any region. Participants within Group D had a significantly lower likelihood (p = 0.027; effect size = 0.10) of self-reporting upper extremity pain at month 12 (OR = 1.29) compared to baseline (OR = 1.78). Conclusion: While workstation interventions to decrease sedentary behavior yielded no reductions in self-reported pain over 12-months, increasing daily accumulated standing and/or walking time did not introduce new musculoskeletal pain in seated office workers. These findings may help alleviate concerns associated with change in musculoskeletal pain when introducing ergonomic solutions to break continuous workplace sitting.
PURPOSE: The present study examined changes in self-regulation and self-efficacy in sedentary employees participating in a 10-week walking intervention.

METHODS: 68 sedentary employees were enrolled in a 10-week walking intervention. Subjects were randomly assigned (based on initial BMI and gender) to one of three groups consisting of two walking protocols: intermittent walking (Age = 46±9, BMI= 30.3±5.7 kg/m²) continuous walking (Age = 48±9, BMI= 30.5±6.17 kg/m²) or control group (Age = 42±10, BMI= 27.6±5.11 kg/m²). The two experimental groups received self-paced walking programs that were time and intensity matched, as well as, a mobile health intervention with weekly strategies to improve self-efficacy and self-regulation skills via text messages, e-mails and videos. The control group received a self-pace walking program only. All groups completed a self-regulation and self-efficacy measured by questionnaire and walking behavior measured by a wrist worn accelerometer at baseline, week 6 and week 11.

RESULTS: Results from the mixed ANOVA showed group and time interaction F(14,130) =8.017, p<.001, and a large effect d =0.19. The continuous group significantly improved overall self-regulation and its sub-scales from pre-test to week 6 and post-test (p<0.05). Self-efficacy decreased significantly from pre-test to week 6 (p=0.047) and post-test (p<0.008) for all groups. Walking activity changed significantly F(14,130)=2.526, p=0.033, with the continuous walking group significantly increasing walking from pre-test to week 6 (p=0.033), and a significant higher percentage of change compared to the control group from pretest to post test (p=0.042).

CONCLUSIONS: For sedentary employees a continuous walking program is a better approach to improve self-regulatory skills and may provide a more feasible approach to prescribing exercise in sedentary office employees. Intermittent physical activity may have some positive impact on self-regulatory skills, however the amount of time and frequency of the bouts need to be tested to determine a feasible approach to include physical activity and meet daily obligations as well.

Self-efficacy To Reduce Sedentary Behavior: Differences Between Depressed And Healthy Populations

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Excessive sedentary behavior (SB) is associated with increased health risks, including risks of poor mental health, such as depression. Previous research demonstrates depressed individuals exhibit increased barriers to health-related behaviors, such as exercise, compared to non-depressed individuals. Examining differences in self-efficacy to overcome barriers to reduce SB in depressed versus non-depressed populations is necessary to design effective SB interventions. Purpose: To examine how self-efficacy for overcoming barriers to reduce SB differs between depressed and non-depressed adults. Methods: Participants with self-reported major depressive disorder (MDD, n=144) and healthy adults (n=1,243) completed an online survey regarding self-efficacy to overcome barriers to reduce sedentary behavior on a Likert scale ranging from 1 (not at all confident) to 10 (100% confident). Questions examined barriers related to social norms, time, fatigue, motivation, pain/health, resources/ environment, and mood. Barriers were compared between depressed and healthy adults with independent-samples t-tests and effect sizes (Cohen's d). Results: Participants with MDD reported significantly lower self-efficacy compared to healthy individuals (p<0.05) for overcoming each barrier. The largest difference between groups was seen for mood (d=0.75). Patients with MDD also reported lower self-efficacy for overcoming barriers related to motivation (d=0.48), fatigue (d=0.45), environment/ resources (d=0.43), pain/health (d=0.34), social norms (d=0.23) and time (d=0.20). For MDD, self-efficacy to overcome barriers was lowest for mood while social norms was the lowest for healthy adults. Conclusion: As confidence in overcoming barriers to reducing SB differs between depressed and healthy adults, intervention strategies that are effective in healthy adults may not be effective for those with depression. It may be necessary to consider the relatively larger impact of mood, motivation, and fatigue on confidence to reduce SB in depressed populations. Future research is needed to examine how addressing low self-efficacy for overcoming different barriers influences the ability to reduce SB in those with depression.
FD PA levels | Sub-Theme | Overarching themes | Quotes
---|---|---|---
PA Practise | PA | Counselling Attitude and Practice | "In secondary care I will say the PA advice is more of the physician role because we don’t have time. I think we get them medically fit for discharge while the therapy team can encourage physical activity".

Involvement of other health professionals | PA Role | Perception Belief | Knowledge about PA

Clinical Settings | Level of Care

Patient Body Size | Obesity and PA counselling | BARRIERS | "We are very busy, often staying late, I think it is put lower down the priority order compared to other jobs."

Lack of Undergraduate Teaching and Role Model | Limited Knowledge and Guidance

Patients Knowledge about PA and Health | Public Awareness | FACILITATORS | Lot of people think PA is important but they have not really thought about talking to patient about it. So highlighting it in a teaching session might bring FD to a consciousness of it and hopefully incullate it in practise"

Foundation Teaching Sessions Clinical Settings | Favourable setting

PURPOSE: The Student Life and Wellness Center (SLWC) at Utah Valley University (UVU) spent $300,540 on its current fleet of 46 pieces of cardiovascular system training equipment (cardio equipment). UVU students pay for gym equipment from student fees. SLWC managers want to know how to use their cardio equipment budget and gym space efficiently to benefit students most. METHODS: All the cardio equipment was purchased from Life Fitness (Rosemont, IL). The equipment reports usage data to Life Fitness, and we retrieved that data from their Halo Fitness Cloud. All the equipment has been in use for 24 months except the treadmills which have only been in use for 3 months. RESULTS: Overall use (distance, hours, and workouts) was compared. Use/month/dollar was compared, in order to best understand the value and popularity of each device.

<table>
<thead>
<tr>
<th>Number</th>
<th>$</th>
<th>Miles</th>
<th>Hours</th>
<th>Hours/month</th>
<th>Workouts</th>
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<tbody>
<tr>
<td>Treadmill (15)</td>
<td>$6,880.23</td>
<td>261,722 0 7</td>
<td>3030 0 5</td>
<td>54.627</td>
<td>860 *</td>
<td>201.267 *</td>
</tr>
<tr>
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<td>231,143 0 6</td>
<td>300 0 5</td>
<td>27.000</td>
<td>867 *</td>
<td>123.333 0 4 *</td>
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<tr>
<td>Upright Bike (5)</td>
<td>$5,999.80</td>
<td>515,325 0 3</td>
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<td>35.600</td>
<td>860 *</td>
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</tr>
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<td>Recumbent Bike (7)</td>
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<tr>
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<td>811 0 4 0 0 4 0 0 4 0 0 9</td>
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<td>860 *</td>
<td>159.210 0 2 0 4 0 4 *</td>
</tr>
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</table>

DISCUSSION: Powermills are the most used equipment in our sample: whether measured as distance, hours, or workouts. They are also the best overall value. FlexStriders cost the most money and were used the least. CONCLUSION: Through simple analysis of automatically-recorded data, UVU can use student money effectively. Students will have the equipment they like to use, and less student fees will be needed as costly unpopular equipment will not be purchased in the future. Gym managers should be able to serve their clientele better with similarly-simple analyses.

PURPOSE: To evaluate the inclusion of technology, a Fitbit Flex and smartphone, into the popular lifestyle modification program: the Diabetes Prevention Program - Group Lifestyle Balance Program (DPP - GLB). The DPP - GLB Program has shown great success in reduction of progression toward T2DM. However, it was unknown how integrating technology would affect overall program outcomes, which included the attainment of 150 minutes of physical activity (PA)/week and weight loss trending toward 7%.

METHODS: Men and women over the age of 40, and at risk for prediabetes, were recruited. The study included an initial four weeks of baseline PA testing, followed by 12 weeks of lifestyle intervention. Individualized weight loss and PA goals were set. Participants self-randomized to the control (N = 11) or the technology group (N = 13). Session participation was high. Technology participants missed 8.3% of sessions, while control participants missed 18.2% of sessions.

RESULTS: Participants were aged 66.24 (SD = 7.38) years. At baseline, 21% of participants were overweight, and 79% were obese. Using a generalized estimating...
Board #84 May 31 3:30 PM - 5:00 PM
The Correlative Relationship Between Fitness Goals and Wearable Usage: An Observational Double-Blind Study
Anton-Luigi L. Picazo. Loyola Marymount University, Los Angeles, CA.
Email: apicazo1@lmu.edu (No relevant relationships reported)

Background: Wearable devices, such as Fitbits, Apple Watches, and numerous fitness devices, have become an increasing trend in those attempting to improve and/or monitor their physical activity. These devices incorporate various features that may elicit behavior change, however there is limited information on which features are utilized most. In addition, there is limited information on whether the usage of wearables varies by fitness goals. The present study observes wearable users and examines any correlative relationships between wearable usage and individual fitness objectives.

Methods: Consenting males and females ages 18 and older who owned any variation of wearable devices were given a 15-minute survey containing questions regarding the type of wearable owned, wearable usage, fitness activity, fitness goals, and opinionated questions. Descriptive statistical analysis using means and frequencies were utilized to describe the sample. Spearman correlation analyses were used to determine the relationship between the participant’s reported fitness goal and reported usage of various wearable features. All analyses were conducted using IBM SPSS Version 25.

Results: Of the participants to complete the survey (n=33), the majority were female (78%) and were between 18 and 24 years old (51.5%). Most participants worked out 3-4 times a week (37%) and used their wearable daily (87.9%). Participants reported that their primary fitness goal was to lose weight (42.4%), build muscle (21.2%), lose fat (18.2%), and improve mobility (18.2%). The most prevalent features used were the usage of wearables. These results suggest that how individuals use their wearable

Conclusion: Our preliminary analyses show weak correlations between reported fitness goal and usage of wearables. These results suggest that how individuals use their wearable device (which impacts the exposure to embedded behavioral change techniques) negligibly impacts and is negligibly affected by their fitness goal. However, more research is needed to further evaluate the relationship between these variables.

Board #85 May 31 3:30 PM - 5:00 PM
The Effects of a Pilot Translational Health In-School Program on Physical Fitness and Health Outcomes
Natasha Cruz, Emily W. Flanagan, Gina Zito, Arlette Perry, FACSM. University of Miami, Miami, FL. (Sponsor: Arlette Perry, FACSM)
Email: nroc220@umiami.edu (No relevant relationships reported)

Low levels of physical activity and physical fitness are associated with adverse medical conditions including type 2 diabetes and cardiovascular disease. Significant declines in physical activity are most notable in children as they transition to adolescence in middle school making this a critical age to promote a physically active lifestyle that confers health benefits. Several existing programs have used multiple courses and activities to promote active lifestyle behaviors in middle school adolescents. We theorized that a single in-school elective course may be an effective strategy to promote health outcomes in adolescents. PURPOSE: To examine the effects of a multidimensional translational health in nutrition and kinesiology (THINK) in-school pilot program encompassing nutrient/exercise physiology education, laboratory experiences, and structured physical activities on physical fitness, physical literacy, and nutrition knowledge.

METHODS: Participants from a public middle school were enrolled in the THINK elective course (n=33, 22 males; 11 females; 11;97±0.03 yrs). The program was administered two hours/day, two days/week for 16 weeks. Participants were evaluated at baseline and post-intervention for physical fitness, elements of physical literacy, and nutrition knowledge. RESULTS: THINK students evidenced a 5.88 mmHg reduction in mean arterial pressure (p<0.05), along with the following improvements in physical fitness: a 4.55 lb increase in muscular strength, a 72.19 ft increase in distance covered during the NIH 2-minute walk test, a 2.34 in increase in lower body power, and 3.64 increase in the number of sit-ups performed in one minute (p<0.01 for all). There were no significant changes in BMI or flexibility. Additionally, THINK students exhibited significant increases in nutrition and kinesiology knowledge (p<0.01) signifying a better understanding of the value of physical activity and nutrition for health promotion/ disease prevention. CONCLUSIONS: A multidisciplinary THINK program employing kinesiology/nutrition science education, laboratory skills, and physical activities in one course can result in significant improvements in physical fitness, physical literacy, and nutrition science education.

Board #86 May 31 3:30 PM - 5:00 PM
Perceived Quantity of Physical Activity as a Reflective Measure in Muscle and Bone Strength
Kirstie Huynh1, Karen Serrano Vides1, Kimberly Esperato1, Rebekkah Reichert1, Maria Alvarez1, Priscilla Franson1, Arianna Mazzarini1, Andrew Denys1, Vanessa Yingling, FACSM1, California State University, East Bay; Garden Grove, CA.
California State University, East Bay, Hayward, CA. (Sponsor: Vanessa Yingling, FACSM) (No relevant relationships reported)

Perception plays a powerful role in shaping health outcomes. An active lifestyle, provides mechanical load needed to strengthen and maintain both muscle and bone health. Many recommendations on the quantity of physical activity needed for health benefits exist however it is unclear if individuals perception of their activity habits relates to muscle and bone strength benefits. PURPOSE: To determine if those who perceived that they get the right amount of exercise or more than needed amount of exercise, have greater muscle and bone strength.

METHODS: 79 participants, 41 females and 38 males (age yrs) 29.2±10.8, height (cm) 166.5±9.2, body fat % 24.6±9.3 performed a relative grip strength (ROG) test using a hand grip dynamometer, 1 repetition maximum leg extension test (IRM), and a vertical jump test using a Vertec (PP). Bone Strength Index (compression) (BSlc) and polar Strength-Strain Index (SSlp) were measured using peripheral Quantitative Computed Tomography (pQCT). A questionnaire stated “Do you feel you get too much exercise, too little exercise, or about the right amount of exercise?” Welch’s t-tests detected differences in muscle function and bone strength based on perception of exercise quantity (Above and Below).

RESULTS: 41 participants perceived they got the “right amount of exercise or above” (Above) and 29 participants reported that they got below the right amount of exercise (Below). Perception of the Above group resulted in greater muscle function tests compared to the Below group. For example: PP: 11.5% (p=0.004), ROG: 5.7% (p=0.004). “Right amount of exercise or above” resulted in greater bone strength (SSlp) at both the radius (11.7% (p=0.055) and tibia (13.3% p=0.02).

CONCLUSIONS: Participants’ perception on quantity of exercise reflected their bone and muscle strength. Those who perceived that they get the appropriate or a higher amount of exercise had greater bone and muscle strength values compared to participants‘ who perceived they exercised less. Perception of getting the “right amount of exercise or above” compared to “below right amount of exercise” was a good indicator of greater bone and muscle strength.
Risk For Noise-Induced Hearing Loss
Listening To Music While Exercising Increases The

Diane L. Elliot, FACSM1, Kristi Racer2, Wendy McGinnis1, Carol Defranchesco1, Leslie Leve1, Kerry Kuehl1. 1Oregon Health & Science University, Portland, OR. 2Oregon Youth Authority, Salem, OR. 3University of Oregon, Eugene, OR. Email: elliotd@ohsu.edu

(no relevant relationships reported)

Incarcerated young women (ages 16 to 21) may be at high risk for future drug abuse. Both regular exercise and adequate restorative sleep have been shown to reduce drug use and other harmful behaviors. Existing programs for incarcerated youth to reduce future drug use do not address healthy lifestyles or incorporate Positive Youth Development models. Implementing such a program requires understanding these young women’s current physical activity and sleep attitudes and behaviors.

RESULTS: Incarcerated young women completed an anonymous survey concerning physical activity and sleep attitudes and behaviors, using a 5-point agreement response scale. 46 of approximately 75 young women consented to participate. Descriptive statistics are presented. A convenience sample of 9 young women wore a Fitbit for a week. RESULTS: No regular physical activity program is provided for these young women. However, the majority felt that they were “built for exercise” and “have the skills for exercise.” There was strong agreement that “when active they enjoy it” at ≥4.08. The majority of girls felt that they “needed more sleep.” Short-term progress was shown with 2 of 12 girls achieving the goal of at least 8 hours sleep per night, despite the prescribed lights out and awakening times that should allow more than 9 hours sleep each night. Only one girl achieved more than 10,000 steps each day. CONCLUSION: Incarcerated young women’s sleep and physical activity do not meet recommended guidelines. Both are domains where these high-risk emerging adults still can make choices despite close custody. A Positive Youth Development program to enhance these behaviors and increase their self-efficacy for health choices could add to existing programs to deter future drug use and other harmful behaviors. Supported by the Paul R. Vogt endowment and Ramona and Thomas McDonald donations.

Listening To Music While Exercising Increases The Risk For Noise-Induced Hearing Loss

Gabriella Messina, Alicja Stannard, Jamie Marotto. Sacred Heart University, Fairfield, CT.

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(no relevant relationships reported)

Music has an ergogenic effect on exercise performance, improves motivation, decreases exertion, and delays the onset of fatigue. However, loud sound levels from music can cause permanent damage to the inner ear resulting in noise-induced hearing loss (NIHL).

RESULTS: Participants reported exercising once a week (3.0%), 1-2 times per week (24.2%), 3-4 times per week (39.4%), 5 or more times per week (30.3%), or not currently exercising (69.7%). Followed by resistance (21.2%) and balance (9.1%). No participants reported posting their exercise to their social media accounts but 27.3% follow a fitness model or blog. There was a strong correlation between exercise frequency and following a fitness model or blog (r=0.3, p<0.05) but the direct relationship was nonsignificant (r<0.4, p<0.3).

CONCLUSION: Our results suggest that there is a correlation between people who follow fitness models or exercise and exercise frequency. Our research also suggests that there may be an underlying mediating variable driving this relationship. We plan to conduct a focus group to ask specific questions regarding social media’s influence on exercise. Future research should look at the mediating relationship between social media use and exercise frequency.

Embargoed until 3:30 PM

Board #88
May 31 3:30 - 5:00 PM
Incarcerated Young Women’s Exercise and Sleep Behaviors: A Needs and Feasibility Study

Board #90
May 31 3:30 - 5:00 PM
Connected Health Exercise Consultation Case Study: A Weight Management Strategy Post Gastric Bypass Surgery

Frank Paul1, Regis Fernandes1, Minako Katayama1, Matthew Burns1, Donna Cataldo1, Robert Scales1. 1Mayo Clinic, Scottsdale, AZ. 2Arizona State University, Phoenix, AZ.

(no relevant relationships reported)

Weight regain is not uncommon post gastric bypass surgery (GBS). A connected health (CH) platform has the potential to improve adherence to lifestyle recommendations to support long-term weight management.

Board #91
May 31 3:30 - 5:00 PM
University Staff Physical Activity Inventory (USPAI)

Kristianna M. Altamirano, Brent M. Peterson, Kelsely L. Miller, Jacob K. Gardner. Biola University, La Mirada, CA.

Email: kristianna.altamirano@biola.edu

(no relevant relationships reported)

The work-related environment has been implicated as a factor involved in the declines of physical activity (PA) in the United States and abroad. Although, the collective literature would suggest that reductions of risk for multiple chronic health conditions exist; however, that have evaluated PA among University staff members. Purpose: To conduct a focus group to ask specific questions regarding social media’s influence on exercise. Future research should look at the mediating relationship between social media use and exercise frequency.
mass index (BMI) of 26.4 ± 4.7 kg/m² and women (n = 212, 39.7 ± 13.3 years of age, 164 ± 8.1 cm in height, 69.8 kg in weight, and an average body mass index (BMI) of 26.03 ± 6.5 kg/m²) who reported being staff members from Biola University. Participants completed the International Physical Activity Questionnaire (IPAQ), using the Survey Monkey® platform. Workers were grouped by type of job (administration, staff and facilities). Daily total sitting time and metabolic equivalent (MET) minute activity-specific (leisure, household, occupational, and transport) and total weekly PA were calculated. RESULTS: A Multivariate Analysis of Variance MANOVA revealed significant (p < 0.05) main effects for job type, total minutes of PA per week, and grand total PA per week. Post-hoc analyses revealed facilities had significantly greater minutes of work PA and total weekly PA than staff and administration. There was no significant (p > 0.05) difference between job types in quantity of leisure, transport, and household PA. An independent T-test was employed to evaluate gender differences for total minutes of work PA and overall minutes of weekly PA. Significant (p < 0.05) differences were observed for gender and total work PA, but not for overall PA. Men were significantly more active at work than women. CONCLUSION: Mean weekly minutes of overall PA exceeded minimal weekly recommendations among all job titles and sexes.

3046
Board #92
May 31 3:30 PM - 5:00 PM
Physical Therapy Students Knowledge And Attitudes of Nutrition
Jordan D. Day, MS, Eric Jones, PhD, Dustin Joubert, PhD, Sarah Drake, MS, RD, LD, Todd Whitehead, PhD, Stephen F. Austin State University, Nacogdoches, TX. (Sponsor: Thomas J. Pujol, FACSMM)

PURPOSE: Physical therapy has incorporated health promotion as a part of practice, which includes nutrition. A search of university curriculum within the state of Texas revealed no nutrition courses within entry-level doctoral physical therapy programs or at prerequisite level. Furthermore, little research has been conducted on the knowledge and attitudes of nutrition in physical therapists. Therefore, the purpose of the present study was to determine knowledge and attitudes of nutrition in current physical therapy students. METHODS: Subjects included doctoral physical therapy students from across the range of years of study in professional preparation programs. This research was conducted online (Qualtrics), which included a Nutrition Knowledge Test (NKT) (32 possible points) and an attitude scale (55 possible points). The survey was disseminated by doctoral physical therapy program directors to students and analyzed using ANOVA. RESULTS: A complete sample of n = 605, the mean NKT score was 22.43 ± 3.43 (70.1%). Though there was no correlation between attitudes and knowledge of nutrition (r = .026, p = .526), physical therapy students revealed high regard for nutrition with the mean attitude score being 47.13 ± 4.32 (85.7% agreeableness with positive nutrition statements). There was also a significant difference in NKT scores when comparing groups who had taken a nutrition course and those who had not, 22.81 ± 3.56 and 21.66 ± 3.46 (p < .001), respectively. Those individuals who had completed 3 or more nutrition courses showed the largest improvement on the NKT (~7%). Additionally, the Midwestern region presented with the most students’ points on the NKT. CONCLUSION: Based on relatively small changes in NKT and the desires expressed during this survey, integrating nutrition competencies within current required courses may be the most appropriate intervention.

3047
Board #93
May 31 3:30 PM - 5:00 PM
Relationship Between Socialization and Weight Changes Using Among Individuals That Use Wearable devices
Milagro Jean-Marie-Tucker, Anton-Luigi Picazo, Lauren Pritting, Zakhoyya H. Lewis. Loyola Marymount University, Los Angeles, CA.
Email: mjemanmar@lion.lmu.edu

(No relevant relationships reported)

Over the past few years, the use of fitness-tracking wearable devices, or wearables, has increased. They have many features that allow users to monitor their activity, measure pulse rate, and communicate their progress with other users. Accessible and streamlined user interfaces assist individuals in weight management while sharing their results with others in their social groups. Prior research has shown evidence for a positive association between weight loss and in-person socialization during workouts. However, research on virtual socialization within wearable devices and changes in weight is limited.

PURPOSE: To investigate the relationships between socialization and changes in body weight after wearable use.

METHODS: Individuals that owned a wearable device were eligible for this observational study. Surveys were completed electronically via Qualtrics Online Survey Platform. Participants were randomized to a Control group (n = 11) or STS group (n = 13). STS participants were required to stand at the desk for a minimum of 2 hours per workday. The Leisure Diagnostic Battery (LDB)-Function was used to assess perceived freedom in leisure. The LDB includes a 25-item survey regarding social comfort, environment, decision making, and communication with others. A

Abstracts were prepared by the authors and printed as submitted.
repeated measures ANOVA was used to analyze results. RESULTS: Two outliers were removed from analysis. All assumptions were met. A significant difference occurred between groups (F = 51.14, p < .01). A significant time effect did occur from pre-test to 6 (p < .02) and pre-test to 12 months (p < .02). The main effect for group was not significant (p > .05). The CG decreased by .05 points from baseline to 6 months and increased by .09 from 6 to 12 months (p > .05). A dependent t-test revealed the STS group significantly decreased by .26 points from baseline to 12 months (p < .001). CONCLUSION: The STS group decreased feeling less free to engage in leisurely activities from baseline to 12 months. Similar to current research, this data demonstrates that workplace interventions may not improve leisure activity participation. However, this study only measured self-reported freedom in leisure. Future research should objectively measure leisure activity participation.

ACKNOWLEDGEMENTS: This project was funded by the University of Central Oklahoma, Research and Sponsored Programs office.

3050 Board #96 May 31 3:30 PM - 5:00 PM Associations Between Neighborhood-level Measures Of Socioeconomic Status And School-reported Health-related Physical Fitness.

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(Please provide the appropriate contact information for the authors)

PURPOSE: We previously reported pervasive musculoskeletal fitness deficits and high obesity prevalence at a proxy predominantly Hispanic elementary school in Corpus Christi, Texas. It’s unclear whether these are linked with neighborhood level measures of socioeconomic status (SES). This study investigated associations between school-reported health-related physical fitness and neighborhood-level measures of SES, i.e., area deprivation index (ADI), median household income, park density, and number of park amenities that support physical activity (PA).

METHODS: The study sample consisted of 41 elementary and middle schools in Corpus Christi Independent School District (student enrollment is 79% Hispanic). Percentages of students who achieved healthy fitness zone (HFZ) classification on FitnessGram® outcomes in 2016-2017 was generated from Texas Education Agency database. School zip codes, corresponding median household incomes, park density, and park amenities that support physical activity were retrieved using Google search engine, US Census Bureau American FactFinder tool, and Geographic Information System (GIS) mapping tools, respectively. ADI was obtained using Neighborhood Atlas. Park density was the ratio of the number of parks to land area (in square kilometers) of respective zip codes. Land area was measured using GIS tools. Linear regression models and resulting standard beta coefficients informed the magnitudes of associations between outcomes. Statistical significance was set at p < .05.

RESULTS: Median household income was negatively associated with the percentage of students who achieved HFZ on the measure of cardiorespiratory fitness (β = -.140; p = .046; 95% CI [0.00, .00]). The number of park amenities that support physical activity (β = .524; p = .000; 95% CI [.003, .008]) and ADI (β = -.420; p = .004; 95% CI [.027, -.005]) were positively and negatively associated with the percentage of students who achieved HFZ classification on BMI, respectively.

CONCLUSION: The current findings suggest that park authorities should invest and ensure equity in the number of park amenities that support physical activity. The ADI was negatively associated with the percentage of students who achieved HFZ classification on BMI, respectively. These findings highlight the importance of public parks that support physical activity to the health of children in Corpus Christi, TX. These findings could also support the need for support and investments for parks in other LMICs.

3051 Board #97 May 31 3:30 PM - 5:00 PM Medical Students' Knowledge and Attitudes to Physical Activity and Health and to Physical Activity Counseling

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PURPOSE: Physical activity (PA) counseling in the health care setting is regarded as a promising avenue to increase population level PA. Equipping future physicians with the necessary knowledge is crucial. The aim of this survey was to assess the knowledge and attitude towards PA and health, as well as PA counseling at a large German Medical School.

METHODS: A 15-item online survey was conducted. The study has been approved by the University Ethics Committee.

RESULTS: 145 students (106 females, 73%) returned the questionnaire. 118 (81%) reported not knowing the WHO PA recommendations. Only 15 (10,3%) respondents could identify the recommendations correctly. 108 (74%) reported having learnt anything on the health effects of PA. 106 (73%) wished more information on this topic. 97% and 96% of respondents considered PA to be important or very important in the prevention and therapy of chronic diseases respectively. 99% judged PA counseling to be physicians’ task. Weekly reported PA was as follows: 9 (6%) no exercise, 19 (13%) > 1 hr, 47 (32%) 1-2 hrs, 41 (28%) 2-4 hrs, and 29 (20%) < 4 hours. 32 (22%) respondents were in the entry phase of their studies, 87 (60%) in the midphase and 26 (18%) in their final, practical year. Gender was not associated with the importance of PA in prevention and therapy, with physicians’ PA counseling role and with perceived need for more information on PA and health. High overall PA volume was only associated with physicians’ PA counseling role (Spearman’s r, .224, p < .001.). The importance of PA in therapy was associated with the importance of PA in prevention (Spearman’s r, .595, p < .001). PA counseling as physicians’ role was associated with PA in prevention (Spearman’s r, 402, p < .001) and PA in therapy (Spearman’s r, .406 p < .001) respectively.

CONCLUSIONS: Medical students are interested in learning about the health effects of PA, consider PA important in the prevention and therapy of chronic diseases, and see PA counseling as physicians’ task, with no difference between males and females and students according to their study phase. Also no association was found between respondents’ PA and health related views and their volume of PA. A self-selection bias in respondents cannot be ruled out.

3052 Board #98 May 31 3:30 PM - 5:00 PM Comparison Of Energy Expenditure Of Overground And Motorized Treadmill Running In Healthy Chinese Young Adults

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PURPOSE: Overground and motorized treadmill running are popular types of exercise training. Compared to motorized treadmill running, overground running has no external motor and depends on subject’s own motor to acceleration and deceleration. However, it is still unexplored for the difference of cardiacmetabolic demands of overground running and compared with treadmill running at the same speed. The purpose of this study was to compare the oxygen consumption at the same speed of overground and treadmill running in Chinese young adults.

METHODS: 40 healthy Chinese young adults (21male, 24±1.04 years; 19female, 23±1.8±1.95 years) volunteered to participate in the study. After the anthropometric data collection, body composition assessment, 6 min running bouts energy costs of different speed (7km/h, 8km/h and 9km/h) of overground and treadmill running were measured. The energy costs of subjects were measured by a portable gas analyzer (MetamaxTM 3B, German). Overground trials were completed in an indoor sports stadium, and treadmill (Rodby RLS300E, Sweden) running were completed in the same stadium to minimize environmental influences on performance. The variables including heart rate, oxygen consumption (VO2) and RPE were collected within 6 minutes during each overground and treadmill running test. RESULTS: The gross overground running metabolic energy cost of male at 7km/h, 8km/h and 9km/h was higher than when compared to the treadmill testing mode (0.242±0.02 vs. 0.252±0.02 ml/kg/m, p<0.01; 0.252±0.02 vs. 0.247±0.02 ml/kg/m, p<0.01; 0.247±0.02 vs. 0.242±0.02 ml/kg/m, p<0.01). We also found significant differences of female between the two modes with the treadmill being lower (0.231±0.02 vs. 0.217±0.02 ml/kg/m, p<0.01; 0.223±0.02 vs. 0.213±0.01 ml/kg/m, p<0.01; 0.228±0.02 vs. 0.207±0.01 ml/kg/m, p<0.01) at speed of 7km/h, 8km/h and 9km/h. CONCLUSIONS: The results demonstrate that, for all experimental velocities in men and women, the energy cost of overground running is higher than the treadmill running. It is critical that these differences are taken into account when prescribing training intensities on whether the overground running or the treadmill running to a training protocol.

Acknowledgements: This work was supported by National science and technology program of China(Grants No.2013FY114700).
body. METHODS: Total 20 participants were randomly assigned to single set (ST, n=10), and multiple sets groups (MT, n=10). The ST group trained for one set with a maximum of six reps. The first rep started at 70% of one repetition maximum (IRM) and increased by 5% after each rep until they reached 90% of their IRM and then the last rep was performed at 100% of IRM. The MT group trained at 70% of IRM for 10 reps with 3 sets. Both groups trained 3 times per week for 8 weeks using the squat and chest bench press. IRM squat, IRM bench press, anaerobic power, vertical jump, and medicine ball throw in upper and lower body were measured at baseline and after 8 weeks of training. Two-way repeated measures ANOVA were used to determine an interaction effect between trial and treatment groups factors for each dependent variable. Main effects of trials and the treatment groups were also tested. RESULTS: There was no significant interaction effect between trial and treatment groups for all dependent variables. Main effect results show that both ST (percentage change = 20%, p < .001) and MT (24.05%, p < .001) groups significantly increased IRM squat, compared to their baseline. IRM bench press was also increased in both ST (6.82%, p < .005) and MT (13.9%, p < .002) groups. No significant differences in IRM squat and IRM bench press were found between the two training groups. Anaerobic power in ST (22.8%, p < .001) and MT (8.6%, p < .002) groups was significantly increased, compared to their baseline. However, there were no significant differences in anaerobic power of upper body. Vertical jump in ST (13.54%, p < .001) and MT (6.43%, p < .049) groups was significantly increased, compared to their baseline. There was no significant increase in the medicine ball throw from both groups. CONCLUSIONS: The results imply that low volume progressive single set training (ST) protocol is as effective as traditional multiple sets training (MT) protocol for increasing muscle strength and power.

### References

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### Abstracts were prepared by the authors and printed as submitted.

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**Board #100 May 31 3:30 PM - 5:00 PM**

**Effects of a Multifactorial Exercise Intervention on Falls Risk Factors: Comparing Age and Falls History**

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In the US, older adults experience an estimated 29 million falls per year resulting in 7 million injuries. Multifactorial exercise interventions (INT) are effective in reducing falls risk. Yet, it remains poorly understood how age and previous history of falls impacts INT aimed to reduce falls risk.

**PURPOSE:** To compare the effects of a multifactorial exercise INT on time (pre, post), age group (50-59, 60-69, 70-79, 80+ years), and faller status [fallers (1 or more falls in past year), non-fallers] on right & left leg strength (RLS & LLS), foot & hand reaction time (FRT & HRT), 30 second sit-to-stand (STS), and timed up and go (TUG).

**METHODS:** One hundred eighty-three older adults (71.0±6.6 years, 1.7±1m, 81.5±17.2 kg) participated in a multifactorial INT Stay Active and Independent for Life (SAIL). Participants met for 1 h, 3x/week for 10 weeks; exercises included aerobic, balance, strength, and stretching exercises. RLS & LLS (normalized to body mass), FRT & HRT (ms), STS (number of repetitions) and TUG (s) were assessed pre- and post-INT. A 2 (time) x 4 (age group) x 2 (faller status) MANOVA was conducted to assess differences among factors. Post-hoc analysis was conducted for significant interactions (α < 0.05).

**RESULTS:** Main effects were attained for time and age group (p < 0.05). Participants were stronger (RLS, pre = 24.8±0.8, post = 28.1±0.9; LLS, pre = 23.0±0.8, post = 27.0±0.9) and improved leg endurance (ST, pre = 12.36±3.22, post = 14.54±4.01) after INT. FRT was faster from pre (306.6±49.8) to post (299.6±43.6). For age group, 60-69 had greater RLS and LLS (26.10±2.06, 26.09±2.07) than 70-79 (25.01±2.50, 24.58±0.88). In 60-69 (14.32±3.94) group, STS was higher than 70-79 (12.96±3.34) and 80-90 (11.66±3.87). TUG scores were faster for 60-69 (7.00±1.52) compared to 70-79 (7.73±1.54) and 80-89 (9.00±2.12). No other statistically significant differences were found (p > 0.05).

**CONCLUSION:** In line with previous literature, SAIL was effective at reducing falls risk factors, supporting SAIL to be an effective INT. Multifactorial INT are an effective strategy to combat falls as they target multiple risk factors. Outcomes of 60-69 age group suggest INT should be adjusted for advanced age. However, including falls efficacy and quality of life may give more insight into improvements. Supported by grant from Potomac Health Foundation.

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**Board #102 May 31 3:30 PM - 5:00 PM**

**High Intensity Interval Training in a Natural Setting: An Intrapersonal Perspective**

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High intensity interval training (HIIT) is an extremely challenging workout associated with negative affect for participants (Eikkeekakis et al., 2011; Foster et al., 2015). HIIT is often perceived as appropriate only for people who are experienced and relatively fit exercisers and as a poor option for deconditioned or previously sedentary exercisers (Hardcastle et al., 2014). Almost all HIIT research has been conducted in controlled, laboratory settings and focused on physiological adaptations. Little is known about the affective experiences of HIIT participants in real-life settings.

**PURPOSE:** To examine the experiences of HIIT participants in a real-life outdoor boot camp.

**METHODS:** Qualitative interviews were conducted with 16 boot camp participants whose length of time participating in HIIT ranged from two months to eight years.

**RESULTS:** Three main findings: 1. People of widely varying fitness levels, ages, body types, and exercise backgrounds were able to enjoy and successfully perform HIIT workouts. According to body mass index categories, 64% of study participants were either overweight or obese. Ages ranged from 26 to 58 years; 2. Participants reported the alternating intensity levels were motivating and allowed them to work at near maximal intensity for short intervals, knowing low intensity intervals would soon provide needed recovery. The ability to customize the intensity and duration of intervals made HIIT workouts easier to complete than moderate intensity workouts extending over long periods of time; 3. Social support within the boot camp was crucial to successful performance and enjoyment of HIIT workouts. Participants reported that social support enabled them to endure workouts at higher intensity levels than would have been possible if exercising alone.

**CONCLUSIONS:** HIIT is appropriate for people of varying fitness levels and exercise experience. Built-in recovery intervals motivate people to maximize effort during high intensity intervals. Social support during HIIT was central to participants’ ability to complete difficult workouts.
Dementia, particularly Alzheimer’s disease (AD), is one of the major causes of impairment and dependence in the elderly. Besides the cognitive decline, that characterize AD, this neurodegenerative disease progresses along with functional impairment, and adversely affects physical conditioning. Recent guidelines reinforce the need to implement effective interventions to mitigate the impact of AD. Physical exercise could be significant in improving functional and cognitive performances in these individuals. Cardiorespiratory fitness has been directly associated with different health-related parameters, brain health, neurocognitive performance and ability to perform daily activities. Submaximal incremental treadmill tests have been used to measure aerobic fitness in healthy older adults and seems to be appropriate for those diagnosed with dementia. PURPOSE: The aim of this study was to evaluate the impact of a multicomponent exercise program on peak oxygen consumption. METHODS: According to the 2011 NINCDS-ADRDA criteria, and in a mild to moderate stage of disease, 15 community-dwelling individuals diagnosed with probable AD were referred from the Neurology Department of a Hospital Centre to participate in this study. VO2 peak was measured through an incremental treadmill test using a modified Bruce protocol, designed for older individuals, previously tested with AD subjects. RESULTS: Results from Wilcoxon Signed Rank test revealed a slight increase on VO2 peak [19.11±3.61; 20.60±4.40; p=0.594] and on time to reach it [5.58±1.48; 6.17±2.23; p=0.575] which may be explained by a potential benefit of exercise on peripheral factors such as muscular resistance and coordination, both essential to success on endurance tests. CONCLUSIONS: Data from both evaluation moments suggest that AD subjects cardiorespiratory fitness is under the established partners for independent healthy older adults. These results reinforced the importance to create cost-effective strategies, and to use gold standard evaluation instruments, to mitigate or prevent the physical conditioning decline, determinant to their autonomy on activities of daily living.

Dietary changes have been associated with less weight loss in some behavioral weight loss interventions (BWLI), and although it has been speculated that adding moderate-to-vigorous physical activity (MVPA) may improve outcomes, the relationship is not well understood. PURPOSE: To examine the relationship between weight loss, MVPA participation, and depressive symptoms over time in subjects enrolled in a BWLI. METHODS: Secondary analyses of depressive symptoms and weight loss in sedentary subjects (n=379; 45.0±7.9 years; BMI=32.42kg/m²±3.8) enrolled in a BWLI and randomized to a reduced calorie diet (DIET, N=104), diet plus a moderate dose of MVPA (MOD-EX, N=97), or diet plus a high dose of MVPA (HIGH-EX, N=102) were completed. All groups reduced energy intake (1200-1800 kcal/day), received weekly intervention sessions (months 1-6), followed by 2 group and 2 telephone contacts per month (months 7-12). MOD-EX was prescribed unsupervised MVPA that progressed to 150 min/wk, and HIGH-EX was progressed to 250 min/wk. Depressive symptoms (CES-D) and weight were assessed at 0, 6, and 12 months. RESULTS: Weight decreased [6mo:-9.18±5.9kg; 12mo:-10.0±7.8 kg] and depressive symptoms modestly increased from baseline to 6 months [BL: 6.45± 2.34; nmo: 7.05] (p<0.001) and baseline to 12 months [BL: 6.45± 2.34; 12mo: 6.93] (p<0.05), with no significant differences between randomized groups. There was a modest, yet significant correlation between baseline CES-D score and weight change at months 6 (r=1.26) and 12 months (r=-0.50) (p<0.05). Subjects who completed 6 months of the intervention (n=377) had significantly higher baseline CES-D scores compared to the non-completers (n=42) (p<0.05), but there were no differences for 12 month completers (p=0.49). CONCLUSIONS: The data revealed an inverse relationship between baseline depressive symptoms and success in the BWLI. This relationship was not different between DIET, MOD-EX, and HIGH-EX, indicating that exercise participation may not influence this relationship. While depressive symptoms increased slightly over time regardless of group assignment, the 6 month completors had lower baseline depressive symptoms than non-completers. Thus, baseline depressive symptoms may be an important marker of both success and attrition in a BWLI.

The result of interventions for body weight reduction is not rare. Disappointing. Adjustments in daily physical activities and in sedentary time in response to exercise may undermine the negative energy balance caused by the interventions, reducing their efficacy. PURPOSE: To determine the effectiveness of an interdisciplinary program (IP) to treat obesity on sedentary and physical activity (PA) time. METHODS: A total of 14 obese women (39.3±3.57 years and BMI 34.14±2.99) participated in a 16-week program consisting of 3 sessions/week lasting 2 hours each. Physical exercise was carried out for 1 hour in every session, followed by psychological, nutritional or physical therapy intervention. For sedentary time and PA determination participants wore an accelerometer for seven consecutive days before and during the last week (LW) of IP. The differences between Pre and LW values were determined by using the weight one-way ANOVA. Pearson’s correlation test was also performed. Significance was set at 5%. The protocol was approved by Uniseps Ethics Committee (n=2.375.89). RESULTS: Following IP, body weight change ranged from -5.90 to -2.40 Kg. However, the program failed to promote a significant mean reduction on body weight (Pre 94.06±28.35; Post 91.0±25.56 Kg). Neither the time (min/day) spent sedentary (Pre: 568±63; LW: 600±75), in light (Pre: 257±47; LW: 267±64) or moderate/vigorous (Pre: 24±10; LW: 24±14) PA nor the number of steps/day (Pre: 6392±1530; LW: 6808±2874) changed in LW compared to the period pre-intervention (p>0.05). The correlation between changes in body weight and changes in time in sedentary (-0.008), light (-0.233), moderate/vigorous (-0.293) PA and steps/day (-0.289) was not also significant (p>0.05). Conclusion: Even though we did not find a significant correlation between variation in body weight and variation in time sedentary/active, the lack of change in sedentary PA time despite the addition of 3 sessions of exercise/work seems to occur the occurrence of a compensation to minimize the increase in daily energy expenditure caused by exercise, contributing to the resistance to body weight reduction. Our results also demonstrate a failure in adopting a more active life style after participating in an IP.

Financial Support: FAPESP 2015/06630-1, 2017/04528-0 and CAPES.

Dietary changes have been associated with less weight loss in some behavioral weight loss interventions (BWLI), and although it has been speculated that adding moderate-to-vigorous physical activity (MVPA) may improve outcomes, the relationship is not well understood. PURPOSE: To examine the relationship between weight loss, MVPA participation, and depressive symptoms over time in subjects enrolled in a BWLI. METHODS: Secondary analyses of depressive symptoms and weight loss in sedentary subjects (n=379; 45.0±7.9 years; BMI=32.42kg/m²±3.8) enrolled in a BWLI and randomized to a reduced calorie diet (DIET, N=104), diet plus a moderate dose of MVPA (MOD-EX, N=97), or diet plus a high dose of MVPA (HIGH-EX, N=102) were completed. All groups reduced energy intake (1200-1800 kcal/day), received weekly intervention sessions (months 1-6), followed by 2 group and 2 telephone contacts per month (months 7-12). MOD-EX was prescribed unsupervised MVPA that progressed to 150 min/wk, and HIGH-EX was progressed to 250 min/wk. Depressive symptoms (CES-D) and weight were assessed at 0, 6, and 12 months. RESULTS: Weight decreased [6mo:-9.18±5.9kg; 12mo:-10.0±7.8 kg] and depressive symptoms modestly increased from baseline to 6 months [BL: 6.45± 2.34; nmo: 7.05] (p<0.001) and baseline to 12 months [BL: 6.45± 2.34; 12mo: 6.93] (p<0.05), with no significant differences between randomized groups. There was a modest, yet significant correlation between baseline CES-D score and weight change at months 6 (r=1.26) and 12 months (r=-0.50) (p<0.05). Subjects who completed 6 months of the intervention (n=377) had significantly higher baseline CES-D scores compared to the non-completers (n=42) (p<0.05), but there were no differences for 12 month completers (p=0.49). CONCLUSIONS: The data revealed an inverse relationship between baseline depressive symptoms and success in the BWLI. This relationship was not different between DIET, MOD-EX, and HIGH-EX, indicating that exercise participation may not influence this relationship. While depressive symptoms increased slightly over time regardless of group assignment, the 6 month completors had lower baseline depressive symptoms than non-completers. Thus, baseline depressive symptoms may be an important marker of both success and attrition in a BWLI.
A single exercise session evokes blood pressure (BP) reductions that are immediate and persist for ≥24hr, termed postexercise hypotension (PEH). Self-monitoring of PEH may foster positive outcome expectations of exercise, and thus, enhance exercise adherence among adults with hypertension. PURPOSE: To compare the efficacy of self-monitoring of exercise (EXERCISE) versus exercise plus PEH (EXERCISE+PEH) for exercise adherence and BP control among adults with hypertension.

METHODS: Adults with high BP were randomized to EXERCISE (n=12) or EXERCISE+PEH (n=12). Subjects underwent supervised, moderate intensity aerobic exercise training for 40-50min/session, 3d/wk for 12wk, and were encouraged to exercise unsupervised at home ≥30min/d, 1-2d/wk. All subjects self-monitored exercise using a calendar recording method. EXERCISE+PEH also self-monitored BP before and after exercise. Adherence was calculated as [# of exercise sessions performed ÷ # of possible exercise sessions] × 100%. BP was measured pre- and post-training.

RESULTS: Healthy, middle-aged (52.3±10.8y) men (n=11) and women (n=13) with hypertension (136.2±10.7/85.2±8.9mmHg) completed exercise training with 87.9±12.1% adherence. EXERCISE+PEH demonstrated greater adherence to supervised training (94.3±6.6%) than EXERCISE (81.6±13.2%; p=0.007). In addition, EXERCISE+PEH performed 32.6±22.5min/wk more unsupervised home exercise than EXERCISE (p=0.004), resulting in greater overall study exercise adherence (101.3±17.9min/wk) than EXERCISE (82.7±12.6min/wk; p=0.002). Post-versus pre-training, BP was reduced -7.4±11.3/3.4±9.9mmHg (p<0.025) with no statistical difference between EXERCISE+PEH (-5.2±13.3/6.6±16.6mmHg) and EXERCISE+PEH (-9.9±11.3/3.6±16.9mmHg; p=0.344). CONCLUSIONS: This study is the first to demonstrate that PEH self-monitoring is an efficacious tool to improve exercise adherence among adults with hypertension. Future research among a larger, more diverse sample is needed to confirm these novel findings and determine whether EXERCISE+PEH translates to better BP control relative to EXERCISE self-monitoring alone.

Table I. MVPA and sedentary behavior compared by group and time.

<table>
<thead>
<tr>
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<th>Pre</th>
<th>Post</th>
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<tbody>
<tr>
<td>Intervention</td>
<td>Control</td>
<td>Control</td>
</tr>
<tr>
<td>n=12</td>
<td>n=7</td>
<td>n=7</td>
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<tr>
<td>MVPA (min/day)</td>
<td>46.7±21.9</td>
<td>50.1±23.4</td>
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<tr>
<td>MVPA (%)</td>
<td>5.6±2.5</td>
<td>5.8±3.0</td>
</tr>
<tr>
<td>Sedentary (min/day)</td>
<td>536±67.5</td>
<td>573.1±64.7</td>
</tr>
<tr>
<td>Sedentary (%)</td>
<td>63.6±5.1</td>
<td>66.1±6.8</td>
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Data expressed as mean ± standard deviation. There were no significant differences for pre vs post assessments (p<0.05). MVPA: Moderate to vigorous physical activity; (min/day): Average daily time on that activity; (%): Percentage of the total week spent on that activity.

3063 Board #109
May 31 3:30 PM - 5:00 PM
Health and Fitness Improvements in Deconditioned Firefighters
Christina Day1, Thomas Andre, Ph.D.2, Hae Ryong Chung, Ph.D.1, Xavier Slaw1, Mathew Smith1, Melanie Poudievigne, Ph.D., CMPC, FACSM1, Clayton State University, Morrow, GA. 1The University of Mississippi, University, MS. (Sponsor: Melanie Poudievigne, Ph.D., CMPC, FACSM)
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(No relevant relationships reported)

PURPOSE: To observe longitudinal changes in health and fitness among deconditioned professional American firefighters using High Intensity Functional Training (HIFT). METHODS: This HIFT was part of a credit-bearing educational experience (course-based) in which 13 undergraduate students participated in a service activity that met the needs of a community partner (Fire Services) and allowed them to gain deeper understanding of course objectives, knowledge and skills at a Committee on Accreditation for the Exercise Sciences accredited university, under the supervision of two ACSM exercise physiologists and one CSCS certified professors. Behavior change (BCG translational model), body composition (BC skinfolds, waist/hip ratio, circumference), aerobic capacity (AC Bruce, step test), balance (BL, BESS), muscular strength (MS, handgrip), muscular endurance (ME, push-up, leg press), and flexibility (FX, seated reach) of 23 male firefighters (mean ± SD, age = 33.3 ± 10.2 yr; height = 182.3 ± 6.5 cm; body mass index, 29.9 ± 4.9) at baseline, at 10 and 20 weeks. RESULTS: Measures of BCG, BC, AC, BL, MS, ME and FX significantly changed over time (MANOVA p < 0.05). Follow-up post hoc analyses indicated that all measures significantly improved from baseline to the end of training (p < 0.05). CONCLUSIONS: The results of the current longitudinal study suggest that measures of health and fitness among deconditioned U.S. firefighters significantly improved over 20 weeks. These results highlight the importance of (1) developing

Abstracts were prepared by the authors and printed as submitted.
an exercise programming that is designed for the active-duty firefighter population to maintain the beneficial adaptations in health and fitness and (2) including exercise science majors in relevant community experiential learning service activities.

**INTRODUCTION**

The holiday season is linked to weight gain which has also been related to distress about self-attitudinal aspects of body image (BI) inclusive of physical appearance and perceptions about physical fitness and health. The impact of a weight management intervention on holiday weight change and BI in midlife females has not been investigated.

**PURPOSE**

This study aimed to examine the effects of an 11-week weight management intervention on holiday weight change and BI in inactive overweight postmenopausal women. **METHODS**: Females (n=18; 54.7±3.9 yrs; BMI=30.5±4.5 kg/m²) completed an 11-week weight management program (supervised exercise with nutrition education) with three phases: 1) Pre-Holiday (PreH; 5 weeks), 2) Holiday Period (HP; Thanksgiving 2017 through New Year’s Day 2018; unsupervised social media support only), and 3) Post-Holiday (PostH; 6-weeks). Weight and BI [Multidimensional Body-Self Relations Questionnaire subscales] were assessed at four times: 1) Baseline 1 (B1); 2) Follow-up 1 (F1; post PreH); 3) Baseline 2 (B2; post HP; baseline for PostH); and 4) Follow-up 2 (F2; final measure after PostH). Data analysis utilized one-way repeated measures ANOVAs and Pearson’s correlations.

**RESULTS**

Weight change was highly variable from B2 to F2 (range=-6.0 to 5.1 kg) although no significant changes occurred (B1=79.5±12.7 kg; F1=79.2±12.4 kg; B2=79.9±12.8 kg; F2=79.9±12.4 kg; p=.33; ESB1-F2=.03). Contrarily, Appearance Evaluation (B1=241.6±6.0; F1=250.8±6.2; B2=261.0±6.9; F2=271.0±6.8; p=.001; ESB1-F2=.004; ES_GYS=52), Fitness Orientation (B1=2.7±3.0; F1=3.0±2.9; B2=3.0±2.7; p=.013; ES_GYS=.43), and Health Orientation (B1=3.1±1.7; F1=3.4±1.6; B2=3.3±1.6; F2=3.5±1.6; p=.01; ES_GYS=.65), increased. No changes in the subscales of Body Areas Satisfaction, Overweight Preoccupation and Self-Classified Weight subscales were detected (all p ≥ .05). Change in weight was related to change in both Fitness and Health Orientation (BI to F2; r=-.56; p=.03) and r=.54; p=0.02; respectively), but it was not related to changes in Appearance Evaluation (r=-.22; p=.37). **CONCLUSIONS**: Our preliminary study suggests that the 11-week weight management intervention attenuated holiday weight gain while positively influencing body image in overweight midlife females.

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**Evaluation of a Weight Management Intervention on Holiday Weight Change and Body Image in Inactive Overweight Midlife Postmenopausal Women**

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(No relevant relationships reported)

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**Association between Quadriceps Strength and Self-Reported Physical Activity in Individuals with Knee Osteoarthritis**

Malia N. M. Blue, Abbie E. Smith-Ryan, FACSM, Hope C. Davis, Troy Blackburn, Brian Pietrosimone, FACSM. University of North Carolina, Chapel Hill, NC. (Sponsor: Abbie Smith-Ryan, FACSM)

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(No relevant relationships reported)

Limited quadriceps strength is common with knee osteoarthritis (OA) and may lead to activity avoidance and low physical activity (PA) levels. **PURPOSE**: To investigate the association between quadriceps strength and self-reported PA in individuals with knee OA. Secondary analyses evaluated the association between a change (Δ) in quadriceps strength and self-reported PA following a 4-week physicial therapy intervention designed to improve lower extremity strength. **METHODS**: Ninety individuals with radiographic knee OA were enrolled in the current study (43% male; Kellgren-Lawrence grade: 2-4). Assessments occurred at baseline, post intervention, and 4 weeks after intervention completion. At each testing visit, participants completed the Physical Activity Scale for the Elderly (PASE), the Western Ontario and McMaster Universities Arthritis Index pain subscale, and a quadriceps maximal voluntary isometric contraction (MVIC) performed at 70° of knee flexion measured with an isokinetic dynamometer. Multiple regression analyses were conducted to assess the association between MVIC normalized to body mass (nMVIC - predictor variable) and PASE after accounting for age, body mass index, radiographic OA severity, and pain. **RESULTS**: For all participants at baseline, there was a significant association between greater nMVIC and greater PASE (Δ=-0.049; p=0.033) after accounting for covariates. When stratified by sex, nMVIC was not associated with PASE (Males: Δ=-0.048; p=0.197; Females: Δ=-0.031; p=0.432). There was no association between the ΔnMVIC and APASE following the intervention (Total: ΔR=-0.043, p=0.072; Males: ΔR=-0.071, p=0.106; Females: ΔR=-0.008, p=0.585), or 4 weeks post intervention (Total: ΔR=-0.001, p=0.845; Males: ΔR=-0.009, p=0.629; Females: ΔR=-0.002, p=0.773). **CONCLUSIONS**: Although greater quadriceps strength was associated with greater self-reported PA, MVIC only explained 4.9% of the variance in PASE. Post intervention, a change in strength was not associated with a change in PA. Therapeutic interventions aimed at increasing strength may not lead to a subsequent increase in PA. Future studies should investigate the influence of interventions incorporating PA and strength on health and physical function in individuals with knee OA.

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**Impact Versus Resistance Training For Bone In Young Women: Preliminary Findings Of The OPTIMA-Ex Trial**

Corner Lambert, Belinda R. Beck, FACSM, Amy T. Harding, Steven L. Watson, Benjamin K. Weeks. Griffith University, Gold Coast, Australia.

(No relevant relationships reported)

**PURPOSE**: The OPTIMA-Ex (Osteoporosis Prevention Through Impact and Muscle-loading Approaches to Exercise) trial aims to compare bone responses to two known osteogenic stimuli - impact exercise and resistance training in young women with lower than average bone mass. **METHODS**: The trial is a three-arm, single-blind, single-centre, randomised controlled exercise intervention targeting healthy but sedentary women aged 18-30 years with lower than average bone mass (T-score ≤ 0). Participants were randomised to a 10 month, twice-weekly, either supervised high intensity impact training (IT), high intensity resistance training (RT) or home-based low intensity exercise (active control) (CON). Preliminary DXA (Medix DR) outcomes for lumbar spine (LS), dominant (D) and non-dominant (ND) femoral neck (FN); D and ND distal 1/3 radius (RAD) areal bone mineral density (aBMD) have been examined per-protocol, using repeated-measures ANCOVA adjusted for compliance, age, height, weight, total lifetime physical activity, dietary calcium and baseline values. DXA results are reported as mean difference ± SE, statistical significance set at p ≤ 0.05. **RESULTS**: A total of 51 women (age=22.2±3.6 years; height=1.64±0.62 m; weight=58.1±8.7 kg) have been randomised (IT=17; RT=17; CON=17) with no between-group differences at baseline. By 12 weeks, the IT group performed 12 weeks of high intensity impact loading (HIIT) at 80% of peak power output, the RT group performed 12 weeks of high intensity resistance training (HIT) at 80% of peak voluntary contraction force and the control group (CON) performed usual activities. **CONCLUSIONS**: Preliminary DXA outcomes indicate that impact exercise is a feasible approach for improving bone health in young women with a low risk of eating disorder for improvement of physical status. Methods: A total of 97 female college students (20.40 yrs) were invited to join the EDI-3 estimate, and 23 of them were judged to have high risk of eating disorder. The 23 students were randomly divided into two groups, the HIIT group (n=12) and the control group (n=11). The HIIT group performed 12 weeks HIIT program particularly designed for them; vehemently pedaling bike for 30 seconds and then resting for 10 seconds, repeating the circle for three times. The training was carried out every other day during the 12 weeks. In contrast, no intervening was taken for the control group during the 12 weeks. Before and after 12 weeks, BMD of total body of all subjects was detected by DEXA, and body composition was measured by BIA. Results: Post-H holiday weight gain was attenuated in the BMD of the HIIT group increased significantly (p<0.05), from 1.987±0.097 to 1.928±0.126 for the head, from 1.778±0.060 to 1.800±0.065 for the trunk, and from 1.943±0.066 to 1.962±0.128 for the legs. The total body showed a very significant increase (p<0.01), from 1.926±0.058 to 1.963±0.107 g/cm². (2) Their averaged weight was increased from 58.86±3.698 to 60.46±3.651, muscle mass was increased from 38.65±3.143 to 39.12±2.92, and BMI also varied obviously (p<0.05). Moreover, the basal metabolism was increased from 1259±7±2.018 to 1269±5±6.345 for the training group students. However, fat mass had no change (p>0.05). Conclusions: 12 weeks HIIT for female college students with high risk of eating disorder could make their BMD and body composition to improve obviously.

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**Association Between Quadriceps Strength and Self-Reported Physical Activity in Individuals with Knee Osteoarthritis**

Malia N. M. Blue, Abbie E. Smith-Ryan, FACSM, Hope C. Davis, Troy Blackburn, Brian Pietrosimone, FACSM. University of North Carolina, Chapel Hill, NC. (Sponsor: Abbie Smith-Ryan, FACSM)

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(No relevant relationships reported)
Although minimal statistical power limits the conclusions that can be drawn from these preliminary data, results indicate both RT and IT improve spine bone mass, while RT may provide a broader osteogenic stimulus in young adult women with lower than average bone mass. Data collection is ongoing.

3068  Board #114  May 31 3:30 PM - 5:00 PM
The Feasibility and Efficacy of a Behavioral Intervention to Promote Appropriate Gestational Weight Gain
Rebecca A. Schlaff, Meghan Baruth, Samantha J. Deere. Saginaw Valley State University, University Center, MI. Email: raschla@svsu.edu

(No relevant relationships reported)

Nearly half of all women gain above gestational weight gain (GWG) recommendations and physical activity (PA) has been shown to decline during pregnancy. Much work remains in understanding how to promote appropriate GWG and PA during pregnancy.

PURPOSE: This study assessed the feasibility and efficacy of a pilot behavioral intervention on GWG and PA behaviors. METHODS: Women (n=45) 14-20 weeks gestation enrolled in a behavioral intervention. Physicians 'prescribed' the intervention to low risk patients. The intervention included self-monitoring, support, and optional walking groups. Process evaluation measures regarding usage and acceptability of study components were obtained. PA was objectively measured at baseline and 3 weeks. The percentage of participants with appropriate GWG was calculated. Data was obtained from the same clinic where participants were recruited. RESULTS: Overall, the intervention was acceptable to participants; attrition was low (6.7%), weekly contact was high (87%), and self-monitoring was high (Fitbit worn on 82% of intervention weeks; weekly weighing on 81%). Facebook (40%) and study website use (19%) was low, as was walking group attendance (7% attended a single group). Participants reported a lack of discussions about the study with their physician. Results showed no significant difference between intervention and control participants in the percentage who gained excess weight (p=0.37). There was a significant decrease in moderate-to-vigorous PA in intervention participants (p<0.0001).

CONCLUSION: Continued efforts for promoting PA and appropriate GWG are needed. Although acceptable, the intervention was not efficacious. Future intervention research should consider/report feasibility and acceptability indices through process evaluation. Trainings for, or input from, prenatal healthcare providers on how to best encourage and support patients' engagement in healthy behaviors, such as PA, are warranted.

3069  Board #115  May 31 3:30 PM - 5:00 PM
Blood Lipid Profile Differences After a 12-Month Sit-to-Stand Workstation Intervention
Cara Daniels, Constance Haynes, Larissa Boyd, Jacilyn Olson, Melissa Powers. The University of Central Oklahoma, Edmond, OK.

(No relevant relationships reported)

A reduction in sedentary behavior has been associated with improvements in metabolic health. Because a disproportionate number of working hours for office-based employees are spent engaged in sedentary behavior, an increase in workplace activity is substantiated.

PURPOSE: The purpose of this study was to determine if the use of a sit-to-stand workstation (STS) effected blood lipid profiles following a 12-month intervention. METHODS: Participants of the study included volunteer faculty and staff of the University of Central Oklahoma who were randomly assigned to a control group (CG) or an intervention group (IG). A STS was provided to the IG with participants being instructed to stand at least 2 hours every work day. Blood lipid profiles were used to measure high-density lipoprotein cholesterol (HDL), low-density lipoprotein cholesterol (LDL), total cholesterol (TC), and blood glucose (BG) at baseline, 6, and 12-months of the intervention. The data was analyzed using a repeated-measures ANOVA. RESULTS: No significant differences were found between groups (p>0.05). Small, non-significant improvements occurred for the IG in HDL and LDL over time and a significant change in BG across all groups took place over time (F = 22.05, p<0.00). Descriptive statistics can be found in Table 1. One outlier was removed from analysis. CONCLUSION: Significant differences did not occur between STS participants and those using a typical workstation; however, some benefits may be gained from breaking up bouts of sedentary behavior. Future research may examine the effects of longer standing time to ascertain the efficacy of the STS.

Table 1
Blood Lipid Profile Statistics at Baseline, 6 months, and 12 months

<table>
<thead>
<tr>
<th>Blood Lipid Profile</th>
<th>Intervention Group</th>
<th>Control Group</th>
</tr>
</thead>
<tbody>
<tr>
<td>HDL pre (mg/dL)</td>
<td>13 60.54 (19.84)</td>
<td>11 58.64 (16.33)</td>
</tr>
<tr>
<td>HDL 6 months (mg/dL)</td>
<td>13 58.54 (17.13)</td>
<td>11 58.55 (15.69)</td>
</tr>
<tr>
<td>HDL 12 months (mg/dL)</td>
<td>12 60.69 (18.03)</td>
<td>13 63.27 (16.47)</td>
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<tr>
<td>LDL pre (mg/dL)</td>
<td>12 104.50 (24.65)</td>
<td>9 97.00 (70.06)</td>
</tr>
<tr>
<td>LDL 6 months (mg/dL)</td>
<td>12 105.67 (36.89)</td>
<td>9 96.78 (29.88)</td>
</tr>
<tr>
<td>LDL 12 months (mg/dL)</td>
<td>12 104.25 (46.38)</td>
<td>9 93.22 (35.35)</td>
</tr>
<tr>
<td>TC pre (mg/dL)</td>
<td>15 175.91 (24.08)</td>
<td>15 175.91 (24.08)</td>
</tr>
<tr>
<td>TC 6 months (mg/dL)</td>
<td>15 182.29 (36.95)</td>
<td>15 180.00 (26.26)</td>
</tr>
<tr>
<td>TC 12 months (mg/dL)</td>
<td>15 187.07 (39.53)</td>
<td>15 191.91 (23.91)</td>
</tr>
<tr>
<td>BG pre (mg/dL)</td>
<td>14 95.73 (8.66)</td>
<td>14 90.73 (10.08)</td>
</tr>
<tr>
<td>BG 6 months (mg/dL)</td>
<td>14 89.53 (5.88)</td>
<td>14 85.82 (12.05)</td>
</tr>
<tr>
<td>BG 12 months (mg/dL)</td>
<td>14 91.53 (11.51)</td>
<td>14 89.00 (11.22)</td>
</tr>
</tbody>
</table>

3070  Board #116  May 31 3:30 PM - 5:00 PM
Effects of a Brief Lifestyle Intervention for Office Workers
Cassandra M. Beattie, Lucas J. Dudgeon, Sarah J. Cosgrove, Katie M. Heinrich. Kansas State University, Manhattan, KS. Email: cbbeattie@ksu.edu

(No relevant relationships reported)

PURPOSE: Our study assessed the impact of a brief lifestyle intervention (LI) using a novel fitness application on body composition and fitness in office workers. METHODS: Insufficiently active office workers (n = 22) participated in a four-week randomized pilot trial. Individuals were randomized to either information-only control (CON; n = 10; age = 34.3 ± 4.6 years, 63.6% female, 80% white) or intervention (LI; n = 12; age = 37.6 ± 4.8 years, 91.7% female, 100% white) groups. CON was provided access to online physical activity and nutrition information with short assessments. LI was trained in-person on a mobile fitness application, that provided short (~2 minutes) daily workouts, alternating muscle groups each day; daily logging of waist circumference, and a tracking system for “treats” (i.e., high sugar/starch foods). In person measures were conducted pre- and post-intervention. Anthropometric measures included height, weight, body fat percentage, and waist circumference (WC). Fitness was measured via handgrip dynamometry (strength), sit-and-reach (flexibility), and 30-second chair stand test (muscular endurance). Independent-samples t-tests were used to examine group differences on baseline characteristics. Both within-group (paired-samples t-tests) and between-group (ANOVA with baseline scores as covariate) changes scores were analyzed. RESULTS: No significant baseline differences were found between groups. Significant changes were found for LI on WC (mean Δ = -3.2 ± 4.3 cm; t = 2.57, p < 0.05), chair stand (mean Δ = 49.4 ± 4.8 repetitions; t = 3.52, p < 0.01), and flexibility (mean Δ = 2.9 ± 3.6 cm; t = 2.84, p < 0.05). Significant changes were found for LI on chair stand (mean Δ = 2.9 ± 0.5; t = 2.92, p < 0.05). No significant between group differences were found for change scores. CONCLUSION: Our data suggest the novel fitness application could be a viable option to improve body composition and fitness among insufficiently active office workers. Future investigations should aim to validate our pilot study with larger sample sizes and consider additional measures of health and fitness.

3071  Board #117  May 31 3:30 PM - 5:00 PM
Muscle Damage and Inflammatory Response from Volume-Equated Resistance Exercise with Short vs Long Rest Interval
Gilmar W. Senna1, Paula P. Brandão2, Estevão Scudese2, Matheus Baffi1, Luiz Claudio P. Ribeiro3, Estélio H.M. Dantas5
1Lisboa University, Rio de Janeiro, Brazil. 2Federal University of State of Rio de Janeiro, Rio de Janeiro, Brazil. 3Petrópolis University, Petrópolis, Brazil. 4Petrópolis University, Petrópolis, Brazil. 5Tiradentes University, Aracaju, Brazil.

(No relevant relationships reported)

Resistance exercise is considered the most efficient method for the improvement of muscular strength, power and endurance. However, it is not possible to explain in their entirety the mechanisms that bring the benefits of neuromuscular fitness levels. PURPOSE: The aim was to analyze the effects of rest period length between resistance exercise (RE) sets on inflammatory response (cytokines and leukocyte)
and muscle tissue damage. METHODS: Ten trained men with at least one year of consistent resistance training experience were selected to participate (26.40 ± 4.73 years, 80.71 ± 8.95 kg, 176.03 ± 6.11 cm, 9.86 ± 3.25% body fat, bench press relative strength: 1.27 ± 0.27 kg.kg−1 of body mass) and to perform two workouts sessions separated by one week. Each session consisted of five sets of 10 repetitions performed at 85% of 10 repetition maximum on barbell bench press followed by the leg press exercise, with either 1- or 3-minute of rest between sets. Circulating concentrations of creatine kinase (CK), interleukin-6, and tumor necrosis factor alpha (TNF-α) were measured at pre-exercise (Pre), and post 3h (except for IL-6), 6h, 12h and 24h. The rate of perceived exertion (RPE) was recorded after each session on both visits. RESULTS: After the statistical analysis, we found increases triggered by the 1-minute of rest period length in CK main-effect for time-points (p = 0.0001) and rest conditions (p = 0.0004), occurring in from 6h to 24h post-exercise compared with the Pre-exercise. For CK, the AUC did not differ (p = 0.0005) between the 1-minute (4572.4 ± 1169.5 μL/L) and 3-minute (3330.1 ± 715.9 μL/L) rest conditions. In addition, we observed an increase in TNF-α for different time-points, mainly in 6h and 12h. Similarly, increases in IL-6 were observed for all post-exercise time-points (6h, 12h and 24h) and 3h compared with Pre-exercise data. For the RPE, the short rest period length demonstrated significant increases compared to the longer rest condition (SH, p < 0.001; LP, p < 0.001). CONCLUSION: The short rest condition promoted a greater overall damage of muscle tissue with a longer duration of the inflammatory process of this tissue. Supported by CAPES Brazil: 203.0476.

**3072**

**Board #118**

**May 31 3:30 PM - 5:00 PM**

**Exergaming Intervention in Sedentary Middle-Aged Adults Improves Cardiovascular Endurance, Balance and Lower Extremity Functional Fitness**

Daniel Rosney, Sr., 1 Peter Horvath. 1 Temple University, Philadelphia, PA. 2 State University of New York at Buffalo, Buffalo, NY.

**METHODS**: Subjects initially underwent balance, cardiovascular endurance and physical fitness (PF) tests in P1, P2, P3, and P5: 40, 100, 360, 710, respectively. A repeated-measures ANOVA was used with time as the independent variable and healthy adults (15, 15) as the control group (15). Measures of depression, anxiety, stress, pain, and balance were administered at baseline (before the classes began) and at the middle (weeks 7) and end of the semester (14 weeks). A repeated-measures ANOVA was used with time (baseline, mid, end) and Group (yoga, tai chi, control) to examine the effects of the interventions. In addition, focus group interviews were conducted at the end of study. **RESULTS**: At baseline, the yoga group had higher anxiety and depression scores than the tai chi group. No other differences were apparent at baseline. Over time, yoga group showed decreased anxiety and depression from baseline to 14 weeks, and in depression from baseline to 7 weeks. Though no other significant differences were noted, there was a pattern of decreasing means across all measures of mental health and pain and improvement in balance in the yoga and tai chi groups. Additionally, focus group findings revealed students favored yoga over tai chi. Tai chi benefits included brief distraction from school and possibly improved sleep but was found to be boring and at times more stressful due to time being taken away from academic work and learning the sequential steps. Yoga was the “bright spot” in the week and more students felt it decreased stress, minimized potential for anxiety attacks, served as a disconnect from the external world, improved pain and mobility and served as a way to connect with friends. **Conclusion**: The preliminary results suggest that implementation of yoga is acceptable and feasible in college students and has the potential of playing a protective or preventive role in promoting mental health.

**3074**

**Board #120**

**May 31 3:30 PM - 5:00 PM**

**The Impact of Text Messaging on Baccalaureate Nursing Students’ Physical Activity: Single Case Design**

Ashley Shu Shu He-Rinicker, Harald Simmons University, Abilene, TX (Dennis G O’Connell, FACSVM).

**Email**: sxh05f@acu.edu

(No relevant relationships reported)

**PURPOSE**: Find the effect of text messaging on physical activity (PA), physical fitness (PF), and physical activity self-efficacy (PASE) of nursing students. **METHODS**: A single-case design, concurrent 4-randomized baselines across subjects, and an 8-week text messaging intervention were used. Participants (Ps) were selected based on results from PA health risk factors, the International Physical Activity Questionnaire (IPAQ), the Physical Activity Appraisal Inventory-Adolescence and Young Adult Version (PAAI). Selected Ps had low or high PA and PASE, and low or moderate PA health risk. Ps (P1-P5: 1 male, 4 female, mean age ± SD = 21) were randomized to 5, 7, 10, or 13 day baselines (BL) and completed 3 or 4 BL PA tests and 4 PF retests in week 2 (W2), 4 (W4), 6 (W6), 8 (W8) of intervention. PF tests were resting and post-walk HR and BP, weight, height, BMI, waist-hip ratio (WHR), hand grip strength, VO2 max from the treadmill 6-minute walk test (6MWT). PA and PASE were measured by the IPAQ and PAAI at W4 and W8 of intervention. All Ps wore pedometers to measure objective PA throughout the intervention. The 2 SD-hand held method was used to compare BL data with W2, W4, W6, and W8 data. **RESULTS**: Self-reported PA increased from BL in P2, P3, P4, and P5 by 9.5, 2.9, 11, and 7.8 hrs, respectively. Statistically significant increases were noted in PA in 4 Ps. P1: Resting HR (BL-W6-W8; 93.3 b/min); Resting SBP (BL-W6-W8; 138 mmHg); WHR (BL-W6-W8; 14.8), post-walk SBP (BL-W6-W8; 187 mmHg), distance traveled in 6MWT (BL-W4-W6-W8; 1537 m), VO2 max (BL-W6-W8; 17.1 mL.kg−1.min); P2: resting SBP (BL-W2-W6-W8; 99 mmHg); WHR (BL-W6-W8; 0.04); post-walk HR (BL-W2-W4-W6-W8; 6.8 b/min), post-walk SBP (BL-W2-W6-W8; 22.5 mmHg). P4: resting HR (BL-W6-W8; 5.8 b/min); weight (BL-W6-W8; 0.5 kg); post-walk HR (BL-W2-W4-W6-W8; 6.8), protein, and 4 PF retests in week 2, 4, 6, 8 of intervention. All Ps wore pedometers to measure objective PA throughout the intervention. The 2 SD-hand held method was used to compare BL data with W2, W4, W6, and W8 data. **RESULTS**: Self-reported PA increased from BL in P2, P3, P4, and P5 by 9.5, 2.9, 11, and 7.8 hrs, respectively. Statistically significant increases were noted in PA in 4 Ps. P1: Resting HR (BL-W6-W8; 93.3 b/min); Resting SBP (BL-W6-W8; 138 mmHg); WHR (BL-W6-W8; 14.8), post-walk SBP (BL-W6-W8; 187 mmHg), distance traveled in 6MWT (BL-W4-W6-W8; 1537 m), VO2 max (BL-W6-W8; 17.1 mL.kg−1.min); P2: resting SBP (BL-W2-W6-W8; 99 mmHg); WHR (BL-W6-W8; 0.04); post-walk HR (BL-W2-W4-W6-W8; 6.8 b/min), post-walk SBP (BL-W2-W6-W8; 22.5 mmHg). P4: resting HR (BL-W6-W8; 5.8 b/min); weight (BL-W6-W8; 0.5 kg); post-walk HR (BL-W2-W4-W6-W8; 6.8), protein, and
hours were imputed using multiple-imputation. Between and within group differences in mean daily wake-time spent SED, standing, and stepping during the fifth week. RESULTS: Significant improvements in body composition, and decreased by 5 seconds each week ending with 30-second recovery durations during the fifth week. The active recovery intervals were 50 seconds during the first week and increased by 5 seconds each week ending with 30-second HIIT durations during each exercise session. The HIIT intervals during the first week were 10 seconds and a 5-minute cool down. The exercise portion consisted of 25 exercise intervals for 5 weeks. Each session consisted of a 5-minute warm-up, 25 minutes of exercise, and a 5-minute cool down. The exercise portion consisted of 25 exercise intervals lasting 10-30 seconds and used combinations of 8-12 different exercises. Twenty-two standard aquatic upper body, lower body, and full body aerobic exercises, most of which utilized aquatic dumbbells or hand paddles, were used in an HIIT protocol during each exercise session. The HIIT intervals during the first week were 10 seconds and increased by 5 seconds each week ending with 30-second HIIT durations during the fifth week. The active recovery intervals were 50 seconds during the first week and decreased by 5 seconds each week ending with 30-second recovery durations during the fifth week. RESULTS: Significant improvements in body composition, submaximal and peak heart rate, submaximal VO2peak, and peak VO2peak occurred from pre- to post-program. CONCLUSION: To our knowledge, this is the first study to evaluate the effectiveness of standard aquatic aerobic exercises in a HIIT protocol. Improvements in cardiopulmonary fitness and exercise economy occurred in sample and patients individuals. This form of exercise may be more tolerated in obese individuals or patients with physical limitations for land-based exercise.

**Table 1.** Data are mean ± SD.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Baseline</th>
<th>5 weeks</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Body Composition (% body fat)</td>
<td>32.55 ± 5.57</td>
<td>30.55 ± 6.31</td>
<td>0.004</td>
</tr>
<tr>
<td>GXT VO2peak (mL/kg/min)</td>
<td>30.53 ± 4.38</td>
<td>31.95 ± 5.08</td>
<td>0.035</td>
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<tr>
<td>GXT Stage 1 VO2peak (mL/kg/min)</td>
<td>15.72 ± 2.18</td>
<td>14.11 ± 2.30</td>
<td>0.013</td>
</tr>
<tr>
<td>GXT Stage 1 HR (bpm)</td>
<td>138.91 ± 5.88</td>
<td>136.64 ± 5.22</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>GXT Stage 2 VO2peak (mL/kg/min)</td>
<td>21.74 ± 3.11</td>
<td>19.25 ± 3.50</td>
<td>0.031</td>
</tr>
<tr>
<td>GXT Stage 2 HR (bpm)</td>
<td>169.18 ± 5.72</td>
<td>164.45 ± 5.56</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>HR Peak (bpm)</td>
<td>198.91 ± 3.45</td>
<td>192.00 ± 5.22</td>
<td>&lt;0.001</td>
</tr>
</tbody>
</table>

3078 Board #124 May 31 3:30 PM - 5:00 PM

Aquatic High Intensity Interval Training Improves Cardiorespiratory Fitness of Sedentary Adults

Brittany B. McDaniel, Mildred R. Naquin, Bovorn Sirikul, Robert R. Kraemer, FACSM. Southeastern Louisiana University, Hammond, LA. (Sponsor: Dr. Robert R. Kraemer, FACSM)

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(NO relevant relationships reported)

**PURPOSE:** The purpose of this study was to determine the effects of five weeks of aquatic high intensity interval training (HIIT) on cardiopulmonary fitness and body composition in sedentary young adults. METHODS: Eleven participants (9 female (20.0 ± 0.71 yr), 2 male (23.5 ± 2.12 yrs) completed 18 sessions: A) a pre-program testing session; B) a familiarization session; C) 15 exercise sessions; and D) a post-program testing session. The participants completed 3 sessions per week for 5 weeks. Each session consisted of a 5-minute warm-up, 25 minutes of exercise, and a 5-minute cool down. The exercise portion consisted of 25 exercise intervals lasting 10-30 seconds and used combinations of 8-12 different exercises. Twenty-two standard aquatic upper body, lower body, and full body aerobic exercises, most of which utilized aquatic dumbbells or hand paddles, were used in an HIIT protocol during each exercise session. The HIIT intervals during the first week were 10 seconds and increased by 5 seconds each week ending with 30-second HIIT durations during the fifth week. The active recovery intervals were 50 seconds during the first week and decreased by 5 seconds each week ending with 30-second recovery durations during the fifth week. RESULTS: Significant improvements in body composition, submaximal and peak heart rate, submaximal VO2peak, and peak VO2peak occurred from pre- to post-program. CONCLUSION: To our knowledge, this is the first study to evaluate the effectiveness of standard aquatic aerobic exercises in a HIIT protocol. Improvements in cardiopulmonary fitness and exercise economy occurred in sample and patients individuals. This form of exercise may be more tolerated in obese individuals or patients with physical limitations for land-based exercise.

3079 Board #125 May 31 3:30 PM - 5:00 PM

Active Video Gaming: Appropriate Tool to Improve Fitness in Pediatric Renal Transplant Recipients?

Sandra Weigmann-Fassbender1, Kathrin Pfeil1, Burkhard Tönshoff2, Gerhard Huber1, Klaus Weib1, Theresa Betz1, Birgit Friedmann-Bette1. 1University Hospital Heidelberg, Heidelberg, Germany. 2University of Heidelberg, Heidelberg, Germany.

(NO relevant relationships reported)

Renal transplanted children are at increased risk for cardiovascular diseases due to reduced cardiovascular fitness. **PURPOSE:** 1) To evaluate cardiovascular fitness, motor coordination, physical activity and health-related quality of life (HRQI) in pediatric renal transplant recipients and 2) to find out, if active video gaming provides a sufficient stimulus for an improvement in these items. METHODS: Twenty renal

Abstracts were prepared by the authors and printed as submitted.
transplant recipients (TX, 13.5 ± 3.4 yr; 152.0 ± 21.1 cm; 52.2 ± 20.5 kg) and 33 healthy controls, matched for sex, pubertal stage, regular physical activity and attended school (CON, 13.1 ± 3.2 yr; 157.2 ± 17.7 cm; 49.0 ± 15.9 kg) completed a cycling or treadmill spiroergometry, a motor coordination and a maximal hand grip strength test. HRQL was determined with a validated questionnaire and activity of daily life was recorded as step per hours with a physical activity monitor. Thirteen patients out of TX (12.9 ± 3.4 yr; 152.1 ± 21.5 cm; 53.8 ± 22.2 kg) participated in a 6-week exercise game intervention. They were instructed to exercise 3x/week at home and were contacted weekly for adherence. All tests were repeated after the intervention. RESULTS: Cardiovascular fitness (VO\text{peak}: 28.6 ± 7.8 vs. 41.7 ± 8.5 mL·min\textsuperscript{-1}·kg\textsuperscript{-1}; P < 0.001), motor coordination (MQ\text{max}: 59.7 ± 17.5 vs. 105.8 ± 14.9; P < 0.001), physical activity (steps/h: 458 ± 171 vs. 687 ± 280; P = 0.001) and HRQL (75.0 ± 10 vs. 85.2 ± 7.5; P = 0.017) were significantly reduced in TX compared to CON. Maximal hand grip strength was similar in both groups. After six weeks of exercise intervention, daily physical activity significantly increased from 481 ± 176.5 to 602 ± 226 steps·h\textsuperscript{-1} (P = 0.043). However, compliance turned out to be low and cardiovascular fitness, motor coordination and HRQL remained unchanged. CONCLUSION: Cardiovascular fitness, motor coordination, physical activity and HRQL are markedly reduced in pediatric renal transplant recipients. Despite low compliance, six weeks of active video gaming provided a stimulus for an increase in daily physical activity in these patients, but did not improve fitness.

Numerous studies have shown that dual-task demands involving exercise lead to a decline in performance on one or both tasks, but the direct effects of exercise intensity and type are less known. PURPOSE: To examine the dual-task performance of reaction time while standing or walking or fast-paced walking on a treadmill while completing tasks of varying complexities. METHODS: Using within-subject and a repeated measures design a total of 32 participants (Mage=21.03±2.79, Female=17) performed six different conditions involving Go/No-Go (GNG) movement tasks while treadmill standing/walking/fast-paced walking (2 task - congruent/incongruent x 3 intensities). Dual-task reaction time was measured during GNG movement task required subjects to strike virtual stimulus that is green while avoiding the red target. The directions were then reversed to create an incongruent condition. All participants performed 3 minutes of each exercise condition on a Motek-instrumented V-gait treadmill integrated with a 180° virtual reality projection screen which created the environment of GNG task. RESULTS: A repeated measures ANOVA with a Greenhouse-Geisser correction showed that mean reaction time differed significantly between exercise conditions, F (3,425,106.177) = 14.157, p<0.01. Post hoc tests using the Bonferroni correction revealed that Go-task while walking condition was faster than Go-task while standing an average of .039 (p<.01). There were no significant differences between Go-task while walking, fast-paced walking and NoGo-task while walking. CONCLUSIONS: This novel research methodology suggests that walking-induced physiological arousal may lead to improved dual-task performance over a standing position (Schaefer et al., 2010).

METHODS: A paired T-tests showed improvements in the following cognitive variables: Reaction Time Variability in working memory tasks (p<0.05) and Impulsivity in attention-based tasks (p<0.05). CONCLUSION: Participants who increased maximal aerobic capacity did not experience greater improvements in cognitive control variables as compared to those who did not. It was also hypothesized that participants would show an improvement in cognitive function after the intervention regardless of whether maximal aerobic capacity improved or not. METHODS: Fifteen lightly active older (67.5±4.4 yr) participants completed 8 weeks of training, 3 days per week (24 sessions total) on BBT. Physical task difficulty was adaptive in the game based on real-time heart rate measurements. Cognitive task difficulty was adaptive and included task switching, selective attention and working memory challenges. Participants were assigned to either a maximal aerobic capacity responder group (Responders) who increased VO\text{2} max (n=7) or a non Responder group (Non-Responders) that did not increase VO\text{2} max (n=8). Cognitive assessments included behavioral and neural measures of working memory, sustained attention and goal management. RESULTS: Analysis of Covariance (ANCOVA) did not reveal any differences in post-test cognitive variables between Responders and Non-Responders. However, when groups were combined, Working Memory did not improve in either group. Further study with group comparison is warranted.

PURPOSE: To determine the effect of functional exercise guided by a kinesiologist in addition to working memory, attention, and goal management via improved brain perfusion, exercise-induced neurogenic factors, and structural adaptations. There is also evidence that cognitive training itself has beneficial effects on cognition via plasticity in neural networks and structural adaptations. However, it is unclear if these adaptations are found equally in those who experience increases in maximal aerobic capacity versus those who do not. PURPOSE: Determine cognitive adaptations associated with older adults performing 8 weeks of training on a video game (BBS) that combined cognitive and physical training. It was hypothesized that positive cognitive adaptations would be greater in participants increased maximal aerobic capacity as compared who did not. There was also hypothesized that participants would show an improvement in cognitive function after the intervention regardless of whether maximal aerobic capacity improved or not. METHODS: Fifteen lightly active older (67.6±4.4 yr) participants completed 8 weeks of training, 3 days per week (24 sessions total) on BBT. Physical task difficulty was adaptive in the game based on real-time heart rate measurements. Cognitive task difficulty was adaptive and included task switching, selective attention and working memory challenges. Participants were assigned to either maximal aerobic capacity responder group (Responders) who increased VO\text{2} max (n=7) or a non Responder group (Non-Responders) that did not increase VO\text{2} max (n=8). Cognitive assessments included behavioral and neural measures of working memory, sustained attention and goal management. RESULTS: Analysis of Covariance (ANCOVA) did not reveal any differences in post-test cognitive variables between Responders and Non-Responders. However, when groups were combined, Working Memory did not improve in either group. Further study with group comparison is warranted.
identical meal combined with either 1min, 3min, or 10min of stair-climbing, all ending 28 min after subjects finished the meal. Fingertip blood glucose measurements were taken at baseline and every fifteen minutes thereafter for one hour.

RESULTS: All results were normalized for body weight. There was no difference in post-exercise PPG at 30min for any of the trials in men (Δ-0.50±0.22 to 0.39±0.20, p = 0.64 to 0.40) or in women (Δ-0.72±0.34 to 0.37±0.28, p = 0.13 to 0.50). In detail, immersive VR resulted in significantly higher steps than non-immersive VR, and traditional stationary biking sessions.

INTRO: In the United States, obesity affects about 12.7 million children and adolescents, with minority and low-income populations at an increased risk. Development of a positive association and regular engagement in physical activity at a young age promotes the transition of these habits into adulthood. School-based physical activity programs benefit communities as well as students and schools. The implementation of a physical activity based service learning program provides a mutually beneficial partnership between pre-service teachers and the elementary students. PURPOSE: The purpose of this study was to determine the effect of a 9-week fitness intervention and education program for under-served 5th grade students. METHODS: Club Fit! consists of a 9-week program with bi-weekly 60-minute exercise sessions. Physical Education Teacher Education pre-service teachers (n=21) served as mentors to 5th grade students (n=35) enrolled at a local elementary school. The pre-service teacher/mentor to student/mentee ratio was 1:1 - 1:2. Pre-service teachers alternated leading lessons focused on health and skill-related physical fitness components, such as paddle tennis, yoga, jumping rope, and locomotor skills. Basic educational concepts from the components of physical fitness were incorporated, including comparing heart rate before and after activity and distinguishing between muscular strength and endurance. Each session concluded with journal questions reflective of the day’s concepts and activities. Prior to the program, pre-service teachers attended leading lessons focused on health and skill-related physical fitness components, such as paddle tennis, yoga, jumping rope, and locomotor skills. Basic educational concepts from the components of physical fitness were incorporated, including comparing heart rate before and after activity and distinguishing between muscular strength and endurance. Each session concluded with journal questions reflective of the day’s concepts and activities. Prior to the program, pre-service teachers attended leading lessons focused on health and skill-related physical fitness components, such as paddle tennis, yoga, jumping rope, and locomotor skills. Basic educational concepts from the components of physical fitness were incorporated, including comparing heart rate before and after activity and distinguishing between muscular strength and endurance. Each session concluded with journal questions reflective of the day’s concepts and activities.

RESULTS: Students improved in all four FitnessGram components (Δ-0.86±2.74 to 5.70±7.76 mg/dL/kg/min, p = 0.77 to 0.38). In detail, immersive VR resulted in significantly higher steps than non-immersive VR, and traditional stationary biking sessions. Immersive VR, and traditional stationary biking sessions.

CONCLUSIONS: Men and women showed a similar response in PPG following moderate intensity stairclimbing of various durations.

3084 Board #130
May 31 3:30 PM - 5:00 PM
Club Fit!: A Physical Activity, Education, and Mentoring Service Learning Program
Erika Kenley, Christine Galvan. California State University, Long Beach, CA. E-mail: email@kenley@gmail.com (No relevant relationships reported)

INTRO: In the United States, obesity affects about 12.7 million children and adolescents, with minority and low-income populations at an increased risk. Development of a positive association and regular engagement in physical activity at a young age promotes the transition of these habits into adulthood. School-based physical activity programs benefit communities as well as students and schools. The implementation of a physical activity based service learning program provides a mutually beneficial partnership between pre-service teachers and the elementary students. PURPOSE: The purpose of this study was to determine the effect of a 9-week fitness intervention and education program for under-served 5th grade students. METHODS: Club Fit! consists of a 9-week program with bi-weekly 60-minute exercise sessions. Physical Education Teacher Education pre-service teachers (n=21) served as mentors to 5th grade students (n=35) enrolled at a local elementary school. The pre-service teacher/mentor to student/mentee ratio was 1:1 - 1:2. Pre-service teachers alternated leading lessons focused on health and skill-related physical fitness components, such as paddle tennis, yoga, jumping rope, and locomotor skills. Basic educational concepts from the components of physical fitness were incorporated, including comparing heart rate before and after activity and distinguishing between muscular strength and endurance. Each session concluded with journal questions reflective of the day’s concepts and activities. Prior to the program, pre-service teachers attended leading lessons focused on health and skill-related physical fitness components, such as paddle tennis, yoga, jumping rope, and locomotor skills. Basic educational concepts from the components of physical fitness were incorporated, including comparing heart rate before and after activity and distinguishing between muscular strength and endurance. Each session concluded with journal questions reflective of the day’s concepts and activities.

RESULTS: Students improved in all four FitnessGram components (Δ-0.86±2.74 to 5.70±7.76 mg/dL/kg/min, p = 0.77 to 0.38). In detail, immersive VR resulted in significantly higher steps than non-immersive VR, and traditional stationary biking sessions. Immersive VR, and traditional stationary biking sessions.

CONCLUSIONS: Men and women showed a similar response in PPG following moderate intensity stairclimbing of various durations.

3085 Board #131
May 31 3:30 PM - 5:00 PM
The Effect of Multimodal Training on Mobility in MCI Patients: A Pilot Randomized Controlled Trial
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Due a growing number of new cases of dementia and the lack of pharmacological treatment for prevention of dementia, the study of non-pharmacological interventions becomes more necessary. Although Mild Cognitive Impairments (MCI) patients begin to show mobility decreases, especially in dual-task (DT), some studies have been used as interventions to combat worker distress and productivity. The sit-to-stand (STS) workstation is another tool aimed at improving workers’ focus and productivity. PURPOSE: Therefore, the purpose of this study is to evaluate the efficacy of a STS workstation on work productivity. METHODS: All participants were volunteer faculty and staff of the University of Central Oklahoma randomly assigned to a control (n=10) or STS workstation intervention (n=8) group. Both groups filled out the Health, and Work Performance Questionnaire at the base-line, 6-month, and 12-month mark of the study to measure productivity. Absolute productivity is a subjective measure of an employee’s work output. Relative productivity is a subjective comparison of the employee’s work output to another employee in a similar position. The control group was instructed to continue their day normal while the intervention group was instructed to stand at least 2 hours per work day, if possible. RESULTS: There was no interaction effect for absolute productivity (F1,18 = 9.11, p = .004) from baseline to 12 months with a moderate effect size (0.68). However, a decrease was seen in the control group from baseline (85 +/- 7.87) to post-test (73.08 +/- 28.07) with a strong effect size (1.69), while the STS workstation group increased from baseline (86.25 +/- 38) to post-test (88.75 +/- 8.35). Relative productivity showed no interaction effect as well (F1,18 = .89, p = .44) from baseline to 12 months. The control group saw a decrease from start (1.09 +/- .17) to finish (1.07 +/- .10) while the intervention group saw an increase from start (1.10 +/- .12) to finish (1.19 +/- .26). CONCLUSIONS: Overall, the STS workstation did not show a significant increase in work productivity compared to the control group. However, a positive trend was seen in the intervention group towards perceived greater work production. ACKNOWLEDGEMENTS: This study was funded by the University of Central Oklahoma, Research and Sponsored Programs office and Areawide Aging Agency.

3087 Board #133
May 31 3:30 PM - 5:00 PM
College Students’ Acute Sedentary Behavior, Step Counts, and Situational Interest during Virtual Reality
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PURPOSE: This study examined differences in college students' acute sedentary behavior, steps, and situational interest during immersive virtual reality (VR), non-immersive VR, and traditional stationary biking sessions.

METHODS: Forty-nine college students (34 females; X̅ age = 23.6 ± 3.4 years; X̅ BMI = 23.8 ± 3.1 kg/m2) were randomly assigned to complete three separate biking sessions: 1) immersive VR bike (NirV р Zoom VR bike, PlayStation 4), 2) non-immersive VR bike (Gameercize bike, Xbox One), and 3) traditional stationary bike (Solofit XR55 bike). Participants’ percentage of sedentary time (%ST) and steps were tracked using Actigraph GT3X+ accelerometers, with situational interest examined using the validated Situational Interest Scale. One-way MANOVA examined differences for all outcomes between the three exercise sessions.

RESULTS: Significant differences were observed for all outcomes between the three exercise sessions, F(1, 135) = 67.9-277.2, p < 0.01, η² = 0.42-0.79, except for %ST (p > 0.05). In detail, immersive VR resulted in significantly higher steps than non-immersive VR and traditional biking, respectively, (F(2, 132) = 432.4, 1412.7 < 193.5, 1546.4 < 288.0). Moreover, participants reported significantly higher situational interest.
interest during immersive VR (3.5 ± 0.4) than non-immersive VR (2.1 ± 0.5) and traditional biking (1.7 ± 0.4). Specifically, immersive VR compared to non-immersive VR and traditional biking, respectively, observed significantly greater novelty (3.7 ± 0.4; 2.2 ± 0.7; 1.3 ± 0.4), challenge (3.7 ± 0.4; 2.9 ± 0.6; 2.3 ± 0.7), attentional demand (3.2 ± 0.6; 1.5 ± 0.7; 1.5 ± 0.5), exploration intention (3.7 ± 0.5; 2.3 ± 0.5; 1.9 ± 0.6), and instant enjoyment (3.1 ± 0.6; 2.2 ± 0.7; 1.3 ± 0.4). Noteworthy, non-immersive VR was observed to be significantly higher than traditional biking in all 5 subscales of situational interest as well.

**DISCUSSION:** Observations suggested immersive VR biking to promote greater steps and situational interest over non-immersive VR and traditional biking, with non-immersive VR observed superior to traditional biking for situational interest, suggesting VR biking may be an attractive exercise modality in this population. Future experimental designs assessing these outcomes are warranted.

**3088 Board #134**
May 31 3:30 PM - 5:00 PM
**Effects of Resistance Training on Physical Fitness and Arterial Compliance in Normotensive Obese Women**
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(No relevant relationships reported)

**Purpose:** The purpose of this study was to determine the short-term effects of resistance training (RT) on arterial compliance and physical fitness in obese women with normal blood pressure.

**Methods:** A total of 16 participants (10 control/6 intervention) were included in the analyses (age: 23.5±4.1 years; body mass index: 33.6±2.9 kg/m²). Pre- and post-intervention assessments included cardiorespiratory tests, arterial stiffness assessments, and leg press (LP) and bench press (BP) one repetition maximum tests (1RM). Trainings consisted of seven strength exercises performed at an intensity of 80% 1RM until 550 rep bench press (BP) and 1RM for LP and BP in the RT group after the intervention (20.5±5.2 kg and 6.1±4.54 kg respectively), but not in the control group (2.26±1.86 kg and 0.58±2.26 kg respectively). There were no statistically significant changes found for arterial compliance.

**Conclusions:**
Short-term high intensity RT had positive effects on muscle strength in obese women with normal blood pressure with no negative effects on arterial compliance.

**3089 Board #135**
May 31 3:30 PM - 5:00 PM
**Weekly Activity Maintained While Adding Training Among Post Bariatric and Obese Participants**
David L. Wechs1, Kristen Byrne1, Brittany Rood1, Elizabeth Edwards1, Jeremy Berkery1, Trent Hargens1, FACSM, James Madison University, Harrisonburg, VA

(No relevant relationships reported)

It is suggested that a barrier to weight loss during exercise training is associated with increased compensatory sedentary activity (CSA). While studies report a positive association between physical activity and improved weight loss in post bariatric (PB) and obese individuals, the effectiveness for the different types of physical activity interventions and CSA reported is often equivocal. **Purpose:** To evaluate if vigorous or moderate continuous exercise regimens maintain or increase energy expenditure of individuals during exercise training. **Methods:** Eight PB participants [7 female, 1 male; Body Mass Index (BMI) = 34.95 ± 7.6] and ten obese individual [7 female, 3 male; BMI = 38.99 ± 6.5] participated in a supervised 12 week three days per week treadmill exercise training program. The PB high intensity group exercised at 80% of their age adjusted heart rate reserve (HRR) for 4 minute intervals interspersed with 4 minute recovery periods at 50% of the HRR for weeks 3 through 6. Exercise was increased to 6 minute bouts at the same HRR intensity and recovery time for weeks 7 through 12. The obese continuous moderate intensity group exercised for 20 minutes at 60% HRR for weeks 3 through 6 and 20 minutes at 65% HRR for weeks 7 through 12. Both exercise interventions included a 2-week run-in to avoid injuries. Energy expenditure (MET-hrs) was measured using micro activPALs for the pre-exercise week and weeks 3, 9 and 12. **Results:** Overall, there were no significant differences between groups for any MET-hrs. MET-hrs increased (p < .05) from the first week (2.11 ± 4.96) during the intervention (week 3: 2.21 ± 8.01; week 9: 218.22 ± 11.19), and remained elevated post-intervention (week 12: 216.35 ± 7.5). Post-intervention MET-hrs had decreased from week 3, but were not significantly different from week 9 MET-hrs. There was 85% confidence for all training sessions for both groups. **Conclusion:** Post Bariatric surgery patients increased METs from vigorous intensity exercise intervention similar to obese individuals in moderate continuous exercise training. Although METs for week 12 declined for both groups, it remained above baseline and appears there was no evidence of CSA for either group.

**Supported by Sentara RMH Hospital and CHBS**

**3090 Board #136**
May 31 3:30 PM - 5:00 PM
**Efficacy of a Virtual Reality Fitness Program for Enhancing Muscular Fitness and Body Composition**
Kenneth Delcastillo1, Andrew Alto1, Ramon Belliard1, Brad Schoenfeld1, Lehman College, Bronx, NY

(Reported Relationships: K. Delcastillo: Industry contracted research; The study was funded by an industry grant)

**PURPOSE:** The purpose of this study was to compare the effects of a time-efficient virtual reality (VR) training system versus a traditional exercise (TE) program on measures of muscular fitness, body composition, and enjoyment.

**METHODS:** Nineteen untrained young men (height: 175.8 ± 4.2 cm; weight: 81.9 ± 15.8; age: 23.3 ± 3.9) were randomly assigned to 1 of 2 experimental groups: A virtual reality (VR) protocol consisting of a computer-guided exercise-based program using a cable pulley resistance that took a half hour to complete (n = 10); or, a traditional exercise (TE) protocol, consisting of a combination of resistance training and cardiorespiratory training that took 1.5 hours to complete (n = 9). The training intervention lasted 8 weeks. Testing was carried out pre- and post-study for changes in measures of maximal muscle strength (1 repetition maximum [1RM] for the bench press and leg press), upper body muscular endurance (50% of 1RM for the bench press), and body composition (fat free mass, skeletal muscle mass, and body fat percentage) assessed via multifrequency bioelectrical impedance analysis. The level of enjoyment of the respective exercise programs was assessed post-study using the modified 8-item Physical Activity Enjoyment Scale.

**RESULTS:**
Main effects for time were observed for 1RM bench press (F (1, 70) = 71.030; p < 0.001), 1RM leg press (F = 64.021; p < 0.001), upper body muscular endurance (F = 104.112; p < 0.001), and skeletal muscle mass (F = 239.256; p < 0.001). No main effects for time were noted with respect to changes in body fat in either group. A time-group interaction was observed for tests of 1RM leg press (p = 0.004) and upper body muscular endurance (p = 0.033), with TE showing significantly greater increases compared to VR. No between-group differences were noted for any other outcome variable.

**CONCLUSIONS:** Despite greater improvements in some performance-related measures for TE, our findings suggest that the specific VR program studied is a viable strategy to improve muscular fitness and lean mass while requiring a limited time commitment in a young, untrained population. Moreover, participants in VR reported a high level of enjoyment with the program, which may help to foster long-term adherence.

**3091 Board #137**
May 31 3:30 PM - 5:00 PM
**Student Engagement in Classroom Physical Activity Breaks**
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(No relevant relationships reported)

**Purpose:** Students are sedentary for approximately 92% of the day. Classroom physical activity (PA) breaks are known to decrease sedentary behavior (SB). However, little consideration has been given to the environmental and behavioral factors influencing how students engage in classroom PA breaks. Therefore the purpose of this study was to understand how perceived classroom climate and sedentary behavior impact students’ total moderate to vigorous physical activity (MVPA).

**METHODS:** Students (n=112) housed in 1st and 2nd grade classrooms across two school districts participated in a one-day study protocol using a classroom climate survey and accelerometers to investigate student engagement in a five minute classroom PA break. Descriptive statistics, bivariate correlation analyses between variables and mediation analyses using linear regression were conducted to explore direct and indirect effects.

**Correlations**
Over half of the students were females (56.3%) and second graders (51.8%). Correlations were found between perceived classroom climate to sedentary behavior (r = -0.31, p < .001) and total MVPA (r = -0.34, p < .001). Sedentary behavior was negatively correlated with total MVPA (r = -0.71, p < .001). The mediation model explained 27% of the total MVPA variance (p < .001). Perceived classroom climate had a direct effect on sedentary behavior (B = -0.04, SE = .01, t = -3.09, p < .05).

**Results:**
Sedentary behavior had a direct effect on total MVPA (B = -0.09, p < .05) but did have significant indirect effect through sedentary behavior (indirect effect = .02, bootstrap SE = .007, 95% bootstrap CI = -.005, .030), meaning that a participant who scores 1 point higher on perceived classroom climate to sedentary behavior (indirect effect = .02, bootstrap SE = .007, 95% bootstrap CI = -.005, .030), meaning that a participant who scores 1 point higher on perceived classroom climate to sedentary behavior (indirect effect = .02, bootstrap SE = .007, 95% bootstrap CI = -.005, .030).
Purpose: Lagree Fitness exercise offers high-intensity, low impact workouts that combine resistance, endurance, core, and cardio training. These classes are offered as alternatives to traditional weight bearing resistance training; however, it is unknown whether this training method has osteogenic effects on bone similar to traditional resistance training. To provide such insight, we assessed changes in bone after six months of the high-intensity training using the Lagree Fitness Megaformer in men and women.

Methods: 31 healthy participants began a 6 month, 3x per week, 25 minute group lead, Lagree Fitness training course on the Megaformer. The data from 19 women and 4 men (45.1 ± 20.9 years of age), weight (150.5 ± 41.5 lb), height (66.5 ± 6.5 in) were analyzed; eight participants did not complete the course and were excluded from data analysis. All participants completed a lumbar spine, bilateral hip, and total body scan on a GE Lunar iDXA dual-energy x-ray absorptiometer at baseline and within 10 days of completing 72 training sessions.

Results: There were no significant osteogenic effects on lumbar spine bone mineral density (BMD) (P= .102), femoral neck BMD (P= .519), or total hip BMD (P=.481) in changes from baseline in total body BMD (P=.186), total arm BMD (P= .125) and total leg BMD (P= .111), there were apparent positive increases that may be promising and suggests the necessity for further data collection with a larger sample. There were similar positive effects on total arm BMC (P= .292) with statistically significant increases in total leg BMC (P< .035). The increase from baseline of total arm lean mass (LM) (P< .009) was significant, and increases in total body LM (P= .069) approximated significance. Change in total leg LM (P= .382) was not significant.

Conclusion: In the absence of weight bearing exercise, high-intensity exercise on the Lagree Fitness Megaformer provided significant total in leg BMC, and promising increases in BMC and BMD across other body regions. However, there were no significant osteogenic effects on the hips and lumbar spine typically of importance in osteopenic populations.

3093
Board #139
May 31 3:30 PM - 5:00 PM
Physical Activity Breaks in the College Classroom: Student Engagement Factors
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Most college classes require long periods of sedentary behavior and attention demanding tasks. College students, as emerging adults, are moving through a key developmental stage, in which it is critical to instill lifelong health behaviors. Physical activity breaks (PABs) in college settings are novel, but have been shown to be potentially beneficial regarding concentration and academic performance (Babkes Stellino, et al., 2017). PURPOSE: To explore college students’ barriers to, and reasons for, engagement in PABs intervention. METHODS: College students were invited to participate in video-led or live instructor-led PABs consisting of cardio-strength based exercises or yoga during a 6-8 week summer college course. Students were asked to write out the reason(s) they chose to engage in the PAB, or not, each day a PAB was offered. At the end of the 6-week course, students also completed an open-ended survey intended to understand their overall reasons for engagement, and barriers to participation in PABs. Basic thematic analysis was conducted to explore why students chose to engage in PABs or chose to opt out. RESULTS: Common reasons reported for engaging in PABs were enjoyment, needing a break from lecture, and contributing to the research. Enjoyment levels were higher when various modes of PABs were offered. Students mentioned a greater personal connection, and a desire to put forth more effort when a live instructor led the activity, particularly for yoga PABs. PABs were viewed as a break from class, and considered a valid exercise bout for some students. This was motivating for some students, but reported as a limitation for others who had already exercised or were going to exercise later that day. Not feeling well, being unprepared or just not wanting to participate, were reported as the main barriers to engagement in the PABs. CONCLUSION: It is important to understand what motivates college students to engage, or not, in PABs, in order to better tailor future programs that will appeal to a greater majority of students. Findings will contribute to the continued exploration of the benefits that PABs can have for college students in the classroom.

3094
Board #140
May 31 3:30 PM - 5:00 PM
Effects Of Exercise Intensity Provided In The Exercise Classes On The Establishing Exercise Habits
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We provided Japanese adult women who have not been having exercising regularly habits and through an exercise intervention (group exercise class like a fitness sports club) succeeded in establishing exercise habits. We considered that providing vigorous intensity exercise, presence or absence of a goal setting, and social support might be effective in establishing exercise habits. In particular, there are indications that low exercise intensity is preferable for establishing exercise habits. However, success experiences of difficult (vigorous intensity) exercise enhance confidence, which may contribute to establishing exercise habits in Japanese adult women.

PURPOSE: To examine the effects of differences in exercise intensity provided in the exercise classes on the establishing exercise habits and changing in self-efficacy of exercise and health-literacy related to behavioral change such as health and exercise habits.

METHODS: We recruited 27 participants (volunteers) in this intervention (exercise classes). Participants were 20-64-year-old healthy Japanese women who have not been having exercising regularly habits, confidence in physical fitness, and athletic ability. They separated randomly moderate- to vigorous-intensity (2-8 METs) exercise class (MV group, n=14) and low- to moderate-intensity (2-4 METs) exercise class (LM group, n=13). We instructed 90 min/session some exercises 24 sessions (twice a week for 3 months) and lectured about association with health and physical activity (exercise) for both groups.

RESULTS: There were 4 participants (28.6%) in MV group and 5 participants (38.5%) in LM group who dropped-out. The establishing exercise habits after the 1-yr from the end of intervention were not significantly different between two groups (20% vs 50%). Self-efficacy (11.8 ± 2.5 → 11.5 ± 3.4 points, 8.8 ± 3.5 → 9.4 ± 2.7 points) and health-literacy (18.3 ± 2.9 → 18.5 ± 2.1 points, 16.5 ± 4.0 → 17.0 ± 5.1 points) did not significantly different from baseline and differ significantly interaction between the two groups.

CONCLUSION: It was concluded that exercise intensity contributed little to increasing self-efficacy, health-literacy and establishing exercise habit. It may be important to definite goal setting (goal contents) or social support to improve them.

3095
Board #141
May 31 3:30 PM - 5:00 PM
Accuracy Of Dual Task To Distinguish Elderly With Alzheimer’s From Healthy Controls
Juliana L. Araujo, Jessica Plácido, José Vinicius Ferreira, Feriade Oliveira, Renato Sobral Monteiro-Júnior, Jerson Laks, Andrea C. Deslandes. UFRJ, Rio de Janeiro, Brazil.

Alzheimer’s disease (AD) is the most prevalent dementia in the world. Indeed, the expectation is that this number will triple in the coming decades. Clearly, accessible interventions to prevent and treat the disease have been crucial, as well as, identify preclinical individuals. Despite clinical diagnosis are still focused on episodic memory deficits as the gold standard for AD, some studies suggest that because of the damages caused by the disease in prefrontal and temporal areas, along with, impairment in executive function AD could also have a motor signature that could be access through gait and Dual task (DT) tests. the accuracy of these tests to distinguish healthy from AD elders.

PURPOSE: To verify the sensitivity and specificity of DT and DT cost to distinguish elderly with AD from healthy controls.

METHODS: We evaluated elderly adults over sixty years old, DT performance was measured by gait velocity (m/s), DT cost (DTC= (single task - dual task) / single task × 100)) and the number of evoked words (DTanimals). We also included Sit to Stand, 8 Foot up and go and STEP test to measure functional capacity. Cognitive functions were evaluated through MMSE, RAVLT and Trail (A and B). T test and Mann-Whitney test were used to compare the two groups. The sensitivity and specificity of the tests were explored through the ROC curve. RESULTS: The final sample consisted of 82 participants, being 39 healthy elderly and 43 diagnosed with AD. There was a significant difference between the Healthy and AD groups in all DT variables and MMSE; DT (p < 0.001), DT cost (p < 0.001), MMSE (p < 0.001). Moreover MMSE (area = 0.974; sensitivity = 82.1%; specificity = 96.8%; p < 0.001) showed better accuracy than DT (area = 0.901; sensitivity = 80.5%; specificity = 86.3%; p < 0.001) and DTC variables (area = 0.816; sensitivity = 82.7%; specificity = 76.3%; p < 0.001). The cut-off point of DT was 9.55.
CONCLUSIONS: DT analysis was able to differentiate AD from Healthy elderly with great accuracy and a moderate sensitivity and specificity. Performance in dual task should be more investigated as a possible motor biomarker of AD.

3096 Board #142
May 31 3:30 PM - 5:00 PM
Effects Of Bingocize® On Quality Of Life, Fall Risk, And Health Knowledge In Community-Dwelling Older Adults

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Quality of life (QOL) is an important aspect of overall well-being in older adults. QOL is associated with functional, physical, and psychological health; all of which can be improved with increased physical activity. A high fall risk is associated with low physical function and QOL. One in four older adults experiences a fall each year, making it necessary to focus public health interventions towards decreasing fall risk and improving QOL in older adults. Bingocize® is a health promotion program designed to promote health, health knowledge, physical activity, and social engagement among older adults. PURPOSE: The purpose of this study was to determine the effects of the new version of Bingocize® on QOL and fall risk in community-dwelling older adults (N=36; mean age 73.63 ± 6.97). METHODS: Participants were clustered and randomly assigned to (a) experimental (n=19; participating in Bingocize® program, which included the bingo game, exercise, and health education) or (b) control (n=17; only played bingo). Each group completed a 12-week intervention that consisted of two 45-60 minute sessions per week. Pre and post data assessments included the TUG, 30-second chair stand, 4-stage balance, handgrip strength, WHOQOL-BREF, PANAS, and a health knowledge quiz. A mixed design analysis of variance (ANOVA) was used to compare intervention effects. Associations were significant at p<0.05. RESULTS: There were no significant interactions for any of the variables, with the exception of positive affect (PA) (F(1,34) = 5.66, p = 0.02, power = 0.64) and handgrip strength (F(1,34) = 8.31, p = 0.007, power = 0.80). There was also a significant main effect for time for health knowledge. Post hoc analysis using independent samples t-tests were conducted on PA (t(33) = 2.39, p = 0.028, two-tailed) and handgrip strength (t(34) = 2.85, p = 0.007, two-tailed). CONCLUSION: Participating in the Bingocize® health promotion program can produce a meaningful and detectable change in handgrip strength and PA in community-dwelling older adults.

3097 Board #143
May 31 3:30 PM - 5:00 PM
Tailored Domain-Specific Sedentary Behavior Intervention on Reducing Sedentary Time

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PURPOSE: To continue the advancement of sedentary behavior intervention, it is important for researchers to design the intervention based on the theoretical model and contextual information of sedentary behavior. Therefore, the purpose of this study is to identify the feasibility of tailored domain-specific sedentary behavior intervention on reducing sedentary behavior time using contextual information of sedentary behavior. METHODS: A total of 43 adults (age ≥ 18) were participated in this study. A randomized controlled trial with a covariate adaptive randomization was used. Participants were randomly assigned to three groups: 1) tailored domain-specific intervention group; 2) standard intervention group; and 3) control group. Behavioral strategies to reduce sedentary behavior included educational meeting and materials, goal setting and feedback, and self-monitoring based on theoretical background for two intervention groups. Additionally, contextual information of sedentary behavior was given to tailored intervention group. Participants’ sedentary behavior time was measured at baseline, 1st and 2nd intervention week by accelerometers, and contextual information of their sedentary behavior was obtained from the Sedentary Behavior Record instrument. Two-way (Group × Time) repeated measures analysis of variance was conducted for comparison for changes in total time spent in sedentary behavior among the three groups.

RESULTS: Thirty-six out of 43 participants who wore the Actigraph during at least 10 hours per day for at least four days were included in this study. There was a significant interaction between group and time, F(3.9, 63.0) = 3.94, G - G p = .007, η2 = .193. Simple effect analysis results showed that sedentary behavior time at each time point were not significantly different for the control group, F(1.7, 18.90) = .48, G - G p = .597, η2 = .042, and the intervention group, F(1.8, 20.1) = 2.16, G - G p = .098, η2 = .108. The sedentary behavior time, however, differed among three times for tailored domain-specific intervention group, F(1.7, 18.8) = 14.00, G - G p < .001, η2 = .560.

CONCLUSIONS: The tailored domain-specific sedentary behavior intervention using contextual information of sedentary behavior was effective, reducing sedentary behavior time for adults.

3098 Board #144
May 31 3:30 PM - 5:00 PM
Stage Of Behavior Change In Regards Of Physical Activity, Health And Quality Of Life Among Health Professionals From Health Institutions

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(No relevant relationships reported)

PURPOSE: To analyze the factors associated to the stage of behavior change among professionals from health institutions. METHODS: The sample consisted of 1054 professionals (247 male and 807 female). The dependent variable was the irregularly active group of the behavioral stage questionnaire (proposed by Prochaska, 1988). The independent variables were: gender, physical activity, steps number, sleep, negative mood, presence of diseases, health perception, and quality of life. Statistical analysis: Binary Logistic Regression Odds Ratio (OR) and its respective 95% confidence intervals (CI) were used to associate the study variables. RESULTS: Factors associated with irregularly active behavior change were: gender, physical activity, sleep, negative mood, presence of disease, health perception and quality of life. On the other hand, steps number was not associated with the stage of irregularly active behavior change (see table below). CONCLUSION: The irregularly active group had a positive association with female sex, as well as a higher probability of belonging to groups that did not comply with the recommendation of physical activity, dissatisfaction with sleep, with a higher frequency of negative mood, with diseases, negative health perception and a low quality of life.

3099 Board #145
May 31 3:30 PM - 5:00 PM
The Effect of a Foot Exercise Protocol on Intrinsic Muscle Volume

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(No relevant relationships reported)

PURPOSE: The irregularly active group had a positive association with female sex, as well as a higher probability of belonging to groups that did not comply with the recommendation of physical activity, dissatisfaction with sleep, with a higher frequency of negative mood, with diseases, negative health perception and a low quality of life.

Musculoskeletal injuries of the foot may be partially attributed to weakness of the intrinsic muscles, which are crucial to foot stability during dynamic activities. Perhaps because of their small size, the potential for strengthening these muscles is highly under-appreciated. Therefore, treatment of foot problems is often focused on externally supporting the foot rather than strengthening it. PURPOSE: To determine the effect of a foot exercise intervention on the volume of plantar intrinsic foot muscles. METHODS: 34 recreational runners were randomly assigned to either a Control (CON) or Foot Strengthening (FS) group. The CON group was assigned to a placebo lower limb stretching protocol while the FS group performed a foot exercise protocol for 8 weeks. Running mileage and training pace were controlled weekly throughout the study for both groups. The right foot of all subjects was imaged using MRI at baseline (T0), as well as at week 8 (T8). Cross-sectional areas (CSA) of the whole length of the Abductor Hallucis (AbH), Abductor Digiti Minimi (AbDM), Flexor Hallucis Brevis (FHB), and Flexor Digitorum Brevis (FDB) were measured by a researcher blinded to both group assignment and time (T0 or T8) The Intraclass Correlation values for repeatedly measuring CSA for this tester was ICC=.97 (0.96-0.98). RESULTS: There was a significant difference in CSA for AbH and CSA for all muscles measured for the FS group between T0 and T8 (p<0.05). Muscle volume in the FS group increased.
by 22.4\% for the ABH, 17.1\% for AbDM, 17.7\% for FHB, and 8.8\% for FDB. No changes were noted in the CON group. CONCLUSION: The foot exercise protocol significantly increased the volume of intrinsic foot muscles in a healthy and physically active population of recreational runners. This study was financed in part by the Coordenação de Aperfeiçoamento de Pessoal de Nível Superior - Brasil (CAPES) - Finance Code 001, FAPESP 2015/14810-0.

3100  Board #146  May 31 3:30 PM - 5:00 PM  The Effect Of Exercise Training And Increasing Non-exercise Physical Activity On Glyca Levels
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Purpose: Aerobic training has been shown to have a beneficial effect on GlycA, which is a marker of inflammation. However, it has not been previously reported if an intervention with aerobic training and increasing non-exercise physical activity can reduce inflammation levels in obese adults measured by GlycA. Changes in GlycA were noted in the CON group. CONCLUSION: The foot exercise protocol significantly increased the volume of intrinsic foot muscles in a healthy and physically active population of recreational runners. This study was financed in part by the Coordenação de Aperfeiçoamento de Pessoal de Nível Superior - Brasil (CAPES) - Finance Code 001, FAPESP 2015/14810-0.

3102  Board #148  May 31 3:30 PM - 5:00 PM  The Impact Of A Workplace Wellness Program On Employees In A University Setting
Bhhiba M. Das, Thomas M. Halloran, Charles D. Kemble, Melanie Sartore-Baldwin, Katrina D. Dubose, FACSM. East Carolina University, Greenville, NC. Architech Sports & Physical Therapy, Charlotte, NC. (Sponsor: Katrina D. Dubose, FACSM)
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Purpose: To evaluate the effectiveness of an educational wellness intervention on overall well-being based on the eight dimensions of wellness in university faculty and staff. METHODS: Employees (N = 12, 72.7\% female; 81.8\% white) underwent an 8-week intervention called the Employee Wellness Institute. Employees met with mild to moderate PD were randomized into a 12-week strength or power training program (2 times per week). Measures of muscular strength (1RM), peak power (PP_ad), balance (Berg balance assessment, dynamic posturography, modified falls efficacy scale), and functional movement (timed up-and-go) were assessed before and after training. RESULTS: No significant group effect was found. Significant increases in leg press (MD = 54.89 kg ± 7.41; ηp² = .749; p < .0001) and chest press (MD = 7.33 kg ± 3.46; ηp² = .518; p < .0001) strength, as well as in leg press (MD = 106.89 W ± 24.73; ηp² = .358; p < .0001) and chest press power output (MD = 52.12 W ± 13.51; ηp² = .298; p < .0001) were seen for the entire sample. There was also a significant decrease in Berg scores for the sample (MD = -1.68 ± .551; ηp² = .192; p = .009). No other differences were detected across the training period. CONCLUSION: Strength and power training produced similar improvements in measures of strength and power in individuals diagnosed with PD. Although Berg scores decreased significantly following training, these declines were not considered clinically significant. We postulate that the lack of improvement in balance and functional movement scores for either intervention may be due to the failure to include movement-specific drills in the training protocol. Future research should continue to examine the differential effects produced by strength and power training in PD patients and should include a functional training phase designed to elicit improvements in balance and daily function.

The Affordable Care Act of 2010 contained incentives for worksites to develop workplace wellness programs and employee wellness programs, which have shown positive outcomes to companies in various dimensions of wellness. Historically, studies have examined one dimension of wellness and typically within a corporate setting. PURPOSE: To evaluate the effectiveness of an educational wellness intervention on overall well-being based on the eight dimensions of wellness in university faculty and staff. METHODS: Employees (N = 12, 72.7\% female; 81.8\% white) underwent an 8-week intervention called the Employee Wellness Institute. Employees met with mild to moderate PD were randomized into a 12-week strength or power training program (2 times per week). Measures of muscular strength (1RM), peak power (PP_ad), balance (Berg balance assessment, dynamic posturography, modified falls efficacy scale), and functional movement (timed up-and-go) were assessed before and after training. RESULTS: No significant group effect was found. Significant increases in leg press (MD = 54.89 kg ± 7.41; ηp² = .749; p < .0001) and chest press (MD = 7.33 kg ± 3.46; ηp² = .518; p < .0001) strength, as well as in leg press (MD = 106.89 W ± 24.73; ηp² = .358; p < .0001) and chest press power output (MD = 52.12 W ± 13.51; ηp² = .298; p < .0001) were seen for the entire sample. There was also a significant decrease in Berg scores for the sample (MD = -1.68 ± .551; ηp² = .192; p = .009). No other differences were detected across the training period. CONCLUSION: Strength and power training produced similar improvements in measures of strength and power in individuals diagnosed with PD. Although Berg scores decreased significantly following training, these declines were not considered clinically significant. We postulate that the lack of improvement in balance and functional movement scores for either intervention may be due to the failure to include movement-specific drills in the training protocol. Future research should continue to examine the differential effects produced by strength and power training in PD patients and should include a functional training phase designed to elicit improvements in balance and daily function.

The Impact Of A Workplace Wellness Program On Employees In A University Setting
Bhhiba M. Das, Thomas M. Halloran, Charles D. Kemble, Melanie Sartore-Baldwin, Katrina D. Dubose, FACSM. East Carolina University, Greenville, NC. (Sponsor: Katrina D. Dubose, FACSM)
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(No relevant relationships reported)
Both cardiorespiratory and muscular fitness are important for overall health and may benefit academic related outcomes in children. However, few intervention studies have examined the impact of an intervention that has emphasized both components on academic or cognitive outcomes. Furthermore, school recess may be an ideal time to promote physical activity and fitness and has been a relatively understudied setting in relation to these outcomes. PURPOSE: To evaluate the preliminary efficacy of a 3-month recess-based combined fitness intervention (INT; consisting of both aerobic and muscular fitness activities) on cognition (inhibition and working memory), classroom behaviors (engaged and off-task behaviors), fitness (cardiorespiratory and muscular), and moderate to vigorous physical activity (MVPA) in elementary school-age children. METHODS: Schools (n=2) were randomized to either the INT (n=27, sex: 66.7% male, age: 8.8±0.1years) or control group (CON; n=27, sex: 42.3% male, age: 9.4±0.1 years). Baseline and post-intervention measures included a flanker test (inhibition), list sorting test (working memory), classroom behavior observation (on- and off-task behaviors), cardiorespiratory fitness (maximal aerobic capacity), muscular fitness (bicycle fitness battery (muscular fitness), and accelerometry (MVPA). Process evaluation measures were recorded daily, weekly, and post-intervention. ANCOVA models were adjusted for baseline score, age, and other covariates. An independent samples t-test was used to compare percent of time spent in MVPA during recess between schools. RESULTS: Percent of time spent in MVPA during recess was significantly higher in the INT compared to the CON group (INT=41.7±2.1%; CON=30.4±0.2; p=0.001). No other significant differences were observed. Although participant enjoyment and INT acceptability was high, the average participation in INT sessions was 19.4% (ranging from 0 to 95.6%). CONCLUSION: This pilot study demonstrated some preliminary support that offering a combined fitness program is feasible and can increase percent of time spent in MVPA during recess. Future research is warranted to determine if the INT can impact academic or cognitive outcomes. Supported by: University of Massachusetts Amherst Graduate School Dissertations and Research Grants.

F-57 Free Communication/Poster - Maternal and Child Health

3104 Board #150 May 31 2:00 PM - 3:30 PM The Associations between Maternal Body Mass Measures and Macronutrient Intake on Insulin Sensitivity Measures during Late Pregnancy

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PURPOSE: To determine associations between maternal body mass measures (body mass index [BMI], gestational weight gain [GWG]) and macronutrient intake (protein, carbohydrate [CHO], fat) on insulin sensitivity (IS) and fasting glucose (GLU) in late pregnancy in normal weight (NW, n = 87), overweight (OW, n = 67) and obese (OB, n = 31) women.

METHODS: Participants were recruited early in pregnancy (<10 wk). A 100-gram oral glucose tolerance test (OGTT) was done following an overnight fast at 30 wks to calculate the metabolic clearance rate of glucose (MCR, mg kg⁻¹ min⁻¹), Dietary intake of animal (AP) and plant (PP) protein (g kg⁻¹ d⁻¹), fat (g) and CHO (g) were estimated using 3-d food records. Correlations between GLU and MCR with AP, PP, fiber, fat, CHO, GWG, and early pregnancy BMI were assessed using Pearson correlations. Multiple linear regression was used to model MCR and GLU with the independent variables. Data are mean ± SD.

RESULTS: MCR (NW: 10.1 ± 1.8; OW: 8.3 ± 1.1; OB: 6.7 ± 1.0 mg kg⁻¹ min⁻¹, p < 0.0001) and PP (NW: 0.39 ± 0.12; OW: 0.32 ± 0.09; OB: 0.27 ± 0.09 mg kg⁻¹ min⁻¹, p<0.0001) differed between groups. Fastling GLU was higher in OW compared to NW (NW: 7.9 ± 6.3; OW: 8.3 ± 7.6 mg/dl, p=0.008), and AP was lower in OB compared to NW groups (NW: 0.67 ± 0.25; OB: 0.52 ± 0.18 g, p=0.004). CHO intake was higher in NW vs. OB (p=0.05). MCR correlated with AP (r=0.21, p=0.047) and BMI (r=0.062, p<0.001) in NW, and with fat (r=0.39, p=0.001) and BMI (r=0.58, p<0.0001) in OW. GLU correlated with BMI (r = 0.37, p = 0.001) in NW, with fat (r = −0.29, p = 0.025) and BMI (r = 0.53, p = 0.016) in OW, and with PP (r = 0.41, p < 0.035) in OB. Most parsimonious models in OW: fat (β = −0.02, p = 0.001) and BMI (β = 0.41, p < 0.0001) were associated with MCR; and PP (β = −0.36, p < 0.008) and fat (β = 0.14, p = 0.002) associated with GLU. In OB, PP (β = 0.8, p = 0.011) and fat (β = −0.02, p = 0.005) were independently associated with MCR; and PP (β = 0.44, p < 0.003) and CHO (β = 0.0, p = 0.043) associated with GLU.

CONCLUSIONS: Higher fat intake and BMI, and low PP intake in OW pregnant women is associated with lower IS. Higher fat and CHO intake, and low PP intake in OB pregnant women is associated with decreased IS. Thus, to improve insulin regulation and glucose metabolism, OW and OB pregnant women may benefit from increasing PP intake and ensure optimal macronutrient intake.
Pregnant women had complete metabolic data. Prenatal exercise exhibited no effect on glucose or lipid profiles at 36 weeks (glucose: p=0.48; TC: p=0.29; TG: p=0.48; HDL: p=0.25; LDL: p=0.79; LT: p=0.96) or their change between the 2nd and 3rd trimesters (glucose: p=0.45; TC: p=0.87; TG: p=0.31; HDL: p=0.65; LDL: p=0.81; LT: p=0.37). Similarly, no effects were found for exercise modes at 36 weeks (glucose: p=0.76; TC: p=0.41; TG: p=0.24; LDL: p=0.49; LT: p=0.69) or across pregnancy (glucose: p=0.83; TC: p=0.40; TG: p=0.32; LDL: p=0.66; LT: p=0.70), with the exception of HDL at 36 weeks. CT mothers exhibited lower LDL levels compared to controls (p=0.04).

CONCLUSIONS: In healthy pregnancies, prenatal exercise and various modes of exercise do not appear to positively nor negatively affect maternal metabolism. Further research should include larger samples and more rigorous assessments of glucose and lipid metabolism (e.g., HbA1C, HOMA-IR, CRP).

PURPOSE: Physical activity (PA) during pregnancy is safe and effective for improving maternal and infant health; however, only 23% of pregnant women exercise in accordance with guidelines, and this number is likely even lower in rural Kentucky. The purpose of this study is to determine the impact of evidence-based educational materials and access to local resources on PA levels and knowledge/beliefs about PA during pregnancy. METHODS: Women were recruited from a rural obstetric clinic (8-12 weeks gestation). PA levels were assessed using a fitness tracker and the Pregnancy Physical Activity Questionnaire. Knowledge/beliefs about PA during pregnancy were assessed via surveys. Stage of readiness to exercise was assessed using the transtheoretical model. Participants were randomly assigned to an intervention (IG) or control group (CG). The IG received evidence-based educational information regarding PA during pregnancy and free access to six local fitness facilities. All baseline assessments were repeated during late pregnancy (32-39 weeks). To assess obstetric outcomes, a survey was emailed to each participant after delivery. RESULTS: 63 women enrolled in the study (age=29.7±4.9 years, pre-pregnancy BMI=26.2±6.3 kg/m², household income=$78,589, average step count in 1st trimester=7,108 steps), and 45 have completed the study (follow-ups are ongoing). There were no differences in baseline variables between groups. In the IG, 13 women utilized PA services (prenatal yoga: 8, gym: 2, both: 3). There was no difference between groups in PA (assessed via change in step counts from early to late pregnancy) (p=0.81). However, there was a trend for the IG to accumulate less sedentary time compared to the CG during late pregnancy (p=0.12). There were no differences in knowledge (p=0.8) or beliefs (p=0.3) regarding PA during pregnancy between groups. The IG was at a later stage of the transtheoretical model than women in the CG during late pregnancy (p=0.04). CONCLUSION: The intervention was unsuccessful at significantly increasing PA levels and knowledge/beliefs. Yoga was the most commonly utilized activity among IG participants; however, being in the IG did not have a trend for the IG to accumulate less sedentary time compared to the CG during late pregnancy.

CONCLUSION: Recruitment of women in early pregnancy for a behavioral lifestyle intervention appears challenging, particularly among women with limited phone access.

Board #155
May 31 2:00 PM - 3:30 PM
Evidence-based Educational Brochures Influenced Beliefs And Improved Knowledge Regarding The Benefits Of Exercise During Pregnancy
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Purpose: Women who are pregnant report receiving little or no advice about physical activity during pregnancy from their provider. The purpose of this study was to assess the effectiveness of an evidence-based educational brochure on both immediate and 2-week retention of knowledge about exercise during pregnancy.

Methods: Thirty-two women of childbearing age (age: 25.1±4.0 years, body mass index: 29.5±6.5 kg/m²) completed a survey before exposure to an evidence-based educational brochure regarding exercise during pregnancy. Post surveys were taken immediately after viewing the educational brochure and again 2 weeks later.

Results: After exposure to educational brochures, survey scores on both surveys were significantly higher immediately-post and two-weeks post compared to baseline survey scores [Survey 1 (assessing beliefs) – pre: 79.2±18.9, post: 92.6±7.4%, 2-weeks post:92.0±6.5%, p < 0.001; Survey 2 (assessing knowledge) – pre: 65.3±16.4%, post: 81.3±14.9%, 2-weeks post:78.8±12.4%, p < 0.001]]. No significant differences detected between immediate post and 2-weeks post for either Survey 1 (p = 0.72) or Survey 2 (p = 0.52), suggesting the information was retained.

Conclusion: An evidence-based educational brochure is effective for improving and retaining information regarding exercise during pregnancy. Health care providers should consider providing patients with this information in order to improve knowledge and patient-provider communication on this topic.

Board #156
May 31 2:00 PM - 3:30 PM
Maternal Water Exercise And Its Effects On Weight Gain And Fetal Outcomes: A Meta-analysis
Robert Bieginski1, Taniya S. Nagpal1, Michelle F. Mottola1, FACSM. The University of Western Ontario, London, ON, Canada. (Sponsor: Michelle F. Mottola, FACSM)

Purpose: To conduct a systematic review and meta-analysis of randomized controlled trials to investigate the effects of prenatal water-based exercise on maternal weight gain and fetal outcomes. METHODS: Eligible trials were identified by a structured search of MEDLINE, EMBASE, ISI Web of Science, Scopus, and SportDiscuss up to October 2018. Data were retrieved comparing standard care with standard care plus prenatal water exercise (at least once a week) for at least one of the following outcomes: maternal weight gain, gestational age at delivery, and/or fetal birthweight. Study selection and data extraction were performed by two independent reviewers. Random-effects meta-analysis was conducted for mean difference between exercise and control groups (PROSPERO registration: CRD42016039473).

Results: Our search yielded 1846 publications of which 1562 were assessed for eligibility. In total, 9 studies were eligible and included in the meta-analysis. Pregnant
women who engaged in a water exercise program showed a significant difference in total maternal weight gain (5 RCTs, n=561, OR -1.00 [95% CI -1.55, -0.45], p=0.001) compared to standard care only. No significant effects on gestational age at delivery (8 RCTs, n=1442, OR 0.04 [95% CI -1.02, 1.10], p=0.94) and birthweight (8 RCTs, n=1427, OR -24.32 [95% CI -86.44, 37.80]) were found. CONCLUSION: Water exercise during pregnancy controls maternal weight gain without influencing the duration of pregnancy or baby weight. Health care providers can consider suggesting water-based exercises during pregnancy to promote appropriate weight gain.

Weight loss interventions have a positive “ripple effect” on untreated partners, but ripple effects in pregnancy are unknown. PURPOSE: To determine whether prenatal lifestyle interventions that reduced gestational weight gain in pregnant women had a positive “ripple” effect on untreated partner weight. METHODS: To determine whether prenatal lifestyle interventions that reduced gestational weight gain in pregnant women had a positive “ripple” effect on untreated partner weight. RESULTS: 122 partners (100% male, 23% Hispanic, 82% married, 82% married) were randomized to intervention (N=59) or usual care (N=63). There was no intervention or time interaction effect on partner weight (P = 0.7953). Partner weight trended to intervention (N=59) or usual care (N=63). There was no intervention or time interaction effect on partner weight (P = 0.7953). Partner weight trended higher, but weight changes were not statistically significant (P = 0.1204) from study entry to 35 weeks’ gestation (Mean 0.19 kg; 95% CI -0.73 to 1.24) or to 12 months postpartum (Mean 0.82 kg; 95% CI -0.84 to 1.12 kg). CONCLUSIONS: There was no evidence of a ripple effect on partner weight. Partner weight gain was 0.82 kg from pregnancy to 12-months postpartum. Partners of pregnant women appear not to experience sympathetic weight gain. Supported by National Institutes of Health Award Number R01HL118208.

Purpose: To evaluate the effectiveness of different exercise modalities in ameliorating cognitive and functional symptoms of AD. Seven specific inclusion criteria were developed to include studies which contained exercise programs designed to improve or maintain aerobic fitness, strength, ADL performance or any combination of thereof.

RESULTS: Fourteen studies, which included 769 patients diagnosed with AD who were 65 years of age or older met the inclusion criteria for the analysis. Calculations for Effect Size (ES) and Confidence Interval (CI) showed that exercise interventions had a moderate positive effect on cognitive function (ES=0.52; CI=0.15-0.89), and a large positive effect on performance of ADLs (ES=0.70; CI=0.19-1.33; p<0.001). Furthermore, interventions that included an aerobic component (Aerobic Training and Multimodal Training) positively influenced cognitive function, while interventions that included resistance and functional training (Resistance Training and Multimodal Training) improved performance in ADLs.

CONCLUSION: While a large variability was found in study design, intervention, duration, and assessment measures, exercise was usually shown to have positive effects on measures of decline in AD. Exercise programs should be incorporated in the management of AD patients. The choice of exercise modality should include both aerobic and strength-functional components to achieve maximum benefit in cognitive function and ADLs performance. Multimodal Training, which includes activities across the metabolic spectrum, shows the greatest promise as an exercise intervention in AD.

Purpose: to investigate the overall effects of HIIT and MICT on insulin resistance as well as subgroup analyses in i) population: healthy (H), overweight/obese (O), metabolic syndrome (MetS), type-2 diabetes (T2D); ii) age: < 30 y, 30-50 y, > 50 y; iii) training duration: < 5 wk, 5-10 wk, > 10 wk; iv) men ratio: < 0.4, 0.4-0.6, > 0.6; and v) type of exercise: cycling vs running. METHODS: randomized controlled trials were included. The standardized mean difference (Cohen’s d) was the outcome used, it was calculated with the random-effects model, applying the DerSimonian-Laird estimator for the between-study variance (τ²). Effect sizes (ES) and Confidence Interval (CI) showed that exercise interventions presented a medium ES (d = 0.53, p = 0.035), with a τ² = 0.05 and significant small-study effect (p = 0.01). The population subgroup had a large ES for O (d = 1.77, p = 0.02), trivial ES for H (p = 0.8), and MetS (p = 0.7), and small ES for T2D (p = 0.6). The age subgroup had a large ES for 30-50y (d = 0.87, p = 0.09), and trivial ES for < 30 y (p = 0.5) and > 50 y (p = 0.5). The training duration subgroup had a large ES for < 5 wk (d = 0.97, p = 0.05), trivial ES for 5-10 wk (p = 0.6), and small ES for > 10 wk (p = 0.6). The men ratio subgroup had a large ES for > 0.6 (d = 1.43, p = 0.03), and trivial ES for < 0.4 (p = 0.9) and 0.4-0.6 (p = 0.8). The type of exercise subgroup had a large ES for cycling (d = 0.83, p = 0.02) and trivial
ES for running (p = 0.5). CONCLUSIONS: despite a medium overall ES, the effects of HIIT and MCT on insulin resistance vary considerably. HIIT may be superior to MCT in improving cardiometabolic health in an overweight/obese population, men, and cycling exercise.

Board #163  May 31 2:00 PM - 3:30 PM
**Evidence for Kinesio Taping in Management of Myofascial Pain Syndrome: A Systematic Review and Meta-analysis**
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Myofascial pain syndrome (MPS) is one of the most common neuromuscular system diseases and is also easily misunderstood in pain clinic. And kinesio taping has been gradually used by physiotherapists or pain clinicians in the pain clinic as a clinical support treatment for MPS. However, no evidence-based medical data is available to support the advantageous effect of kinesio taping on MPS over other treatments at post-intervention and follow-up. PURPOSE: To evaluate the effectiveness of kinesio taping for managing MPS in terms of pain intensity, pressure pain threshold, range of motion (ROM), muscle strength and disability. METHODS: PubMed, EBI SICO, ScienceDirect, Web of Science, Cochrane Library and Physiotherapy Evidence Database were searched from database inception to January 2018. Randomised controlled trials (RCTs) that used kinesio taping as the main treatment protocol for participants diagnosed with MPS were included. Two reviewers independently screened articles, scored methodological quality by using Cochrane risk-of-bias tool and extracted data. The primary outcomes were pain intensity, pressure pain threshold and ROM at post-intervention and follow-up. The secondary outcomes were muscle strength and disability at post-intervention and follow-up. RESULTS: Meta-analyses of 15 RCTs involving 713 patients, showed that kinesio taping was more effective than other treatments in improving pain intensity (mean difference [MD] = 0.94 cm, 95% confidence interval [CI]: -0.32 cm, p=0.003) and ROM (standardised mean difference [SMD] = 0.32, 95% CI: 0.12 to 0.52, p=0.002) at post-intervention. Kinesio taping was also superior to other non-invasive techniques in relieving pain intensity at follow-up (MD = -0.68 cm, 95% CI: -1.22 cm to -0.13 cm, p=0.02). CONCLUSION: The latest evidence statistically supports the use of kinesio taping over other treatments for relieving the pain intensity and range of motion of patients with myofascial pain syndrome. Kinesio taping is also statistically superior to other non-invasive techniques in relieving pain intensity at follow-up. However, no significant superiority of kinesio taping was found in pressure pain threshold, muscle strength and disability.

Board #164  May 31 2:00 PM - 3:30 PM
**Sprint Interval Training or High-Intensity Interval Training to Improve VO2max In Sedentary Individuals? A Meta-analysis.**
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(No relevant relationships reported)

**PURPOSE:** To evaluate improvements in VO2max in sedentary adults aged 18-55 comparing sprint interval training (SIT) vs high intensity interval training (HIIT) vs continuous cardiovascular training (CCVT).

**METHODS:** A systematic literature search (key terms: HIIT, endurance, interval training, SIT, and VO2) was conducted of electronic databases (PubMed, Scopus, Sport Discus, Science Direct, Web of Science, Google Scholar) to ascertain appropriate studies. The inclusion properties for the studies were: sedentary individuals between the ages of 18-55 free of comorbidities other than being overweight or obese; included a continuous training group; completed a pre and post VO2max graded exercise test. These search criteria yielded 20 studies evaluating HIIT protocols totaling 527 subjects in the interval group and 214 subjects in the CCVT group. There were nine studies studying a SIT protocol with 111 total subjects in the interval group and 85 subjects in the CCVT group.

**RESULTS:** Statistics and effect sizes were calculated using G*Power software (Heinrich-Heine-Universität Düsseldorf) with a post-hoc two-tailed designed t-test with α error at .05. Training, regardless of type, increased VO2max. HIIT increased VO2max by 11.42%, whereas SIT increased it by 10.53%, followed by CCVT with an increase of 7.36%. Cohen’s d provided effect sizes comparing HIIT, SIT, and CCVT training groups. Both HIIT and SIT had large Cohen’s d effect sizes at 1.053 and 0.764, respectively, to a moderate effect size of 0.506 for the CCVT group.

**CONCLUSIONS:** Both HIIT and SIT are valid options for increasing the VO2max of sedentary individuals with a relatively small commitment time needed. This could have implications for participant adherence to the protocol. Both HIIT and SIT had a significantly positive effect on the participant’s VO2max as compared to the CCVT group. However, CCVT also improved their VO2max. Therefore, any sustained physical activity is beneficial for sedentary adults to improve VO2max.
Various interventions have combined aerobic exercise with strength, power or balance training and the direct effect on balance in older adults. The specific effect of aerobic exercise on balance is unclear. PURPOSE: The purpose of this study was to examine the effect of aerobic exercise on balance in older adults. METHODS: The systematic search was made on academic scientific bases: Academic Complete Search, ProQuest, PubMed, Science Direct and Sport Discuss, using the Boolean phrase: (aerobic exercise OR strength training) AND (adult* OR aging* OR senior* OR older adult*) AND (balance*) NO (diet or nutrition) NO (Animal) And random*. The inclusion criteria were: publications in English or Spanish, full text, older adult (people and women), people over 50 years, experimental and quasi-experimental studies, treatment focused on aerobic exercise and dynamic or static balance indistinctly of the type of test. We analyzed 4496 studies and only 11 investigations met the inclusion criteria, obtaining 56 effect sizes (TE) in 590 subjects. The moderator variables were age, sex, level of physical activity, health condition. N per study, duration of the session and exercise modality. RESULTS: The overall effect size for the experimental conditions was TE = 1.083, (p = 0.05) (95% CI: 0.63 - 1.53, Q: 679.07, p = 0.00, df = 99.55), the effect size of the control group was TE = 0.056, (p = 0.685) (95% CI: 0.14 - 25, Q = 11.48, p=0.009, F= 73.88). There were no differences in differences between the control groups of TE (n=16) and experimental group (n=40) (F = 2.73, p = 104). The Cochran’s Q for the experimental group presents values that indicate that the calculated effect size have high heterogeneity according to Borenstein, et al. (2009). In addition, the Egger test was applied and this gave the following data: t = 4.55, gl = 3.0; p = 0.000, * indicating that there is asymmetry; procedure that detected a publication bias. CONCLUSION: Aerobic exercise (AE) exerts a positive effect on the balance of older adults; therefore, AE training is a valid strategy to counteract the loss of balance in older adults.

The most frequently used rapid weight loss (RWL) methods in weight-sensitive sports were dehydration and decreased energy intake, with RWL accompanied by many adverse health effects. PURPOSE: To evaluate the effects of 7-day RWL intervention on body composition and biomarkers of creatine metabolism in eight elite judokas during a pre-competition period. METHODS: The participants voluntarily participated in this study. Strategy of weight loss included restriction of fluid and food intake, and started 7 days before competition. During the first six days, dietary changes included restricted intake of fluids and macronutrients (35% reduction in total caloric intake), followed by a total food restriction on the last day (a weigh-in day). RESULTS: RWL induced a significant drop in weight (81.7 ± 10.7 kg at baseline vs. 76.8 ± 10.3 kg at follow-up; P = 0.001), fat mass (12.6 ± 5.6 kg vs. 9.2 ± 4.0 kg; P = 0.003) and fat-free mass (69.1 ± 7.3 kg vs. 76.7 ± 7.7 kg; P = 0.05), accompanied by an increase in serum creatinine levels at follow up (104.0 ± 10.5 µmol/L vs. 114.9 ± 10.2 µmol/L; P = 0.009). CONCLUSIONS: An acute restriction of food and fluid intake attempt to negatively affects fat-free mass and indices of kidney function in judokas. Decreased tubular secretion of creatinine due to poor fluid intake (and excretion) might be a possible cause of elevated serum creatinine and a potential kidney stress after RWL, which requires further investigation. This project was partly supported by the Serbian Ministry of Education, Science and Technological Development (175037 and 179011), the Provincial Secretariat for Higher Education and Scientific Research (142-451-2473 and 114-451-710) and the Faculty of Sport and Physical Education, University of Novi Sad (2018 Annual Award).

Excess caloric intake leads to weight gain which contributes to an increase in health risks such as those associated with metabolic syndrome. PURPOSE: The purpose of this study was to examine the diet of division III football players in and off season and to identify the differences between skilled and unskilled players. METHODS: Twenty-two players [18.9 ± 0.79 yr] completed (F, Fall) and off season (S, Spring) testing. Data included height, weight, body composition and a 24 hour diet recall using the 5-pass method. Nutrition data were analyzed using Food Processor software. In and off season data were compared using a paired sample t-test. Repeated measures ANOVA was used to test for differences between skilled and unskilled players. This study was approved by the Linfield College Institutional Review Board. RESULTS: All players gained weight (F: 86.1 ± 13.1 kg; S: 92.0 ± 12.8 kg, p = 0.033) by spring. The weight gain was associated with an increase in percentage body fat (F: 13.8 ± 4.6; S: 16.3 ± 4.4, p = 0.028). All players decreased total caloric intake in the spring (F: 5553 ± 1922 kcal; S: 3972 ± 1384 kcal, p = 0.003). Sodium and cholesterol consumption decreased significantly (S: 5553 ± 1922 kcal; S: 3972 ± 1384 kcal, p = 0.0008). There were no differences in macronutrient distribution (%kcal) at either time point (Fat: F: 37.3 ± 5.9%; S: 37.3 ± 9.1%; Carbohydrate: F: 47.5 ± 6.8%; S: 46.1 ± 10.0% Protein: F: 15.2 ± 3.8%; S:16.8± 4.5%). The player’s relative weight in the off season (F: 2.60 ± 1.36; S: 1.87 ± 0.97; p = 0.036). Sodium and cholesterol consumption decreased from F to S but remained above the daily recommended intake for all players. There were no differences in total calories, macronutrient composition, relative protein intake, sodium or cholesterol between the skilled and unskilled players. A majority of the players meals were consumed at the college dining hall. CONCLUSION: Body weight and percent body fat increased from F to S with an associated increased caloric intake during the season. The players consumed large amounts of calories with a high percentage of fat during the season. All players decreased caloric intake in the off season. The change in body weight and body composition may increase health risks in the long run. It is important for players to make dietary choices to maximize performance and reduce long term health risks within the constraints of eating at the college dining hall.
Proper hydration is vital to peak athletic health and performance. Although hydration status is relatively simple to monitor, regular hydration testing is rarely implemented in sport regardless of competition level. Consequently, many athletes enter competition unaware of their hydration status, preventing opportunities to begin in an optimal state of readiness. PURPOSE: To evaluate the effect of hydration testing and simple feedback on pre-game hydration status of collegiate basketball players. METHODS: Twenty men’s collegiate basketball players from a single NCAA Division II university participated in this study during the 2016-17 (N = 14) and 2017-18 (N = 12) seasons. In Season 1, players’ urine specific gravity (USG) and body weight (BW) were assessed 1-2 hours prior to the start (PRE) of eight pairs of regular season conference games (16 games total) played on consecutive days (Fri & Sat). In Season 2 (10 games), players’ USG was assessed 4-5 hours before game time, at which time they were provided feedback about their hydration status. USG was reassessed 1-2 hours prior to game time, along with BW. USG was measured using a hand-held clinical refractometer. Hydration status was defined as: hyperhydrated (HYP; USG < 1.005), euhydrated (EUV; 1.005 ≤ USG < 1.020), moderately hypohydrated (MOD; 1.020 ≤ USG < 1.025), and severely hypohydrated (SEV; USG ≥ 1.025). BW was measured using a digital scale, with players wearing similar clothing each time. RESULTS: PRE hydration status, based on proportional distribution, was significantly different between Season 1 and Season 2 (P < 0.001). In Season 1, 14% of players were EUH and 24.9% were MOD at PRE compared to 82.3% and 4.6% in Season 2, respectively. While 27.1% of players were SEV at PRE in Season 1, no players were SEV at PRE in Season 2. There was no change in PRE USG from Fri (1.018 ± 0.008) to Sat (1.019 ± 0.008) in Season 1 (P = 0.077), but PRE USG on Sat (1.010 ± 0.005) was significantly lower than on Fri (1.011 ± 0.006) in Season 2 (P = 0.015). CONCLUSION: The implementation of hydration testing and simple feedback significantly improved pre-game hydration status of collegiate basketball players compared to hydration testing alone. Athlete monitoring, when combined with proper feedback and education, can be used effectively to optimize athletic readiness.

**Table. Food servings ingested by Food Group in the studied Groups (n=66)**

<table>
<thead>
<tr>
<th>Device (n = 25)</th>
<th>Device plus counseling (n = 25)</th>
<th>Control (n = 16)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre</td>
<td>Post</td>
<td>Pre</td>
</tr>
<tr>
<td>ASF</td>
<td>5.0 ±3.0</td>
<td>3.7 ±3.9</td>
</tr>
<tr>
<td>Dairy</td>
<td>2.0 (0.0 - 4.0)</td>
<td>1.9 (0.0 - 4.0)</td>
</tr>
<tr>
<td>Legumes</td>
<td>1.0 (0.0 - 6.0)</td>
<td>1.0 (0.0 - 3.0)</td>
</tr>
<tr>
<td>Cereals</td>
<td>6.0 (3.0 - 18.0)</td>
<td>7.0 (3.0 - 24.0)</td>
</tr>
<tr>
<td>Vegetables</td>
<td>2.0 (0.0 - 5.0)</td>
<td>2.0 (0.0 - 7.0)</td>
</tr>
<tr>
<td>Seeds</td>
<td>2.0 (0.0 - 11.0)</td>
<td>0.0 (0.0 - 11.0)</td>
</tr>
<tr>
<td>Fats</td>
<td>3.0 (0.0 - 16.0)</td>
<td>5.0 (1.0 - 15.0)</td>
</tr>
<tr>
<td>Fruits</td>
<td>3.6 ±2.0</td>
<td>3.0 (1.0 - 11.0)</td>
</tr>
<tr>
<td>Sugars</td>
<td>2.7 (0.0 - 12.0)</td>
<td>2.0 (0.0 - 10.0)</td>
</tr>
</tbody>
</table>

**ASF:** Animal source foods. * Mean ± standard deviation. ** Median (min - max). * p <0.05 pre vs post.
PURPOSE: To determine whether meeting overall calorie intake impacts the number of days an athlete has concussion-related symptoms following diagnosis.

METHODS: Fourteen Division I collegiate athletes with a mean age of 20.14 (SD=1.94) who did not have a concussion were recruited (control group = n=7; intervention group = n=7). Daily caloric intake was calculated by the Body Density (D) calculation proposed by Durnin and Womersley (1974). To assess body composition, body density was measured using underwater weighing. In both groups, daily caloric intake was compared to total daily caloric needs and the individual was coded as met or did not meet energy needs. Concussion related symptoms were assessed using the Sports Concussion Assessment Tool (SCATS) Symptom Evaluation Form. For the intervention group, four single serving packets of a carbohydrate supplement were provided following immediate impact at the suspicion of a concussion or within 30 to 60 minutes of diagnosis (two servings immediately at suspicion or following diagnosis of concussion, and one serving every other hour within the first 4 hours following the initial servings), and two single serving packets during daily concussion protocol evaluation until the athlete reported no symptoms. A 2x2 Factorial ANOVA was conducted on the total number of days of concussion symptoms with respect to daily average calories being met (AvgCalories) and comparing the control and intervention groups (Control/Intervention).

RESULTS: Statistically significant differences were found in a number of days of concussion symptoms between those who met average daily caloric needs and those who did not, F(1,14) = 7.826, p<.05. No statistically significant difference was seen in the number of days of concussion symptoms between athletes who were in the control group and the intervention group, F(1, 14) = 0.936, p=.356. Although a statistical significance was not observed in the number of days of athlete symptoms, an average decrease in the number of days was observed in the intervention (M = 4.43, SD = 2.37) when compared to the control (M = 8.57, SD = 0.90), (t) = 2.357, p = .151.

CONCLUSION: In this population, athletes that meet their daily calorie needs had fewer days that they experienced concussion related symptoms compared to the subjects that did not meet their caloric needs. This preliminary research suggests that it is beneficial to assure that individuals are aware of their caloric needs and strive to meet them following the diagnosis of a concussion.

3127 Board #173 May 31 2:00 PM - 3:30 PM

Body Composition And Food Consumption Of A Group Of Trekkers Of S&O Sao Paulo - Sp, Brazil

Marcia Nacif, Gabriela Soares, Juliana Masami Morimoto. Universidade Presbiteriana Mackenzie, Sao Paulo, Brazil. Email: marcia.nacif@mackenzie.br

(NO relevant relationships reported)

The demand for physical activities in the nature has increased a lot and one of the most practiced modalities in Brazil is the trail. The trail is characterized by open paths amidst nature and it is considered the main form of access to preservation areas and lush landscapes. Due to the lack of national literature regarding trekkers, it is justified the importance of studying these sportmen. PURPOSE: Evaluate the body constitution and the food consumption of a group of trekkers of S&O Sao Paulo, Brazil. METHODS: Cross-sectional study, approved by the Research Ethics Committee of the Mackenzie Presbiterian University, performed with trekkers of both sexes, who consented to participate in the research. To assess body composition showed the weight, height, skinfolds and body circumferences. The percentage of body fat was calculated by the Body Density (D) calculation proposed by Durnin and Womersley (1974) and subsequent conversion of D by the Siri’s equation (1961). The body fat percentage was calculated by the formula made according to Durnin et al. (1992). The food consumption was evaluated by a 24-hour Recall. The macronutrients, fatty acids, vitamins A, C, E, calcium, magnesium and iron were calculated using Avanutri® Software version 4.0. We used the recommendations of the Institute of Medicine (2001) and the Brazilian Society of Cardiology (2013). The analysis of the average difference between nutrients and anthropometric variables was made by Student’s t test and Analysis of Variance (ANOVA). RESULTS: 14 trekkers were evaluated with an average age of 29 years, 50% female and 50% male. It was observed that 35.71% of the participants were overweight and 50.0% showed a high fat percentage. Men had higher stature and weight, while women presented higher fat percentage and biceps skinfold (p<0.001). It was found adequate intake of macronutrients, but the consumption of saturated and cholesterol fats was below recommendations as still was a high prevalence of inadequacy about calcium consumption and greater intake of lipids by men (p<0.05). CONCLUSION: It is recommended that the trekkers search for guidance on food and nutrition, seeking a good performance and greater utilization of this experience with nature.

3128 Board #174 May 31 2:00 PM - 3:30 PM

Association Of The Adequate Intake Of Macronutrients Between Strength Levels From 1RM In University Athletes


(NO relevant relationships reported)

PURPOSE: To analyze the association between the proportions of athletes with adequate macronutrient intake with one repetition maximum (1RM) on bench press in college athletes.

METHODS: 164 (103 men, 61 women) college athletes from different sports were evaluated. 24-h dietary recalls were administered to estimate the macronutrient intake. Carbohydrate (CHO), protein (PRO) and fat (FAT) intake were calculated and adjusted for body weight (g/kg/day). Consumption was classified as “adequate” if the athlete consumed the recommended minimum amounts for each macronutrient: 5 g/kg/day of CHO, 1.2 g/kg/day of PRO, and 0.5 g/kg/day of FAT. Bench press 1RM test was performed to determine the maximal strength. Then, 1RM was classified into sex-specific quartiles: (Men: Q1 <57.8 kg, Q2 57.8 - 66.8 kg, Q3 66.9 - 80.3 kg, and Q4 >80.3 kg; Women Q1 <35.1 kg, Q2 35.2 - 39.6 kg, Q3 39.7 - 48.8 kg, and Q4 >48.8 kg) of displaced weight (kg). The proportion of athletes with an adequate intake of each macronutrient was compared between 1RM quartiles and analyzed by sex. Similarly, the proportion of subjects with adequate intake were compared between macronutrients within quartiles. Chi-square and multiple Z tests (with Bonferroni adjustment) were used to determine significant differences between groups. Significant differences were deemed at a p-value ≤0.05.

RESULTS: No association between adequate macronutrients intake and 1RM bench press strength levels were observed. However, CHO was the macronutrient with the lowest proportion of athletes achieving the minimum recommended intake.

<table>
<thead>
<tr>
<th>Table. Proportion of participants with adequate macronutrient intake by 1RM strength quartile.</th>
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<tr>
<td></td>
</tr>
<tr>
<td>PRO</td>
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<td>FAT</td>
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<td>CHO</td>
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<td>PRO</td>
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<tr>
<td>FAT</td>
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<tr>
<td>CHO</td>
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<tr>
<td>p-value</td>
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</table>

Data expressed as frequencies (%). Different letters denote significant differences between nutrients within quartiles (p<0.05).

3129 Board #175 May 31 2:00 PM - 3:30 PM

A Comparison Study of Energy Expenditure and Nutrition Intake in Amateur Athletes in Long Distance Running

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(NO relevant relationships reported)

PURPOSE: By analyzing the energy expenditure figures of each group (training group, marathon group and cross-country running group) and their nutrition intake figures, some reasonable suggestions were given to solve the problem of nutrition intakes in daily training or competition. METHODS: The energy expenditure data were collected by wearing 3-axis accelerometer (ActiGraph GT3X, USA) when 10 amateurs did 10km training, 6 amateurs did marathon competition, and 6 amateurs did 50-100 km cross-country running. They were asked to record all the foods and beverages during competition or training. After measuring energy expenditure during their exercises, and recording the process of nutrition supplement, we compared the differences in energy expenditures of different groups, and analysis the relativity between energy expenditures and nutrition intakes.
RESULTS: (1) The energy expenditure figure of training group was 0.66±0.10 kcal/kg/km, which was observably lower than those of marathon group (1.22±0.32 kcal/kg/km) and cross-country group (1.20±0.18 kcal/kg/km); however, there was no obvious difference between the marathon group and cross-country group (p>0.05).(2) The calorie of supplement intakes was 756.17±338.80 kcal/kg/km, which was significant lower than the calories of energy expenditure (2331.61±939.30 kcal/kg/km) in 22 amateurs. However, there was a positive correlation between energy expenditure and supplement intake (r=0.21, p<0.01); however, there was no difference in urinary Ca excretion (H: 22±15 mg; L: 21:18 mg). Changes in iCa during exercise were not different (H: -0.03±0.11 mg/dL; L: -0.08±0.24 mg/dL; p=0.46). H prevented the increase in CTX during exercise (H: -0.03±0.04 mg/mL; L: 0.02±0.05 mg/mL; p=0.03), but the increase in PTH during exercise (H: 12.7±16.7 pg/mL; L: 11.3±16.5 pg/mL; p=0.80) did not differ for H and L. During recovery, CTX was lower for H (H: 0.03±0.05 mg/mL; L: 0.10±0.06 mg/mL; p=0.003). PTH did not differ (-10.3±14.9 pg/mL; H: -9.5±1.45 pg/mL; p=0.88). There were no differences between H and L for iCa during recovery or iCa during exercise or recovery. CONCLUSION: Ca absorption was higher in H versus L, but there was no difference in urinary excretion, suggesting that absorbed Ca was retained. The Ca load was effective in attenuating the increase in CTX despite no attenuation of the PTH response. Supported by DoD Grant W81XWH-12-1-0364.

INTRODUCTION: The effects of diet and exercise are well studied in connection with human health. However, the relationship between the human gut microbiome (HGM) and exercise is not well understood. PURPOSE: The purpose of this study was to examine possible changes to the HGM diversity and composition resulting from an 8-week intervention of cardiovascular exercise (CVE). METHODS: Twenty-seven participants (20 F and 7 M) aged 18-25 years were recruited. Inclusion/exclusion criteria were determined using the AHA/ACSM pre-screening questionnaire along with screening for historical factors that might impact the microbiome. Fecal samples for HGM profiling were collected weekly, during three phases of the project: baseline (4 wks; no CVE), intervention (8 wks; CVE 3 x wk), and washout (4 wks; no CVE). Pre/post VO2 max and body composition analyses were conducted. Heart rate ranges for the CVE intervention were pre-determined by the subject’s VO2 max test. Gut microbiota were profiled using 16S rRNA gene sequencing. Microbiome sequence data were analyzed with the QIIME 2 bioinformatics platform. RESULTS: To track changes in each subject’s HGM, community richness and composition were compared to the week 1 (baseline) values for each subject. One week after the CVE began there was a significant change (p = 0.0001) in the HGM composition. This change persisted through week 11, when the CVE program stopped and microbial compositions abruptly returned to baseline values. Interestingly, in week 8, some individuals seem to have returned to a composition similar to baseline. Reasons for this anomaly are unclear. Additionally, each individual’s community richness and compositions were compared to the prior week to understand week-to-week changes, demonstrating a significant shift (p = 0.0002) in composition at week 8, indicating settlement into a novel HGM. These data suggest that less than a month of low or high choline intake may not negatively affect strength gains in older adults. CONCLUSION: The micronutrient choline is a precursor to acetylcholine (ACh), which mediates skeletal muscle contraction and force production. We previously reported that 12 weeks of low choline consumption (~50% of Adequate Intake [AI]) impaired strength gains in older adults in response to resistance exercise training. The purpose of this study was to investigate whether low choline consumption for a shorter period of time has negative effects on muscle responses to resistant exercise (RE) in older adults. METHODS: Thirty one, 50-to-65-year-old, generally healthy men and women were randomly assigned to one of three choline intake groups (Low, 3.6 ± 0.6 mg/kg/d; n=10; Med, 6.0 ± 0.6 mg/kg/d, n=10; High, 8.8 ± 0.8 mg/kg/d, n=10) and underwent 3 weeks of diet and RE intervention (leg press and extensions, 2x/week, 3 sets, 8-12 reps, 75% of maximum strength [1RM]; 4 bouts of maximal isometric force production on leg extension). 1RM and EMG tests were performed before and after intervention. RESULTS: While all three groups experienced significant increases in strength, there was no difference between choline groups in changes in 1RMs (Leg press, Low: 12.4 ± 12.0%, Med: 17.5 ± 10.7%, High: 15.8 ± 10.7%, p=0.588; Leg extension, Low: 17.9 ± 13.0%, Med: 15.3 ± 18.8%, High: 5.9 ± 12.2%, p=0.209). Similarly, no differences were observed in EMG amplitudes or average/peak isometric force outputs between groups. CONCLUSION: These data suggest that less than a month of low or high choline intake may not affect strength gains in older adults. It appears that only a prolonged period of low choline intake may have negative effects on muscle responses to RE.
Vitamin K is a required nutrient important in bone health. Some researchers have reported that vitamin K can help to prevent bone fractures. PURPOSE: To explore whether a relationship exists between vitamin K intake and bone mineral density (BMD) among athletes, 18 to < 35 years of age and ≥ 35 years of age. METHODS: In 72 EOD operators (80% Caucasian), VITD was measured using a blood test (25-hydroxyvitamin D3). Body fat percentage (BF%), bone mineral content (BMC), maximal volume of oxygen uptake (VO_{max}), muscular strength (one-repetition max; back squat, bench press), blood lipids, blood pressure, posttraumatic stress disorder symptoms, and depression symptoms were also assessed. Pearson product-moment correlation coefficients were used to explore the associations between vitamin K intake and biobehavioral characteristics. RESULTS: Mean ± SE were as follows: age = 34.2 ± 0.8 years; BF% = 17.6 ± 0.4; VITD = 39.0 ± 1.0 ng/mL; and VO_{max} = 47.9 ± 0.7 ml/kg/min. Associations with VITD were: BF% (r = 0.33) and android fat (r = 0.36), both p < 0.05; VO_{max} (r = 0.24), blood triglycerides (TGs; r = 0.36), and diastolic blood pressure (DBP; r = 0.25), all p < 0.05. No correlations were observed with strength, the other blood lipids, or behavioral health. CONCLUSION: EOD operators in this study were generally healthy with respect to VITD levels and all other measures. The negative association between VITD and BF% is consistent with accruing data in both military and athletic populations. It also reflects the prevailing hypothesis that in overweight individuals, VITD can become sequestered within fat tissue. Inverse relationships with android fat, TGs, and DBP are in line with reports that VITD deficiency is linked to cardiovascular disease risk factors. Future studies will evaluate VITD status with neurocognitive function and genetic variants of stress physiology.

Inflammation plays an important role in muscle soreness after the high-intensity resistance exercise. Cholesterol is essential for mediating inflammation through regulating membrane homeostasis and facilitating cell signaling. PURPOSE: The purpose of this study was to investigate the effects of dietary cholesterol on the exercise-induced soreness levels. METHODS: 16 untrained, healthy young men (n=12) and women (n=4) performed a short-term high-intensity resistance exercise consisting of unilateral leg press and extension with 5 sets and repetitions until failure at 85% 1RM in the Resistance Exercise (RE) sessions and 3 sets/10 repetitions at 50% 1RM in the Light Exercise (LE) sessions. The RE was performed on the starting day (day 0) and day 9 while the LE was performed on day 3 and 6. Participants were randomly assigned to either a Low Cholesterol Intake (LC, n=7) or a High Cholesterol Intake (HC, n=9) group. Soreness levels were recorded with a Soreness Visual Analog Scale. Overall soreness was defined as the average soreness from Day 1 to Day 12. RESULTS: The overall soreness levels in LC were 91.6±13.6% higher than HC (P=0.044). Two days after the first RE, soreness levels reached to the highest point in both groups and were higher in LC than HC (P=0.028). The soreness in LC on Day 10 was lower than Day 2 (P=0.01). There was no significant difference between groups after the second RE. CONCLUSIONS: The soreness levels peaked at two days after the first resistance exercise in both groups, which is consistent with the Delayed Onset Muscle Soreness. The lower overall soreness in HC than LC might suggest that the higher level of dietary cholesterol promoted a more efficient recovery via the regulation of inflammation and thus lowered the soreness levels. However, the levels of the biomarkers such as creatine kinase and C-reactive protein were unknown and should be analyzed in future studies to investigate the effects of cholesterol on the exercise-induced inflammation.
Elevated Inflammation in Preadolescent Girls
Low Cruciferous Vegetable Intake is Associated with Elevated Inflammation in Preadolescent Girls

Jennifer W. Bea1, Lindsay Kohler2, Megan Hetherington-Rauth1, Janet Funk1, Nora Carranza1, Vinson Lee1, Robert Bliew1, Scott B. Going1. 1University of Arizona, Tucson, AZ. 2University of Lisbon, Lisbon, Portugal.

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Abstracts were prepared by the authors and printed as submitted.
CONCLUSIONS: Cruciferous vegetable intake among girls aged 9-12 years was low overall. The lowest intake was associated with the CRP risk category considered to confer a moderately elevated risk of CVD among adults. Enrichment of the diet with cruciferous vegetables is an intervention strategy that should be tested in girls to reduce inflammation and CVD risk early, regardless of BMI status. Supported by National Institute of Child Health and Human Development (HD074565) and the National Cancer Institute (P30CA023074).

F-62 Free Communication/Poster - Education and Funk
Friday, May 31, 2019, 1:00 PM - 6:00 PM
Room: CC-Hall WA2

3141 Board #187 May 31 2:00 PM - 3:30 PM
Pathology Classification And Exercise Adherence: A JTA Educational Approach To Providing Community-Based Exercise Programs
Dr. Gregory J. Ledoux, Northern Vermont University - Lyndon, Lyndonville, VT. (Sponsor: Dr. Samuel A. E. Headley, FACSM)
Email: gregory.ledoux@northernvermont.edu
(No relevant relationships reported)

Pathology Classification and Exercise Adherence: a JTA Educational Approach to Providing Community-Based Exercise Programs

PURPOSE: The purpose of this study was to determine if pathology classification is a significant predictor of adherence to a community-based exercise program.

METHODS: A cohort study design was implemented, evaluating the Lyndon Health/fitness Intervention Program (HFIP). Subjects (N = 44) had a mean age of 65.82 (SD = 10.00) years, participated in a 6-week exercise program consisting of 60 min per session, two days per week. Each subject's Primary Healthcare Provider identified the pathology classification and exercise adherence was defined as the number of sessions attended out of 12 possible sessions. Data were analyzed via an independent groups 2-way analysis of variance (2-way ANOVA), simple linear regression, and multiple linear regression. RESULTS: No significant interaction was found in regards to other data clarifying the Program (F(1,2) = 0.363, p < 0.698). There was no significant difference between exercise adherence for gender (F(1,1) = 0.299, p = 0.588), or for pathology (F(1,4) = 1.823, p = 0.146). Pathology classification was found to be significant predictor of exercise adherence (F(1,31) = 4.560, p < 0.041).

CONCLUSION: While pathology classification was a statistically significant predictor of exercise adherence, only 10.0% of the variance in adherence could be predicted from this model (adjusted R2 = 0.10). Necessary future research in this area should consider larger and more diverse samples, longer duration exercise programs, and follow-up with subjects after program conclusion. Furthermore, the Lyndon HFIP was facilitated in conjunction with a senior-level, undergraduate exercise science course, and served as an applied means to elucidate imbedded ACSM clinical exercise science course, and served as an applied means to elucidate imbedded ACSM

3142 Board #188 May 31 2:00 PM - 3:30 PM
Program Directors' Perspectives On Coaes-mediated Caahep Accreditation For The Exercise Sciences
Carlton R. Insley, III1, Susan M. Muller2, Sidney R. Schneider1, William Coale3, Salisbury University, Salisbury, MD.
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For viability, college medical faculty must provide quality programs in an enrollment-competitive market. Accreditation, credentialing, and licensure contribute to health practice prosperity. Kinesiology-related domain programs (exercise science, exercise physiology, etc.) have incomplete achievement in program accreditation, credentialing, and licensure.

PURPOSE: To assess Program Directors' perspectives on CoAES-mediated CAAHEP accreditation for the Exercise Sciences. METHODS: A 19-question survey was developed and validated by an expert committee. Upon IRB approval, an exploratory study was conducted. Surveys were anticipated to be distributed to Program Directors' perspectives, and enabling CoAES insight to forward a more positive accreditation path. Electronically solicited, 75 individuals from approximately 500 commercially identified Kinesiology-related programs (undergraduate and graduate) with published e-mail addresses, offered responses. Utilizing descriptive statistics, response analyses were performed in context of survey items. RESULTS: The following data graphs represent salient features of survey results:

3143 Board #189 May 31 2:00 PM - 3:30 PM
Retrieval Practice Improves The Recall And Transfer Of Learning Of Physiology Information
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(No relevant relationships reported)

PURPOSE: It is well-documented that retrieval practice can enhance the recall of both complex and simple information when compared to more typical methods of learning such as repeated studying (i.e., reading). Evidence is also accumulating that retrieval practice can enhance higher orders of thinking, such as the ability to critically evaluate research articles (Dobson, Linderholm and Perez, 2018) and transfer of learning (Butler, 2010). One purpose of this investigation was to explore the effects of retrieval practice on transfer of learning with physiology information. A second purpose was to compare recall and transfer of physiology information following retrieval practice versus a judgment of learning task (JOLT) that may be easier for students to implement on their own. METHODS: Participants were randomly assigned to learn three short (~500 words) physiology texts using each of the following strategies: 1. studying a text four consecutive times (SSS), 2. studying and then retrieving a text two consecutive times (SRS), and 3. studying a text four consecutive times while completing multiple JOL during the second and fourth repetitions (SSJ). Recall and transfer of learning were both assessed one week after the participants learned the texts, and the results were analyzed using repeated measures ANOVAs. RESULTS: The SRS strategy facilitated significantly greater recall than the SSS strategy (21.35 ± 1.08 vs. 17.35 ± 1.86, p<0.05), and both the SRS and SSJ strategies lead to significantly greater transfer than the SSS strategy (44.60 ± 2.55 and 41.79 ± 2.63, respectively, vs. 36.07 ± 2.40, p<0.05). CONCLUSION: These results demonstrate that retrieval practice enhances both recall and higher order thinking about physiology information and that covert retrieval, as experienced in a JOLT task, may provide similar benefits.

3144 Board #190 May 31 2:00 PM - 3:30 PM
Effects Of A Situated Environment On Classroom Community, Connectedness, And Learning In Exercise Science Students
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(No relevant relationships reported)

Clinical exercise science programs require rigorous academic preparation often taught in traditional classroom and lab settings. However, employers also require students to develop strong interpersonal professional skills necessary to be successful in the field. Incorporating situated learning in the exercise science classroom provides opportunities for students to develop social interaction, theory application, critical thinking, and problem-solving skills. A greater sense of classroom community is understood to significantly enhance students’ internalization of learning and the development of these desired professional skills. PURPOSE: The purpose of this research is to explore students’ perceptions of overall classroom community, connectedness, and learning in both a situated and traditional classroom environment. METHODS: 53 undergraduate exercise sciences students (age [yrs] = 22.21 ± 2.96, males = 35.8%; females = 62.3%) who had participated in either a situated learning course or a traditional learning course completed Rovai’s (2002) Classroom Community Survey at the end of the semester. A one-way ANOVA was performed to
A growing body of research supports a positive relationship between physical activity (PA) and alcohol consumption within various sample populations. Anecdotally, producers of craft beer appear to specifically market to active consumers via promotions for participating patrons. These data provide preliminary evidence for motivations to pair the promotion of PA with the consumption of craft beer.

PURPOSE: Exercise habits may have positive effects on working memory of college students, especially on accuracy of completing working memory process, and the related brain mechanisms need to be further studied.

RESULTS: Significant differences in working memory were observed between the groups. The situated learning group demonstrated significantly higher mean scores. Potential effects and benefits of various conflict management approaches are discussed. Evidence is presented to further understand and appreciate the elements involved with conflict in intertwining healthcare professionals in a sports medicine setting. Conclusion. In conflict management, recognizing that all team members have differing viewpoints can serve as a resolution point which encourages team members to embrace their differences. Finally, a case study summarizes the theories for conflict management.

RESULTS: A response rate of 77% was achieved. Participating breweries (N=10) were located in areas that are populated and that generally consist of a higher proportion of renter-occupied housing units (63.1±18.8%). All respondents indicated that the respective establishment hosted at least one type of PA event. Over an average month, 25 group runs (mean=4±1), 18 sponsorship competitions, charity biking, and hosting of regular PA events (e.g., group fitness classes) hosted over an average month, as well as associated promotions: Operators of 13 craft producers of craft beer appear to specifically market to active consumers via promotions for participating patrons. These data provide preliminary evidence for motivations to pair the promotion of PA with the consumption of craft beer.

PURPOSE: Working memory is the process of storing information by human body and processing by way of thinking. Relevant studies have shown that exercise have positive impacts on working memory of human body, but previous studies mostly focused on the forms of exercise, and the subjects were mostly children or elderly people. So, this study aimed to explore whether exercise can affects the working memory of college students by comparing who have the exercise habit with who have been sedentary.

METHODS: 12 students from the Capital University of Physical Education and Sports were taken as subjects. According to the exercise habits, 6 subjects with exercise habits were divided into exercise group and 6 subjects with sedentary were divided into control group. The E-prime software was used to program the 2-Back task to measure the working memory of subjects. The experimental procedure was divided into four blocks. The first and third blocks were simple tasks, the second and fourth blocks were complex tasks. The SPSS23.0 was used to analyze the experimental data.

RESULTS: The behavior data were analyzed with 2 (exercise habit group)*2 (task type) repeated measurement ANOVA to investigate the responsiveness of different exercise habits to 2-Back task. The results showed that for accuracy, the main effect of task type was not significant F(1,10)=2.923, p=0.118, and the interaction effect between task type and group was significant F(1,10)=6.245, p=0.032, indicating that the subjects with exercise habits had higher accuracy than those who with sedentary, but there was no difference in accuracy when performing simple and complex tasks. For the response time, the main effect of task type was not significant F(1,10)=125.7, p=0.731; the interaction effect of task type and group was not significant F(1,10)=0.484, p=0.831, indicating that there was no difference in response time between subjects in the process of two tasks, and there was no significant difference in the reaction time between subjects with exercise habits and sedentary.

CONCLUSION: Exercise habits may have positive effects on working memory of college students, especially on accuracy of completing working memory process, and the related brain mechanisms need to be further studied.

Purpose. Conflict management is an important aspect in the administration and organization of sports medicine teams. Health care professionals attempt to exert personalities, influences, biases that may create points of misunderstanding within everyday team operations. Methods. This review gathers contemporary information and theories towards conflict and conflict management, including definitions of current terminology and current concepts. This study also identifies opportunities that team members may utilize when dealing with conflict. Four main types of conflict are discussed and are juxtaposed with sports medicine scenarios. These types include: goal related conflict, affective conflict, procedural conflict, and cognitive conflict. A review of recent literature also provides strategies for dealing with conflict and creating commitment within team members. Results. This review gathers contemporary information and theories towards conflict and conflict management, recognizing that all team members have differing viewpoints can serve as a resolution point which encourages team members to embrace their differences. Finally, a case study summarizes the theories for conflict management.
HR was not different (p=0.96) between groups however resting HR was different (p=0.0001) between the CAI and Control groups (77.3±7.5ppm and 64.9±8.1ppm, respectively). FAMASport (p=0.0001) and NASA (p=0.0001) were all observed to indicate differing activity levels between the groups. CONCLUSIONS: CAI in college-aged adults results in significantly reduced PA and cardiorespiratory fitness levels accompanied by significantly greater body fatness. Our findings suggest these serious negative health outcomes will rapidly develop as a consequence of the reoccurrence of this musculoskeletal injury as a young adult.

3149 Board #195
May 31 3:30 PM - 5:00 PM
Early Brace Progression Following Anterior Cruciate Ligament Reconstruction Leads to Improved Knee Range of Motion
Lauren N. Erickson, Kathryn C. Lucas, Cale A. Jacobs, Darren L. Johnson, Mary L. Ireland, FACSIM, Brian Noehren, FACSIM. University of Kentucky, Lexington, KY.

Loss of passive knee extension (KE) following anterior cruciate ligament (ACL) reconstruction is a common deficit after surgery, and has been associated with prolonged pain, quadriceps weakness, and gait impairments. Recent literature indicates that it is also predictive of an increased risk of osteoarthritis due to altered knee kinematics. Post-operative bracing may limit the ability to achieve full KE; however, the effects of various brace progressions have received little attention.

PURPOSE: To quantify the time to achieve baseline KE and knee flexion (KF) after ACL reconstruction following an early versus delayed brace progression. METHODS: 18 ACL-reconstructed subjects were allocated into an early brace progression (n=9; 4F, 5M; 21.2 ± 4.9 y; 27.6 ± 5.1 kg/m²) or delayed brace progression (n=9; 3M, 6F; 22.8 ± 5.6 y; 24.4 ± 3.0 kg/m²) group. The delayed group was weight bearing as tolerated (WBAT) with a post-operative brace locked in full extension for full ambulation for 4 weeks. A brace was unlocked with a transition to a hinged knee brace at 2 months. The early group was WBAT with the post-operative brace locked in full extension for 1-2 weeks. Subjects were gradually weaned from braces at 1-3 weeks with complete discontinuation of the brace at 3-6 weeks. KE and KF were measured with a goniometer. Independent t-tests were used to compare differences between groups (α=0.05).

RESULTS: There were no significant differences between groups for baseline KE (early: -5.7 ± 2.2°; delayed: -4.6 ± 3.5°; p=0.43) and KF (early: 142.6 ± 5.2°; delayed: 142.4 ± 8.6°; p=0.97). There were significant differences between groups post-surgery in time to achieve baseline KE (early: 12.8 ± 9.3 days; delayed: 142.6 ± 5.2 days; p=0.004) and KF (early: 31.6 ± 8.8 days; delayed: 142.4 ± 8.6 days; p=0.001). No subjects were noted to have increased knee laxity. CONCLUSIONS: Early brace progression was more effective than delayed brace progression in reducing the time to restore baseline KE and KF. Early restoration of knee motion following ACL reconstruction may limit post-operative complications such as knee stiffness, anterior knee pain, delay in strength recovery, and gait impairments. Adjustment of post-operative brace protocols can have a profound impact on clinical outcomes.

3150 Board #196
May 31 3:30 PM - 5:00 PM
The Detection of Knee Joint Sounds under Different Loading Conditions using Vibroarthrography
Kristin Kalot1, Rainer Sus2, Daniel Niederer3, Volker Gross2, Winfried Banzer, FACSIM1, Lutz Vogt1.1.Goethe University Frankfurt, Frankfurt am Main, Germany. 2.University of Applied Sciences, Giessen, Germany. 3.University of Applied Sciences, Giessen, Germany.

Crepitus of the knee may mirror structural changes of the joint during motion. Although the magnitude of these sounds increases with greater cartilage damage, it is unclear whether knee joint sounds also reflect joint loading. PURPOSE: To reveal whether the magnitude of knee joint sounds differs across defined dynamic loading conditions using vibroarthrography. METHODS: Twelve healthy volunteers (26 ± 3.59 years, 7 females) participated in the randomized-balanced crossover study. Knee joint sounds were recorded (linear sampling, 5512 Hz) by means of two acoustic sensors (microphones), one placed on the medial tibial plateau and one on the patella. Two activities of daily life (standing up from and sitting down on a bench, descending stairs) and three open kinetic chain (OKC) knee extension-flexion cycles (10°, 40° and 60°) were performed. Each participant carried out three sets of five repetitions and three sets of 15 steps downwards (stairs), respectively. For data analysis, the mean noise volume for each loading condition was determined. The resulting values were expressed as relative difference to the individual OKC passive movement value. Friedman test and Bonferroni-Holm adjusted post-hoc tests were performed to detect differences between conditions. RESULTS: The OKC passive movement sound ranged from .0001 to .003 a.u. (± 43.6 ± 69.3 dB) at the medial tibia and from .001 to .03 a.u. (± 60.6 ± 87.7 dB) at the patella. Significant differences between joint sound amplitudes for all movements, both measured at the medial tibial plateau (Chi²=20.7, p=0.001) and at the patella (Chi²=27.6, p=0.001) were obtained. The corresponding median difference for the tibia sensor were: stand/sit: 236 %, stairs: 67.5 %, OKC1: 291 %, OKC2: 384 %, and for the patella sensor: stand/sit: 158 %, stairs: 260 %, OKC1: 75 %, OKC2: 78 %. CONCLUSION: Overall, the larger the supposed knee joint loading was, the louder was the recorded knee crepitus. Consequently, vibroarthrographically assessed knee joint sounds can differ across knee joint loading conditions. Future studies should further support these findings using inverse dynamics as a measurement of knee joint loading.

3151 Board #197
May 31 3:30 PM - 5:00 PM
Glenohumeral And Hip Range Of Motion Are Associated In Softball: Implications For Performance And Injury
Mallory Faherty, Carolyn Killelea, Morgan Skidmore, Robert Zarzour, Timothy Sell, FACSIM. Duke University, Durham, NC.

Email: Timothy Sell, FACSIM (No relevant relationships reported)

Effective ball release during throwing requires coordination between the upper extremity (UE) and lower extremities. Deficits in UE and lower extremity (LE) range of motion (ROM) have been associated with decreased throwing performance and musculoskeletal injury. PURPOSE: To determine the association between glenohumeral and hip ROM in softball athletes. METHODS: 28 NCAA Division I female softball athletes participated (Age:18.8±1.5years,Height:168.1±6.8cm,Weight:70.6±9.3kg). ROM tests included: glenohumeral internal rotation (GIR) and external rotation (GER), hip internal rotation (HIR) and external rotation (HER). All ROM tests were completed bilaterally and an average of three trials was utilized for data analysis. ROM measurements were analyzed individually, as well as a total ROM for the UE (TGRM) and LE (THR). Data was stratified by pitcher vs. position players, dominant (DOM) vs. non-dominant (NDOM) UE and LE. Normality was assessed using a Shapiro-Wilk test. Correlations between UE and LE ROM were analyzed utilizing Pearson correlations or Spearman-Rho correlations, as appropriate. Significance was set a priori at p < 0.050. RESULTS: Pitchers demonstrated significant correlations between DOM GIR and DOM HIR (Correlation:0.845,P=0.017), as well as between DOM GIR and NDOM HER (Correlation:0.79,P=0.034). Pitchers also demonstrated correlations between DOM GIR and DOM THROM (Correlation:0.770,P=0.043), as well as DOM GIR and NDOM THROM (Correlation:0.785,P=0.036). Position players did not demonstrate any significant correlations between glenohumeral and hip ROM. CONCLUSION: Pitchers demonstrated significant correlations between glenohumeral and hip ROM, while position players did not. The positive correlation in pitchers may indicate that effective pitch performance is dependent on efficient coordination between the glenohumeral joint and hip. Proper hip ROM is necessary for an athlete to effectively transfer energy to the glenohumeral joint. Changes in hip ROM may lead to adaptations in glenohumeral ROM, both positive and negative, future research should focus on understanding these possible adaptations.
Plastic wraps are a practical alternative for clinicians as they may be disposed of by the
either elastic wrap with high compression or plastic wrap with minimal compression.

**CONCLUSIONS**

Although the mean difference between compression treatments was 45.1 ± 8.3 mm Hg
the end of the elastic compression treatment. Intramuscular temperatures decreased
3 cm and 34.4 ± 1.3°C at 1 cm, to 23.1 ± 4.9°C at 3 cm and 17.8 ± 5.2°C at 1 cm by

**RESULTS**

Intramuscular temperatures decreased from baselines of 35.1 ± 1.1°C at
the vastus lateralis were measured continuously during a 10-minute baseline period,

**METHODS**

applied with elastic wrap compression or held in place with plastic wrap but with no

**PURPOSE**

To evaluate and compare the cooling effectiveness of wetted ice bag

**PURPOSE**

Lacrosse officials come from different backgrounds, ages and training
levels, but all function as athletes while refereeing. Anecdotal evidence shows that
mild-to-severe musculoskeletal pain is common in this population. We need to
understand the scope of the problem to help keep these adults active over the long-
term and engaged in the sport. The purposes of this study were to: 1) determine the
prevalence, location and impact of musculoskeletal pain, and 2) identify physical or
training-related correlates of pain. **METHODS:** A specific anonymous survey
was developed and distributed to members of the national US Lacrosse Officials
Development Program and 1,441 were returned complete. Respondents were 52.0 ±
12.9 y rs, 79.5% male and 63.5% represented east coast regions. 51.1% never played
lacrosse, and 37.8% of former players participated through post-collegiate years.

Pain sites and severity (0-10 numerical pain rating), previous injuries and current
impact of pain on officiating duties were captured. **RESULTS:** Pain was present in
18.1% - 40.1% of officials primarily at the foot, shoulder, back and knee. Pain severity
during rest and exercise averaged 4.3 - 4.6/10 pts, respectively. A total of 437 officials
reported diagnoses of osteoarthritis (OA); knee 48.7%, hip 10.5%, spine 10.1%,
shoulder 8.0%) and 247 reported OA in more than one joint. Correlates of these pain
symptoms included former lacrosse injury (22.6% have long-term pain today) and
weight gain in last five years (r range = .053-.186; all p<.05). Current participation in
running as a sport was inversely related to pain symptoms. Officials with any diagnosis
of OA more often reported frequent or continual difficulties with a) running the entire
field distance, b) starting and stopping on the field, c) keeping pace, d) focusing on
multiple actions of players at once, and e) enjoying the officiating duties than officials
with no OA (Mann Whitney U tests all p<0.001). **CONCLUSION:** Officials are
unrecognized athletes, and many may benefit from clinical care support at the field
before, during and after games to help manage musculoskeletal pain, especially during
regulation games or tournaments. Pain relief may translate to better engagement in
lacrosse officiating duties, improvement in player safety and enjoyment of the
officiating role.

**RESULTS**

There were significant differences between the 6-7 mo. vs 8-9 mo groups (P=.001) and
the 6-7 mo vs 8-9 mo groups (P=.004) for subjective function (P=.04). There were significant differences between the 5-6 mo vs 8-9 mo groups (P=.07) and the 6-7 mo vs 8-9 mo groups (P=.004) for MVIC Extension (P=.14). No differences were
seen between groups for MVIC for knee extension (P=.14) or flexion (P=.97) or
knee flexor LSI (P=.60) (Table 1).

**CONCLUSIONS**

Clinically, compression is often applied in combination with ice. Amongst
practitioners, elastic wrap is the most common type of external compression, while
plastic wrap has become increasingly popular because it can be discarded without
returning it to the treatment facility. However, few studies have investigated the
magnitude of tissue cooling along different types of external compression applied to
an ice bag.

**PURPOSE**

The effect of icing with varying degrees of compression on quadriceps intramuscular
temperature

Stephen Mathew1, Susan Y. Kwiecien1, Glyn Howatson, FACSM,2 Malachy P. McHugh, FACSM,1 'Nicholas Institute of Sports Medicine and Athletic Trauma, Lenox Hill Hospital, New York, NY.3 Northumbria University, Newcastle upon Tyne, United Kingdom. (Sponsor: Malachy P McHugh, FACSM)

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(No relevant relationships reported)

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showing excellent reliability, these results show that age does affect the accuracy of the measurement of the TP muscle size assessed by ultrasound imaging; however, it would also be beneficial to be able to assess quality of muscle tissue.

**Purpose:** Emerging research has indicated that anterior cruciate ligament reconstruction (ACL-R) is associated with neuroplasticity. It has been speculated that these findings may have future implications on rehabilitation and ACL-R outcomes. However, most of this research has focused on cortical plasticity rather than sub-cortical plasticity. The purpose of this project was to determine the effects of ACL-R on sub-cortical portions of the cortical-subcortical motor loop. METHODS: A healthy group of active participants (n=16, age=23.2±3.5 years, height=1.7±0.1 m, weight=69.7±14.3 kg) and a left ACL-R group (n=15, age=21.7±2.7 years, height=1.7±0.1 m, weight=70.4±15.8 kg, 38.1±27.2 months post-surgery) were locally recruited. Functional magnetic resonance imaging (fMRI) and T1 structural imaging were performed to analyze brain activation during a unilateral left (involved) 45° knee extension/flexion at a rate of 1.2 Hz for 4 blocks of 30 seconds interspersed with 30 seconds of rest. The right putamen and right sub-thalamic nuclei (STN) served as seed regions, and the two groups were contrasted using a mixed-effects general linear model with a priori cluster threshold of p<.05. RESULTS: Compared to the control group, the ACL-R group displayed no differences in right putamen and right STN activation during the unilateral motor task. CONCLUSION: These results indicate that ACL-R may not influence the motor control loop at the sub-cortical level. Therefore, motor control and motor learning, as it relates to the subcortical structures, may not be affected by ACL-R. As a result, neurorehabilitation after ACL-R should use priming techniques to target specific cortical regions that previous studies have indicated as being affected by ACL-R.

**Method:** Clinical, radiographic and demographic data were collected for NWHL players during pre-participation physicals. Alpha angles were measured on 45° Dunn radiographs, with alpha angles >55° defined as cam-positive. Spearman correlations were performed to analyze the relationship between alpha angle and both ROM measurements and meniscal age. Players were grouped into those with and without cam lesions and group differences were assessed using the student’s t-test. RESULTS: Twenty-seven athletes were included. Nineteen (70%) had alpha angles >55°; 14 (52%) had bilateral cam deformity. Average meniscal age was 13.9±1.5 years. There was a significant association between age of menarcahs and alpha angle (right hips, p=0.01; left hips, p=0.04). There was no significant association between alpha angle and either hip ROM or clinical impingement signs. CONCLUSION: This study suggests that elite female ice hockey players have a higher prevalence of cam-type morphology than the general population. The positive association between alpha angle and age of menarche lends additional support to the etiological hypothesis of the cam lesion resulting from activity-related stress at the proximal femoral physes; players with earlier menarche (and therefore earlier physeal closure) seem to be less vulnerable to the development of cam deformity of the proximal femur. Thus, professional women’s ice hockey players have a high risk of developing cam-type morphology of the proximal femur, although each player’s age of menarche may mediate her individual risk for cam lesion development.
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**Board #206 May 31 3:30 PM - 5:00 PM**

**Initial/Repeat Triamcinolone Acetonide Extended-Release (TA-ER) Reduces Osteoarthritis Knee Pain Regardless of Prior Intra-Articular Corticosteroids (IACS)**

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*No relevant relationships reported*

**PURPOSE:** Repeat IACS are common in the management of knee osteoarthritis (OA), but efficacy may diminish over time, and recurrent use has been associated with articular damage. This post hoc analysis of a Phase 3b, single-arm, open-label study was designed to evaluate repeat injection of TA-ER in patients with knee OA who had received prior IACS.

**METHODS:** Patients ≥40 y with symptomatic knee OA for ≥6 mo received the 1st TA-ER injection on Day 1 and the 2nd injection at the first visit (Wk 12, 16, 20, or 24) at which repeat dose criteria were met (benefit from and tolerated the 1st injection without safety concerns and clinical indication to receive the 2nd injection). Patients who received 2 injections were evaluated every 4 wks up to 52 wks after the 1st injection. Treatment-emergent adverse events (TEAEs) and index knee radiography were evaluated. Exploratory efficacy endpoints included Western Ontario and McMaster Universities Osteoarthritis Index (WOMAC) A (pain).

**RESULTS:** Of 208 enrolled patients, 179 received 2 injections. Of these, 95 (53.1%) had prior index knee IACS. Median time to 2nd injection was 16.4 wks (prior IACS) and 16.9 wks (no prior IACS); in both subgroups ~20% did not need the 2nd injection until Wk 24. Mean WOMAC A scores were comparable in both groups and decreased ~50% following each injection (Figure). Incidences of serious and Grade 3/4 TEAEs were low and similar in both groups. There were no indications of chondrolysis, osteonecrosis, subchondral insufficiency fractures, or clinically significant subchondral bone changes in either group.

**CONCLUSION:** TA-ER provided substantial analgesia for 12-24 wks in patients who had received prior IACS use. Safety profiles were consistent with the overall population and previous reports. TA-ER may be a potential long-term nonoperative management strategy for knee OA pain.

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**Board #207 May 31 3:30 PM - 5:00 PM**

**Acute and Longitudinal Effects of Pitching on Passive Range of Motion in Division I Athletes**

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*No relevant relationships reported*

**PURPOSE:** To assess passive range of motion (ROM) measurements acutely over time and how this acute change alters over the course of a baseball season.

**METHODS:** Seven healthy male NCAA Division I baseball pitchers were measured prior to the start of the season. Each pitcher was assessed for passive shoulder and elbow ROM, with measurements taken after each pitching bout during the season.

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**Board #208 May 31 3:30 PM - 5:00 PM**

**Skin Combatibility with 3d Printed Splints And Casts**

Diana Hall1, Dean Millar1, Suprit Singh1, Yue Li2, Bill Bentley1, Lex Schultheiss1, 2 ActivArmor, Pueblo, CO. 1 University of Central Florida School of Medicine, Orlando, FL. 2 University of Maryland, College Park, MD.

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*No relevant relationships reported*

**PURPOSE:** 3D printed limb orthotics offer hygienic advantages over traditional technology because no padding is needed. We investigated biocompatibility and chemical profile of 3D printed material in contact with skin.

**METHODS:** Patient-specific 3D printed ABS polymer casts from multiple sources of feedstock were evaluated according to ISO 10993 standards used by FDA for review of biocompatibility. The effect of post-processing with acetone vapor was evaluated as an independent variable. Cytotoxicity testing using L929 fibroblast reactivity, sensitization by Kligman Maximization methods in Guinea Pigs and irritation evaluation by intracutaneous injection in New Zealand White Rabbits of 3D print extractions were conducted under GLP conditions. In addition, mass spectrometry of filament feedstock and 3D printed casts was performed on solvent extractions using DART methods.

**RESULTS:** Finished casts met criteria for permanent contact with skin.

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**Board #209 May 31 3:30 PM - 5:00 PM**

**Skin Combatibility with 3d Printed Splints And Casts**

Diana Hall1, Dean Millar1, Suprit Singh1, Yue Li2, Bill Bentley1, Lex Schultheiss1, 2 ActivArmor, Pueblo, CO. 1 University of Central Florida School of Medicine, Orlando, FL. 2 University of Maryland, College Park, MD.

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*No relevant relationships reported*
and limited contact with mucosal membranes. Mass spectrometry findings indicated that changes in ABS polymer occurred with 3D printing and post-processing in both surface and internal chemistry. However, these chemical changes did not compromise biocompatibility assessed under ISO 10993. CONCLUSIONS: Patient-specific 3D ABS orthotics met industry standards for biocompatibility for extended patient contact despite changes in material chemistry from feedstock. Therefore, testing and adherence to specific manufacturing controls is necessary to assure patient safety. Mass spectrometry assessment of composition of ABS polymers may serve to continually monitor product quality of 3D printed medical devices in accordance with 21 CFR 820.30. This work was supported in part by a CERSI grant to University of Maryland from the US FDA (U01FD005946A). Its contents are solely the responsibility of the authors and do not necessarily represent the official views of the HHS or FDA.

Females sustain ACL injuries more often than males, especially among physically active adolescents and young adults. Studies suggest that increased estrogen during the ovulatory phase of the menstrual cycle is related to ephemerous increases in ACL laxity, and thus elevated injury risk. These hormonal factors may partially explain the sex-bias in injury risk, since males do not experience the same estrogen spikes and thus avoid these bouts of elevated risk. Little is known, however, about how variability in estrogen exposure within females affects inter-individual differences in injury risk. One factor that may play a role in cumulative estrogen exposure is age at menarche, since estrogen exposure within females affects inter-individual differences in injury risk. One factor that may play a role in cumulative estrogen exposure is age at menarche, since it relates to total number of cycles experienced. Our prior work shows links between age at menarche, pubertal growth patterns, and biomechanical risk for ACL injury. It is possible that age at menarche also has an impact on ACL injury risk through effects on laxity.

Purpose: To determine if age at menarche is related to female ACL laxity.

Methods: Subjects were recreationally active undergraduate and medical school females (N=15) and males (N=20). Males served as a control group, in which pubertal development timing was assessed as age at achieving adult height (recall). Age at menarche and current menstrual status in females were assessed by recall questionnaire. Telos™ stress radiography was used to assess ACL laxity. Statistical analysis consisted of an independent samples t-test to compare laxity in males and females. Linear regression analysis was used to determine whether laxity was related to pubertal timing within each sex.

Results: The t-test found no significant sex difference in ACL laxity (female mean ± SD = 3.0 ± 1.8 mm; male mean ± SD = 3.7 ± 1.7 mm; P=0.26). In males, regression analysis demonstrated no relationship between age at achieving adult height and knee laxity: slope = -0.03 (95% CI: -0.38 – 0.31); intercept = 4.34 (95% CI: -1.60 – 10.39); r² = 0.003; P = 0.83. Similarly, females exhibited no relationship between knee laxity and age at menarche: slope = -0.17 (95% CI: -0.95 – 0.61); intercept = 5.15 (95% CI: -8.47 – 15.16); r² = 0.02; P = 0.65. The absence of regression relationship persisted after controlling for current menstrual cycle status.

Conclusion: ACL laxity in females appears to be unrelated to age at menarche.

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MEDICINE & SCIENCE IN SPORTS & EXERCISE®

3164 Board #210 May 31 3:30 PM - 5:00 PM Pubertal Timing is Not Related to Anterior Cruciate Ligament Laxity in Young Adults.

Matthew Diehl, Andrew Froehle, Joseph Cox, Jedediah May, Sarah Kreul. Wright State University Boonshoft School of Medicine, Dayton, OH.

Email: diehl.27@wright.edu

(No relevant relationships reported)

Females sustain ACL injuries more often than males, especially among physically active adolescents and young adults. Studies suggest that increased estrogen during the ovulatory phase of the menstrual cycle is related to ephemerous increases in ACL laxity, and thus elevated injury risk. These hormonal factors may partially explain the sex-bias in injury risk, since males do not experience the same estrogen spikes and thus avoid these bouts of elevated risk. Little is known, however, about how variability in estrogen exposure within females affects inter-individual differences in injury risk. One factor that may play a role in cumulative estrogen exposure is age at menarche, since it relates to total number of cycles experienced. Our prior work shows links between age at menarche, pubertal growth patterns, and biomechanical risk for ACL injury. It is possible that age at menarche also has an impact on ACL injury risk through effects on laxity.

Purpose: To determine if age at menarche is related to female ACL laxity.

Methods: Subjects were recreationally active undergraduate and medical school females (N=15) and males (N=20). Males served as a control group, in which pubertal development timing was assessed as age at achieving adult height (recall). Age at menarche and current menstrual status in females were assessed by recall questionnaire. Telos™ stress radiography was used to assess ACL laxity. Statistical analysis consisted of an independent samples t-test to compare laxity in males and females. Linear regression analysis was used to determine whether laxity was related to pubertal timing within each sex.

Results: The t-test found no significant sex difference in ACL laxity (female mean ± SD = 3.0 ± 1.8 mm; male mean ± SD = 3.7 ± 1.7 mm; P=0.26). In males, regression analysis demonstrated no relationship between age at achieving adult height and knee laxity: slope = -0.03 (95% CI: -0.38 – 0.31); intercept = 4.34 (95% CI: -1.60 – 10.39); r² = 0.003; P = 0.83. Similarly, females exhibited no relationship between knee laxity and age at menarche: slope = -0.17 (95% CI: -0.95 – 0.61); intercept = 5.15 (95% CI: -8.47 – 15.16); r² = 0.02; P = 0.65. The absence of regression relationship persisted after controlling for current menstrual cycle status.

Conclusion: ACL laxity in females appears to be unrelated to age at menarche.

Sponsor: DACMEC

F-64 Free Communication/Poster - Breast Cancer

3166 Board #212 May 31 3:30 PM - 5:00 PM Impact of Aerobic and Resistance Exercise on Global Shoulder Function in Breast Cancer Survivors

Frank C. Sweeney1, Wendy Demark-Wahnefried2, Kerry S. Courneya3, Nathalie Sami4, Kyuwan Lee5, Debu Tripathy3, Thomas A. Buchanan6, Darcy Spicer7, Leslie Bernstein8, Joanne Mortimer1, Christina M. Dieli-Conwright, FACSM. 1University of Southern California, Los Angeles, CA. 2University of Alabama at Birmingham, Birmingham, AL. 3University of Alberta, Edmonton, AB, Canada. 4The University of Texas, MD Anderson Cancer Center, Houston, TX. 5City of Hope National Medical Center, Duarte, CA. (Sponsor: Christina Dieli-Conwright, FACSM)

(No relevant relationships reported)

Purpose: Treatment strategies for breast cancer including surgery, radiation, endocrine therapy and chemotherapy have contributed to improving survival rates. However, the implementation of surgical and radiation therapies precipitates adverse musculoskeletal effects in the upper extremity (UE), including decreased shoulder range of motion (ROM), weakness, and chronic pain, with 67% of breast cancer survivors (BCS) reporting upper extremity problems. The purpose of this exploratory analysis of a randomized, controlled trial was to investigate the effects of a 16-week aerobic and resistance exercise intervention on the functional mobility of the UE in BCS.

Methods: BCS were randomized to the Exercise (EX; N=50) or Control (CON; N=50) groups. The EX group underwent moderate-to-vigorous aerobic and resistance exercise sessions 3 times/week for 16 weeks. Functional mobility was assessed pre- and post-intervention by active ROM, maximal isometric voluntary strength, the Disabilities of Arm, Shoulder and Hand (DASH) questionnaire, and the Penn Shoulder Scale (PSS). Repeated-measures analyses of variance were used to compare pre- and post-intervention data in the two groups and assess between group differences.

Results: Included BCS were 53.5±10.4 years old, Hispanic white (55%) with body mass index 33.5±5.5 kg/m². Participants were treated with surgery (79% mastectomy) and both chemotherapy and radiation therapy (76%), including breast alone (55%) or breast + nodal radiation (45%). At baseline, EX and CON did not differ on functional mobility measures (pc>0.05). Post-intervention, the EX group experienced statistically significant improvements in active ROM (shoulder flexion, external rotation at 0°–90°), isometric strength (shoulder flexion, external rotation, internal rotation and horizontal adduction) and DASH/PSS scores when compared to their baseline measures (p<0.001) and to the CON group (p<0.001). The CON group did not experience any changes (p>0.05).

Lisfranc injuries account for 1 in 55,000 injuries yearly and are associated with poor outcomes and high complication rates. Superficially connecting the medial cuneiform and second metatarsal, the dorsal Lisfranc ligament is easily visualized with ultrasound. Ultrasound can provide quick, cost effective diagnosis but is not currently standard in clinical practice.

PURPOSE: This study sought to compare measurement accuracy of the dorsal Lisfranc ligament using ultrasound, external software, and gross anatomic dissection, with an additional anatomic study of the joint complex. METHODS: Ultrasound images of 22 embalmed cadaveric feet (13 male, 9 female, 79.5±13.3 years) were obtained using a 6-1MHz linear array. Dorsal Lisfranc ligament length and joint space were measured and compared between methodologies. Images were also re-measured using ImageJ software. Specimens were dissected to evaluate dorsal, interosseous, and plantar Lisfranc ligaments. Joint complex morphology was documented. RESULTS: Ultrasound (8.39±1.26 mm) and ImageJ measurements (8.26±1.76 mm) of the dorsal Lisfranc ligament did not differ significantly, but both were significantly different (p < 0.05) than gross dissection (10.81±1.84 mm). There were no significant differences in dorsal joint space measures between ultrasound (2.19±0.49 mm) and ImageJ (2.05±0.52 mm), but both were significantly different (p < 0.05) than dissection measurements (1.04±0.24 mm).

The dissected dorsal and interosseous ligaments had consistent morphology, whereas the plantar ligament demonstrated a Y- and a fan-shaped variant. A connection between the interosseous and plantar ligaments was present in 64% of dissections.

CONCLUSION: The dorsal Lisfranc ligament is easily visualized on ultrasound with 23% of the ligament not clearly visible at the peripheral bony attachments. While visually unrepresented on ultrasound, measurements were consistent. Radiographic joint space measurement remains the diagnostic gold standard. Further research should focus on using ultrasound to measure both bony and ligament integrity. Ligament echogenicity provides additional diagnostic information to assess more subtle joint injuries. Additionally, the plantar Lisfranc ligament variability may impact the stability of the joint in some patients.
Results: At baseline, HIIT and CON groups did not differ by age (46.9±9.8yr) or BMI (31.6±5.1kg/m²). Paired t-test and repeated ANOVA were used to determine effects of the intervention over time. Lean mass and fat mass were obtained at baseline (wk0) and at the end of the intervention (wk9) in both groups. Total body weight, LM, FM, and upper and lower body strength between groups. Total body weight did not change significantly in the HIIT (wk0: 77.5±13.7kg to wk9: 76.0±13.4kg, p>0.05) or CON (wk0: 72.7±12.5kg to wk9: 72.6±13.2kg) groups. Lean mass significantly increased in the HIIT (wk0: 41.2±13.8kg to wk9: 42.4±13.6kg, p<0.05) and CON (wk0: 37.0±12.6kg to wk9: 38.2±12.3kg, p>0.05) groups. Lean mass significantly increased in the HIIT group (HIIT: wk0: 40.0±6.4kg to wk9: 41.4±6.2kg, p<0.05) and did not change in the CON group (wk0: 40.3±8.2kg to wk9: 40.2±8.3kg, p>0.05). The CON groups experienced a significant decrease in LM (wk0: 37.0±12.6kg to wk9: 35.4±13.4kg, p>0.05) as well as CRF and SEVR (r = -0.40; p = 0.25). Conclusions: Previous studies have shown that HIIT intervention in breast cancer survivors can improve body composition and strength without compromising physical function. Further studies are needed to explore the long-term effects of HIIT on body composition in this population.

Purpose: While widely used in breast cancer patients, antracyclines induce multiple adverse side effects, including weight gain and muscle atrophy. High intensity interval training (HIIT) is a novel exercise method that improves glucose metabolism, cardiorespiratory fitness and body composition in less exercise time than traditional continuous aerobic exercise in the general population. However, the effects of HIIT on body composition when performed during chemotherapy are unknown. The purpose of this study was to examine the effects of HIIT on body composition in breast cancer patients undergoing anthracycline chemotherapy.

Methods: Thirty sedentary breast cancer patients diagnosed with stage I-III breast cancer were randomized to exercise (HIIT=15) or control (CON=15) groups. HIIT performed 3 exercise sessions per week on stationary bike for 8 weeks during anthracycline chemotherapy. Exercise intensity was individually prescribed based on peak power output (PPO) and each HIIT session included 7 alternating bouts of 90% of peak power output followed by 10% peak power output. CON was asked to maintain current level of activity. Lean mass and fat mass were obtained at baseline (wk0) and post-treatment (wk9) from the InBody 770 bioelectrical impedance scale ( Biospace, Cerritos, California). Paired t-test and repeated ANOVA were used to determine effects of HIIT on body composition within and between the two groups.

Results: At baseline, HIIT and CON groups did not differ by age (46.0±9.9yr) or BMI (31.0±7.5kg/m²). Following 8 weeks, body composition did not significantly change in either group (p>0.05). Fat mass slightly decreased in the HIIT (wk0: 37.8±13.8kg to wk9: 35.4±13.4kg, p>0.05) and CON (wk0: 30.2±12.6kg to wk9: 29.4±13.7kg, p>0.05) groups. Lean mass slightly increased in the HIIT group (HIIT: wk0: 44.0±6.4kg to wk9: 44.7±6.2kg, p<0.05) and did not change in the CON group (wk0: 44.3±8.2kg to wk9: 44.2±8.3kg, p>0.05). The CON groups experienced a significant decrease in LM (wk0: 37.0±12.6kg to wk9: 35.4±13.4kg, p>0.05) as well as CRF and SEVR (r = -0.40; p = 0.25). Conclusions: Previous analyses revealed that a community-based exercise program is effective in improving CRF while either maintaining or improving other markers of physical fitness. Community-based exercise programs have the potential to be viable alternatives for treating BCS who are presently experiencing CRF. Future studies are needed to explore relationships among CRF and other markers of physical fitness as they could provide insight into potential underlying mechanisms driving CRF. Supported by funding from the Breast Cancer Research Foundation of New York.

Purpose: Currently used accelerometer cut-points to identify different intensities of physical activity are validated in the healthy population. These cut-points may not be applicable to patients with cancer due to lower fitness levels or different energy expenditure in rest. We aimed to examine the relationship between oxygen consumption and accelerometer output during different controlled activities in women with breast cancer shortly after completion of chemotherapy treatment.

Methods: Forty women aged 50.4 (SD 9.5) years who completed chemotherapy treatment for breast cancer two to four months ago participated in this laboratory study. A cardiopulmonary exercise test was conducted to assess peak oxygen consumption (peakVO2). Oxygen consumption in rest was assessed while lying supine for 6 minutes. Subsequently, nine activities with different intensities were performed while wearing an accelerometer on the right hip, and during which oxygen consumption was assessed. The relationship between oxygen consumption (expressed as percentage of peakVO2, and Metabolic Equivalent of Task (MET) value) and accelerometer output (in counts per minute (cpm)) was studied with linear regression analyses.

Results: PeakVO2 was 21.5 (SD 6.1) mL/kg/min. Oxygen consumption in rest was 3.1 (SD 0.6) mL/kg/min. The accelerometer output corresponding to the cut-points for low versus moderate (40% peakVO2) and moderate versus vigorous (60% peakVO2) intensity physical activity were 1000 and 1868 cpm, respectively. These analyses based on MET values resulted in a cut-point of 1172 cpm to distinguish between low and moderate intensity physical activity (3 MET) and a cut-point of 2689 cpm to distinguish between moderate and vigorous intensity physical activity (6 MET).

Conclusions: The accelerometer cut-points to distinguish different physical activity intensities were lower than cut-points validated in the general population (i.e. 1952 cpm for moderate and 5724 cpm for vigorous intensity). This finding was irrespective of the method used to express oxygen consumption (%peakVO2 versus MET). This study demonstrates that the use of accelerometer cut-points validated in the general (healthy) population underestimates the physical activity intensities in patients with breast cancer after chemotherapy treatment.
In the earlier OptiTrain randomized controlled exercise trial, we found beneficial effects of two different exercise programs on health and treatment related outcomes. PURPOSE: The aim of this study was to report on cancer-related fatigue (CRF), quality of life (QoL), symptoms, muscle strength, cardiovascular fitness, body mass and physical activity levels of women with stage I-IIA breast cancer who had been involved in the OptiTrain exercise RCT, 24 months from baseline. METHODS: The original 16-week, supervised exercise program was a three-armed, randomized controlled trial comparing the effects of a combined program of resistance training and high intensity interval training (RT-HIIT) to usual care among 240 women with breast cancer undergoing chemotherapy. At 24 months, 117 and 155 participants participated in the in-clinic tests and completed the self-report questionnaires, respectively. We assessed CRF, QoL, symptoms, muscle strength, estimated cardiorespiratory fitness, body mass and objectively measured sedentary behaviour and physical activity. Analyses included mixed linear effects model analyses. RESULTS: RT-HIIT reported lower levels of total CRF (1.37, 95% confidence interval (CI) -2.70, -0.04, effect size (ES) = -0.38), cognitive CRF (-1.47, 95% CI -2.75, -0.18, ES = -0.44), physical symptoms (-0.23, 95% CI -2.70, -0.00, ES = -0.29) but higher muscle strength (12.09, 95% CI 3.77, 20.40, ES = 0.51) than UC at 24 months. Whereas AT-HIIT reported lower total symptoms (-0.23, 95% CI -0.42, -0.03, ES = -0.29), symptom burden (-0.30, 95% CI -0.60, -0.01, ES = -0.08 (no effect)) and body mass (-2.15, 95% CI -3.71, -0.60, ES = -0.28) than UC at 24 months. CONCLUSIONS: The RT-HIIT group from the OptiTrain exercise RCT reported lower levels of total and cognitive CRF, and physical symptoms but higher muscle strength at 24 months, whereas, the AT-HIIT group reported lower total symptoms, and body mass at 24 months. The clinically relevant ES in muscle strength in the RT-HIIT is particularly encouraging given the importance of muscle strength as a predictor of many relevant health outcomes. While these results are promising, effect sizes range from small to medium and the results must therefore be interpreted with caution.

F-65 Free Communication/Poster - Clinical Exercise Physiology - Other

Inflammatory and Affective Responses to Acute Resistance Exercise of Varying Loads in Postmenopausal Women.

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(No relevant relationships reported)
3175 Board #221 May 31 3:30 PM - 5:00 PM
Blood Pressure Abnormalities Among NCAA Athletes
Hannah M. Wright1, Michael C. Meyers, FACSM2, Mark L. Niebyski2, James C. Sterling1, Shack K. Robinson1. 1Idaho State University, Pocatello, ID. 2World Hypertension League, Corvallis, MT. 3Baylor, Scott & White, Dallas, TX.
Email: wrighannah@isu.edu

No relevant relationships reported

Although an athlete is routinely exposed to rigorous physical training programs leading to improved cardiorespiratory function, more recently, there has been concern with athletes presenting with hemodynamic abnormalities commonly associated with morbidity and mortality within the general population. PURPOSE: To quantify blood pressure (BP) abnormalities among NCAA Division I and II collegiate athletes.

METHODS: Following written informed consent, 217 (131 male, 86 female) athletes (mean ± SEM; age = 20.0 ± 0.1 yr; ht = 178.7 ± 1.1 cm; wt = 86.9 ± 1.8 kg) underwent supine, hyperventilation, and standing BPs using a manual, hand-held sphygmomanometer as part of a preexercise evaluation prior to CPT. Supine BPs were subsequently evaluated using ACC/AHA criteria, with data analyzed by gender and race (50 African American, 167 White).

RESULTS: MANOVAs (Wilk’s λ) indicated a significant main effect across gender (F2,214 = 14.987, P < 0.0001), but not race (F2,214 = 2.239; P = 0.101). Post hoc analyses indicated that, overall, males exhibited a higher incidence of elevated BP (BPsys > 129 mm Hg, BPdias > 80 mm Hg) than females, respectively. Among the 45.6% of total athletes diagnosed with elevated BP, 74.7% were males (BPsys > 129.0±0.7 mm Hg, BPdias > 80.1±0.9 mm Hg). Of equal concern, was the hypertension indicated in 7.6% of male athletes (BPsys > 142.1±8.1 mm Hg, BPdias > 90.5±1.9 mm Hg). Among these athletes, 30% exhibited more than one elevation of BP.

CONCLUSION: Findings indicated that 50.2% of NCAA Division I and II athletes in this study were diagnosed, based on ACC/AHA guidelines, with either elevated BP (BPsys > 129 mm Hg, BPdias > 80 mm Hg) or Stage I or II hypertension (BPsys > 139 mm Hg, BPdias > 85 mm Hg). These findings support the need for early detection, follow-up screening, and non-drug treatment of athletes to include identifying risk factors (i.e., stress) and knowledge assessment. Ongoing studies are underway to assess the breadth and long-term implications of the risk.

3176 Board #222 May 31 3:30 PM - 5:00 PM
Cardiac Etiology of Exercise Induced Hypoxemia within Elite Athletes
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No relevant relationships reported

PURPOSE: Exercise induced hypoxemia (EIH) is common finding within a group of elite athletes. It is generally thought, that the causality lies in the pulmonary. We report results of a study to evaluate the cardiac origin of the EIH.

METHODS: Eleven males (mean ± SD; age: 24.3 ± 5.4 years; BMI: 26.0 ± 5.3 kg/m2; HBA1c: 5.2 ± 0.2%; VO2iast: 38.3 ± 6.1 ml/kg/min) performed four randomized trials: presence of the hypoxemia. Differential diagnoses was based on previously published reports for evaluation of cardiac shunts - number of microbubbles and latency (number of cardiac cycles) between the shunts, and appearance of the microbubbles in the left heart. Trans-esophageal echo has been performed in the follow up procedure to evaluate the anatomical etiology of the shunt.

RESULTS: Four athletes presented pulmonary etiology of the hypoxemia. Four athletes have presented cardiac origin with right to left shunt causing EIH. Consequent transthoracic echocardiography at hospitalization and follow up examination of one athlete revealed ASD and three patent foramen ovale (PFO). One athlete with present PFO ASD underwent successful catheterization closure due to anatomical challenges.

CONCLUSIONS: Exercise induced hypoxemia is generally thought to be caused by anatomical or functional shunts within the pulmonary circulation. Our findings suggest possibly higher prevalence than originally thought of cardiac etiology. Successful treatment by catheter-based closure device improves performance and eliminate other clinical signs of the right to left cardiac shunt. Further evaluation of larger group of elite athletes with EIH is warranted to understand better the real prevalence and possible treatment of the cardiac origin of the EIH.

3177 Board #223 May 31 3:30 PM - 5:00 PM
Metabolic And Cardiovascular Effects Of Body Weight Support Treadmill Walking In Healthy Older Adults.
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Email: vanzant@findlay.edu

No relevant relationships reported

Purpose: Body weight supported treadmill training (BWSTT) has been proven to be effective for gait re-education for patients experiencing neurologic and musculoskeletal impairments. Recently our lab showed no significant difference in cardiovascular and metabolic effects of BWSTT in healthy young adults at clinically appropriate levels of body weight support (BWS). The purpose of this study was to determine the effects of BWSTT on cardiovascular and metabolic function in older (50-80 years) healthy adults. Methods: A total of 20 subjects (50% female, 58.3±7.3 yr; 172.6±9.0 cm; 84.2±22.4 kg; 28.2±5.4 kg/m²) provided their informed consent for study participation. Each subject completed 3, 5-minute treadmill walking trials at a self-selected pace, with 0%, 15%, and 30% BWS, performed in a single-blind randomized fashion. Subjects rested for a minimum of 5 minutes between each trial, and did not begin a subsequent trial until HR was verified to be < 5 bpm of HR rest. Heart rate using a Polar Beat HR monitor, blood pressure (BP) via auscultation, rate of perceived exertion (RPE) using the Borg ratio scale, and oxygen uptake (VO₂) using continuous indirect calorimetry, were measured at rest, and during the 3 walking trials. Mean walking time, mean walking distance, mean VO₂, mean B岘rm, heart rate during the trials were calculated. All tested parameters for all exercise trials were significantly (p<0.05) different from rest. Results: VO₂, HR, B岘rm, and treadmill walking times were greater at 15% BWS than 0% BWS. However, these differences were not statistically significant (p>0.05) at 30% BWS. Conclusion: In contrast to previous findings in younger adults, 30% BWSTT elicits a significant reduction in VO₂ and treadmill distance in older adults at self-selected walking speeds.
no exercise and no whey protein (R); acute treadmill exercise (EX; 70% VO2 max for 60 min) performed ~12-14 hrs prior to a 75 g oral glucose tolerance test (OGTT); 50 g of whey protein (W) administered as a 30 min preload prior to an OGTT; and EX combined with W (EXW). Plasma samples from the OGTTs were analyzed for insulin, glucagon, GIP and GLP-1 using multiplex kits. Glucose was measured using enzyme-electrode technology. All variables are represented as incremental area under the curve (IAUC).

RESULTS: Glucose and insulin responses are represented in Table 1. GIP, GLP-1, and glucagon increased for both W and EXW compared to R (p < .01) and EX (p < .03).

Table 1. Participant glucose and insulin iAUC between trials

<table>
<thead>
<tr>
<th>Glucose (mmol x 120 min)</th>
<th>R</th>
<th>EX</th>
<th>EXW</th>
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<tr>
<td>116.8 ± 105.3</td>
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<td>155.7 ± 92.9</td>
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<td>-21.1* ± 103.6</td>
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<td>16.2* ± 118.1</td>
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<tr>
<th>Insulin (pmol x 120 min)</th>
<th>R</th>
<th>EX</th>
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<tr>
<td>40922 ± 32078</td>
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<tr>
<td>34176 ± 22623</td>
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<tr>
<td>78956 ± 36162</td>
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<td>63182 ± 51780</td>
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* p < .01 vs R; † p < .01 vs EX

CONCLUSION: Postprandial glucose responses are reduced following the consumption of 50 g of whey protein prior to a 75 g glucose challenge. Additionally, 50 g of whey protein increased plasma GIP and GLP-1, which has been shown to stimulate insulin secretion. Based on these findings, the combination of acute aerobic exercise and whey protein provides the most beneficial comparison to exercise or whey alone.

Bilateral asymmetry (BA) is defined as any significant differences in functional or anthropometric measures between contralateral limbs. BA in muscle function has previously been observed in persons with multiple sclerosis (PwMS), with higher levels of asymmetry in lower limb strength having a negative impact on walking capacity and quality of life. Previous methods used with PwMS have not allowed for the assessment of BA during bipedal movements. Purpose: The aim of the current study was to assess the levels of BA in power output in PwMS during submaximal cycling compared to healthy controls. Methods: Eight PwMS and 6 controls completed a cycle ergometer graded exercise test (GXT) at a self-selected cadence. Peak torque (PT) produced by each leg was assessed at 50%, 60%, and 70% of peak power output (PPO) to determine level of BA. Subjects additionally completed a 25-ft walk test (25FWT), six-min walk test (6MWT), and maximal voluntary contractions (MVCs) of the knee extensors. Group comparisons were assessed at each %PPO using a mixed factorial ANOVA. Correlations between GXT outcomes and 25FWT, 6MWT, MVC, and Expanded Disability Status Scale (EDSS) scores were assessed using Pearson’s r and Spearman’s rho correlations. Results: Non-significant effects were found for the Group x %PPO interaction (p > .05) and %PPO (p > .49) variables. Compared to controls, PwMS did not show any significant differences in BA at any %PPO. When collapsed across groups, the % difference in peak torque was found to have a weak to strong correlation with the 25FWT (r = -0.72, 0.80, and 0.79, all p < .01), 6MWT (r = -0.41 p < 0.04, -0.63 p < 0.02 and -0.73 p < .0) MVC (r = -0.27 p < 0.35, 0.47 p < 0.09, and 0.80 p < 0.00) and EDSS (rho = 0.38 p < 0.18, 0.27 p < 0.35, 0.02 p = 0.49) at 50, 60, and 70% of PPO respectively. Conclusion: No significant differences were found for cycling peak torque asymmetry between PwMS and controls. Despite non-significance, PwMS displayed a between limbs difference of ≥10% for peak torque at all levels of %PPO whereas controls all had differences <10%. Furthermore peak torque asymmetry was found to correlate moderately well with MS outcome measurements when collapsed across groups. Future research is needed to determine the viability of assessing BA with cycling PT measures.

Multiple Sclerosis (MS) is a progressive immune-mediated disease that causes demyelination of the central nervous system. One of the most common symptoms in MS patients is fatigue. While strength asymmetries (SA) have been previously identified in MS patients, less is known of the impact fatigue has on SA. Fatigue of ankle dorsiflexion (AD) has the potential to limit walking function and activities of daily living (ADL) in MS patients. PURPOSE: To investigate the impact AD fatigue has on peak torque (PT) between limbs in MS patients compared to healthy individuals (Non-MS). METHODS: 26 individuals participated in the current study (MS: n = 13, Age = 50.3 ± 9.1 yrs, Expanded Disability Status Scale = 3.5 ± 1.8; Non-MS: n = 13, Age = 50.8 ± 8.5 yrs). Visit 1 & 2 consisted of test familiarization sessions. Visit 3 consisted of pre-exercise (PRE) maximal isometric contractions (MVC) of AD followed by fatiguing isometric exercise (FE) at 30% MVC until exhaustion. Immediately (POST) and 2 minutes (REC) after exercise subsequent MVCs were performed. Both limbs were tested with 15 minutes of rest between FE. Limbs were separated for analysis based on MVC PT (strong vs. weak). RESULTS: There was no group or limb difference in FE duration. When both limbs were collapsed for analysis,
FE duration was significantly lower in the MS group compared to the Non-MS group (161.14 ± 97.13 vs. 226.24 ± 83.77, respectively; p < 0.009). PT significantly decreased PRE-POST-REC but still significantly less at REC from PRE for both limbs within each group (p < 0.05). The MS group showed a significant PT difference between limbs at PRE (Δ 4.34 ± 5.88 N; p < 0.05) and REC (Δ 3.94 ± 7.14 N; p < 0.05), while the Non-MS group showed no limb difference. PRE PT was significantly correlated to FE duration in the Non-MS group (r = 0.55; p < 0.003), but there were no significant correlations between PRE PT and FE duration in the MS group (p > 0.1). CONCLUSION: The MS group fatigued more quickly than the Non-MS group, however there was no fatigue asymmetries between limbs. The fatiguing exercise attenuated PT differences between limbs in the MS group but not in the Non-MS group. Strength was not related to FE duration in the MS group, but was so in the Non-MS group. The lack of a relationship between strength and fatigue in MS patients may help guide rehabilitation to improve ADLs.

3182 Board #228 May 31 3:30 PM - 5:00 PM Benefits Of Whole Body Vibration Exercise For Non-specific Chronic Low Back Pain: An Assessor-blind, Randomized Controlled Trial Xueqiang Wang, Peijie Chen. Shanghai University of Sport, Shanghai, China. Email: qiang897@163.com (No relevant relationships reported)

PURPOSE: The purpose of this study was to confirm the benefits of whole body vibration (WBV) exercise for pain intensity and functional disability in patients with non-specific chronic low back pain (NSCLBP). METHODS: This was a 2-arm single-blind randomized controlled trial. Eighty-nine NSCLBP patients met the inclusion criteria, they were randomly allocated to either the WBV exercise group (n=45) or the control group (n=44). The WBV exercise group received WBV exercises three times a week for 12 weeks. The control group received a general exercise protocol three times a week for 12 weeks. Primary outcome measures were pain intensity and functional disability measured by the visual analog scale (VAS) scores and Oswestry Disability Index (ODI). The secondary outcome measures included lumbar joint position sense, quality of life (Short Form Health Survey 36, SF-36) and overall treatment effect (Global Perceived Effect). RESULTS: A total of 84 NSCLBP patients completed the 12-week study program. After 12 weeks, compared with the control group, the mean VAS and ODI scores decreased by additional 1 point (95% CI; 1.22, -0.78; P<0.001), 3.81 point (95% CI; -4.98, -2.63; P<0.001) based on adjusted analysis in the WBV exercise group. And the WBV exercise group provided additional beneficial effects for in terms of lumbar joint position sense, SF-36 (P<0.05), and Global Perceived Effect (P<0.012). CONCLUSIONS: The study demonstrated that WBV exercise could provide more benefits than general exercise for relieving pain and improving functional disability in patients with NSCLBP.

3183 Board #229 May 31 3:30 PM - 5:00 PM The Synergic Impact of Sarcopenia and Dynapenia on depressive symptoms in Korean Older Adults Youngyoun Jin, Jinkyung Cho, Donghyun Kim, Inhwon Lee, Taewan Kim, Kiuk Jang, Hyunisk Kang. Sungkyunkwan University, Suwon, Korea, Republic of. (No relevant relationships reported)

The Synergic Impact of Sarcopenia and Dynapenia on Depressive Symptoms in Korean Older Adults

Purpose: To examine the synergistic impact of low appendicular skeletal muscle mass (ASM) and low muscle function (MF) on the risk of depressive symptoms in community-dwellers of Korean older adults.

Methods: Data obtained from a total of 446 participants aged 65 years or older (80% women) recruited from local communities were used in this analysis. ASM and MF were assessed with dual-energy X-ray absorbimetry (DEXA) and a 30-s chair stand test, respectively. Depressive symptoms were assessed with the center for epidemiologic studies depression Scale (CES-D). Logistic regression was used to estimate odds-ratios (ORs) and 95% confidence interval (CIs) for having depressive symptoms in elderly Korean adults, implying an urgency of an intervention targeting at both muscle mass and function for a healthy aging. This study was supported by the National Research Foundation funded by the Korean Government (NRF-2018R1D1A1B07048210 and NRF-2017R1A2B407357).

3184 Board #230 May 31 3:30 PM - 5:00 PM Effect of Resistance Training on Muscle Function and Functional Mobility in Adults with Cerebral Palsy Tiffany N. Raczynski, Victoria B. Kott, Pooja Pal, Areum K. Jensen. San Jose State University, San Jose, CA. (No relevant relationships reported)

Cerebral Palsy (CP) is a non-progressive neurological disorder due to damage in the brain leading to musculoskeletal dysfunction and immobility. Physical deconditioning of individuals with CP appears to accelerate muscle atrophy and osteoporosis; thus, adults with CP are more prone to fall and fracture. The lower state of balance and functional mobility is also related to the higher risk of fall in the general public, and resistance training is known to improve overall muscular strength and functional mobility. However, equivocal results were reported whether resistance training has a positive effect on muscular function and balance in CP population.

PURPOSE: To determine the influence of resistance training to muscular strength and balance in adults with CP who already developed muscle atrophy and osteoporosis.

METHODS: Twenty adults with and without CP were recruited. Seven CP participants completed post-exercise experiments after performing resistance training twice a week for three months. Muscular strength (torque, work, and power) at 90, 150, and 210 °/sec were assessed in the leg using the Humac Norm Isokinetic Dynamometer. Functional mobility was assessed from the Berg Balance Test, and limits of stability test using the Biodex balance system.

RESULTS: CP group had significantly lower knee extensor peak torque (e.g., 11.8±2.3 CP vs. 68.1±12.5 control, ft-lbs, P<0.05), and lower knee flexor peak torque (e.g., 6.3±1.6 CP vs. 41.8±7.9 control, ft-lbs, P<0.05) compared to control. After 3 months of training, CP group did not show statistical differences in muscular strength (e.g., extensor peak torque (27.5±17.0 pre vs. 31.5±24.2 post, ft-lbs, P>0.05), and flexor peak torque (9.3±5.6 pre. vs. 15.0±10.9 post, ft-lbs, P>0.05), or balance (e.g. overall score (25.2±16.1 pre vs. 24.3±11.4 post p<0.05) on limit of stability test, overall score (18.0±19.5 pre vs. 24.4±21.6 p<0.05) on Berg Balance test. However, individuals who improved peak torque in knee flexors and extensors also improved postural stability via the Berg balance test.

CONCLUSIONS: These preliminary findings suggest that muscular strength influences functional mobility in adults with CP only after exercise training.

3185 Board #231 May 31 3:30 PM - 5:00 PM Differential Effect of Obesity on Muscle Strength in Adults with Cerebral Palsy Bjorn L. Mulgintapang, Pooja Pal, Cory E. Low, Areum K. Jensen. San Jose State University, San Jose, CA. (No relevant relationships reported)

Cerebral Palsy (CP) is a non-progressive and permanent neurological disorder that is characterized by muscular deterioration and atrophy. The major clinical problem with CP is early development of cardiovascular disease with increased rates of mortality. Due to the inevitability of motor dysfunction adults with CP can develop health risk factors such as obesity at a higher rate compared to the general population. Limited information is available to identify levels of obesity and its relation to muscular function in adults with CP.

PURPOSE: To determine whether severity of obesity may affect muscular function and strength in adults with CP.

METHODS: We studied total of sixteen adults with and without CP. Muscular strength (i.e., torque, work, and power) during knee extension and flexion was measured at 90, 150, and 210 °/sec in the lower extremity using Humac Norm Isokinetic Dynamometer. Maximal isometric forearm muscle strength was measured using a handgrip dynamometer. Body mass index (BMI), waist to hip ratio, and whole-body scan from Dual Energy X-Ray Absorbimetry were used to identify the levels of obesity.

RESULTS: Compared to control, individuals with CP had similar BMI (26.8±3.0 CP vs. 22.9±1.0 control kg/m²; P>0.05), % body fat (35.2±4.5 CP vs. 28.4±3.7 control %; P>0.05), and % leg fat (40.7±4.3 CP vs. 30.5±4.1 control %; P>0.05). However, waist to hip ratio was significantly greater in CP (0.90±0.02 CP vs. 0.80±0.02 control; P<0.05); muscular strength was significantly lower in CP compared to control (e.g., knee extensor peak torque at 90 °/sec, 25.9±8.1 CP vs. 72.5±12.2 control ft-lbs; P<0.05). There was no relationship between BMI and extensor/flexor peak torque in both groups; however, there was a linear relationship between waist to hip ratio and extensor/flexor peak torque only in CP group (R²=0.34). A strong inverse relationship between % leg fat and extensor/flexor peak torque was observed in both groups (R²=0.79).

Abstracts were prepared by the authors and printed as submitted.
CONCLUSION: These findings suggest that central obesity rather than BMI appeared to influence muscular strength in CP adults. In addition, less fat in the legs rather than the total body may contribute for higher leg muscular strength in adults with CP. Supported by Central RSCA and Undergraduate Research Grant, SIU.

3186 Board #232 May 31 3:30 PM - 5:00 PM Effects Of Fatigue On Isometric And Isokinetic Dorsiflexion Strength Asymmetry In Multiple Sclerosis
Cameron Owens, Davis Lantis, Gregory Cantrell, Debra Bemben, FACSM, Christopher Black, FACSM, Daniel Larson, Rebecca Larson. 1University of Oklahoma, Norman, OK. 2St. Ambrose University, Davenport, IA. 3Northern State University, Aberdeen, SD.
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(No relevant relationships reported)

Multiple Sclerosis (MS) is an autoimmune disease affecting the central nervous system. MS is characterized by a variety of symptoms, with fatigue being the most commonly reported symptom. Strength asymmetry (SA) of knee extensor/flexor has been documented in previous research in individuals with MS. However, SA of the dorsiflexors in MS patients has yet to be fully investigated in a fatigued state.

PURPOSE: The aim of this study was to measure SA of the dorsiflexors during isometric/isokinetic maximal voluntary contractions (MVC/MVIC, respectively) before and after a fatigue test (FT).

METHODS: Thirteen individuals with MS (8 Female (F), 5 Male (M), Age = 50.3 ± 9.1 yrs. and an expanded disability status scale (EDSS) score = 3.5 ± 1.6) and 13 Non-MS (8 F and 5 M, Age = 50.8 ± 8.5 yrs.) participated in a three visit study. Visit 1 consisted of equipment and test procedure familiarization. The following two visits consisted of either a FT test at 30% of MVC or at 30% of MVIC. Prior to, and immediately following the FT, MVC or MVIC’s were performed. During each visit both legs were tested with a 15 minute break between assessments. The order of test (MVC or MVIC) and leg (left or right) was randomized. All MVIC’s were performed at 60%.

RESULTS: SA was calculated as the difference between limbs Pre and Post FT. Measurements of peak tension (PT), voluntary contraction time (VCT), and muscle tension maintaining capacity (MTMC) during MVC and MVIC between legs (within) and between groups were not statistically different (p>0.05). Although MVC MVIC and PT between groups was not significantly different, notable effect sizes (ES) were shown between groups during MVC for VCT (ES=0.67, MS vs. Non-MS= 0.12 ± 0.09 vs. 0.07 ± 0.06 sec, p= 0.12), and MVIC for PT (ES=0.8, MS vs. Non-MS= 3.3 ± 2.67 vs. 1.35 ± 1.23 Nm, p=0.06).

CONCLUSION: The moderate/large ES for MVC PT and MVIC VCT highlights the possibility of fatigue affecting SA and VCT differently between MS and Non-MS. In future studies, a larger sample size should be used to improve the statistical power of the analyses.

3187 Board #233 May 31 3:30 PM - 5:00 PM Safety And Feasibility Of Strength Training In Patients With Duchenne Muscular Dystrophy
Email: djlotttt@phhp.ufl.edu
(No relevant relationships reported)

Duchenne muscular dystrophy (DMD) is a rapidly progressive and currently incurable neuromuscular disease. Understanding the role of exercise is important for these patients as high-intensity or eccentric actions can be damaging in DMD yet a lack of loading may exacerbate muscle dysfunction. Isometric exercise may be safe and potentially delay the loss of muscle function in DMD, no study has systematically examined the potential of strengthening exercise to improve muscle function or attenuate disease progression.

PURPOSE: To examine the safety and feasibility of a pilot, in-home strengthening intervention consisting of knee extensor (KE) and flexor (KF) exercise in DMD.

METHODS: Eight ambulatory boys with DMD [9.3 (0.8) yrs, BMI 19.0 (4.6) kg/m²] on corticosteroid therapy were recruited to undergo 12 weeks of isometric exercise training of the bilateral KE and KF. Exercise prescription consisted of 4 sets x 6 reps, 3x/week at a target intensity of 50% maximal volitional contraction (MVC). At baseline (BL), MVC testing and training familiarization were done for one week on site. Exercise equipment (custom built chair, laptop, and load cell) was subsequently shipped allowing for in-home training and supervision via live video conferencing for each session. Safety outcome measures to assess muscle damage included magnetic resonance proton transverse relaxation time (T₂) of KE and KF, pain assessment, and creatine kinase levels at BL, 1, 6, and 12wks. MVC strength and KF MVC and time to ascend/descend 4 steps were also assessed at BL and 12wks.

RESULTS: The 7 boys who completed the strength training program had a compliance of 84.9 (9.0)% for the exercise sessions. The safety measures did not indicate signs of muscle damage [non-significant change in mean T₂; KE=2.3 (3.6)% and KF=0.4 (4.0)%]. Peak torque increased by 20.6% for KE (p<0.01) and 14.3% for KF (p<0.05), and the time to ascend (19.2% ± 2.7%, p<0.05) steps improved after exercise training.

CONCLUSION: This in-home, 12-week supervised strength training program was safe, feasible, and improved strength and function in boys with DMD. Future research is required to optimize the strengthening protocol and further explore its potential efficacy and clinical application.

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The prevalence of chronic low back pain (CLBP) in young adults is increasing; however, the biological mechanism of CLBP in this population remains unknown.

PURPOSE: To observe the characteristics of muscle tone and stiffness (MTS) of relevant muscle groups in young adults with CLBP, in order to provide reference for rehabilitation and prevention of CLBP.

METHODS: Twenty six subjects with CLBP (age: 22±2 years, 14 males and 12 females) were recruited as the experimental (E) group, while 29 healthy subjects (age: 25±2 years, 16 males and 13 females) were recruited as the control (C) group.

The degree of pain (Visual Analogue Scale/Score, VAS) was recorded, and the MTS (indicators including F-Frequency, D-Logarithmic Decrement and S-Stiffness) of three muscle groups (para-spinal, hamstring and tensor fascia lata) muscles was assessed using the Myoton-3 equipment. Group differences were determined by using independent-sample t-tests; within the E group, MTS was compared between gender and degree of pain (VAS) using ANOVA.

RESULTS: Compared with C group, the E group’s MTS of all three muscles were significantly higher(p<0.05), and the differences were 11.4%, 10.0% and 14.9% respectively. E group showed bilateral imbalance in all 3 muscles, while C group did not show imbalance. With the E group, compared with female subjects, male subjects had higher MTS of tensor fascia lata and para-spinal muscles (p<0.05), and the differences were 12.8% and 20.0%, respectively; in addition, the MTS values of tensor fascia lata, hamstring and para-spinal muscles in the subjects with moderate pain (VAS 4–7) were higher than those with mild pain (VAS 1–3) (p<0.05), and the differences were 12.7%, 14.9% and 22.2% respectively.

CONCLUSIONS: MTS is associated with considerable increase of hamstring, para-spinal muscle and tensor fascia lata in young patients with CLBP; Young CLBP patients had significant bilateral MTS imbalance of all these muscles; Young male CLBP patients had higher MTS in para-spinal muscle and tensor fascia lata than female patients; The more painful, the higher of the MTS in young CLBP patients.

3189 Board #235 May 31 3:30 PM - 5:00 PM Differential Effect of Resistance Training on Musculoskeletal Architecture and Strength in Adults with Cerebral Palsy
Ramon C. Ronquillo, Mac G. Damoulos, Cory E. Low, Alan L. De Vera, Areum K. Jensen. San Jose State University, San Jose, CA.
(No relevant relationships reported)

Cerebral Palsy (CP) is a neurological disorder caused by lesions in the brain and is characterized by impaired motor function, musculoskeletal deformity, and atrophy. Individuals with CP appear to develop osteoporosis at an earlier age compared to the general population. Bone weakness has adverse effects on the muscular system, which causes CP population to be more prone to fractures and further immobility. Bone mineral density (BMD) improves in the general population via resistance training. However, it is still uncertain whether resistance training alters skeletal strength in the CP population and whether it influences musculoskeletal architecture and strength.

PURPOSE: To determine the effect of resistance training on BMD, skeletal architecture, and muscular strength in adults with CP.

METHODS: We studied 14 adults with and without CP. CP participants went through 3 months of resistance training twice per week. Dual-energy X-ray absorptiometry was used to measure local BMD and architectural differences in the long bone, lumbar spine (L1-L4) and proximal femur, and tibia/ulna regions. Architectural differences were identified by measuring various angles and lengths in the proximal femur. Leg muscular strength was measured during knee extension and flexion using the Humac Norm Isokinetic Dynamometer.

RESULTS: There was a significant increase in BMD at femur in CP group after 3 month exercise (0.6±0.1 vs. 0.9±0.1; p<0.01) and BMD at lumbar and forearm in CP group was similar to control group even though BMD in CP group seemed to improve after training (P>0.05). Skeletal architecture and muscular strength were significantly lower in CP compared to control, but it did not change after resistance.
CONCLUSIONS: Our preliminary findings of decreased BF through PHA indicate conditions that elicit PHA (e.g. wearing narrow-toed shoes) may affect BF and tissue health.

Purpose: Plantar fasciitis is postulated to arise from chronic overload. First line treatment includes non-steroidal anti-inflammatory drugs, orthotics, physical therapy and stretching exercises. Patients who do not respond to the above after a 6-month period can be considered for extracorporeal shock wave therapy (ESWT). In this study, we evaluated the outcomes of conventional physiotherapy alone versus physiotherapy together with ESWT over a 6-month period for patients diagnosed with plantar fasciitis.

Method: Patients with heel pain who presented to the Specialist Orthopaedic Clinic from April 2017 to Apr 2018 were assessed for eligibility criteria. Enrolled patients were randomized into 2 arms: physiotherapy alone, or physiotherapy together with ESWT. Clinical and functional outcomes were evaluated using the SF 36 score, the American Orthopaedic Foot-Ankle Society (AOFAS) hindfoot score, as well as the Visual Analog Scale (VAS) at baseline, 3 months, and 6 months. Results: A total of 26 subjects were recruited; 1 dropped out of the study, and 5 defaulted follow-up. Results from the remaining 20 subjects were analysed. No significant difference in SF 36 score was found at 3-month follow-up (physical functioning p=0.806, physical limitations p=0.624, body pain p=0.075, general health p=0.879, vitality p=0.119, social functioning p=0.419, emotional limitations p=0.939, mental health p=0.770). The differences in AOFAS and VAS at 3-month follow-up were not statistically significant (p=0.222 for AOFAS, p=0.329 for VAS).

There was also no significant difference in SF 36 score after 6 months (physical functioning p=0.814, physical limitations p=0.481, body pain p=0.091, general health p=0.427, vitality p=0.839, social functioning p=0.680, emotional limitations p=0.299, mental health p=0.416). 6-month post-intervention AOFAS and VAS were not significantly different (p=0.978 for AOFAS, p=0.372 for VAS).

Conclusion: Our study showed no significant differences in SF 36 score, AOFAS, and VAS after a 6-month period between participants who underwent physiotherapy alone as compared with those who received ESWT in addition to physiotherapy. No serious adverse events were noted at the 6-month follow-up visit. Further studies need to be undertaken with a larger sample size, and a longer follow-up period.

S192 Board #238 May 31 3:30 PM - 5:00 PM
A Randomized Controlled Trial Comparing Physiotherapy And Extracorporeal Shock-wave Therapy In Treatment Of Plantar Fasciitis
Jade Chee1, Charles Kon1. *Singhealth, Singapore, Singapore. 1 Changi General Hospital, Singapore, Singapore. (No relevant relationships reported)

Purpose: Plantar fasciitis is postulated to arise from chronic overload. First line treatment includes non-steroidal anti-inflammatory drugs, orthotics, physical therapy and stretching exercises. Patients who do not respond to the above after a 6-month period can be considered for extracorporeal shock wave therapy (ESWT). In this study, we evaluated the outcomes of conventional physiotherapy alone versus physiotherapy together with ESWT over a 6-month period for patients diagnosed with plantar fasciitis.

Method: Patients with heel pain who presented to the Specialist Orthopaedic Clinic from April 2017 to Apr 2018 were assessed for eligibility criteria. Enrolled patients were randomized into 2 arms: physiotherapy alone, or physiotherapy together with ESWT. Clinical and functional outcomes were evaluated using the SF 36 score, the American Orthopaedic Foot-Ankle Society (AOFAS) hindfoot score, as well as the Visual Analog Scale (VAS) at baseline, 3 months, and 6 months. Results: A total of 26 subjects were recruited; 1 dropped out of the study, and 5 defaulted follow-up. Results from the remaining 20 subjects were analysed. No significant difference in SF 36 score was found at 3-month follow-up (physical functioning p=0.806, physical limitations p=0.624, body pain p=0.075, general health p=0.879, vitality p=0.119, social functioning p=0.419, emotional limitations p=0.939, mental health p=0.770). The differences in AOFAS and VAS at 3-month follow-up were not statistically significant (p=0.222 for AOFAS, p=0.329 for VAS).

There was also no significant difference in SF 36 score after 6 months (physical functioning p=0.814, physical limitations p=0.481, body pain p=0.091, general health p=0.427, vitality p=0.839, social functioning p=0.680, emotional limitations p=0.299, mental health p=0.416). 6-month post-intervention AOFAS and VAS were not significantly different (p=0.978 for AOFAS, p=0.372 for VAS).

Conclusion: Our study showed no significant differences in SF 36 score, AOFAS, and VAS after a 6-month period between participants who underwent physiotherapy alone as compared with those who received ESWT in addition to physiotherapy. No serious adverse events were noted at the 6-month follow-up visit. Further studies need to be undertaken with a larger sample size, and a longer follow-up period.

S193 Board #239 May 31 3:30 PM - 5:00 PM
Effect Of A Virtual-exercise Program On Physical Function And Activity: Findings From The VERITAS Trial
Janet P. Bettger1, Cynthia L. Green1, DaJuanica Holmes2, Anang Chokshi3, Bryan T. Hoch4, Arthur J. Deleon4, Laura Webb2, Vincent Miller2, Joseph M. Smith3, Eric D. Peterson4, 1Duke University, Durham, NC. 2Duke Clinical Research Institute, Durham, NC. 3Revection Health, San Diego, CA. 4Duke Health, Durham, NC. Email: janet.bettger@duke.edu
Reported Relationships: J. P. Bettger: Industry contracted research; Reflection Health.

Purpose: To determine the effect of a virtual exercise program versus usual care on physical function and activity 6 and 12 weeks after total knee arthroplasty (TKA). METHODS: We conducted a multicenter, randomized controlled trial with adults undergoing unilateral TKA. At least 10 days before surgery, participants were randomized 1:1 to the virtual exercise program with an avatar coach, in-home 3D biometrics and weekly telehealth clinician support versus usual care (referral to home health or outpatient physical therapy as determined by the surgeon and clinical team). Intention-to-treat analysis was used for the following 6- and 12-week secondary patient-reported outcomes: physical function (in five domains of the Knee injury and Osteoarthritis Outcome Score [KOOS], higher score is better function) and minutes per week of moderate-to-vigorous physical activity (MVPA). Patient satisfaction with the virtual exercise program was assessed of intervention group patients 12-weeks after surgery. RESULTS: From November 2016-December 2017, 306 patients were randomized (mean age, 65 years; 62.5% women); 287 completed the trial (143 virtual, 144 usual care). At 6 weeks, there was no difference between groups in pain, symptoms, quality of life, difficulty with daily activities, and with function needed for sports and recreation (p>0.05). Patients in the virtual exercise group reported a mean of 119.9 (SD 197.4) min/week of MVPA at 6 weeks compared with 68.9 (SD 112.0) min/week for usual care patients (p=0.089). At 12 weeks, physical activity, pain, symptoms, quality of life and daily activities were not significantly different between groups but
patients in the virtual exercise group reported less difficulty with function related to sports and recreation than usual care patients (intervention 75.6 [SD 19.2] vs usual care 61.5 [29.3], p=0.006). Patients in the virtual exercise group reported high likelihood of recommending the program to others (mean score 91.1 ± 2.1) on a scale of 0-100.

CONCLUSIONS: Among patients receiving TKA, the virtual exercise program increased MVPA in the first 6-weeks after surgery and resulted in measurable gains to physical function for sports and recreation activities at 12-weeks.

F-67 Basic Science World Congress/Poster - Sleep and Cardiometabolic Effect

Friday, May 31, 2019 - 1:00 PM - 6:00 PM
Room: CC-Hall WA2
3194 Board #240
May 31 3:30 PM - 5:00 PM
Impact Of Anxiety-state On Moderate Continuous And 3-km Time-trial Exercise After 36h Of Sleep Deprivation
Carina Faggiani Dias, Marcos Mônico Neto, Sérgio Tufik, Hanna Karen Moreira Antunes. UNIFESP. Santos, Brazil.
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No relevant relationships reported

Carina Faggiani Dias, Marcos Mônico-Neto, Sergio Tufik, Hanna Karen Moreira Antunes. Universidade Federal de São Paulo, UNIFESP.
Several evidences suggest that aerobic exercise performance decrease after sleep deprivation (SD) and psychobiology aspects could explain these effects, however, the role of anxiety on this way is poorer explored. Purpose: Investigate the role of anxiety-state on moderate continuous and 3-km time-trial exercise in subjects sleep deprived. Methods: Eleven healthy male subjects (32.72±6.73yrs; 70.93±7.9kg; 1.74±0.05m; 23.37±2.74 kg/m²), were submitted to 30 min of moderate continuous exercise followed a 3-km Time-Trial test in treadmill in two conditions separated by 15 days: Normal Sleep (7-8 hours of sleep) and SD (36 consecutive hours). The subjects answered an anxiety state questionnaire (Idate Trait-State) before (B), immediately after aerobic moderate continuous exercise (AM), immediately after 3-km time-trial (AT-T) and 30 minutes recovery (R). The time to finish the time-trial was used as performance index, and the time to partial distances was accompanied to observed strategy performance. The time-course and groups differences were compared by ANOVA repeated measures with post-hoc Duncan test, with significance P<0.05. The protocol was approved by Unifesp Ethics Committee (02.00369). Results: The mean score of anxiety were higher in SD condition in B (34.9 vs 38.18; P<0.03), AM (31.8 vs 38.6; P=0.006) and R (30.90 vs 37.23; P<0.01) time-courses. No differences were found in the total and partial time to complete the 3-km test. The initial velocity of the time-trial test was higher in the normal sleep condition (15.45 vs 13.95; P<0.005).

Conclusion: We observe that although the SD is not able to affect the total time to complete the 3-km test, the score of anxiety in different time-courses (before, during and after exercise) was higher in the SD condition. In addition, the strategy used were different, demonstrated by the lower initial velocity chosen by the volunteers sleep deprived. These findings suggest that the level of anxiety associated with SD can alter strategies by underestimating the performance.

Financial Support: AFIP, CAPES (#1179687), CNPq (400129/2016-7).

3195 Board #241
May 31 3:30 PM - 5:00 PM
Effects Of Bariatric Surgery On Cardiac Autonomic Parameters During Sleep
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No relevant relationships reported

PURPOSE: To analyze the effects of bariatric surgery on cardiac autonomic modulation in morbid obese patients.

METHODS: The study included 14 morbid obese patients that were submitted to bariatric surgery. Before and after surgery subjects were submitted to body mass index (BMI) assessment, answered, and were submitted to polysomnography. During polysomnography, AHI and cardiac autonomic modulation were assessed during sleep. RESULTS: After surgery BMI and AHI reduced significantly (p<0.05) from 48.7 ± 5.6 kg/m² to 41.9 ± 5.7 kg/m² and from 34 ± 29 events/h to 18 ± 16 events/h, respectively. Standard deviation were used as a measure of variability in pre and postoperative period and values were calculated with pre 829.20 ± 82.84 and post 972.24 ± 146.20 with p ≤ 0.001 demonstrating gains in HRV in all patients. [1] Additional information with the application of the spectral wavelet analysis in the frequency decomposition provided values pre 2.8775x10² and post 2.3440x10² (p<0.05).

CONCLUSIONS: Morbid obese submitted to bariatric surgery presents improvement in cardiac autonomic modulation during sleep.

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Oxygen Desaturation in Sleep Apnea is Inversely Associated with Vascular Changes Following Exercise Training
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No relevant relationships reported

PURPOSE: Obstructive sleep apnea (OSA) is characterized by reductions in nocturnal mean O2 saturation (meanSpO2) that may increase cardiovascular disease morbidity. The extent to which exercise confers cardioprotection in overweight adults with different meanSpO2 profiles is not known. The purpose of this study was to examine the association of meanSpO2, with vascular function changes following exercise training in adults with and without OSA.

METHODS: At baseline, participants underwent overnight polysomnography to determine the presence and severity of OSA. Tertile-based cut-off points were used to categorize meanSpO2 and apnea hypopnea index (AHI). Body fat was analyzed using dual energy X-ray absorptiometry. Vasoreactivity of the brachial artery was measured using flow-mediated dilation (FMD), while microcirculatory function was assessed via the total shear stress area under the curve (SSAUC) response during FMD. Body fat and vascular measures were repeated upon completion of a 6 week (3 sessions/wk; 1 hr/session) exercise training program.

RESULTS: Thirty (age: 49±2 years; BMI: 32.0±3.8 kg/m2; 16 men; 12 women) adults with and without OSA completed the study. At baseline, adults in the highest tertile of meanSpO2 were younger than those in the lowest tertile (43.29±3 vs 53.7±3 yr, p=0.017), yet no differences in vascular measures, AHI or total body fat percentage were observed across the tertiles. No changes in brachial arterial diameter or FMD were observed across tertiles following exercise. However, the change in SSAUC in the highest tertile of meanSpO2 was greater, compared to the lowest tertile (13.6±3 vs 15.8±9 A.U. vs. –186±10879 A.U., p=0.041). Forward stepwise linear regression revealed that the highest tertile of meanSpO2 was a significant (F=5.15, p=0.036) determinant of the increased SSAUC with exercise, independent of age and baseline SSAUC.

CONCLUSIONS: Severe oxygen desaturation during sleep was inversely associated with improvements in microcirculatory function following exercise training.

3197 Board #243
May 31 3:30 PM - 5:00 PM
Shorter Sleep Duration Is Associated With Increased Sedentary Duration In Lean, But Not Overweight Or Obese, Individuals
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No relevant relationships reported

PURPOSE: Sedentary behavior and insufficient sleep can both independently increase the risk for chronic diseases such as obesity and cardiovascular disease. However, whether or not prior nocturnal sleep duration influences daytime sedentary behavior is not well understood. We hypothesized that total sleep duration at night will be inversely associated with the subsequent day’s total sedentary time. We also explored if this relationship is different in lean compared to non-lean individuals.

METHODS: 27 adults (10 lean, 50 ± 2 years) chose a self-selected 8-h sleep opportunity for 5-14 days and completed the study. At baseline, adults in the highest tertile of meanSpO2 were younger than those in the lowest tertile (43.29±3 vs 53.7±3 yr, p=0.017), yet no differences in vascular measures, AHI or total body fat percentage were observed across the tertiles. No changes in brachial arterial diameter or FMD were observed across tertiles following exercise. However, the change in SSAUC in the highest tertile of meanSpO2 was greater, compared to the lowest tertile (13.6±3 vs 15.8±9 A.U. vs. –186±10879 A.U., p=0.041). Forward stepwise linear regression revealed that the highest tertile of meanSpO2 was a significant (F=5.15, p=0.036) determinant of the increased SSAUC with exercise, independent of age and baseline SSAUC.

CONCLUSIONS: Severe oxygen desaturation during sleep was inversely associated with improvements in microcirculatory function following exercise training.
Sleep duration and quality have been associated with obesity risk. Most previous studies used body mass index (BMI) as a proxy of obesity and subjectively evaluated sleep. Older adults often suffer from poor sleep quality, high body fat, and low cardiorespiratory fitness (CRF), especially women after menopause. PURPOSE: To investigate if sleep duration and quality are associated with BMI, body composition, and CRF in older women. METHODS: Older women (n = 115; age: 65.6±8.32) wore an actigraph monitor for 7 days to measure sleep metrics. Total sleep time and sleep quality, which included wake after sleep onset, activity counts during sleep, sleep onset latency, and number of awakenings, were determined using manufacturer provided software. BMI was calculated, and a dual x-ray absorptiometry scan was performed to assess body composition. A graded exercise test was used to measure CRF. Data was collected in two locations (n=89 and 26, respectively). Pearson product correlations were used to determine associations and study location was controlled for.

RESULTS: Total sleep time negatively associated with lean mass and fat free mass (r = -0.28, p=0.012; r = -0.28, p=0.012), but positively associated with percent body fat (r=0.26, p=0.025). There were no associations between sleep metrics and CRF. CONCLUSIONS: Our data indicates longer total sleep time was associated with less lean mass but greater body fat in older women. This suggests in older women longer total sleep time may be linked with less physical function and worse health condition. Further examination of the association between sleep with physical function and biomarkers in this population is recommended.

Overweight and obesity and having an abnormal lipoprotein profile are associated with increased risk of cardiovascular disease (CVD). Increased sedentary time, decreased physical activity (PA), and restricted sleep are risk factors for obesity and CVD. Calorie restriction is often used to induce weight loss. However, little information exists concerning how calorie restriction, sleep restriction, and PA interact, and their overall impact on CVD risk.

PURPOSE: To examine changes in body weight, PA, and lipoprotein particle concentrations and sizes following caloric restriction (CR) and sleep restriction (SR) intervention (CR+SR) compared to CR alone in overweight or obese adults. METHODS: 28 adults (age=44.5±5.8 years) were randomized into an 8-week CR or CR+SR group. Both groups consumed a diet equivalent to 95% of the individual’s resting metabolic rate. Participants in the CR+SR were instructed to restrict time-based up to 90 minutes 5 days per week. Sedentary and PA time was measured using a Sensewear Mini Armband. Fasting serum samples were collected for analysis of lipoprotein particle concentrations and sizes by nuclear magnetic resonance spectroscopy. Repeated measure analyses included a group×time interaction to compare changes in weight, sedentary and PA time, and lipoprotein particle concentrations and sizes between groups.

RESULTS: Body weight significantly decreased in both groups with no difference between groups (p=0.748; weight loss: 2.5±0.2 kg in CR and 2.2±0.5 kg in CR+SR). A significant difference in the change in total PA time between CR and CR+SR (p=0.044) was found. Total PA time significantly increased in CR (256.7±87.6 to 320.1±122.7 minutes, p=0.025) only. No differences in the changes in lipoprotein particle concentrations or sizes between CR and CR+SR were found. Large HDL particle concentrations decreased in the entire sample (7.5±3.4 to 6.6±3.4 μm/L, p=0.004). CONCLUSIONS: The CR+SR did not result in increased PA as in the CR; however, weight loss and lipoprotein particle concentration or size changes for the two groups were similar. These results suggest that moderate SR on 5 days a week may not significantly alter lipoprotein metabolism during weight loss, which may partly be due to compensated sleep on the other 2 days of the week. Supported by AHA Grant 14BGIA20307006

PURPOSE: It has been estimated that women are at 40% increased risk for developing clinically significant sleep disturbances (such as insomnia) compared to men. Reproductive-related hormones, such as estradiol (E2), have been shown to play a key role in sleep-wake behavior in women, and pharmacological interventions which target the regulation of E2 have been shown to improve sleep in women. Importantly, body mass index (BMI) has been shown to be inversely associated with E2 levels in premenopausal women, and previous studies have also suggested that women who are overweight or obese are significantly more likely to report clinically-significant sleep disturbances. Thus, this study aimed to examine associations between BMI, E2, and sleep disturbances in premenopausal women in order to identify a non-pharmacological, physical activity (PA) related modifiable target for the prevention of clinically significant sleep problems in women. METHODS: Following a two-tiered screening process, 28 healthy women (18-45y, mean age: 24.6y) who were medication-free and had regular menstrual cycles completed: (1) enrollment visit, (including mood and sleep assessment and assessment of cardiorespiratory fitness via maximal oxygen consumption during exercise); (2) one-week sleep monitoring period (objective and subjective measures of sleep-wake behavior); and (3) saliva collection for the assessment of salivary E2 levels. Saliva collection occurred during the follicular phase of the menstrual cycle to control for ovarian cycle E2 fluctuations. RESULTS: Higher BMI was significantly associated with lower E2 levels (r = -.38, p = 0.04), and also longer objectively-measured sleep onset latency (SOL) duration (r = -.51, p = 0.004). Consequently, lower E2 levels were significantly associated with increased objectively-measured wake after sleep onset (WASO) duration (r = -.43, p = 0.03) and increased number of awakenings during the sleep period (r = -.48, p < 0.01). CONCLUSIONS: Results suggest that, in premenopausal women, higher BMI may be associated with increased sleep disturbances, and that this relationship may be mediated by E2 levels. It is therefore possible that regular PA, which has been shown to be inversely associated with BMI, may improve sleep via its positive effects on adiposity and associated regulation of E2.

PURPOSE: Reducing daily sedentary time, decreasing daily feeding duration, and increasing total sleep duration are important lifestyle targets for improving the metabolic health of adults undergoing weight loss. However, objective methods for simultaneous measurement of sedentary time, meal timing, and sleep in free-living adults are lacking and it is unclear how these variables are related in overweight adults or change in response to weight loss.

METHODS: Thirty-two overweight and obese adults were recruited to participate in an ongoing weight loss study (90% female, Age= 36.4±6.4 y, BMI= 33.4±5.5 kg/m²). Participants simultaneously wore an activPAL accelerometer on the thigh and an Actiwatch on the non-dominant wrist for 7 days in a free-living environment to assess waking sedentary behavior and nighttime sleep, respectively. A cell phone application (MealLogger) was used to photograph and timestamp all caloric events during the 7-day period to determine daily feeding duration which was verified using a continuous glucose monitor. Assessments were performed at baseline and will be repeated at 12 weeks following completion of the weight loss intervention. Correlation analyses were performed at baseline to determine associations among sitting time during waking hours, daily feeding duration, sleep duration, and sleep timing.

RESULTS: On average participants were sedentary for 67.5±8.5% of waking hours, consumed energy over 11.0i±1.9 hours during the day and slept for 7.2±0.7 hours at night. Sedentary time (as a percent of the waking day) was negatively correlated with sleep duration (r=0.48, P=0.006) but was not related to later sleep timing (sleep midpoint), longer feeding duration, or timing of the last meal.

CONCLUSIONS: Using a novel set of methods, we show that higher levels of sedentary time during waking hours are associated with shorter total sleep duration in adults beginning a weight loss intervention, however cause and effect cannot be...
established in this analysis. Our future studies are aimed at understanding whether reducing sedentary time leads to increased sleep duration (or vice versa) and measuring how sleep, activity, and meal timing change with weight loss.